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Local Front Runners: GRIDs in the 4 Northeast Ohio Metropolitan Areas

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LOCAL FRONT RUNNERS: GRIDS IN THE 4 NORTHEAST OHIO METROPOLITAN AREAS

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INTRODUCTION

Northeast Ohio (NEO) is an 18-county region[1] which encompasses four different Metropolitan Statistical Areas (MSAs);[2] MSAs commonly refer to the labor market of a given area (for this study: the Akron MSA, the Canton-Massillon MSA, the Cleveland-Elyria MSA, a part of the Youngstown-Warren-Boardman, OH-PA MSA) and remaining rural counties ("non-MSA counties"). Within NEO, these four distinct metro areas have different industry structures. Investigating the internal dynamics of each region's economic driver industries—what we call *Groups of Regional Industry Drivers* (GRIDs)—can inform local leaders and economic development practitioners of expanding and emerging industries to foster regional growth.

Economic trends in NEO over the past twenty years are typical of the Midwest region, with a positive increase in output outpaced by the state of Ohio and the United States. The two recessions of 2001 and 2009 showed deeper output declines across NEO than in comparable Midwest regions and the United States. The goal of this research is to provide up-to-date, data-driven insights for competitive industries in each of the four Northeast Ohio MSAs. This research seeks to update previous research conducted for the Regional Economic Competitiveness Strategy in 2011 and to provide understanding into the economies of each area.

About this Analysis

Traditionally, industries with high regional specialization and competitive advantage that produce and export products have an ample regional supply chain; these industries are called *economic base industries*. GRIDs are industries with strong or increasing regional specialization and competitiveness, as well as growing output and productivity. Some GRIDs are capital-intensive and do not employ many people. However, these industries contribute to the regional economy by paying high wages and creating jobs in companies within their supply chains. These capital-intensive industries also fuel other sectors of the economy—such as service industries—which pay high wages and create large disposable incomes regionally.

Using the wealth-creation variables of industries, we conducted statistical analyses to form, identify, and analyze the characteristics of industry groups to discern GRIDs. Variables used in the model examined the competitiveness of industries (change in wages, output, and productivity), importance to the regional economy (share and concentration of output, wages, and employment in the regional economy), and comparison to the national economy (a local competitiveness component of a shift-share analysis using output and employment). Variables are measured by the levels in 2017 or by changes over the five years (2013 to 2017).

[1] Northeast Ohio includes 18 counties: Ashland, Ashtabula, Columbiana, Cuyahoga, Erie, Geauga, Huron, Lake, Lorain, Mahoning, Medina, Portage, Richland, Stark, Summit, Trumbull, Tuscarawas, and Wayne.

[2] A Metropolitan Statistical Area (MSA) is a designation established by the U.S. Office of Management and Budget to group counties and cities into specific geographic areas, usually with a core city and its surrounding population.

The NEO Labor Market

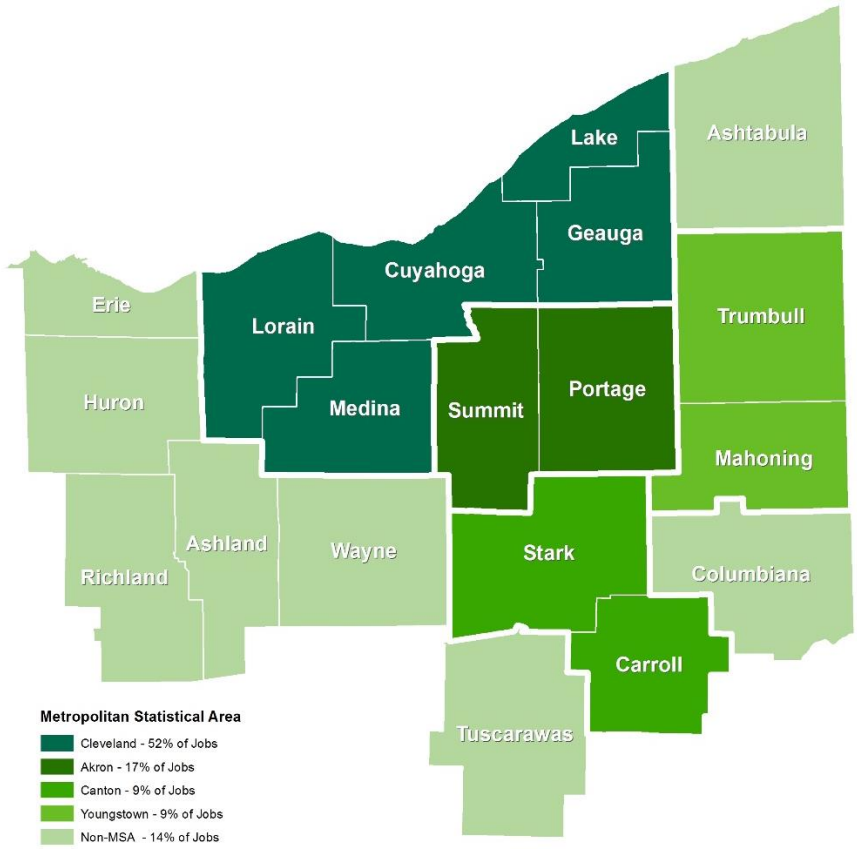
The NEO labor market is composed of four metropolitan areas (MSA) and eight non-MSA counties.[3] Table 1 illustrates distributions of total employment and output across these geographies. Figure 1 geographically displays each MSA and their contribution to overall employment. Overall, the Cleveland MSA generates 52% of total jobs in the region and produces almost 60% of output. The second-largest region is the Akron MSA, and then the non-MSA counties aggregated together.

Table 1. Distribution of NEO Employment and Output across Four MSAs and Non-MSA Counties

	2017 Employment		2017 Output	
	Jobs	% of NEO	Output	% of NEO
Cleveland MSA	1,069,941	52%	$136.9B	59%
Akron MSA	344,321	17%	$36.7B	16%
Non-MSA Counties	293,335	14%	$18.0B	8%
Canton MSA	176,893	9%	$16.4B	7%
Youngstown MSA	174,603	9%	$16.4B	7%
NEO 18-Counties	**2,051,290**	**100%**	**$233.7B**	**100%**

Source: 2017 Moody's Analytics

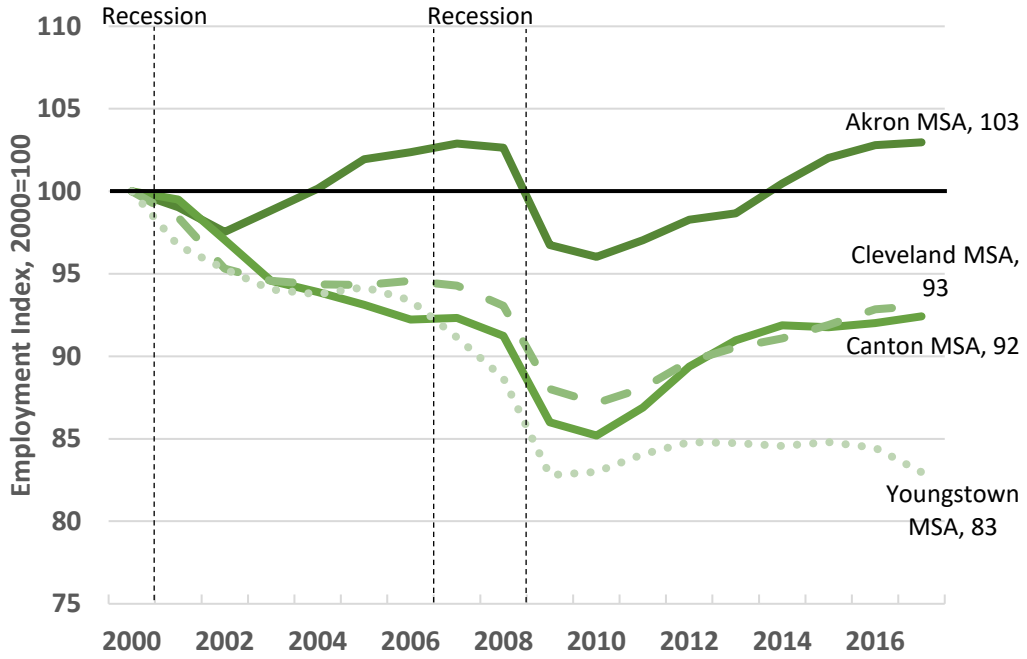
Figure 1. Northeast Ohio Labor Market by Metropolitan Statistical Area



[3] The map illustrates 19 counties. Carroll County is not part of Northeast Ohio but is included in this report to demonstrate an accurate portrayal of the Canton MSA.

Meanwhile, high output increased the sector's productivity. The Akron MSA is the only metropolitan area in NEO that recovered back to 2008 employment levels (even experiencing a 3% growth since 2013). In 2017, the Cleveland MSA employed 93% of its 2000 employment, and the Canton MSA employed 92% of its 2000 employment levels. During the last two decades, the Youngstown MSA lost half of its employment in the manufacturing sector, which can be seen in a steady decline of its overall employment.

