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Measuring Exports at the County Level: **Is it Possible?**

Author: Travis MG Yates

Phone: 716-523-2601

E-mail: tmy5026@psu.edu

Market Analyst, Economic Development Corporation

Cooperating Faculty Member:

Dr. James A. Kurre

Associate Professor of Economics

Director, Economic Research Institute of Erie

Black School of Business

814-898-6266

K12@psu.edu



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Abstract

Those who wish to promote economic development at the local level often start by asking how an area makes its living. That usually leads to the question of what the local area exports outside of its region to bring income in to local residents. However, data on this topic seem to be elusive. This project sets out to determine just what data are, and are not available, on exports for small economies. The focus is Northwest Pennsylvania and Northeast Ohio, specifically ten individual counties surrounding the Erie, Pennsylvania metro area, but the results can be useful for researchers anywhere in the country. The research examines what is and what is not available at such sources as the U.S. Department of Transportation, the U.S. Census Bureau's Division of Foreign Trade, PIERS DATA, the U.S. Bureau of Economic Analysis, USA Trade Online, and the International Trade Administration of the U.S. Department of Commerce. It provides information on the data that are available, such as how the data are gathered, their time period and frequency, how detailed the data are in terms of product/industry breakdowns, and potential problems with the data. Using data that are available, the project demonstrates how to analyze local economies' exports. Since it is often not possible to rely on direct export data, the project also presents an alternative method to estimate exporting activities using federal government data on employment and income that are typically available for county level economies. The sources and techniques here would be useful to serve as a model for other areas that wish to analyze their areas' exports.

Measuring Exports at the County Level: Is it Possible?

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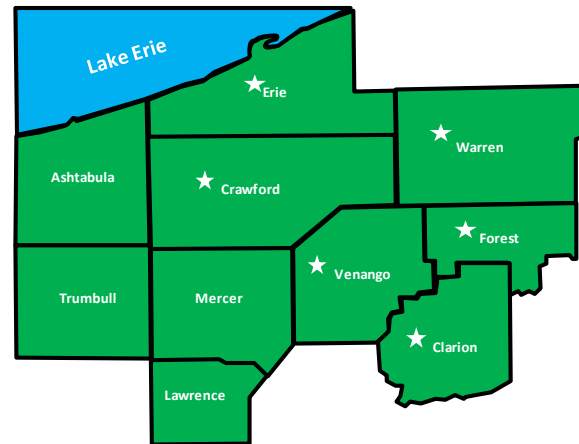
I. Introduction

Ten counties have been chosen for an economic analysis that primarily focuses on exports from the individual counties as well as the ten county region as a whole. For this paper exports are defined as anything leaving the county for destinations outside of the county. This means not only international exports, but domestic exports as well. Eight of the ten counties are in northwest Pennsylvania and the other two are in northeast Ohio. A map of the ten county region can be found in Figure 1.

Counties Chosen for Research

Ashtabula, OH	Lawrence, PA
Clarion, PA	Mercer, PA
Crawford, PA	Trumbull, OH
Erie, PA	Venango, PA
Forest, PA	Warren, PA

Figure 1
Map of Ten County Region*



*Counties that are part of Erie County's Economic Area are marked by a star.

The U.S Bureau of Economic Analysis (BEA) groups together counties with one or more economic nodes into Metropolitan or Micropolitan Statistical Areas, which serve as regional centers of economic activity and classifies them as Economic Areas (EAs). In making their decision on what areas to consider as EAs the BEA takes into account the commuting data from the 2000 decennial population Census, Metropolitan Areas as defined by the Office of Management and Budget which were redefined in February of 2004, and newspaper circulation data from the Audit Bureau of Circulations for 2001. (BEA Economic Areas, 2010)

The BEA considers Erie County to be the center of an EA and it serves five other counties: Clarion, Crawford, Forest, Venango, and Warren (BEA Regional Economic Accounts, 2010). These counties are marked by a star Figure 1 above. The other two Pennsylvania counties included in the study, Lawrence and Mercer, were added to the research list because the Northwest Pennsylvania Regional Planning and Development Commission (NWC) works with businesses in these counties as well as the six counties that are part of Erie's EA (Northwest Commission, 2010). Since the Northwest Commission is a leader in community development and regional planning, it would be best to include the other two

counties that fall outside of Erie County’s EA. It is also important to include these two additional counties because the NWC will be helping the Economic Development Corporation of Erie County (EDC) collect data on imports and exports in the future.

