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Greater Wheeling Regional Plan

INDUSTRIAL CLUSTER ANALYSIS

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Industrial Cluster Analysis

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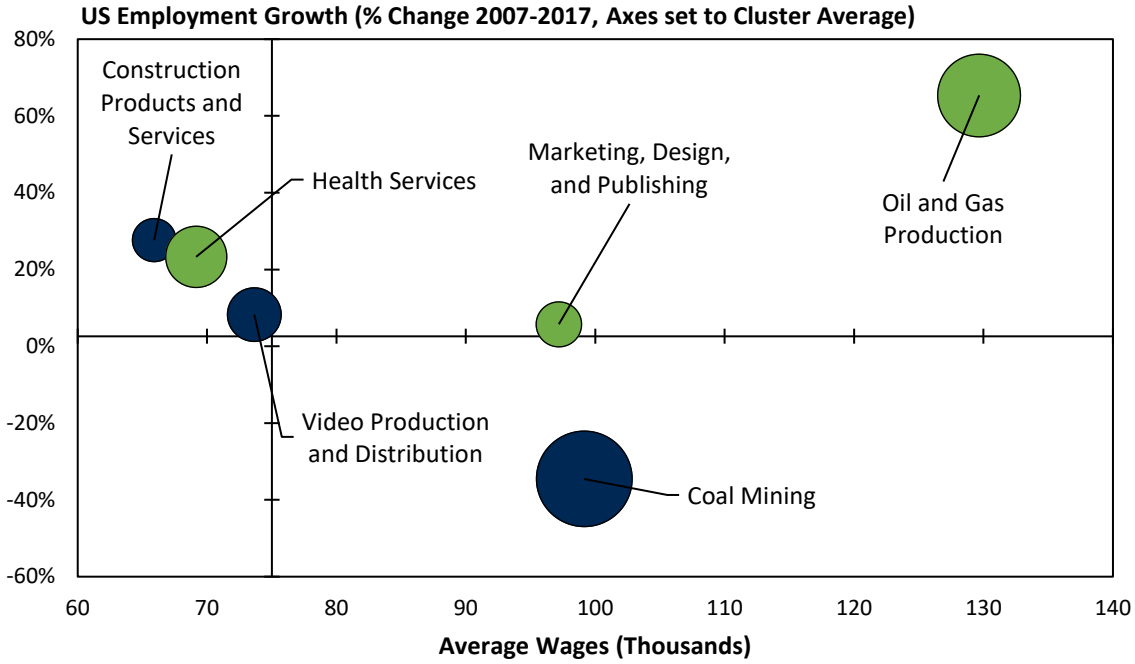
Executive Summary

One of the most prominent strategies followed by economic development officials is to identify what the region already does well and work to enhance these strengths. Improving on a region's competitive advantage has been the focus of Porter's work on economic clusters, which he defines as network of companies that forms within a geographic location based on supplier relationships. In this report, we identify the industry clusters that are present in the Wheeling Metropolitan Statistical Area (MSA) and provide tools to assess the most promising clusters for economic development targeting. This type of cluster analysis has become an increasingly important way for regions to understand their local economic structure and more effectively develop strategies to promote economic growth.

We begin by first identifying the existing clusters in the Wheeling region, as well as emerging clusters that are becoming more specialized in the local economy. We then rank these clusters by their potential for future economic performance. Through this process, we identified three impact clusters for the region—Oil and Gas Production and Transportation; Marketing, Design, and Publishing; and Health Services—shown in Figure 1.

Figure 1: Impact Clusters for the Wheeling Region



Source: Author Calculations. Bubble size depicts the average establishment size in 2017. Green bubbles are impact clusters.

Having identified three impact clusters in the Wheeling region, we further examine these clusters to find specific industries that may provide the greatest opportunities for targeted economic development. We employ an economic development strategy of import substitution to look for areas where the priority clusters may be able to substitute local suppliers for production inputs that they are currently purchasing from outside the Wheeling area.

Some of the most promising industries include:

- Support Activities for Oil and Gas
- Real Estate Services
- Insurance and Financial Services

The largest of the clusters we have identified is the Oil and Gas Production and Transportation cluster, which has experienced rapid development in the Wheeling region over the last 10 years. However, while this analysis identified Oil and Gas as a rising cluster in the area, it is largely a backward-looking snapshot of recent development in a sector that is relatively new to the region. Because of this, our analysis cannot take into account the potential for future downstream development from this cluster in those industries that rely on natural gas as an input to their production processes.

Another significant finding is the importance of the Wheeling area's service industries to the local economy. Two of the three impact clusters identified in this study were service sectors—Marketing, Design, and Publishing; and Health Services. These industries may not produce large manufacturing plants with hundreds of employees, but they do employ skilled workers earning high wages. These services are required by a wide range of local and regional companies, which indicates an underserved market for companies in the Wheeling area.

1 Introduction

One of the most prominent strategies followed by economic development officials is to identify what the region already does well and work to enhance these strengths. Improving on a region's competitive advantage has been the focus of Porter's work on economic clusters, which he defines as network of companies that forms within a geographic location based on supplier relationships.[1] In this report, we identify the industry clusters that are present in the Wheeling Metropolitan Statistical Area (MSA) and provide tools to assess the most promising clusters for economic development targeting. This type of cluster analysis has become an increasingly important way for regions to understand their local economic structure and more effectively develop strategies to promote economic growth.

We begin by first identifying the existing clusters in the Wheeling region, then identify emerging clusters that are becoming more specialized in the local economy. Third, we rank these clusters by their potential for future economic performance. Lastly, we look at the supply chain gaps for these impact clusters to find specific industries that may provide opportunities for local companies to have a competitive advantage over firms located outside the region.

2 Cluster Identification

To identify industry clusters in the Wheeling region, we follow a four-part process based on the approach taken by the Regional Economic Development Research Laboratory (REDRL) at Clemson University.[2] First, we identify those clusters that have a large existing presence in the Wheeling region. These clusters have had a historical competitive advantage that allowed for widespread development in the region over time. Second, we identify emerging clusters in the region. These clusters are growing in importance in the region as the supplier relationships between industries become more specialized and highly concentrated in the Wheeling area. Third, we rank the clusters identified in the previous steps to identify those that are mostly likely to provide large-scale gains to the local economy and have the most growth potential in the future. Fourth and last, within each of these impact clusters we identify individual industries that may have the potential to grow their supply chains into the region to substitute local suppliers for imports.

The cluster definitions we use for this analysis are based on the US Cluster Mapping Project from Harvard Business School's Institute for Strategy and Competitiveness.[3] In general each cluster groups together one or more primary industries with related industries that are part of its supply chain. US Cluster Mapping identifies 67 different clusters with between one and 62 industry members. The clusters are divided into two categories: traded and local. The 51 traded clusters involve industries that are primarily export-based, meaning that the products they produce are largely sold outside the region.

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[1] Michael E. Porter, *On Competition*, (Boston: Harvard Business Press, 1998).

[2] David L. Barkley and Mark S. Henry, "Targeting industry clusters for regional economic development: The REDRL approach," in *Targeting Regional Economic Development*, ed. Stephan J. Goetz, Steven C. Deller, and Thomas R. Harris (New York: Routledge, 2009), 183-197.

[3] US Cluster Mapping, "Cluster Mapping Methodology," Harvard Business School Institute for Strategy and Competitiveness. Accessed Nov. 4, 2019, https://clustermapping.us/content/cluster-mapping-methodology.

These clusters bring income into the local area from outside the region and thus grow the local economy. The 16 local clusters include industries that primarily sell to the local market. While these clusters can be important sources of economic activity, they largely draw income from local business or residents and do not bring in additional funds from outside the region. For this reason, our analysis focuses only on traded clusters, as these are the clusters that are likely to bring additional economic growth to the Wheeling area. Though Health Care is considered a local cluster by the US Cluster Mapping Project, we make an exception and include it as an export cluster. This is because the advanced specialty care provided by large health care centers in Wheeling draws patients from a wide area.