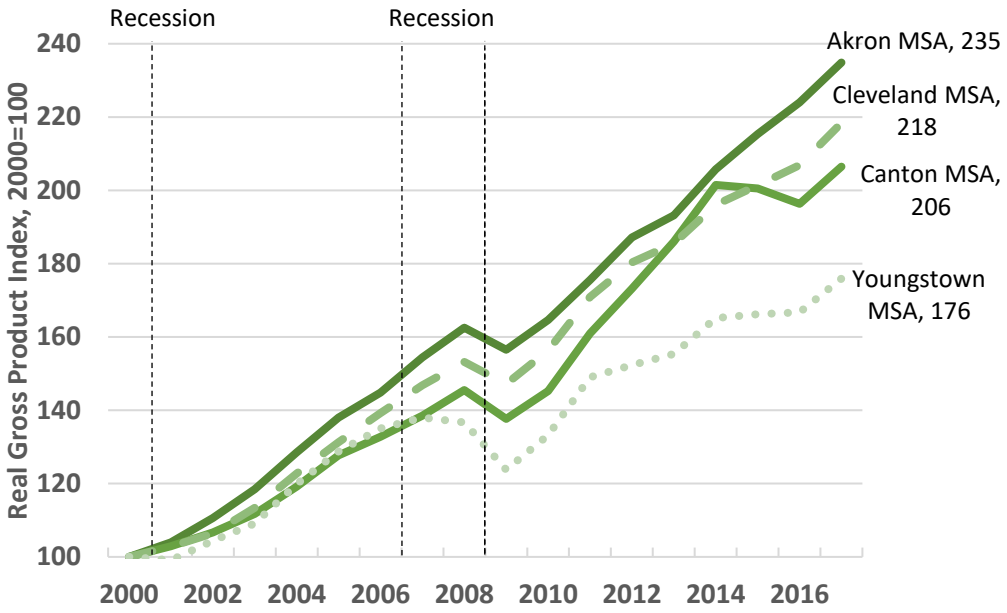
Figure 2. NEO MSAs Employment Trends



Source: Moody's Analytics

Despite considerable job losses, real output of the NEO MSAs showed an upward trend since 2000 (Figure 3). Output fell off in 2008 due to the Great Recession but recovered relatively quickly within two years of the Recession's onset. The Akron MSA and the Cleveland MSA displayed an overall linear output path, with outputs higher than pre-recession levels. Similar to employment trends, annual growth of output in the Akron MSA exceeded growth in Non-MSA counties. During two post-recession years (2015 and 2016), real output in the Canton MSA fell by nearly 5% due to the steep drop in oil prices in 2015; growth recovered in 2017 to 206% above its 2000 level. Although output growth in the Youngstown MSA was positive, it remained significantly lower than in other metropolitan areas in NEO at 176% higher than 2000 output.

Figure 3. NEO MSAs Output Trends



Source: Moody's Analytics

THE CLEVELAND-ELYRIA MSA GRIDS

The Cleveland-Elyria MSA (Cleveland MSA) is a 5-county area, and it is the largest economy within Northeast Ohio, consisting of nearly 60% of its output ($137 billion out of $234 billion).[4] Employment and output in the MSA displayed growth through rebounding to pre-recession levels. Over the last eighteen years (2000 to 2018), the Cleveland regional economy has grown substantially in output and has mostly recovered its job losses from the most recent recession.

The recession made the region face a hard reality; without jobs, residents moved away to find jobs, which is one of many factors causing its shrinking population. Overall, the MSA's population declined from 2007 to 2017 by 1.6%; as compared to the U.S. that saw population growth by over 8% during the same time.[5] The U.S. Census Bureau estimates that from 2010 to 2018 the Cleveland region had a domestic outmigration of over 70,000 people. However, this is not the case for the state overall; for instance, Columbus, Ohio reported almost 50,000 in additional domestic migration into the city.

Declining populations are tied directly to a declining workforce. Over the last ten years, employers have complained of a growing skills gap between the skills needed for a job and the skills that workers have. Economic development has sought to identify ways to align skills-gap work that has been occurring across the region. Sector partnerships—such as TalentNEO that

[4] The Cleveland MSA is a 5-county area that includes Cuyahoga, Geauga, Lake, Lorain, and Medina Counties.
[5] Elvery, J. & Dunn, J. (2019, March). Cleveland—Improved Economic Conditions. *Federal Reserve Bank of Cleveland*. Retrieved from https://www.clevelandfed.org/newsroom-and-events/publications/metro-mix/cleveland/mm-201903-cleveland.aspx

seek to align skills and openings through the WorkKeys assessment—are an example of best practices deployed to overcome these challenges.[6] Beyond the skills gap, the Federal Reserve of Cleveland identified "opportunity jobs"—jobs without advanced degrees and pay decent wages. These jobs include registered nurses, secretaries, truck drivers, licensed nurse practitioners, machinists, customer service representatives, maintenance workers, bookkeeping clerks, and construction jobs.[7]

Beyond some of the regional challenges, there are multifaceted assets that make Northeast Ohio a magnet for manufacturing and health care. Cleveland's robust history as a manufacturing powerhouse may require significant restructuring due to global market changes, but advanced manufacturing and skilled machining still have a place in the 21st-century economy.[8] Beyond this, the region has significant assets of world-class health care institutions that attract patients from around the world, while these institutions export their knowledge and research to other areas.

It is these assets that foster the growth of the industrial drivers in the region. The Cleveland MSA has three GRIDs in professional services, manufacturing, and oil and gas. In all, these GRIDs represented 33 industries with $58 billion of output and employed 222,458 people; this accounts for 42% of total output and 21% of the total employment in the Cleveland MSA.

Professional Services GRID

The Professional Services GRID consists of strong and growing professional service industries, including *Hospitals* (6221)—representing the major employers of the Cleveland Clinic and University Hospitals. This GRID is driven by potential high value, high output, and employment specialization, and a high share of regional output—all are the indicators of strong and growing economic activity. The total employment and output in this GRID were 164,117 workers and almost $45 billion, respectively. It is important to note that the Cleveland MSA propels the overall NEO economy in this GRID, serving as the hub of the regional economy in *financial services* (5221), *company headquarters* (5511), and *hospitals* (6221).

[6] Team NEO. (2018). Aligning opportunities in Northeast Ohio [PDF]. Retrieved from https://www.clevelandplus.com/teamneo/wp-content/uploads/sites/2/2019/03/AligningOpportunities2018-FINAL.pdf

[7] Fee, K., Wardrip, K., Nelson, L. (2019). Opportunity Occupations Revisited. *Federal Reserve Bank of Cleveland*. Retrieved from https://www.clevelandfed.org/newsroom-and-events/publications/a-look-behind-the-numbers/albtn-opportunity-occupations.aspx

[8] Center for Economic Development (2019). A profile of advanced manufacturing in Northeast Ohio. Urban Publications.

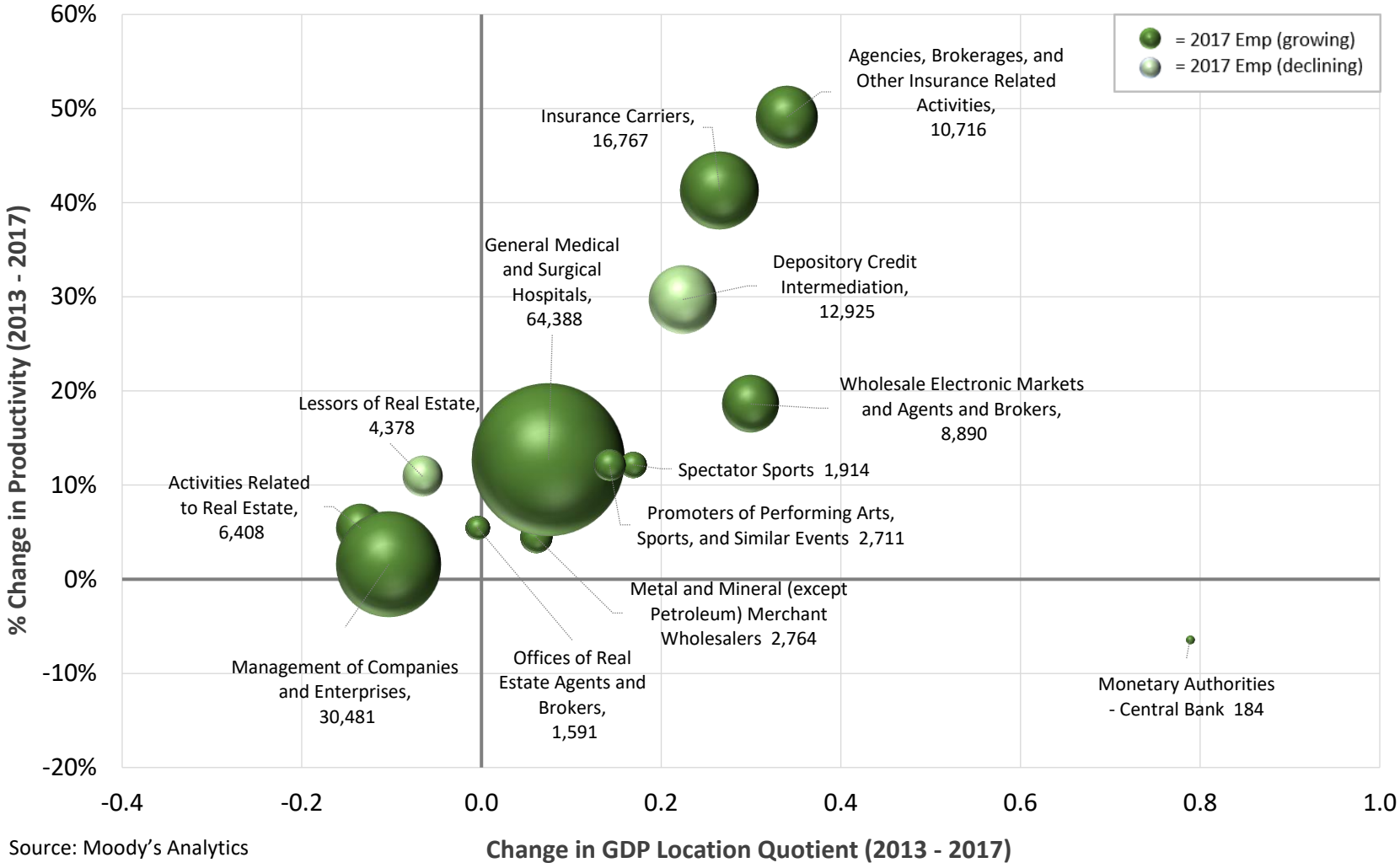
Table 2. Industries in the Cleveland MSA Professional Services GRID

NAICS	Industry	2017 Output	2017 Employment
4251	Wholesale Electronic Markets and Agents and Brokers	$2,280 M	8,890
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	$436 M	2,764
5211	Monetary Authorities-Central Bank	$127 M	184
5221	Depository Credit Intermediation	$3,969 M	12,925
5241	Insurance Carriers	$4,006 M	16,767
5242	Agencies, Brokerages, and Other Insurance Relate Activities	$2,645 M	10,716
5311	Lessors of Real Estate	$6,512 M	4,378
5312	Offices of Real Estate Agents and Brokers	$3,121 M	1,591
5313	Activities Related to Real Estate	$10,266 M	6,408
5511	Management of Companies and Enterprises	$4,709 M	30,481
6221	General Medical and Surgical Hospitals	$5,939 M	64,388
7112	Spectator Sports	$609 M	1,914
7113	Promoters of Performing Arts, Sports, and Similar Events	$257 M	2,711
TOTAL		**$44,876 M**	**164,117**

Source: Moody's Analytics

The Professional Services GRID in the Cleveland MSA includes a group of large employers such as the *General Medical and Surgical Hospitals* (6221), *Insurance Carriers* (5241), and *Agencies, Brokerages, and Other Insurance Related Activities* (5242) industries. Despite the growth of employment in these industries over the last five years, they have shown a significant increase in productivity (Figure 4), signifying high output growth in these industries. These three industries have also become more specialized in the region, especially the *Agencies, Brokerages, and Other Insurance Related Activities* (5242), and *Insurance Carriers* (5241) industries.