The two Ohio counties, Ashtabula and Trumbull, have been added to the list of counties being researched because of the Inland Port Project (IPP) that the EDC is working on. The IPP’s main goal is to develop an intermodal logistical hub in Northwest PA (the exact location is confidential) that capitalizes on the region’s uncongested highways, rail lines, and two under-utilized ports of Conneaut, Ohio and Erie, Pennsylvania (EDC, 2010). It is possible that the IPP can link all ten of these counties economically and in doing so make each one better off. In order to see if the IPP does this, it will be useful to set a benchmark by collecting and analyzing data now.

Even though the BEA does not officially consider four of the ten counties being researched in this paper to be economically linked, given the focus of the IPP, it is felt that at some point in the future they may all become economically linked.

With the exception of Lawrence County, each of these counties geographically borders at least two of the other counties being researched, so they are already linked in some way. Also, residents of these counties commute to surrounding counties to work, to visit friends and family, to vacation, and to go shopping. Evidence of this can be seen in the U.S. Census data on county to county workforce commuting. Table 1 below shows the number of people working in one of the other nine counties that is not the county of their residence and it shows the percentage of the host county’s total employment that is comprised of workers from the other nine counties collectively.

Table 1
Employees from Other Counties

County	Employees from Other Nine Counties	Percentage of Total Employment
Ashtabula	2,257	6.4
Clarion	991	7.1
Crawford	5,156	14.6
Erie	6,514	5.1
Forest	879	45.9
Lawrence	2,012	6.8
Mercer	7,228	15.2
Trumbull	4,136	5.5
Venango	3,118	14.4
Warren	581	3.4

Census Bureau, 2010

The NWC, which deals with businesses in the eight PA counties, has agreed to help collect import/export data generated by a survey that was earlier developed by the EDC. It will take time to collect and analyze these data, so this paper will not be able to include them. However, this paper will be useful as a cross reference tool for the newly collected data in the future.

II. Demographics

a) Population and Physical Size

As measured by 2008 population numbers Erie County was the largest county with a population of 279,647 people and the smallest was Forest County with a population of 6,808. In terms of physical size (square miles) Crawford County was the largest with a land area of 1,012.7 square miles and Lawrence County was the smallest with an area of 360.5 square miles. Table 2 shows relevant data for all ten counties.

The most densely populated county was Erie County with 348.7 persons per square mile, but the County of Trumbull was a close second with 342.8 persons per square mile. Forest County is aptly named since it was the least densely populated county with only 15.9 persons per square mile.

From 2001 to 2008 Ohio's and Pennsylvania's populations have increased 1.2 and 2.2 percent respectively (BEA Regional Economic Accounts, 2010). Even though Ohio's and Pennsylvania's populations have increased, the counties being researched have all decreased in population except for Forest County whose population has increased an estimated 35 percent. Warren County's population has decreased by 6.3 percent which is the largest decrease in population among the counties.

Table 2
Size of Counties Measured by Population and Land Mass

County	Population 2008	Percentage Change from 2001-2008	Physical Size In Sq. Miles	Population Per Sq. Mile
Ohio	11,528,072	1.2	40,948.4	281.5
Ashtabula	100,973	-1.7	702.4	143.8
Trumbull	211,156	-5.7	616.5	342.8
Pennsylvania	12,566,368	2.2	44,816.6	280.4
Clarion	39,753	-4.2	602.4	66.0
Crawford	88,524	-1.8	1,012.7	87.4
Erie	279,647	-0.7	802.0	348.7
Forest	6,808	35	428.1	15.9
Lawrence	90,555	-3.7	360.5	251.2
Mercer	116,660	-2.6	671.8	173.7
Venango	54,505	-4.4	675.0	80.7
Warren	40,776	-6.3	883.5	46.2
Totals for 10 Counties	1,029,357	-2.9	6,754.9	-
Average of 10 Counties	102,936	0.4*	675.5	152.4