3 Primary Existing Clusters

To begin our analysis, we must first refine the list of 51 traded clusters down to those that constitute significant existing clusters in the Wheeling region. Following the REDRL approach, we identify three criteria for determining if a cluster has a significant existing presence in the region currently (Table 1):

Table 1: Criteria for Existing Clusters

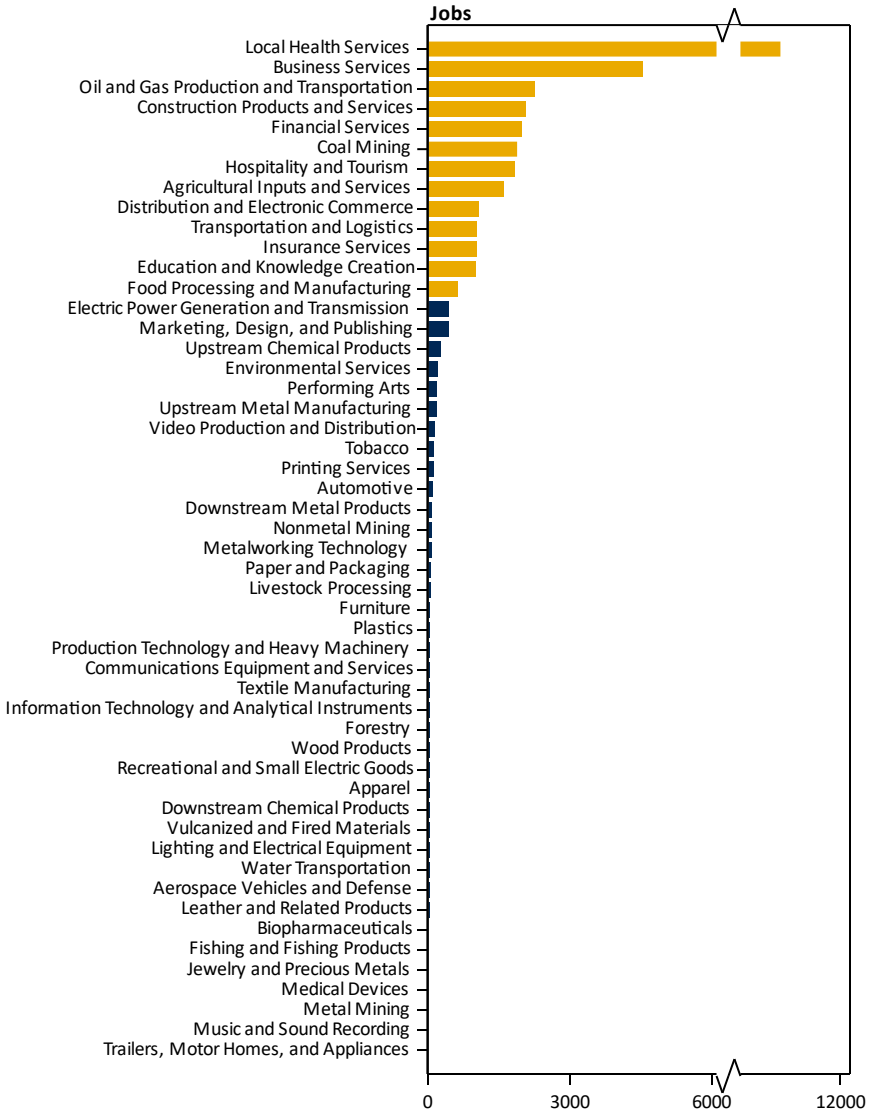
Description	Criteria
Cluster Employment	Greater than 500 jobs
Number of Establishments	Greater than or equal to 5
Location Quotient	Greater than 1

In Figure 2, we show the level of employment in 2017 for all 51 traded clusters in the Wheeling Metropolitan Statistical Area. As indicated by a yellow color, 13 of these clusters meet the first standard defined above, indicating they have a sizable employment presence in the Wheeling region. Health Services has the largest employment, with more than 10,700 workers.[4] This large cluster includes hospitals, doctors offices, dentists, nursing care facilities, etc.

Business Services has the second-largest employment, with more than 4,500 workers employed in this cluster. This cluster includes a wide range of services industries, ranging from engineering and architectural services, to taxi and legal services. Oil and Gas Production and Transportation is third, with nearly 2,300 workers. Finally, Food Processing and Manufacturing is the smallest cluster to meet the employment threshold, with approximately 650 workers engaged in production of processed food and beverages.

[4] Note: These employment figures are from 2017, prior to the losses from the closure of Eastern Ohio Memorial Hospital and Ohio Valley Medical Center in 2019.

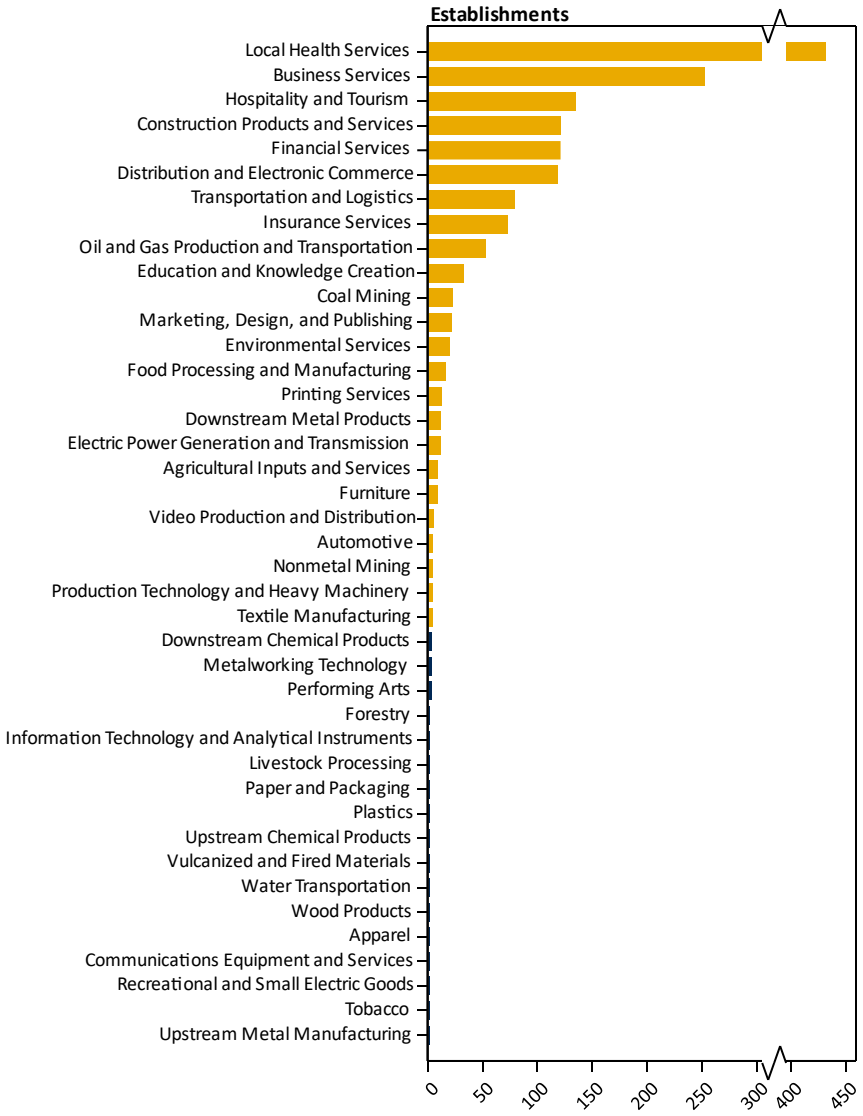
Figure 2: Traded Clusters: Employment (2017)



Source: IMPLAN. Author Calculations. Clusters in yellow are those that meet the employment criteria for a primary existing cluster.