Figure 4. Cleveland MSA Professional Services GRID- Industry Dynamics, Productivity, and Specialization



Source: Moody's Analytics

Growing Legacy Manufacturing GRID

The Growing Legacy Manufacturing GRID is driven by high regional output and employment specialization and had total employment of 57,544. The output of the Growing Legacy Manufacturing GRID accounted for 51% (almost $11 billion) of all manufacturing output in the Cleveland MSA, but only accounted for 17 of the 86 manufacturing industries. Reinforcing that this GRID consists mostly of manufacturing economic base industries that have shown signs of growth since the recession. These industries have shown signs of restructuring since the recession and have modified their products and processes to compete in the global manufacturing marketplace.

Table 3. Industries in the Cleveland MSA Growing Legacy Manufacturing GRID

NAICS	Industry	2017 Output	2017 Employment
3222	Converted Paper Product Manufacturing	$504 M	3,398
3251	Basic Chemical Manufacturing	$1,722 M	2,859
3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	$723 M	1,648
3255	Paint, Coating, and Adhesive Manufacturing	$1,567 M	4,105
3259	Other Chemical Product and Preparation Manufacturing	$533 M	1,506
3311	Iron and Steel Mills and Ferroalloy Manufacturing	$579 M	2,563
3312	Steel Product Manufacturing from Purchased Steel	$292 M	1,241
3314	Nonferrous Metal (except Aluminum) Production & Processing	$167 M	605
3315	Foundries	$474 M	2,534
3321	Forging and Stamping	$467 M	3,981
3322	Cutlery and Hand tool Manufacturing	$126 M	1,290
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	$844 M	8,294
3328	Coating, Engraving, Heat Treating, and Allied Activities	$417 M	4,351
3329	Other Fabricated Metal Product Manufacturing	$661 M	5,860
3335	Metalworking Machinery Manufacturing	$428 M	4,518
3339	Other General-Purpose Machinery Manufacturing	$776 M	6,178
3353	Electrical Equipment Manufacturing	$546 M	2,514
TOTAL		**$10,826 M**	**57,445**

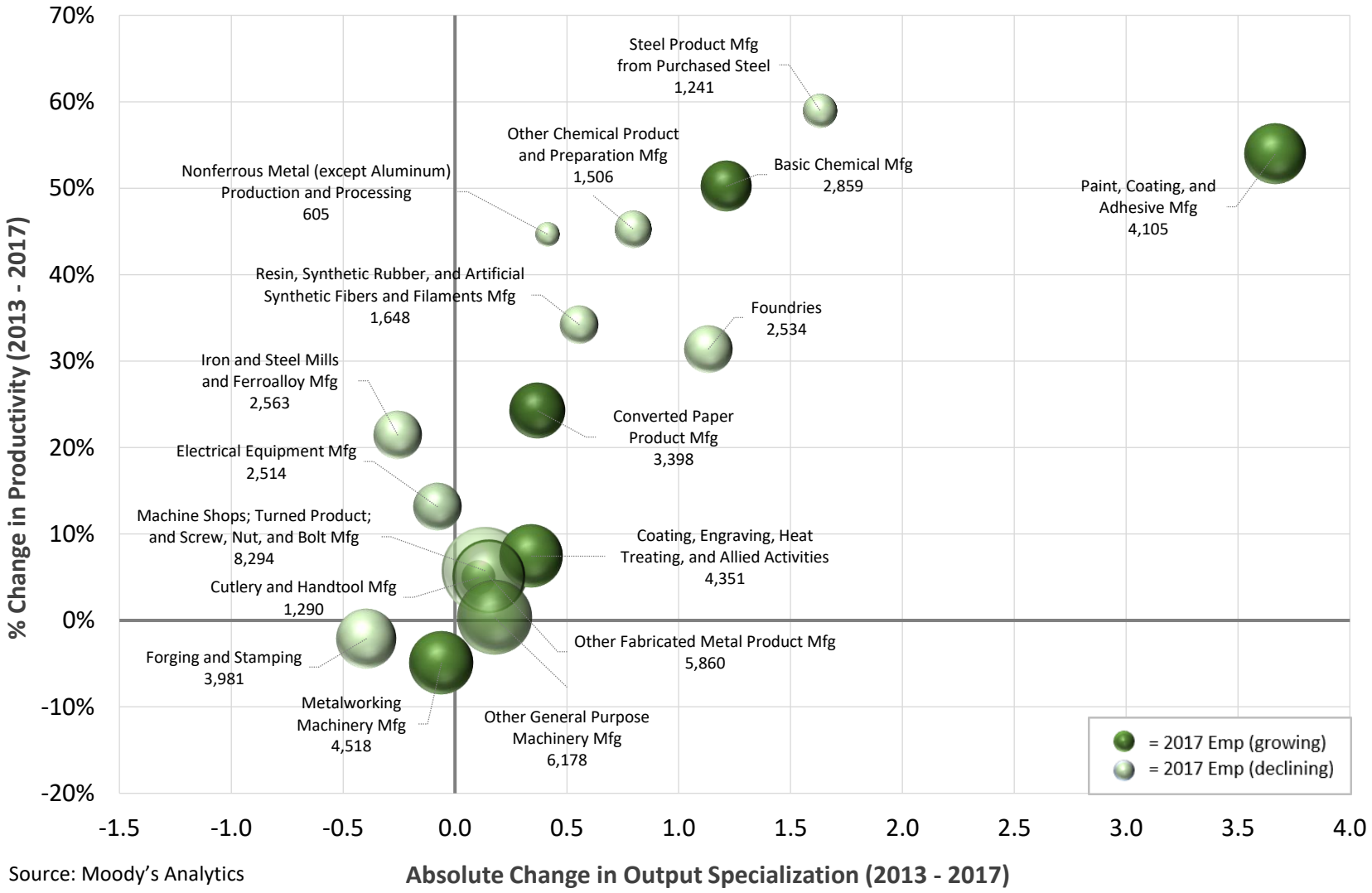
Source: Moody's Analytics

Figure 5 displays each industry's 5-year change in productivity with its change in specialization. Therefore, those industries to the far right of the graph have a significant competitive advantage. The *Paint, Coating, and Adhesive Manufacturing* (3255) industry has shown rapid growth in specialization over the last years; this can be reflected in the industry leadership of key regional employers Sherwin-Williams and RPM International.[9]

This industry stands out in the *Growing Legacy Manufacturing GRID* as a relatively large employer that is growing in productivity and emerging as a highly specialized industry in Cleveland. Six industries in the *Growing Legacy Manufacturing GRID* —the *Basic Chemical Manufacturing* (3251), *Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing* (3252), and *Other Chemical Product and Preparation Manufacturing* (3259), *Nonferrous Metal [except Aluminum] Production and Processing* (3314), *Foundries* (3315), and *Steel Product Manufacturing from Purchased Steel* (3312) — have increased their productivity by at least 30% over the last five years (Figure 5). These industries are representative of the robust chemical, petrochemical, and metal manufacturing locally in Cleveland.

[9] Crain's Cleveland. (2018) *Book of Lists—Manufacturing Companies*.

Figure 5. Clevleand MSA Growing Legacy Manufacturing GRID- Industry Dynamics, Productivity, and Specialization



Source: Moody's Analytics

Oil & Gas GRID

The Oil and Gas GRID is described by high wages relative to the nation and high output specialization, indicating that these industries are driven by growing wages, productivity, and specialization. This is an emerging GRID and is the result of oil and gas shale development as well as regional policies over the last five years focused on energy sector development. In 2017, the Oil and Gas GRID had a total employment of 896, with 755 of its workers in the *Petroleum and Coal Products Manufacturing* industry. For this relatively small employment, the GRID produced a large amount of output ($1.9 billion) equating to 1.4% of the total output of all industries in the Cleveland MSA.

Table 4 shows three industries in the Oil and Gas GRID related to the development of oil and gas extraction from shale in Ohio, which represent regional economic drivers. Note that the industry of *Petroleum and Coal Products* (3241) was added to this GRID based on the understanding of the regional supply chain and was originally not grouped with this GRID due to declining productivity. However, we believe that the national restructuring of this industry is causing this decline in productivity. Currently, *Petroleum and Coal Products* (3241) has high regional competitiveness in output. The *Oil and Gas Extraction* (2111) industry showed a significant increase in output during the five years.