BEA Regional Accounts, 2010 and Economic Census Bureau, 2010

*The 35 percent increase in Forest County's population skews the average. Without Forest County's population change included the average would be -3.5 percent.

b) Per Capita Income

Since 1969 U.S. per capita income has grown on average 6.2 percent per year, and from 1969 to 2008 the U.S. per capita income has nominally increased by 947.1 percent. From 2001 to 2008 the U.S. per capita income increased 29.0 percent, Ohio's increased 22.6 percent, and Pennsylvania's increased

29.7 percent (BEA Regional Economic Accounts, 2010). Table 3 shows per capita income data from the study region, the states in which the study region lies, and the United States.

On average, the focus counties' per capita income increased 27.0 percent from 2001 to 2008, less than the national average. Lawrence County's per capita income increased the most over the 2001-2008 period with an increase of 35.8 percent. Forest County's income per capita has increased the least over the same period with an increase of 6.1 percent, which pulls down the average per capita income for the ten counties, which would be 29.3 percent without Forest County.

Table 3
Per Capita Income

County/State/Country	Per Capita Income 2008 (\$)	Percentage Change 2001-2008
United States	40,166	29.0
Ohio	35,889	22.6
Ashtabula	28,881	23.2
Trumbull	30,850	22.6
Pennsylvania	28,881	29.7
Clarion	30,651	31.1
Crawford	29,222	30.4
Erie	32,294	29.3
Forest	23,100	6.1
Lawrence	31,303	35.8
Mercer	31,321	30.1
Venango	31,214	30.7
Warren	31,315	30.4
Weighted Average of 10 Counties	30,987	27.0

BEA Regional Economic Accounts

III. NAICS

a) NAICS Defined

The North American Industry Classification System (NAICS) identifies business establishments by category. It is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to countries in North America (U.S. Census Bureau, 2010). Economic units that use similar or identical processes to produce goods or services are grouped together into super sectors and the super sectors are broken down into sub-sectors. A list of the super sectors and their titles can be found in Table 4, and a more in depth explanation of each NAICS code can be found in the Appendix.

NAICS codes replaced the U.S. Standard Industrial Classification (SIC) system on April 9, 1997. The Office of Management and Budget (OMB) announced the decision to adopt NAICS codes as the industry classification system used by the statistical agencies of the United States, such as the BEA and the US Census Bureau.

NAICS was developed jointly by the US, Canada, and Mexico to provide new comparability in statistics about business activity across North America. NAICS codes also provide for increased

comparability with the International Standard Industrial Classification System (OMB, 2010), developed and maintained by the United Nations.

There are six different levels of NAICS codes. The two digit level is the basic level and contains data from the three digit level, the four digit level, the five digit level, and the six digit level. The two digit level represents the main industries and the sub levels simply break down the two digit level into greater detail. Therefore, the two digit level contains all of the data from all the sub levels. For the purposes of this paper NAICS codes will be used at the super sector level, meaning the two digit level.

Table 4
NAICS Codes and their Titles

NAICS Code	Name of Classification Code	Brief Title for Industry
11	Agriculture, Forestry, Fishing and Hunting	Agriculture
21	Mining, Quarrying, and Oil and Gas Extraction	Mining
22	Utilities	Utilities
23	Construction	Construction
31-33	Manufacturing	Manufacturing
42	Wholesale Trade	Wholesale
44-45	Retail Trade	Retail
48-49	Transportation and Warehousing	Trans. And Ware
51	Information	Info
52	Finance and Insurance	Finance/Insurance
53	Real Estate and Rental and Leasing	Real Estate
54	Professional, Scientific, and Technical Services	Scientific
55	Management of Companies and Enterprises	Management
56	Administration, Support, Waste Management, Remediation Services	Administration
61	Educational Services	Education
62	Health Care and Social Assistance	Health Care
71	Arts, Entertainment, and Recreation	Recreation
72	Accommodations and Food Services	Accommodations/Food
81	Other Services (Except Public Administration)	Other
92	Public Administration	Public Admin.