Health Services also tops the number of establishments in the Wheeling region with more than 430 different locations (see Figure 3). Each establishment is a given location where the primary economic activity falls within a particular cluster. Having multiple establishments in a given cluster is an indication that the economic activity is not limited to a small number of (or single) employers, and thus provides a more diversified portfolio of firms in the local economy. Other clusters with large numbers of establishments include: Business Services with 252 different locations; followed by Hospitality and Tourism; Construction Products and Services; Financial Services; and Distribution and Electronic Commerce, each of which have more than 100 establishments. In total, 23 clusters have at least 5 establishments, indicating it has met our second standard for a primary cluster.

Figure 3: Traded Clusters: Number of Establishments (2017)



Finally, in Figure 4 we show the location quotient for each cluster in the Wheeling area. LQ is calculated as the ratio of the share of local employment in the cluster relative to the share nationally. An LQ above 1 means that the cluster constitutes a greater share of employment in the local region than in the

national labor market. In all, nine clusters have an LQ above 1, indicating a high concentration of jobs in Wheeling for these clusters relative to the national average.

With an LQ of nearly more than 72, the cluster with the largest LQ by a wide margin is coal mining. This LQ indicates that the share of coal mining employment in the Wheeling area is 68 times that of the nation as a whole, a strong indicator of competitive advantage in this area. Tobacco products also has a very high LQ, with a score of more than 22, due to the Swisher International tobacco manufacturing plant in Wheeling. Upstream Chemical Products and Oil and Gas Production and Transportation have similar LQ scores of 3.7 and 3.6, respectively.

Figure 4: Traded Clusters: Location Quotient (2017)

When we combine the data for all 51 clusters, we find four that meet all three of the criteria delineated above. These clusters are shown in Table 2. Leading the list is Health Services, which is unsurprising given the large amount of employment in the region at major hospitals and other medical centers.

Second is Oil and Gas Production and Transportation, which has grown considerably over the last decade as hydraulic fracturing and horizontal drilling has opened new natural gas reserves in shale formations. Belmont County, in particular, has seen dramatic increases in natural gas production and employment between 2007 and 2017, leading to a high concentration of jobs in this area.

Construction Products and Services is less concentrated in the region, as indicated by LQ, but meet the other criteria for an existing cluster. Lastly, Coal Mining also has a substantial presence in the Wheeling area, though the employment and number of establishments is somewhat lower than Oil and Gas.

Table 2: Primary Existing Traded Clusters (2017)

Cluster	Employment	Establishments	Location Quotient
Health Services	**10,740**	**432**	**1.2**
Oil and Gas Production	**2,270**	**53**	**3.6**
Construction Products and Services	2,086	121	1.1
Coal Mining	1,892	23	72.3

Note: Impact clusters are in bold.

4 Emerging Clusters

In this section we turn to identifying emerging clusters, which are those clusters that are not currently highly concentrated in the region but have significant potential to grow in importance. To identify emerging clusters, we apply four criteria to clusters that do not meet our definition of existing clusters (Table 3).

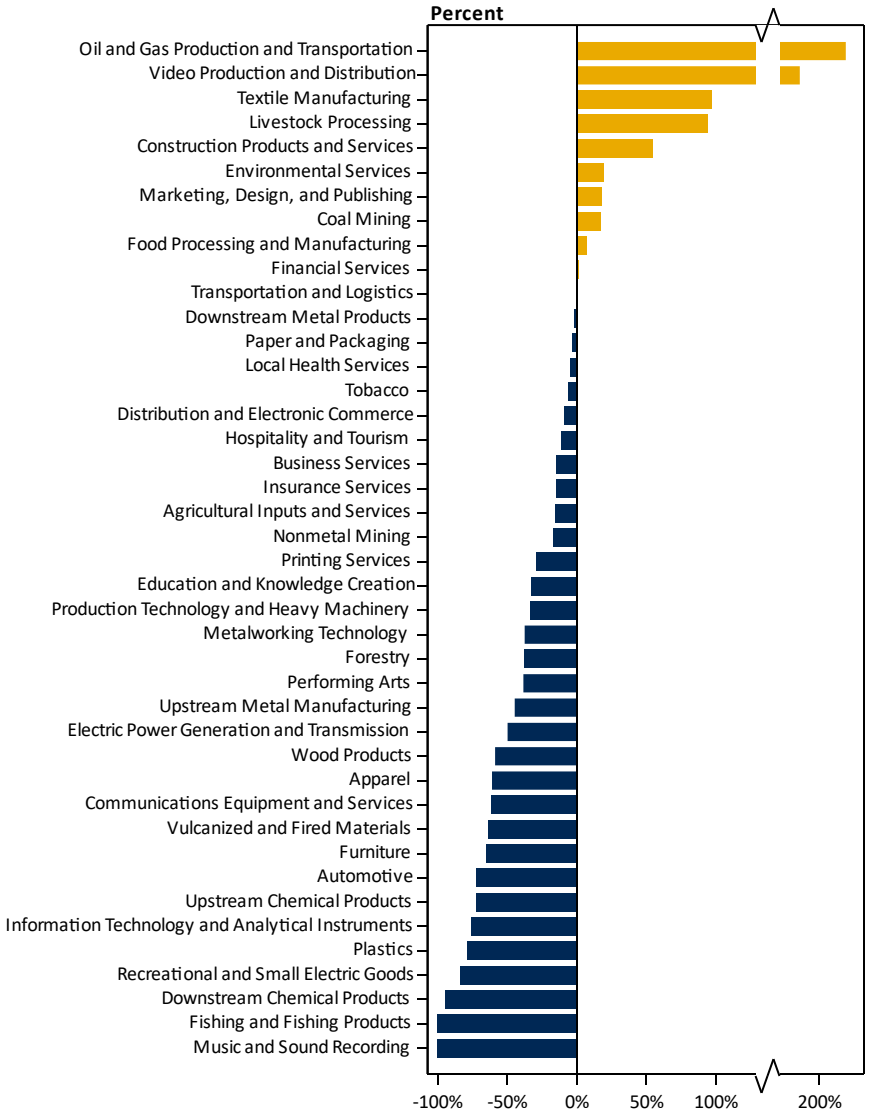
Table 3: Criteria for Emerging Clusters

Description	Criteria
Cluster Employment	Greater than 100 jobs
Job Growth	Positive job growth over 10 years
Location Quotient Growth	Positive LQ change
Shift-Share	Competitive component greater than zero

These criteria were chosen to identify clusters that have a sizable presence in the Wheeling area, but do not currently meet the definition of a cluster in the region. They also indicate that the emerging cluster is growing over time and has an increasing competitive advantage relative to other clusters both in the region and nation.