Table 4. Industries in the Cleveland MSA Oil & Gas GRID

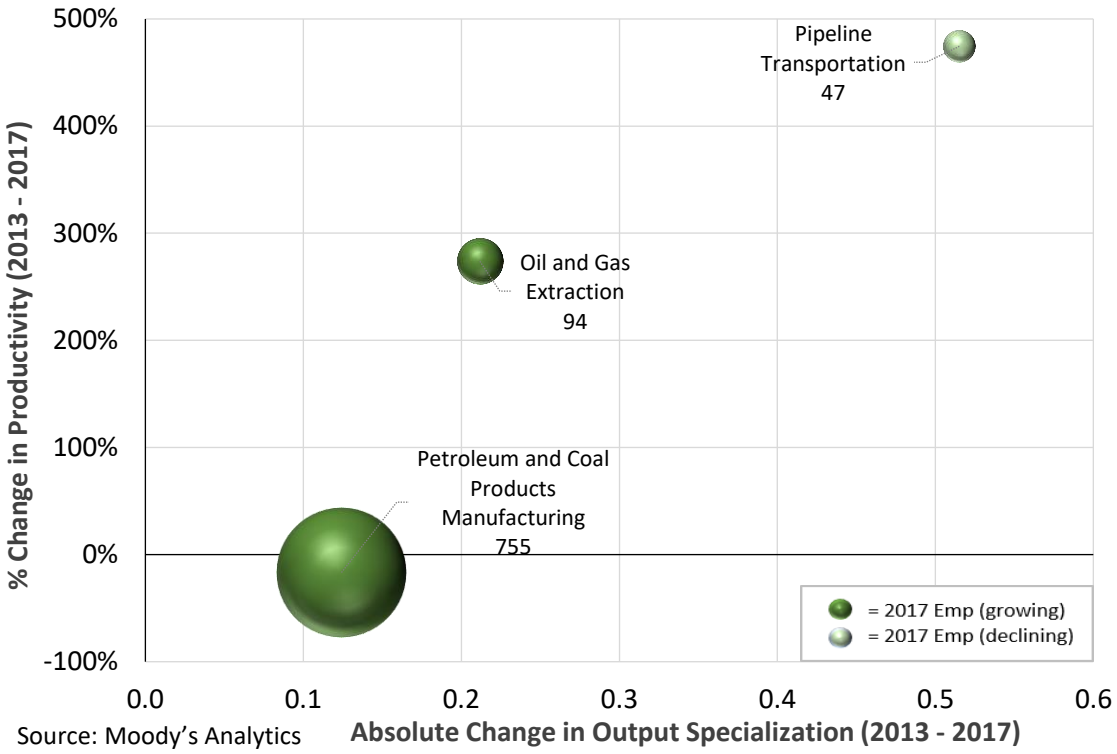
NAICS	Industry	2017 Output	2017 Employment
2111	Oil and Gas Extraction	$338 M	94
3241	Petroleum and Coal Products Manufacturing	$1,433 M	755
4860	Pipeline Transportation	$134 M	47
TOTAL		**$1,905 M**	**896**

Source: Moody's Analytics

Examining the change in the competitive advantage of the oil and gas GRID reveals that even though *Pipeline Transportation* (4860) and *Oil and Gas Extraction* (2111) are extremely small industries, they have more than tripled their productivity (Figure 6). Two factors may be occurring in these industries: First, both of the industries are highly technical fields that depend upon specialized workers that traditionally travel from oil-producing states (i.e., Texas, Louisiana, and Oklahoma) to extract oil and gas from shale deposits. Due to the accounting of the data, these employees are not counted as "Ohio" employees—therefore, the productivity in Ohio (output per employee) may be overstated since there are fewer employees accounted for in the state. Secondly, these industries are capital intensive; as they grow, they are becoming even more capital- and computer-intensive, magnifying productivity increases.

The Petroleum and Coal Products Manufacturing (3241) industry is the largest employer in the Oil and Gas GRID, with a total of 755 jobs in 2017. However, productivity in this industry has declined over the last five years due to growing employment.

Figure 6. Cleveland MSA Oil & Gas GRID- Industry Dynamics, Productivity, and Specialization



Source: Moody's Analytics

THE AKRON MSA GRIDS

The Akron MSA[10] is the second-largest contributor to NEO's regional economy—totaling $37 billion, or 16% of the overall regional output. The region is rich in history with major employers in rubber and polymer manufacturing (tire and rubber companies of Goodyear and Firestone), as well as a significant asset in the University of Akron. The City of Akron is undergoing a revival aimed at developing the city into a destination for millennials and urbanites. Several projects, including the Main Street Corridor project, combine to nearly $100 million in investments and are designed to transform downtown Akron by the end of 2020.[11]

Beyond the industrial infrastructure, Akron has significant physical infrastructure assets of the Akron-Canton Regional Airport (CAK). The Akron-Canton Airport serves the Akron MSA and surrounding regions (particularly Canton) with a local alternative to the busyness of the Cleveland-Hopkins Airport located one hour north, and at the lowest average airfares in Ohio.[12] CAK offers airline service from major airlines, including American Airlines, Delta, Spirit, and United. CAK is also in the final stages of completing an ambitious 10-year, $110 million, expansion and update of facilities.

[10] The Akron MSA is a 2-county area that includes Summit and Portage counties.
[11] Cleveland Plus. (n.d). Downtown Akron development aims to spur economic activity. Retrieved from https://www.clevelandplus.com/business/news-press-and-updates/downtown-akron-revival/
[12] CAK Airlines. Accessed 2018, May 16 from https://www.akroncantonairport.com/airlines

However, not all is rosy in the "Rubber City." A recent report conducted by the G.A.R. Foundation found that the Akron economy was "neither distressed nor dynamic" and that African Americans have been largely excluded from the economy.[13] The city established Elevate Akron—a strategic economic development plan for the city—to address these issues. This plan examined the harsh realities experienced by the city and identified strategies to foster growth with new approaches to economic development including establishing scale-up and middle-market companies, increasing economic inclusion, fostering innovation and startups, and refocusing on the urban core.

Beyond this, Northeast Ohio Four County Regional Planning and Development Organization (NEFCO)—made up of Summit, Portage, Stark, and Wayne counties—conducted a SWOT analysis in its Comprehensive Economic Development Strategy and found local strengths included quality of life, innovation spillovers from the University of Akron, and a growing oil and gas industry.[14] However, weaknesses and threats identified by NEFCO were similar to those seen across the NEO region and included declining population growth, an inability to attract or retain young adults, sprawl, low-income growth, and workforce/skill mismatch issues. Through identifying the regional industrial drivers, regional and local leaders can move the needle towards a dynamic economy. In the Akron MSA, $15 billion was produced by three GRIDs: the Oil and Gas GRID, the Professional Services GRID, and the Growing Legacy Manufacturing GRID. Legacy industries are those which historically belonged to the growing economic base, had a significant regional presence, and were once driving the regional economy. The Growing Legacy Manufacturing GRID in the Akron MSA consists of 12 industries producing nearly $3 billion in output. The Professional Services GRID is represented by ten industries which contribute $9 billion to output, while the Oil and Gas GRID accounts for $3.6 billion in output. These GRIDs employed a total of 81,630 people in 2017, one-quarter of the Akron MSA's workforce.

[13] Mackinnon, J. (2018, October 29). Economic redevelopment work to 'Elevate Akron' is just beginning, speakers say. *Akron Beacon Journal*. Retrieved from https://www.ohio.com/news/20181029/economic-redevelopment-work-to-elevate-akron-is-just-beginning-speakers-say

[14] Northeast Ohio Four County Regional Planning and Development Organization. (2019). *Comprehensive Economic Development Strategy*. Retrieved from http://www.nefcoplanning.org/publications/CEDS/2018%20CEDS%20website.pdf

Professional Services GRID

The Professional Services GRID describes a group of industries which earn revenue by providing services to businesses and the population overall (Table 5). In Akron, service industries included *financial services* (5221), *insurance* (5241), and *headquarters* (5511). This group is associated with increased productivity and share of regional output. The total output of these industries in 2017 was $8.5 billion, which accounts for 23% of the total output of the Akron MSA. The Professional Services GRID accounted for approximately 20% of overall employment in the Akron MSA (60,910 employees). Two industries contributed to over half of employment in this GRID: *Management of Companies and Enterprises* (5511) and *General Medical and Surgical Hospitals* (6221), although a portion of a hospital's business is service to the local population.

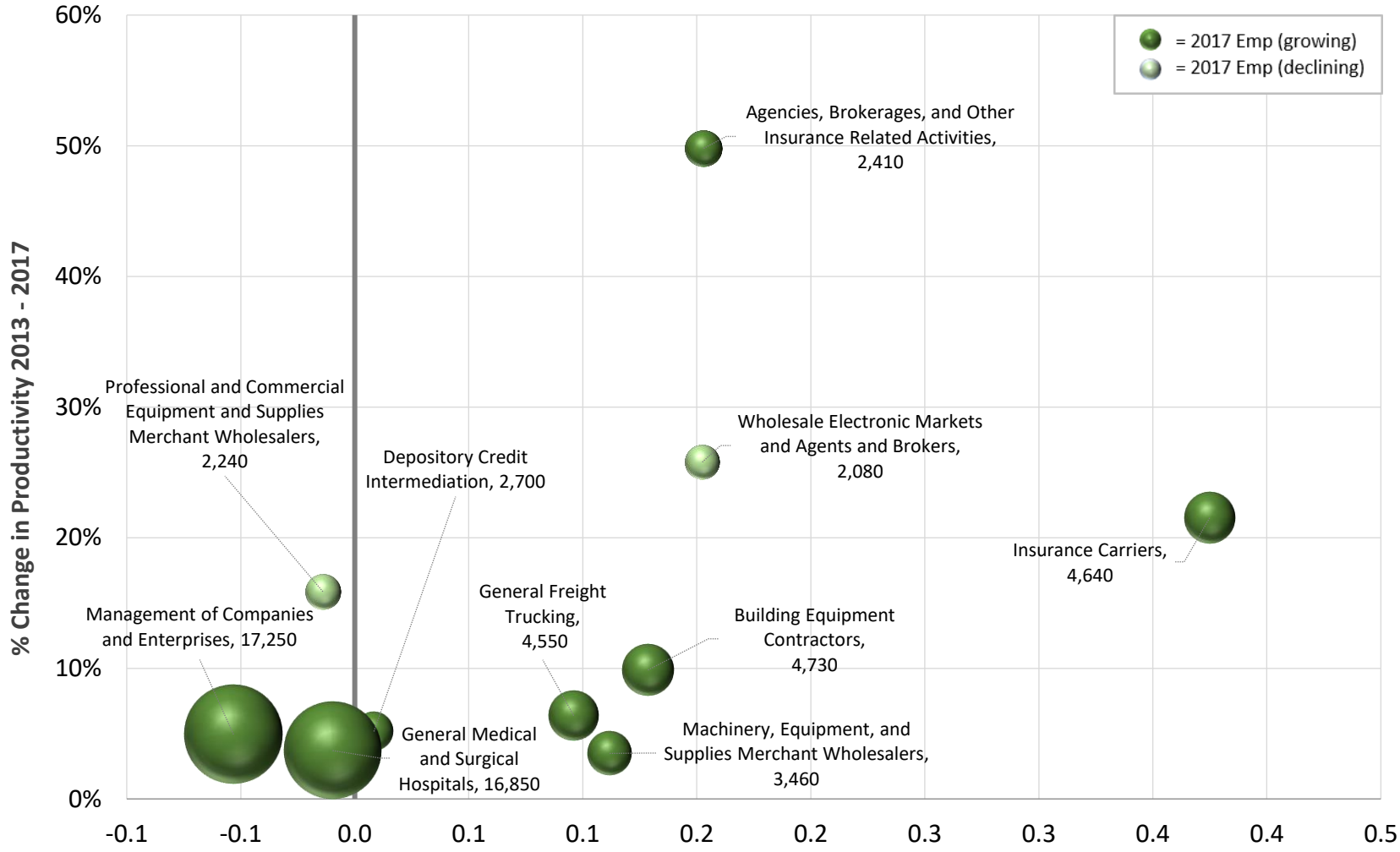
Table 5. Industries in the Akron MSA Professional Services GRID