Census, 2010

b) Industrial Structure of Employment

A comprehensive table of all the counties, region, NAICS codes, and employment breakdown by sector can be found in Table 5. Either NAICS 31-33 (manufacturing), NAICS 62 (health care), or NAICS 92 (public admin.) were the leading employers in each of the ten counties in 2008. Ashtabula, Crawford, Trumbull, and Venango counties’ main employer was NAICS 31-33 (manufacturing). Erie, Lawrence, Mercer, and Warren counties’ main employer was NAICS 62 (health care). Forest County’s main employer was NAICS 92 (public admin.). NAICS 44-45 (retail) was also a main contributor (ten percent or higher) to each county besides Forest County. The economic structures of these counties are similar, with each county having one of the above mentioned sectors ranked one, two, three, or four as leading employers in their economies.

NAICS 21 (mining) employs approximately one percent or less in all counties besides Clarion and Warren counties where NAICS 21 (mining) employs greater than four percent. NAICS 22 (utilities)

and NAICS 51 (info) each employ approximately one percent or less in every county. NAICS 55 (management) also employs less than one percent of all employees in each county except for Warren County where NAICS 55 (management) accounts for over four and a half percent of total employment in the county.

Table 5
Percent of Total Employees Employed by Each NAICS Industry 2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	10 County Region	United States
11-Agriculture	2.9%	4.7%	5.4%	1.3%	10.7%	2.0%	2.4%	1.1%	2.1%	4.8%	2.3%	1.9%
21-Mining	0.5	4.5	1.1	0.3	-	0.3	0.7	0.7	1.2	4.3	0.9	0.6
22-Utilities	0.6	0.5	0.3	0.3	0.0	0.5	0.3	0.2	0.6	0.5	0.3	0.3
23-Construction	7.1	5.9	5.9	4.5	3.4	7.3	4.2	5.0	4.0	4.2	5.2	6.1
31-33-Manufacturing	16.3	11.0	16.9	14.4	8.2	10.7	15.0	16.4	16.9	13.2	14.8	7.8
42-Wholesale	2.0	2.0	1.6	2.6	0.7	2.9	3.4	2.7	2.5	1.6	2.5	3.6
44-45-Retail	12.2	12.0	11.1	11.3	5.3	11.2	13.0	13.0	13.6	11.0	12.0	10.4
48-49-Trans. And Ware	3.4	3.5	2.8	2.2	2.4	3.6	3.9	3.6	3.9	5.7	3.2	3.3
51-Info	1.0	0.8	0.9	1.4	0.6	1.5	0.8	0.9	0.8	0.7	1.1	1.9
52-Finance/Insurance	2.5	2.9	2.4	4.3	-	4.6	3.1	3.1	2.9	3.8	3.5	5.0
53-Real Estate	4.0	2.6	2.9	3.1	0.8	3.0	2.6	3.8	2.3	2.0	3.1	4.6
54-Scientific	3.0	2.4	3.2	3.8	-	3.9	2.7	3.1	2.4	2.7	3.2	6.8
55-Management	0.5	0.0	0.2	0.6	0.0	0.8	0.6	0.7	0.2	4.6	0.7	1.1
56-Administration	4.1	2.0	3.8	5.6	-	5.0	3.5	5.9	4.1	2.2	4.7	6.1
61-Education	1.0	0.8	2.6	3.1	-	2.7	2.4	1.0	0.6	1.1	2.0	2.1
62-Health Care	13.4	12.5	13.1	14.8	15.8	14.6	17.5	13.6	15.2	13.9	14.5	10.2
71-Recreation	1.5	0.8	1.4	2.5	1.2	1.7	1.5	1.6	1.0	1.1	1.7	2.1
72-Acommodations/Food	6.4	7.2	6.5	6.8	10.5	5.9	6.9	7.2	5.3	5.0	6.7	6.8
81-Other	5.7	6.2	7.3	5.9	4.2	6.3	6.1	5.7	6.1	6.2	6.0	5.7
92-Public Admin	11.9	17.7	10.6	11.2	32.0	11.5	9.4	10.7	14.2	11.4	11.5	13.5
Total	100.0%	100.0%	100.0%	100.0%	95.8%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

BEA Regional Economic Accounts, 2010

*Some of the counties had missing data which had to be estimated. However, Forest County did not have enough data in NAICS codes 21 (mining), 52 (finance /insurance), 54 (scientific), 56 (administration), and 61 (education) for an estimate to be generated due to non-disclosure problems. These industries together accounted for approximately 4 percent of Forest County's total employment, and approximately .03 percent of total employment for the ten county region as a whole. The highest employment, by percentage, is in bold face for each county. Please contact the author for details on the estimation process.

c) Growth of Employment by Individual NAICS: 2001-2008

A comprehensive table of counties, region, NAICS Codes, and growth rates for employment from 2001-2008 can be found in Table 6. The bolded blue numbers represent the sector with the highest growth and the bolded red numbers represent the sector with the highest contraction for each county.