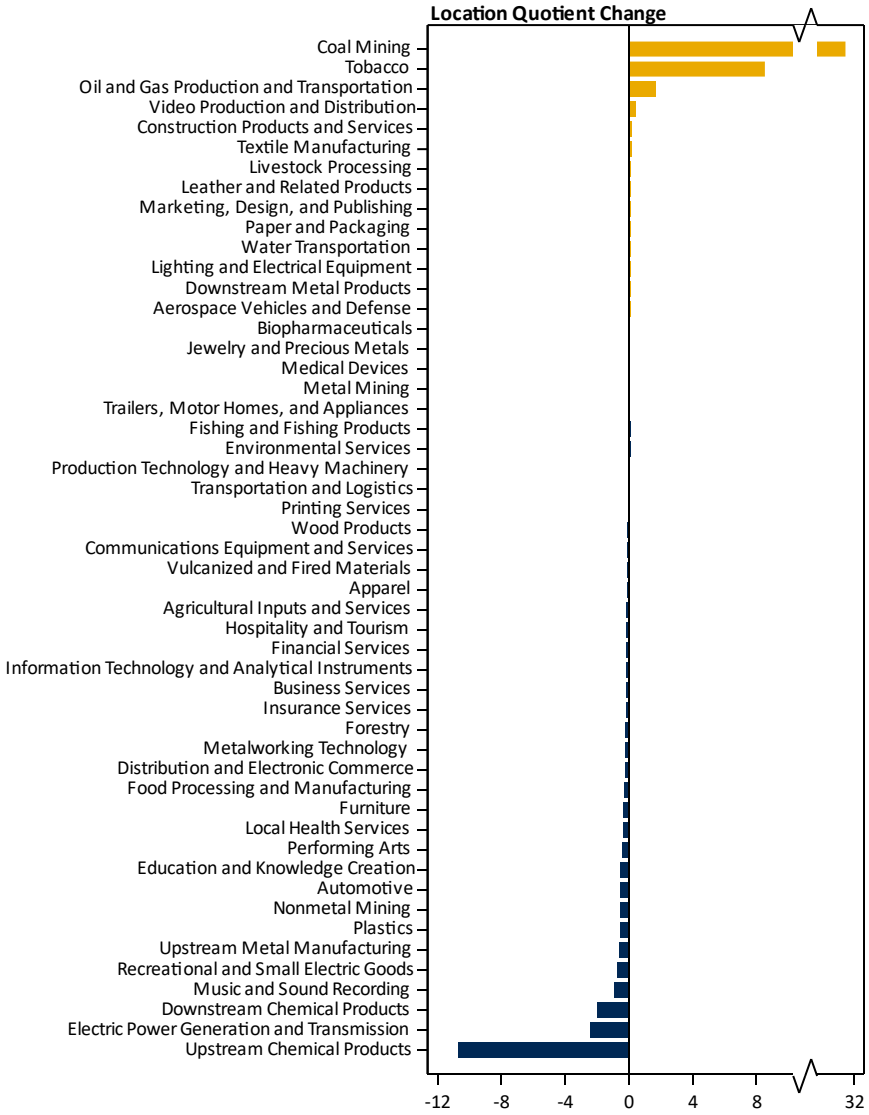
As shown in Figure 5, 10 of the 51 traded clusters had positive employment growth between 2007 and 2017. Oil and Gas Production and Transportation led with more than 200 percent growth in the region during this period, amounting to an average annual growth of more than 12 percent. Video Production and Distribution, and Textile Manufacturing also had relatively high growth rates at 11 percent and 7 percent respectively, though they started from low baselines. Coal Mining also had significant growth, with an average growth rate of 1.6 percent.

Figure 5: Wheeling Employment Growth (2007-2017)



The Coal Mining cluster experienced extremely high LQ growth between 2007 and 2017, as shown in Figure 6. The cluster rose from a 34 LQ in 2007 to more than 72 in 2017, a gain of nearly 34 points. The cluster did have significant job gains over the decade prior to 2017. However, because LQ is defined as a relative measure, the gain the cluster's LQ growth can be largely attributed to a decline in coal mining jobs nationally during this same period, causing Wheeling to become more highly concentrated in coal mining jobs when compared to the nation. Other clusters that had significant LQ growth in the Wheeling region were the Tobacco cluster; and Oil and Gas Production and Transportation. Similar to Coal Mining, Tobacco's rise was due to falling employment in other parts of the country, while the Oil and Gas cluster's gain was due to a rapid employment increase in the Wheeling region.

Figure 6: Location Quotient Growth (2007-2017)



Lastly, we examine the employment change in the competitive component of the regional shift-share analysis. Shift-share analysis decomposes the changes in a region's employment into three types of impacts. The national component identifies changes in employment due to overall national job growth. The industry mix component quantifies the amount of employment change due to changes in the distribution of industries nationally. Lastly, the competitive component compares industrial growth in a given region with the same industry nationally. A positive competitive component indicates that the industry in the region grew faster than that industry nationally and vice versa for a negative indicator. Thus the competitive component identifies employment growth that is due to a region's ability to draw employment away from other regions. This last measure is understood to be a measure of the study region's competitive advantage.

As shown in Figure 7, the Oil and Gas Production and Transportation cluster had the highest employment gains due to competitive advantage. Of the 1,559 jobs gained between 2007 and 2017, nearly all of them (1,550) were due to jobs moving to Wheeling from other parts of the country rather than overall employment gains in the industry. Construction Products and Services, and Coal Mining both experienced job gains in Wheeling, but job losses in other parts of the country, which led to large increases in the competitive component of the region's shift-share.

Health Services, identified above as a major primary cluster, became significantly less competitive over the 2007-2017 period, even prior to recent losses at Eastern Ohio Memorial Hospital and Ohio Valley Medical Center in 2019. The cluster had a competitive decline of more than 3,100 jobs, indicating that the Wheeling region could have had this many additional Health Services jobs if the cluster had kept up with national trends.

Figure 7: Competitive Shift-Share (2007-2017)

Excluding the existing clusters identified in the previous section, we find two clusters that meet all of four the criteria defined above for emerging clusters. These clusters are shown in Table 4. Marketing, Design, and Publishing is the largest emerging cluster, with nearly 450 employees, followed by Video Production and Distribution at 157 workers. Video Production and Distribution grew at a rate of 1.9 percent between 2007 and 2017. This cluster also had the highest growth in location quotient and competitive shift-share. However, Video Production and Distribution started from a low base, and it still represents a relatively small cluster in the region.

Table 4: Emerging Clusters

	2017 Employment	Employment Growth (Percent Change 2007-2017)	Location Quotient Growth (2007-2017)	Competitive Shift-Share (Job Growth 2007-2017)
Marketing, Design, and Publishing	**448**	**0.2**	**0.0**	**46**
Video Production and Distribution	157	1.9	0.4	98

Note: Impact clusters are in bold.

5 Cluster Rankings

The six clusters identified in the previous two sections have all played an important role in the Wheeling economy over the last decade. As such, these clusters will provide significant synergies between anchor industries and their suppliers and thus provide a competitive advantage for firms locating in the state. However, some of these clusters may not be as attractive as others for economic development efforts in the future. In this section we attempt to rank the clusters that have the greatest potential for economic growth and will provide the largest economic impact on the region moving forward. To this end, we have chosen three indicators of growth and economic impact potential:

1. The cluster's growth rate in the US between 2007 and 2017;
2. The cluster's average establishment size nationally;
3. The average wages paid to workers in the US.

While our previous measures have all been based on local data, all the indicators in this section are measured on a national basis. This is because our goal in this section is to understand the best prospects for economic development efforts, and national figures give a better indication of where the cluster is headed in the US. The US employment growth rate, for instance, provides a measure of how quickly the cluster is growing in total. It is easier to attract new companies to the region if they are growing nationally, as firms will be making a decision on where to locate new establishments rather than having to relocate existing plants. Average establishment size and average wages provide an indication of the potential economic impact of each cluster. Larger establishments will have more workers employed in the region, and higher wages will provide greater economic gains from household spending.

Since each of these measures have different scales, we have calculated an index of each of the indicators in order to be able to compare them across clusters. For each measure, we calculate the number of standard deviations above or below the average value of all 51 traded clusters. We then add these values together to create a summary index. These indexes are reported in Table 5.