NAICS	Industry	2017 Output	2017 Employment
2382	Building Equipment Contractors	$624 M	4,730
4234	Professional and Commercial Equipment & Supplies Merchant Wholesalers	$549 M	2,240
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	$403 M	3,460
4251	Wholesale Electronic Markets and Agents and Brokers	$669 M	2,080
4841	General Freight Trucking	$500 M	4,550
5221	Depository Credit Intermediation	$578 M	2,700
5241	Insurance Carriers	$893 M	4,640
5242	Agencies, Brokerages, and Other Insurance Related Activities	$507 M	2,410
5511	Management of Companies and Enterprises	$2,465 M	17,250
6221	General Medical and Surgical Hospitals	$1,315 M	16,850
TOTAL		**$8,503 M**	**60,910**

Source: Moody's Analytics

All industries in the Professional Services GRID in the Akron MSA increased their productivity over the previous five years (Figure 7). The *Agencies, Brokerages, and Other Insurance Related Activities* (5242) industry gained the most substantial growth in productivity. In the Akron MSA, the largest employers in the *Professional Services GRID—Management of Companies and Enterprises* (5511), *and General Medical and Surgical Hospitals* (6221)—have declined in productivity and specialization over the last five years (Figure 7).

Figure 7. Akron MSA Professional Services GRID - Industry Dynamics, Productivity, and Specialization



Source: Moody's Analytics

Growing Legacy Manufacturing GRID

Examining the Growing Legacy Manufacturing GRID shows the manufacturing industries that have high output and employment specialization as well as increasing specialization—indicating that they have engaged in a larger export capacity than in the past. The Growing Legacy Manufacturing GRID consists of 11 industries in the manufacturing industry and its supply chain (Table 6). The Growing Legacy Manufacturing GRID is associated with an increase in employment specialization and output. These industries create significant wealth and drive regional specialization.

Almost all industries in the Growing Legacy Manufacturing GRID displayed an increase in productivity, signaling that these industries are on their way to recovery from the recession. In 2017 the output for this GRID equated nearly $3 billion, and the total employment was 18,300.

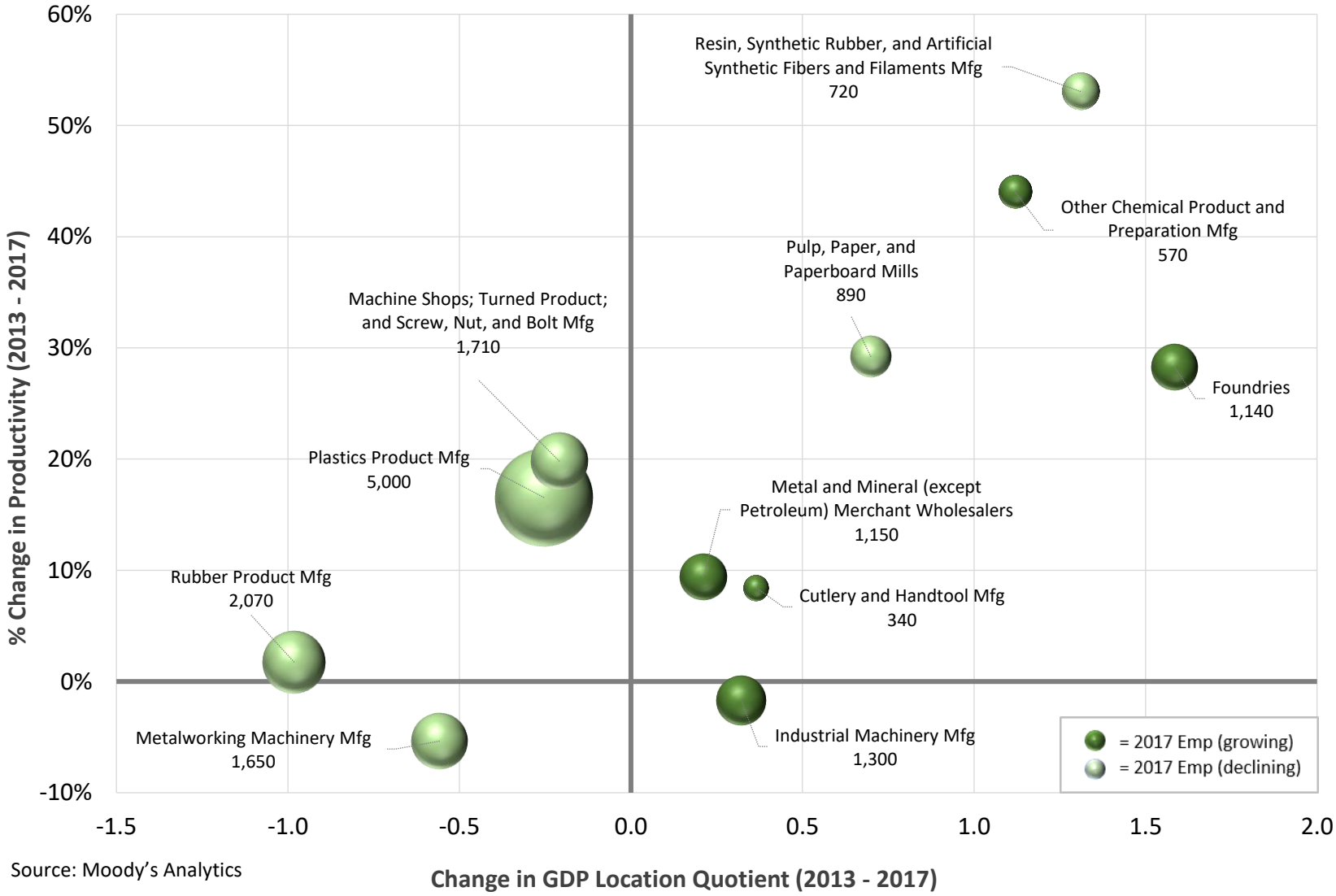
Table 6. Industries in the Akron MSA Growing Legacy Manufacturing GRID

NAICS	Industry	2017 Output	2017 Employment
3221	Pulp, Paper, and Paperboard Mills	$130 M	890
3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	$319 M	720
3259	Other Chemical Product and Preparation Manufacturing	$156 M	570
3261	Plastics Product Manufacturing	$627 M	5,000
3262	Rubber Product Manufacturing	$234 M	2,070
3315	Foundries	$155 M	1,140
3322	Cutlery and Handtool Manufacturing	$40 M	340
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	$232 M	1,710
3332	Industrial Machinery Manufacturing	$159 M	1,300
3335	Metalworking Machinery Manufacturing	$135 M	1,650
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	$167 M	1,150
TOTAL		**$2,885 M**	**18,300**

Source: Moody's Analytics

The Growing Legacy Manufacturing GRID in the Akron MSA includes industries such as *Foundries* (3315) that are becoming highly specialized, while industries such as *Rubber Product Manufacturing* (3262)—main staples of the Akron economy—have declined in specialization over the last five years (Figure 8). The largest employer in this GRID—*Plastics Products Manufacturing* (3261) showed an increase in productivity but became less specialized in the region.

Figure 8. Akron MSA Growing Legacy Manufacturing GRID- Industry Dynamics, Productivity, and Specialization



Source: Moody's Analytics

Oil & Gas GRID

The Oil and Gas GRID can be categorized as an emerging base industry due to its growth in output specialization. This GRID is associated with an increase in wages and productivity but has yet to establish its regional importance.

The Oil and Gas GRID is described by essential activities associated with the development of oil and gas extraction from shale deposits. *Oil and Gas Extraction* (2111) is at the core of this group. Real estate activities are also present within this GRID, due to obtaining rights and leasing of land for the building of properties and the extraction of natural gas. Therefore, the industries *Lessors of Real Estate* (5311), *Offices of Real Estate Agents and Brokers* (5312) and *Activities related to Real Estate* (5313) are also industries associated with oil and gas and servicing real estate marking in the urban core.