The majority of the counties had high employment growth (greater than 20 percent) in NAICS 21 (mining), 53 (real estate and rental and leasing), 55 (management of companies and enterprises), 62 (health care and welfare assistance. NAICS 31-33 (manufacturing) has been decreasing in every single county being researched except for Forest (16.8 percent growth rate); it declined the most in Trumbull (-40.1 percent), and represents the fastest shrinking sector of the economy in the counties of Ashtabula, Erie, and Trumbull. Overall employment grew in every county except for Ashtabula, Trumbull, and Venango counties. As a whole the ten county region did not grow or shrink over the 2001-2008 time period.

One must note that even though some of these sectors are growing or shrinking at large rates the overall growth or contraction in employment numbers may not be that significant because that particular sector may only represent a small portion of total employment in that county.

Table 6
Employment Growth of Individual NAICS Industries 2001-2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region	United States
11-Agriculture	-17.8%	21.6%	3.9%	-5.1%	41.0%	-22.1%	-14.7%	-11.0%	-8.9%	34.7%	-3.6%	-9.3%
21-Mining	55.9	103.0	36.6	64.2	-	-8.3	320.0	27.4	86.9	89.1	72.7	43.3
22-Utilities	-8.8	-41.3	2.3	-3.0	-	4.0	-22.3	4.6	-42.9	-17.3	-13.1	-4.1
23-Construction	6.0	5.4	5.8	-3.6	-1.7	-1.7	-12.3	6.5	0.4	18.5	0.5	13.6
31-33-Manufacturing	-21.8	-15.2	-10.0	-23.3	16.8	-14.9	-9.5	-40.1	0.0	-28.7	-23.5	-16.7
42-Wholesale	1.8	-5.3	-10.7	1.3	4.2	-1.8	5.8	-8.6	45.0	-7.1	-0.1	5.4
44-45-Retail	2.6	-12.6	3.6	-6.5	-12.7	-21.1	-1.5	-9.4	-11.5	6.0	-6.4	3.3
48-49-Trans. and Ware.	22.1	-16.6	6.2	26.1	-10.0	62.5	53.1	-12.1	-21.4	-3.4	10.2	9.9
51-Infor	-15.7	-9.7	-4.8	-20.9	58.3	-20.3	-13.8	-0.1	-30.3	-21.6	-16.2	-12.8
52-Finance/Insurance	3.9	17.0	8.8	11.8	-	9.3	10.8	8.2	-17.2	36.7	9.6	15.6
53-Real Estate	21.2	64.9	45.0	18.2	28.6	26.4	37.2	18.2	35.7	55.4	25.4	50.9
54-Scientific	21.6	9.4	11.5	21.1	-	30.8	14.3	-15.4	4.4	-38.0	7.8	20.2
55-Management	28.9	-40.0	151.2	32.6	0.0	-17.7	294.7	2.7	95.2	-22.1	9.2	11.6
56-Administration	15.8	-3.7	6.4	8.2	-	50.2	20.6	23.5	0.9	-15.2	14.5	14.5
61-Education	-7.4	35.8	13.8	15.4	-	39.5	18.7	-7.3	8.6	114.7	15.4	28.4
62-Health Care	21.0	49.8	18.8	29.5	47.9	14.4	21.3	18.7	4.9	46.6	23.3	21.9
71-Recreation	-4.4	13.0	-12.7	44.4	50.0	0.9	18.9	7.3	-0.8	4.8	17.9	22.0
72-Accommodations/Food	-5.1	1.8	6.3	7.7	31.1	-4.5	-9.3	-3.0	7.3	2.5	0.7	13.9
81-Other	5.2	12.5	8.0	5.0	12.6	4.5	3.1	-7.4	-4.7	0.0	2.2	13.8
92-Public Admin.	-3.2	-2.8	-1.2	5.3	152.0	-4.1	-4.0	-12.0	-4.9	-14.5	-2.1	6.2
Overall Growth Rate	-0.2%	5.1%	4.2%	2.9%	43.4%	0.9%	4.4%	-10.2%	-2.1%	0.3%	0.0%	9.8%