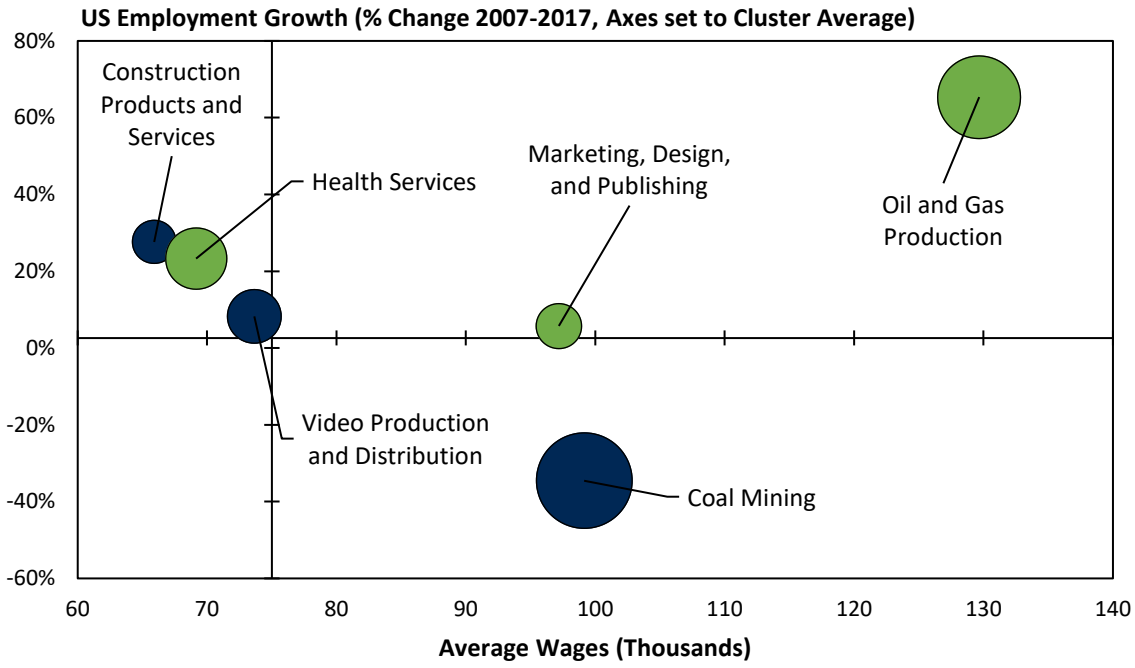
Table 5: Cluster Impact Potential

	Average US Wages Index	US Employment Growth Index	Average Establishment Size Index	Summary Index
Oil and Gas Production and Transportation	**1.5**	**2.5**	**0.3**	**1.6**
Marketing, Design, and Publishing	**0.6**	**0.1**	**-0.8**	**0.1**
Health Services	**-0.2**	**0.8**	**-0.4**	**0.1**
Construction Products and Services	-0.3	1.0	-0.9	0.0
Coal Mining	0.7	-1.5	0.8	0.0
Video Production and Distribution	0.0	0.2	-0.6	-0.1

Source: Author Calculations. Index values for each measure represent the number of standard deviations above or below the average for all clusters in the region. Summary index is a weighted summation of the three index values. Impact Clusters are in bold.

Three clusters stand out as having the highest economic impact potential in the Wheeling region. Oil and Gas Production and Transportation; Marketing, Design, and Publishing; and Health Services. All have a summary index value greater than zero, indicating that the cluster is above the national average overall when combining the three criteria. These three clusters, which we have labeled “impact clusters,” are highlighted in green in Figure 8. The individual industries included in these clusters may be found in Appendix A.

Figure 8: Cluster Growth Potential



Source: Author Calculations. Bubble size depicts the average establishment size in 2017. Green bubbles are impact clusters.

The upper right quadrant of Figure 8 are clusters that are higher than the national average in both wages and employment growth. Oil and Gas Production is a clear standout in this quadrant, with extremely high wages of nearly $130 thousand combined with employment growth of more than 65 percent nationally over the 2007-2017 period. Oil and gas operations also have large establishment sizes.

The Marketing, Design, and Publishing cluster also outperforms the national average for both wages and employment growth. Average wages in this cluster are approximately $97 thousand with employment growth of approximately 5 percent over the 10-year period. Below-average establishment size pulls this cluster downward, however.

Lastly, Health Services had rapid employment growth over the 2007-2017 period of more than 23 percent and above-average establishment size of nearly 25 employees per location. The cluster's overall index was reduced by its somewhat below-average wages.

In the lower right quadrant is the Coal Mining cluster. While coal mining is currently important in the Wheeling region, it has experienced large employment declines nationally over the previous decade. The challenge for this clusters, which we have labeled "holding clusters," will be to retain the current level of employment while working to diversify the local economy. Lastly, we have labeled the clusters in the upper left quadrant—Construction Products and Services; and Video Production and Distribution—"growth clusters" because they have been growing nationally, but their lower wages and employment size make them less attractive targets for economic development efforts.

6 Supply gaps and disconnects

Having identified three impact clusters in the Wheeling region, we turn now to pinpointing specific industries that may provide the greatest opportunities for targeted economic development. Using a methodology from Deller (2009),[5] we employ an economic development strategy of import substitution to identify gaps in the local supply chains for these priority clusters. Under this approach, we look for areas where the impact clusters may be able to substitute local suppliers for production inputs that they are currently purchasing from outside the Wheeling area. Depending on value of these input purchases, import substitution may be an opportunity for local companies to have a competitive advantage over outside firms.

We also examine the potential for so-called "disconnects" between what local companies are producing and the needs of the region's large clusters. For this process, we find those industries where the impact clusters have large imports, but the region is also exporting the same products. Local suppliers may be able to retool their production processes to better serve the anchor clusters in the region, which keeps more of the economic value of these products within the region. However, this may not always be possible, as sometimes the local suppliers are producing products that may not fit the needs of the larger clusters.

6.1 Oil and Gas Production and Transportation

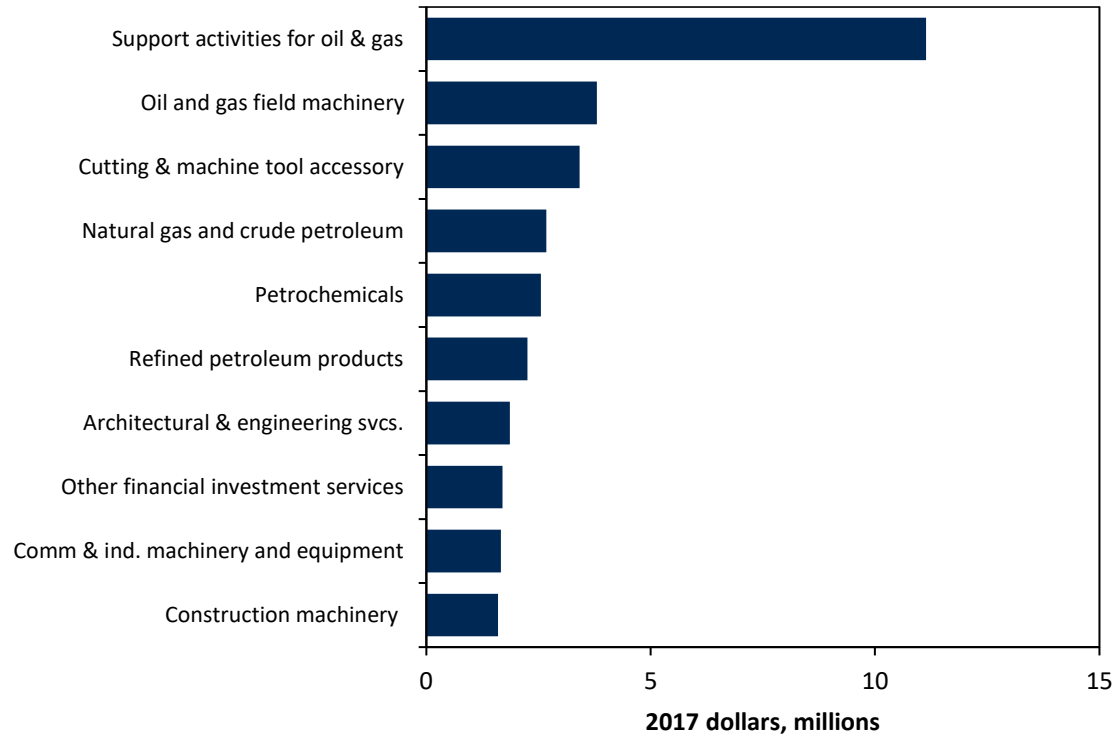
The Oil and Gas Production and Transportation cluster is the first impact cluster identified in the above analysis. As the name suggests, this cluster includes a fairly narrow set of industries involved in the extraction, refining, and pipeline transportation of natural gas.