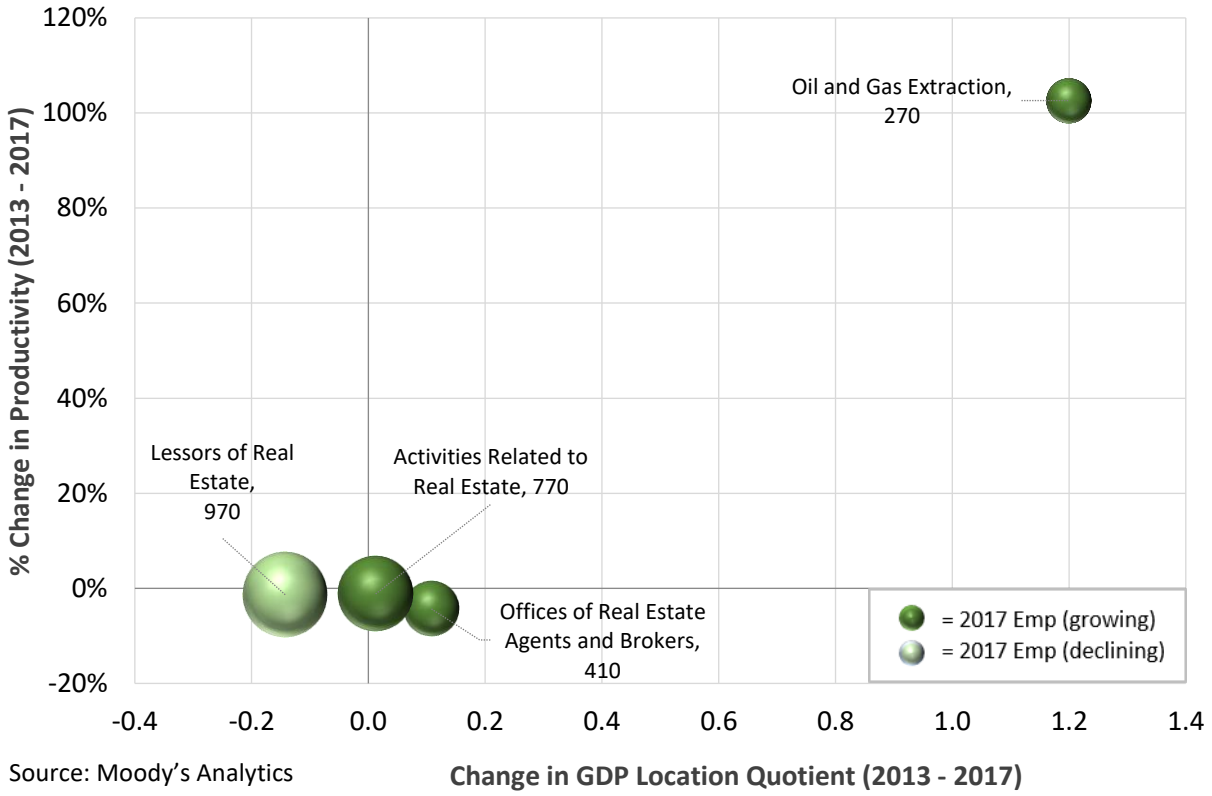
Table 7. Industries in the Akron MSA Oil & Gas GRID

NAICS	Industry	2017 Output	2017 Employment
2111	Oil and Gas Extraction	$557 M	270
5311	Lessors of Real Estate	$1,231 M	970
5312	Offices of Real Estate Agents and Brokers	$703 M	410
5313	Activities Related to Real Estate	$1,081 M	770
TOTAL		**$3,572 M**	**2,420**

Source: Moody's Analytics

As shown in Figure 9, the *Oil and Gas Extraction* (2111) industry in the Akron MSA has doubled its productivity over the last five years. The high growth in specialization in this industry (Figure 9) shows its emergence as an essential economic driver in the Akron MSA. The Oil and Gas GRID is characterized by very high growth in output and productivity. Three of the four industries in this GRID—*Oil and Gas Extraction* (2111), *Offices of Real Estate Agents and Brokers* (5312) and *Activities Related to Real Estate* (5313) had double-digit growth in output. These four industries saw 26% growth in output from 2013 to 2017, representing 10% of total output in the Akron MSA. The Oil and Gas GRID in the Akron MSA employed 2,420 workers in 2017.

Figure 9. Akron MSA Oil & Gas GRID - Industry Dynamics, Productivity, and Specialization



Source: Moody's Analytics

THE YOUNGSTOWN-WARREN-BOARDMAN, OH-PA MSA GRIDS

The Youngstown-Warren-Boardman, OH-PA MSA[15] (Youngstown MSA) is a region straddling the Ohio-Pennsylvania border in the Mahoning Valley—an area rich in coal with proximity to iron ore shipments from Lake Erie which made it a natural fit for steel production. However, as the economics of the steel industry relocated much of the production overseas and shifted domestic production to capital-intensive work that required fewer workers, many in this region lost their jobs. Youngstown and the surrounding Mahoning Valley has experienced the most substantial adverse effects of the past two recessions and subsequent recovery. In the Youngstown MSA, both employment and output trail the Cleveland, Akron, and Canton MSAs.

This lag in recovery is a result of the region's historical reliance on legacy manufacturing, particularly steel, and automobile manufacturing. During the last two decades, the Youngstown MSA lost half of its employment in the manufacturing sector, which is the primary contributor to the steady decline of its overall employment. Regrettably, a declining economic base, composed of 19 industries, accounted for 24% ($3.9 billion) of output and 18% (31,930) of total employment. These 19 declining industries form the core economic base of the Youngstown MSA, and the data shows that they are still in the process of restructuring after the recession as their current trends in gross domestic product (GDP) are mostly negative.

[15] In this report, the Youngstown MSA is a 2-county area that includes Mahoning and Trumbull counties in Ohio.

All of this combines with recent news regarding the General Motors Lordstown Assembly Plant. Talks are underway to sell Lordstown Assembly to a new company, providing the possibility of bringing manufacturing jobs back. However, questions over the number of jobs that will be offered from any new buyer as well as when those jobs would be available have regional officials concerned. All of this does not overcome the cumulative job loss of over 7,000 jobs (4.4% of employment in the Youngstown MSA) and a loss of over $8.2 billion in output from the plant closure.[16] For every four jobs lost at the GM plant from the elimination of all three shifts, an estimated two additional jobs will be lost in supply chain companies, and one additional job will be lost in consumer service sectors.

But not all is lost in Youngstown; TJX, the parent company of TJ Maxx and HomeGoods, recently announced that it is moving forward with the construction of a new distribution center in Lordstown.[17] The distribution center is expected to create 1,000 permanent full-time jobs by 2024, but at a relatively low wage when compared to previous blue-collar work for the region.

The Youngstown MSA accounts for nearly 10% of NEO's economy. Seven industries are classified into two different GRIDs within the MSA: Oil and Gas and Growing Legacy Manufacturing. The Oil and Gas GRID was the largest, providing nearly $2 billion in output, while the Growing Legacy Manufacturing GRID represented three industries producing $790 million of output. In 2017, these GRIDs employed 5,360 workers—3% of the total workforce in the Youngstown MSA.

To stay competitive, the Youngstown MSA can look for opportunities to support the further restructuring of the core economic base industries, as well look towards further diversification by encouraging locally and regionally growing industries. One example is the Oil and Gas GRID, one of Youngstown's two GRIDs; it is fast-growing and beginning to emerge as an economic base in Northeast Ohio. The GRID has experienced double-digit growth in output in NEO and is a growing specialization for the region. It has one of the highest employment multipliers of all GRIDs analyzed, with average multipliers of 3.4 jobs in the supply chain and 6.4 jobs in consumer product and service industries for every direct job provided (so far providing 3,160 direct, 18,945 indirect, and 14,208 induced jobs). As oil and gas production continues to boom in the tri-state region, NEO, and Youngstown in particular—with its central location on the Marcellus and Utica Shale deposits, as well as its proximity to Pennsylvania—should strive to continue increasing the Oil and Gas GRID in size and scale to benefit overall regional performance.

[16] Lendel, I., Piazza, M., Ellerbrock, M. (2019). Lordstown GM plant closure economic impact study. *Levin Publications*. Retrieved from https://engagedscholarship.csuohio.edu/urban_facpub/1592/

[17] Vandenberge, J. (2018, December 28). Major retail distribution center moving forward as Lordstown GM plant remains uncertain. *News 5 Cleveland*. Retrieved from https://www.news5cleveland.com/news/local-news/cleveland-metro/major-retail-distribution-center-moving-forward-as-lordstown-gm-plant-remains-uncertain

Growing Legacy Manufacturing GRID

This GRID consists of three industries—*Steel Product Manufacturing from Purchased Steel* (3312), *Alumina and Aluminum Production and Processing* (3313), and *Nonferrous Metal (except Aluminum) Production and Processing* (3314). These are legacy steel and aluminum manufacturing industries in the Youngstown MSA, which have recovered from the recession and are illustrating healthy growth. Industries in the Growing Legacy Manufacturing GRID have high and growing output specialization. The total GDP of the three industries in the GRID was $790 million; the GRID also employed a total of 4,100 people in 2017.

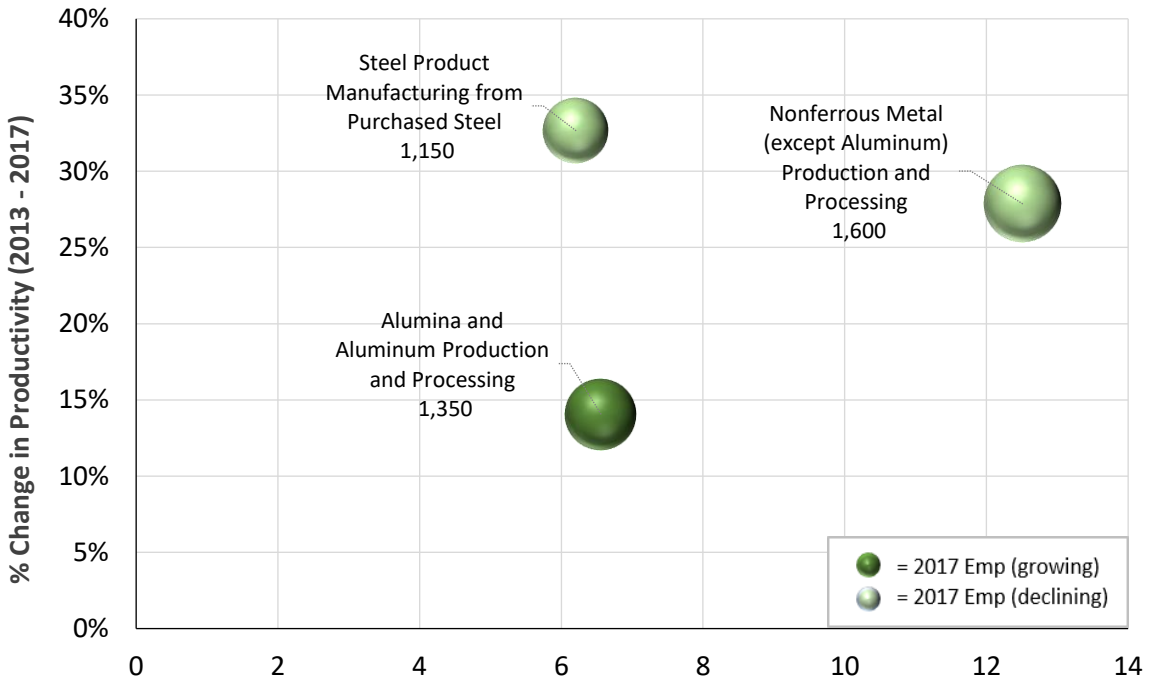
Table 8. Industries in the Youngstown MSA Growing Legacy Manufacturing GRID

NAICS	Industry	2017 Output	2017 Employment
3312	Steel Product Manufacturing from Purchased Steel	$179 M	1,150
3313	Alumina and Aluminum Production and Processing	$215 M	1,350
3314	Nonferrous Metal (except Aluminum) Production and Processing	$395 M	1,600
Total		**$789 M**	**4,100**

Source: Moody's Analytics

The Growing Legacy Manufacturing GRID in the Youngstown MSA consists of *Steel Product Manufacturing from Purchased Steel* (3312), *Alumina and Aluminum Production and Processing* (3313), and *Nonferrous Metal (except Aluminum) Production and Processing* (3314), altogether producing $790 million of output. These industries have recovered from the recession and are experiencing healthy growth, as Figure 10 illustrates.

Figure 10. Youngstown MSA Growing Legacy Manufacturing GRID - Industry Dynamics, Productivity, and Specialization



Source: Moody's Analytics

Oil & Gas GRID

The Oil and Gas GRID in the Youngstown MSA consists of four industries associated with an increase in regional output, productivity, and wages. This GRID also includes real estate activities that secure land leases and rights-of-ways (property rights) to build oil and gas pipelines and other relevant infrastructure.

The Oil and Gas Extraction (2111) industry in the Youngstown MSA had exceptionally high growth in output (275%) and productivity (361%) from 2013 to 2017. The Oil and Gas GRID can be categorized as an emerging base industry due to its growth in output specialization. The total output of the GRID in 2017 was $2 billion; even though industries in this GRID are relatively small employers, with total employment of just 1,260 in 2017.

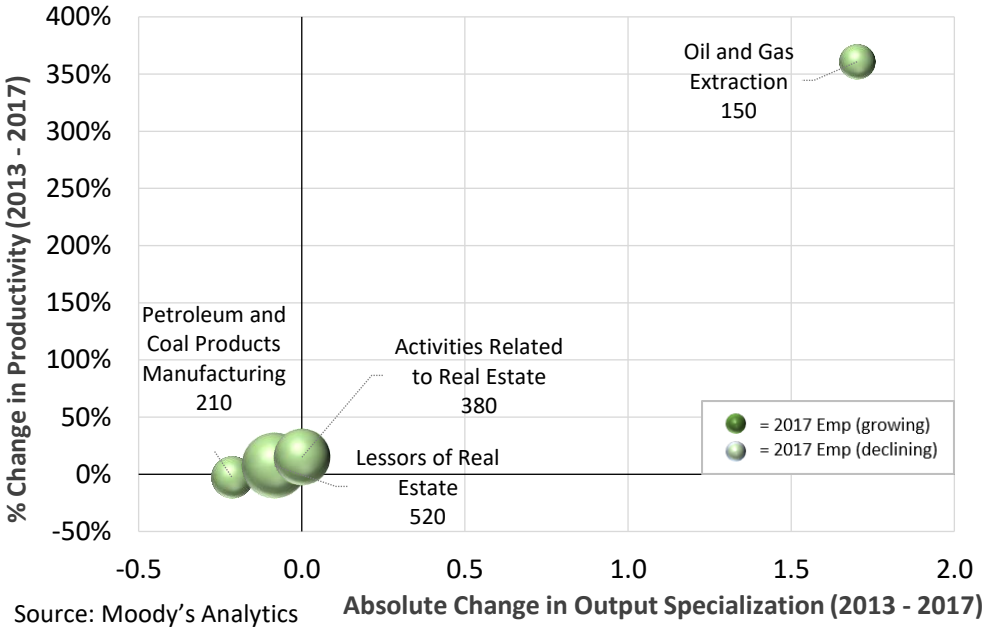
Table 9. Industries in the Youngstown MSA Oil & Gas GRID

NAICS	Industry	2017 Output	2017 Employment
2111	Oil and Gas Extraction	$329 M	150
3241	Petroleum and Coal Products Manufacturing	$567 M	210
5311	Lessors of Real Estate	$559 M	520
5313	Activities Related to Real Estate	$489 M	380
Total		**$1,944 M**	**1,260**

Source: Moody's Analytics

The Oil and Gas GRID in Youngstown MSA consists of industries for *Oil and Gas Extraction* (2111), *Petroleum and Coal Products Manufacturing* (3241), and *Lessors of Real Estate* (5313). The Oil and Gas GRID is fast-growing, with double-digit growth in output in NEO (Figure 11) and has one of the highest employment multipliers of all GRIDs analyzed.

Figure 11. Youngstown MSA Oil & Gas GRID - Industry Dynamics, Productivity, and Specialization



Source: Moody's Analytics

THE CANTON-MASSILLON MSA GRIDS

The Canton-Massillon MSA (Canton MSA) is a two-county area consisting of Carroll and Stark counties which produced $16.4 billion in output in 2017. Two GRIDs consisting of eight industries in the Canton MSA economy were the Oil and Gas GRID and the Growing Legacy Manufacturing GRID, which together produced $1.6 billion in output. Of this, the Oil and Gas GRID was responsible for nearly $1 billion; the Canton MSA GRIDs employed 6,050 people, 3% of the total employment in the MSA.

The Canton MSA has a long history in manufacturing, with Timken (steel manufacturing) and Diebold Nixdorf (self-service ATMs) both headquartered in North Canton—as well as being the birthplace of the upright vacuum cleaner and home of The Hoover Company. The Hoover Company defined Canton for nearly a century until its sale to Whirlpool and then Hong Kong-based Techtronic Industries in the mid-2000s resulted in the elimination of all office and manufacturing jobs in the area by 2007.[18]

The area also has a substantial presence in oil and gas industries, with the Marathon Petroleum (formerly Ashland) Canton Refinery employing hundreds and producing millions of barrels of petroleum per year. The expertise and industry knowledge from this refinery, combined with the region's direct location on the Utica and Marcellus Shale deposits should have the advantage of providing the MSA with opportunities for growth in the Oil and Gas GRID. Unfortunately, declining output in extraction, as explained below, does not provide the strengths these industries could potentially have.

Supporting growth in both the Legacy Manufacturing and Oil and Gas GRIDs within the Canton MSA is an essential step in growing the region's productivity and wealth creation. With developments in other sectors at various stages of improvement, Canton is poised to continue its advancement. One such development is the Pro Football Hall of Fame, headquartered in Canton, which has been undergoing a significant expansion since 2014 with the addition of the new "Hall of Fame Village," billed as the "first-ever sports and entertainment 'Smart City.'"[19] The $899 million investment in the mixed-use retail-hotel-sports amusement park is scheduled to be complete by 2021—in time for the NFL's 100th anniversary—and promises to turn the Hall of Fame into a nationally-known destination and multi-use entertainment hub.

Oil & Gas GRID

The *Oil and Gas Extraction* (2111) industry in this GRID had high and growing productivity. However, the industry is not yet regionally significant due in part to the association of the GRID with declining output and its regional specialization. Table 10 shows industries in the group: *Lessors of Real Estate* (5311), *Offices of Real Estate Agents & Brokers* (5312) and *Activities*

[18] Hoover, S. (2016, February 1). North Canton moves forward almost a decade after Hoover Co. Canton Repository. Retrieved from https://www.cantonrep.com/article/20160201/NEWS/160129139

[19] Hall of Fame Village | Pro Football Hall of Fame Official Site. Accessed 2018, May 16 from http://www.profootballhof.com/jcihofvillage/

related to Real Estate (5313). Real estate activities also describe this GRID because land rights must be obtained to extract natural gas.

However, the Oil and Gas GRID does not have as significant an impact in the Canton MSA as it does in other regions. The total output of $979 million accounted for 6% of the Canton MSA's total output in 2017. From 2013 to 2017, the Oil and Gas GRID recorded a substantial decline in output. The only industry which had a positive change in output was *Activities related to Real Estate* (5313); the other three industries all declined in output by at least 38%. Total employment for the Oil and Gas GRID was 1,070 in 2017.

While the Canton MSA was the first Ohio region to experience the boom in development of oil and gas extraction from shale deposits, with drilling activities moving to rural counties, its output in oil and gas extraction has significantly declined. However, Canton still holds stable suppliers to oil and gas and produces an overall benefit from regional shale development.