The Oil and Gas cluster in Wheeling purchased approximately $115 million of goods and services as inputs into its production process in 2017.[6] A little less than half of this total—$52 million—was purchased from outside the Wheeling region. In Figure 9, we report the 10 largest imports for the Oil and Gas cluster. The single largest import was for Support Activities for Oil and Gas, which likely reflects that this industry is relatively new in the region and still requires bringing in contractors from outside the Wheeling area. The cluster also imports large amounts of Oil and Gas field machinery and Cutting and Machine Tools.

[5] Steven C. Deller, "Import substitution and the analysis of gaps and disconnects," in *Targeting Regional Economic Development*, ed. Stephan J. Goetz, Steven C. Deller, and Thomas R. Harris (New York: Routledge, 2009), 183-197.

[6] Data for this section is drawn from IMPLAN. For more information see https://implan.com/.

Figure 9: Input Purchases from Outside Wheeling Region: Oil and Gas Cluster

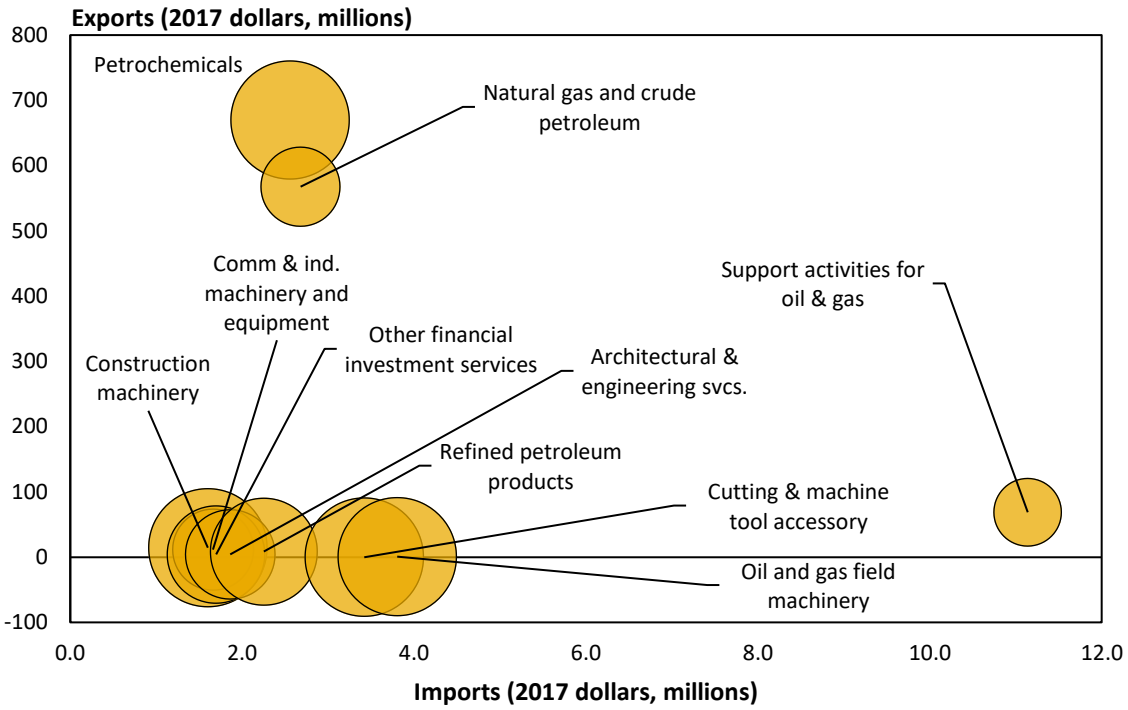


Source: IMPLAN, Author Calculations

Though the Oil and Gas Production and Transportation cluster imports a large amount of support activities in dollar terms, the value of those imports is a relatively small share of the total required by the industry. As shown in Figure 10, the Oil and Gas cluster imports only about one-third of its needs for support activities, which may not leave a lot of room for further consolidation in the Wheeling area. Other manufacturing industries directly involved in the production of natural gas—such as Construction Machinery, Oil and Gas Field Machinery, and Cutting and Machine Tool Accessory Manufacturing—are almost entirely imported. These industries may be good targets for local suppliers. Other areas that may provide opportunities for local companies are in service industries, such as Architectural and Engineering Services, and Other Financial Investment Services. However, these services are likely tied heavily to recent pipeline construction that is nearing completion, which could limit their growth potential going forward.

One industry that appears to have a large disconnect is Petrochemicals. In 2017, the Petrochemicals industry in Wheeling exported about $700 million worth of products outside the region, while at the same time the Oil and Gas cluster imported about $2.5 million in products from the Petrochemical industry. Westlake Chemical's Natrium plant is most likely the source of this disconnect. The Natrium plant produces a range of petrochemical products that have uses in plastics and pharmaceutical manufacturing. However, these chemicals are not widely used in the Oil and Gas cluster, indicating that it is unlikely that the Natrium plant will be able to supply the needs of the Oil and Gas industries.

Figure 10: Import/Export Disconnect: Oil and Gas Cluster



Source: IMPLAN, Author Calculations. Bubble size represents value of imports in 2017 dollars.

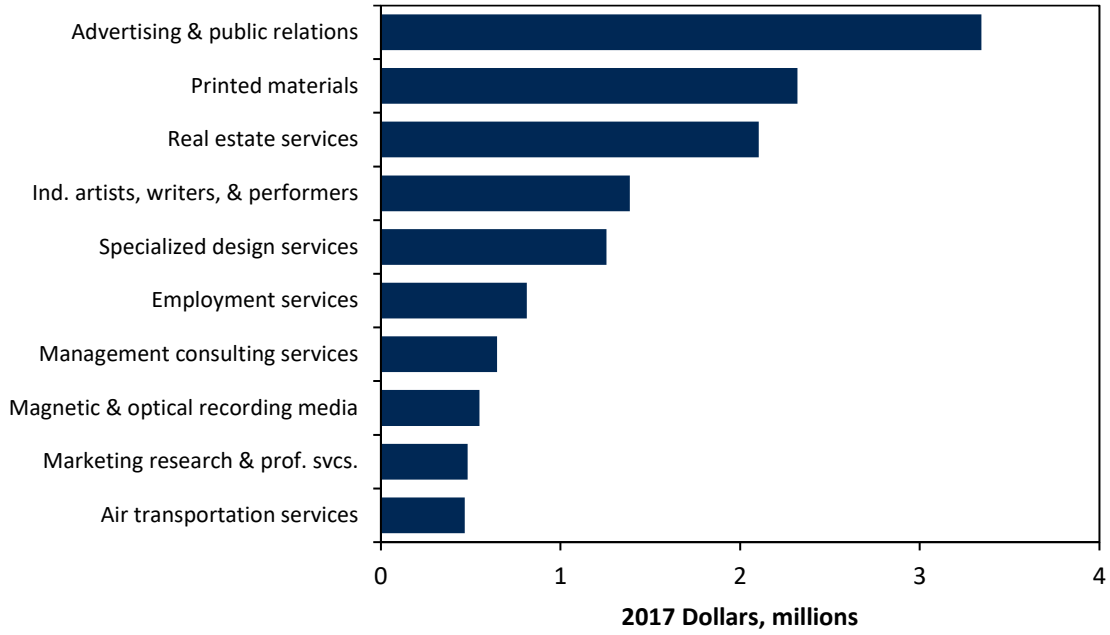
6.2 Marketing, Design, and Publishing

Second, our cluster analysis identified an impact cluster in Marketing, Design, and Publishing. This diverse cluster includes industries ranging from book and periodical publishing, to advertising and public relations and associated services.

As of 2017, the cluster primarily imported services from within the same cluster, as shown in Figure 13. The single largest imported service was Advertising and Public Relations, which required more than $3 million of imported services in 2017. The cluster also imported nearly all of its needs for printed materials, which include items such as pamphlets, books, and newspapers.