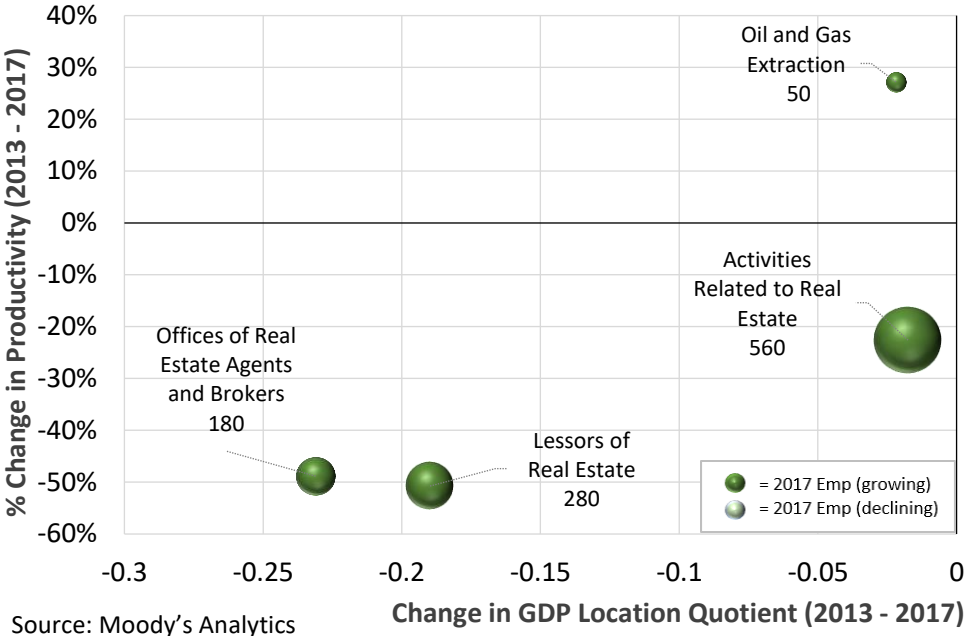
Table 10. Industries in the Canton MSA Oil & Gas GRID

NAICS	Industry	2017 Output	2017 Employment
2111	Oil and Gas Extraction	$130 M	50
5311	Lessors of Real Estate	$154 M	280
5312	Offices of Real Estate Agents and Brokers	$150 M	180
5313	Activities Related to Real Estate	$545 M	560
Total		**$979 M**	**1,070**

Source: Moody's Analytics

Industries in the Canton Oil and Gas GRID are *Oil and Gas Extraction* (2111), *Lessors of Real Estate* (5311), *Offices of Real Estate Agents & Brokers* (5312) and *Activities related to Real Estate* (5313). As shown in Figure 12, the Oil and Gas Extraction (2111) industry in this GRID had high productivity, but it does not have as significant an impact in the Canton MSA as it does in other regions. The total output of $979 million accounted for 6% of the Canton MSA's total output in 2017.

Figure 12. Canton MSA Oil & Gas GRID - Industry Dynamics, Productivity, and Specialization



Source: Moody's Analytics

Growing Legacy Manufacturing GRID

Industries in the Growing Legacy Manufacturing GRID are those which have restructured after the recession to regain their competitive advantages. Industries in this GRID showed strong signs of wealth creation: high output along with high and growing productivity. Also, these industries had exceptionally high and increasing output specialization. From 2013 to 2017, the *Steel Product Manufacturing from Purchased Steel* (3312) industry grew its output specialization by 49% from 17.5 to 26.1.[20]

Output specialization of *Foundries* (3315) in the Canton MSA increased by 76% from 8.6 to 15.2. The total output of the four industries in the Growing Legacy Manufacturing GRID was $618 million, which accounts for 4% of the total output of the Canton MSA. The GRID employed a total of 4,980 people in 2017.

Table 11. Industries in the Canton MSA Growing Legacy Manufacturing GRID

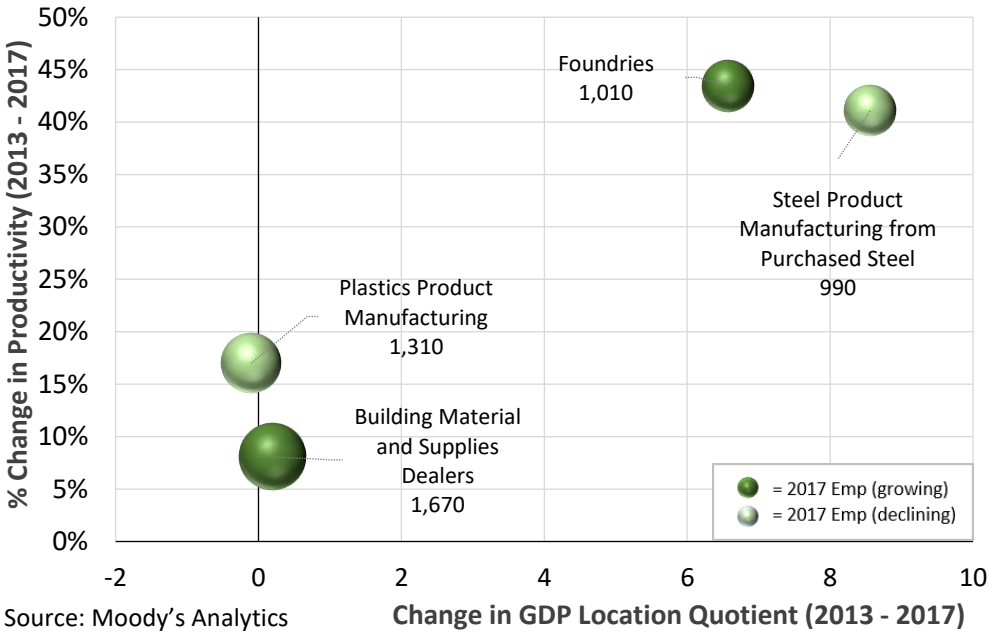
NAICS	Industry	2017 Output	2017 Employment
3261	Plastics Product Manufacturing	$124 M	1,310
3312	Steel Product Manufacturing from Purchased Steel	$175 M	990
3315	Foundries	$184 M	1,010
4441	Building Material and Supplies Dealers	$136 M	1,670
Total		**$619 M**	**4,980**

Source: Moody's Analytics

[20] Remember a Location Quotient (LQ) greater than 1 indicates that a region exports its industrial products; with a LQ of 26, the Steel Product Manufacturing from Purchased Steel (3312) is highly specialized and a significant exporter in the Canton MSA.

The Growing Legacy Manufacturing GRID in the Canton MSA includes industries such as *Plastics Product Manufacturing* (3261), *Steel Product Manufacturing from Purchased Steel* (3312), *Foundries* (3315), and *Building Material and Supplies Dealers* (4441). As illustrated in Figure 13, these industries had exceptionally high and increasing output specialization with *Foundries* (3315), experiencing the highest change in productivity.

Figure 13. Canton MSA Growing Legacy Manufacturing GRID - Industry Dynamics, Productivity, and Specialization



Source: Moody's Analytics

CONCLUSIONS AND TAKEAWAYS

This analysis identified industries with strong regional specialization as export industries—those that grew output, increased productivity, and illustrated positive components of local competitiveness over the last five years. [21] In all, three groups of industries met these criteria: *Professional Services*, *Growing Legacy Manufacturing*, and *Oil and Gas*. These three industry groups were identified as Groups of Regional Industry Drivers, or GRIDs; combined they produced nearly 40% of Northeast Ohio's (NEO) economic wealth and employed 20% of NEO's workforce. GRIDs drive the regional economy by selling $31.8 billion of their products to non-GRID industries for intermediate use and purchasing $66.1 billion from non-GRID industries to produce their outputs.

Overlap Across the Regions

Of the four distinct metro areas and non-MSA counties within NEO economy,[22] the Professional Services GRID in NEO had the most significant employment and output of the three GRIDs in 2017. Nine of the ten industries in NEO were perfectly matched with the Cleveland MSA, indicating that professional services industries in the Cleveland MSA contributed the most to the Professional Services GRID in NEO. The Cleveland MSA constitutes the most substantial portion of NEO employment and output and the largest contributor to all GRIDs. The Cleveland MSAs was solely responsible for 53% of the output generation in the NEO Professional Services GRID. The second-largest industry group, in terms of output and employment, was the Growing Legacy Manufacturing GRID. Twenty industries in this GRID produced $19 billion of output and employed 109,470 people. The Cleveland MSA contributed half of all employment and output to the NEO Growing Legacy Manufacturing GRID. However, this is not surprising considering the Cleveland MSA is the largest employment hub and contributes overwhelmingly to regional output.

The smallest group of driver industries is oil and gas. In 2017, the overall Oil and Gas GRID employed just 3,160 individuals in NEO, equating to only 0.2% of total employment; corresponding output was equal to $6 billion, 3% of all output in NEO. The Oil and Gas GRID is gaining importance in each of the four metropolitan areas in NEO. When examining the individual regional contribution to this group, it is interesting to note that non-MSA counties contributed the most both to NEO employment (41%, 396 employees) and to NEO output (53%, $1.5 billion) in the *Oil and Gas Extraction* (2111) Industry. They were closely followed by the Akron MSA—with 270 workers employed and $557 million of output. It is noteworthy that over a quarter of oil and gas activity in NEO comes from rural counties, including the core Utica Shale development rural counties of Jefferson, Harrison, Guernsey, Belmont, Noble, and Monroe.

[21] Based on employment and output regional and national analysis.

[22] Note that Carroll County is not part of Northeast Ohio but is included in this report to demonstrate an accurate portrayal of the Canton MSA.

GRIDs in NEO Regions

- The Professional Services GRID not only provided the highest output in both the Metropolitan Statistical Areas (MSAs) of Cleveland and Akron, but it also provided the most employment. In the Cleveland MSA, this GRID was driven by its high value, high output and employment specialization, and a high share of regional output. In the Akron MSA, the output from the Professional Services GRID accounted for about one-fourth of total output. Two industries alone (*General Medical and Surgical Hospitals* and *Management of Companies and Enterprises*) contributed over half of all employment in this specific GRID.

- The Growing Legacy Manufacturing GRID has overall seen an upward trend in all four MSAs (Cleveland, Akron, Youngstown, and Canton). This is due to its restructuring since the recession, which has improved wealth creation overall. The Cleveland MSA alone contributed to over half of all employment and output to the general NEO economy.

- The Oil and Gas GRID has seen high growth in output and productivity in both the Akron MSA—with some industries seeing double-digit growth in output—and in the Youngstown MSA, which has seen triple-digit growth in its output specialization. Even though this GRID is gaining importance in all four metropolitan areas, most of NEO's employment and output from Oil and Gas are in surrounding non-MSA counties.

Overall, Northeast Ohio's regional economy shows signs of growth and potential opportunities to expand its economic impact further. While the region overall should be considered, it is the Cleveland and Akron MSAs which shoulder the most significant burden in keeping the region moving forward. While NEO still has significant strides ahead of it to catch up to other Midwest regions and the overall nation's wealth and employment, there is nonetheless abundant hope—as well as significant evidence—that it can achieve these levels once again.