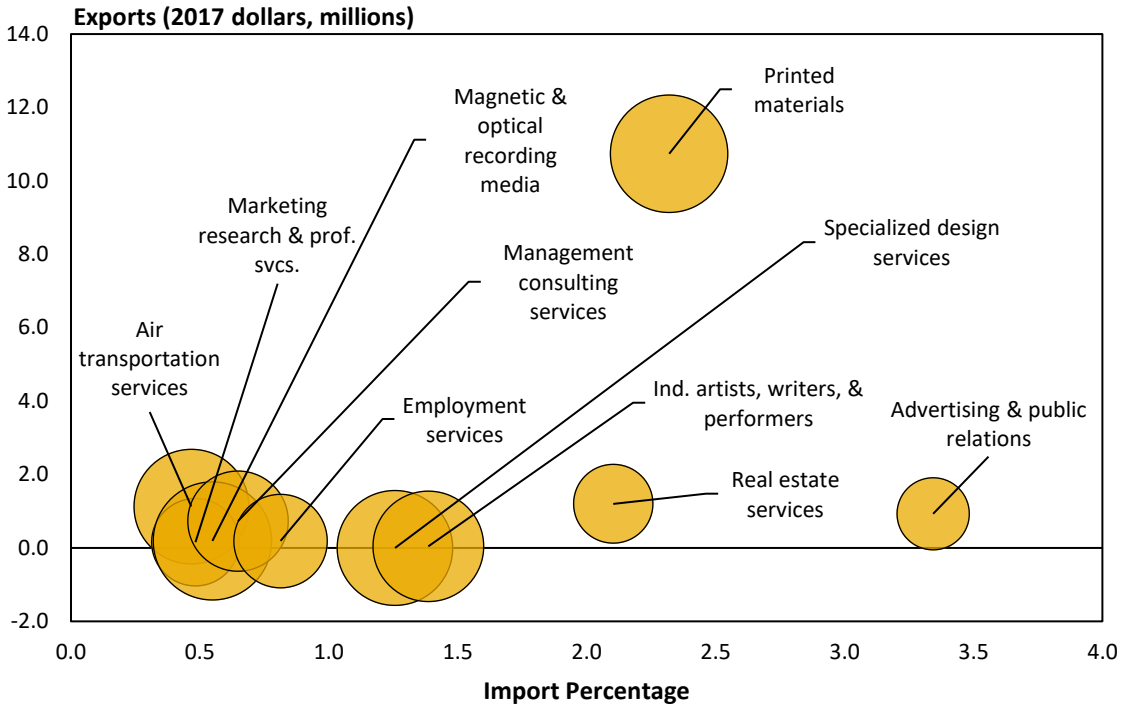
Printed Materials topped the list of industries with the highest level of disconnect between imports and exports, as shown in Figure 14. The Marketing cluster imported nearly all its Printed Materials products; however, this industry also had nearly $11 million in exports outside of Wheeling. We do not have a high level of detail on which particular products are being sold, so it is unclear why marketing companies are not able to meet their needs within Wheeling. However, this disconnect may provide an opportunity for local firms to provide publishing services to the anchor industries in this cluster.

Figure 11: Input Purchases from Outside Wheeling Region: Marketing, Design, and Publishing



Source: IMPLAN, Author Calculations

Figure 12: Import/Export Disconnect: Marketing, Design, and Publishing



Source: IMPLAN, Author Calculations. Bubble size represents value of imports in 2017 dollars.

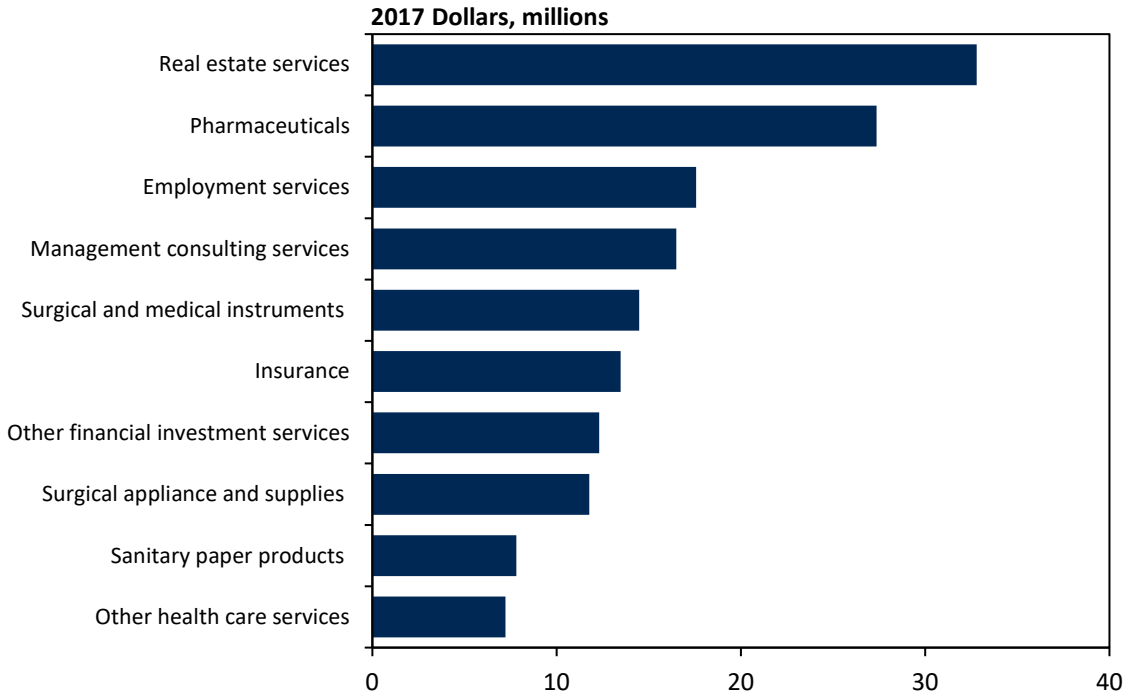
6.3 Health Care Services

Finally, the Health Services cluster is the last impact cluster identified in the analysis above. This cluster includes a wide range of services related to health care, from hospitals and doctor's offices, to dental clinics and nursing homes.

The Health Services cluster imported approximately $268 million in goods and services in 2017, approximately half of its total inputs of $546 million. The largest amount of imports—$33 million—came from the Real Estate Services industry (see Figure 11). This category includes a number of services surrounding the sale and leasing of real estate properties, which may be a potential growth area for local suppliers. The Health Care cluster also imported more than $27 million from the pharmaceuticals industry; however, since this is a global business it is unlikely that manufacturing in this area can be moved to the Wheeling region. The cluster also imports significant amounts of business services, including management consulting ($16.5 million) and employment services ($17.6 million).

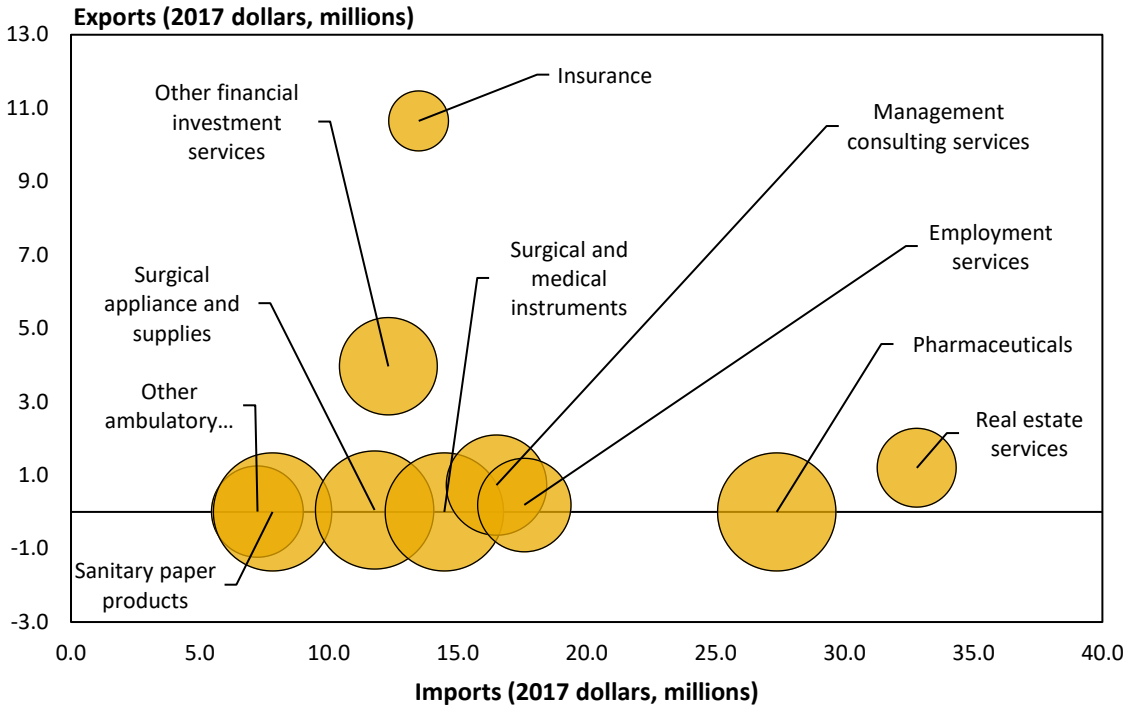
As shown in Figure 12, one potential market disconnect is in the area of Insurance. Wheeling's Insurance industry exported about $10.6 million in services in 2017, while at the same time the Health Services cluster imported about $13.5 million from the same industry. This mismatch may indicate that the health care sector requires more specialized insurance products than local suppliers can provide, but it may also indicate a potential opportunity for local suppliers to move into those markets. The Health Services cluster is importing more than two-thirds of its needs in Other Financial Investment Services, while the region is also exporting about $4 million of these same services to other areas. It is likely that since Wheeling is a relatively small urban area, many of these investment, banking, and credit services are being provided by companies in the Pittsburgh region. But Wheeling is also providing similar services to companies outside of Wheeling. This disconnect may offer an opportunity to expanding more specialized financial services into Wheeling to serve the local cluster.

Figure 13: Input Purchases from Outside Wheeling Region: Health Care



Source: IMPLAN, Author Calculations

Figure 14: Import/Export Disconnect: Health Services



Source: IMPLAN, Author Calculations. Bubble size represents value of imports in 2017 dollars.

7 Conclusion

This analysis has identified three clusters that have been growing in concentration in the Wheeling area and have the potential to provide significant economic impact to the local economy. All of the industries in these clusters would provide sound targets for development efforts in order to strengthen existing industrial linkages in the Wheeling economy.

The largest of the clusters we have identified is the Oil and Gas Production and Transportation cluster, which has experienced rapid development in the Wheeling region over the last 10 years. Oil and Gas now employs nearly 2,300 workers, second only to Business Services as an employer in the Wheeling Metropolitan Area. While this analysis identified Oil and Gas as a rising cluster in the area, it is largely a backward-looking snapshot of recent development in a sector that is relatively new to the region. Because of this, our analysis cannot take into account the potential for future downstream development from this cluster in those industries that rely on natural gas as an input to their production processes. The Wheeling region does not currently have the infrastructure in place to crack and refine natural gas and natural gas liquids for use in petrochemical and plastics manufacturing. However, these assets are under construction in Pennsylvania, and may soon be under construction in Ohio, which should allow Wheeling to capture economic activity in related industries. As a recent BBER analysis showed, these industries have the potential for large-scale economic impacts beyond that of extracting natural gas.[7] Thus, this cluster is likely to become an even more central part of the regional economy as the anchor for both mining and manufacturing.

Another significant finding of our research is the importance of the Wheeling area's service industries to the local economy. Two of the three impact clusters identified in this study were service sectors—Marketing, Design, and Publishing; and Health Services. These clusters may not produce large manufacturing plants with hundreds of employees, but they do employ skilled workers earning high wages. The Health Services cluster, in particular, is growing rapidly across the country and may provide significant opportunities for economic development. However, while this cluster has significant impact potential, it has faced difficulties since the end of our study period in 2017. The closure of Eastern Ohio Memorial Hospital and Ohio Valley Medical Center in 2019 resulted in the loss of more than 1,000 jobs. These job losses may make health care a difficult sector for economic targeting in the future.

[7] Eric Bowen, *Economic Impact of Downstream Gas Development in West Virginia* (Morgantown, WV: WVU Bureau of Business and Economic Research, Winter 2020), https://researchrepository.wvu.edu/bureau_be/321/

Appendix A: Industries included in Impact Clusters

Table 6: Oil and Gas Production and Transportation

NAICS Code	Industry Name
211111	Crude Petroleum and Natural Gas Extraction
211112	Natural Gas Liquid Extraction
213111	Drilling Oil and Gas Wells
213112	Support Activities for Oil and Gas Operations
324110	Petroleum Refineries
324199	All Other Petroleum and Coal Products Manufacturing
333132	Oil and Gas Field Machinery and Equipment Manufacturing
486110	Pipeline Transportation of Crude Oil
486210	Pipeline Transportation of Natural Gas
486910	Pipeline Transportation of Refined Petroleum Products
486990	All Other Pipeline Transportation
541360	Geophysical Surveying and Mapping Services

Table 7: Marketing, Design, and Publishing

NAICS Code	Industry Name
511120	Periodical Publishers
511130	Book Publishers
511140	Directory and Mailing List Publishers
511199	All Other Publishers
519110	News Syndicates
519120	Libraries and Archives
519130	Internet Publishing and Broadcasting and Web Search Portals
519190	All Other Information Services
541410	Interior Design Services
541420	Industrial Design Services
541430	Graphic Design Services
541490	Other Specialized Design Services
541613	Marketing Consulting Services
541810	Advertising Agencies
541820	Public Relations Agencies
541830	Media Buying Agencies
541840	Media Representatives
541850	Outdoor Advertising
541860	Direct Mail Advertising
541870	Advertising Material Distribution Services
541890	Other Services Related to Advertising

NAICS Code	Industry Name
541910	Marketing Research and Public Opinion Polling

Table 8: Health Services

NAICS Code	Industry Name
339116	Dental Laboratories
446110	Pharmacies and Drug Stores
446130	Optical Goods Stores
532291	Home Health Equipment Rental
621111	Offices of Physicians (except Mental Health Specialists)
621112	Offices of Physicians, Mental Health Specialists
621210	Offices of Dentists
621310	Offices of Chiropractors
621320	Offices of Optometrists
621330	Offices of Mental Health Practitioners (except Physicians)
621340	Offices of Physical, Occupational and Speech Therapists, and Audiologists
621391	Offices of Podiatrists
621399	Offices of All Other Miscellaneous Health Practitioners
621410	Family Planning Centers
621420	Outpatient Mental Health and Substance Abuse Centers
621491	HMO Medical Centers
621492	Kidney Dialysis Centers
621493	Freestanding Ambulatory Surgical and Emergency Centers
621498	All Other Outpatient Care Centers
621511	Medical Laboratories
621512	Diagnostic Imaging Centers
621610	Home Health Care Services
621991	Blood and Organ Banks
621999	All Other Miscellaneous Ambulatory Health Care Services
622110	General Medical and Surgical Hospitals
622210	Psychiatric and Substance Abuse Hospitals
622310	Specialty (except Psychiatric and Substance Abuse) Hospitals
623110	Nursing Care Facilities (Skilled Nursing Facilities)
623210	Residential Intellectual and Developmental Disability Facilities
623220	Residential Mental Health and Substance Abuse Facilities
623311	Continuing Care Retirement Communities
623312	Assisted Living Facilities for the Elderly
623990	Other Residential Care Facilities
812210	Funeral Homes and Funeral Services
812220	Cemeteries and Crematories

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