BEA Regional Economic Accounts, 2010

*Numbers bold faced in blue represent the sector that has grown the most from 2001-2008 and numbers bold faced in red represent the sector that has contracted the most over the same time period for each county. Overall growth rate is defined as the change in total employment from 2001 to 2008.

d) Industrial Structure of Earnings

A comprehensive table of all of the counties, region, NAICS Codes, and earnings breakdown by sector can be found in Table 7. Either NAICS 31-33 (manufacturing) or NAICS 92 (public admin.) were the leading earners for each of the individual ten counties, as well as the region as a whole in 2008. The main earner for Ashtabula, Crawford, Erie, Mercer, Trumbull, Venango, and Warren counties was NAICS 31-33 (manufacturing). The leading earner for Clarion and Forest counties was NAICS 92 (public admin.). There was a tie for Lawrence County's leading earner between NAICS 31-33 (manufacturing) and NAICS 92 (public admin.). Each of the ten counties had over 11 percent of their earnings earned by NAICS 62 (health care), and each of the ten counties, besides Forest, had over 6 percent of their earnings earned by NAICS 44-45 (retail). The economic earnings structures of these ten counties were similar in 2008.

Table 7
Percent of Total Earnings by Each NAICS Industry 2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	10 County Region	United States
11-Agriculture	0.9%	0.8%	2.6%	0.3%	9.3%	0.4%	0.3%	0.2%	1.6%	0.5%	0.6%	1.1%
21-Mining	0.6	5.7	1.1	0.2	-	0.3	0.9	0.2	0.7	2.6	0.7	1.2
22-Utilities	1.8	1.1	0.7	0.7	0.1	1.3	0.6	0.5	1.8	1.3	0.9	0.8
23-Construction	5.0	5.1	4.2	4.1	2.1	11.2	3.8	4.1	2.8	3.2	4.6	6.1
31-33-Manufacturing	27.5	18.3	26.3	24.0	8.4	15.0	23.9	33.1	26.6	20.1	25.2	10.9
42-Wholesale	2.9	2.3	1.8	3.5	0.5	4.4	4.5	3.4	3.3	3.3	3.4	5.3
44-45-Retail	7.8	8.2	7.8	7.0	2.3	7.0	8.5	7.8	8.2	6.8	7.5	6.2
48-49-Trans. And Ware	4.1	4.6	2.9	2.4	2.4	5.5	5.2	3.8	4.5	6.3	3.8	3.4
51-Info	1.1	0.8	1.0	1.9	0.4	1.6	0.9	1.0	1.2	0.8	1.3	3.4
52-Finance/Insurance	2.5	2.9	2.3	6.2	-	5.1	4.1	3.0	3.4	4.7	4.3	7.5
53-Real Estate	0.8	0.6	1.0	0.9	0.1	1.8	0.8	1.1	0.6	0.7	0.4	1.7
54-Scientific	1.9	4.2	2.6	3.9	-	3.7	2.3	2.2	1.8	2.2	2.9	9.7
55-Management	0.6	0.2	0.4	1.0	0.0	1.9	1.0	1.3	0.2	8.9	1.3	2.4
56-Administration	2.2	1.0	1.8	3.1	-	2.7	2.4	3.2	2.2	0.8	2.6	3.9
61-Education	0.4	0.3	2.6	2.2	0.1	1.7	2.0	0.4	0.3	0.8	1.5	1.5
62-Health Care	14.6	11.3	15.6	15.9	15.2	13.6	18.3	13.9	15.1	13.5	15.2	10.1
71-Recreation	0.3	0.2	0.3	1.0	0.5	0.6	0.4	0.4	0.2	0.4	0.6	1.1
72-Acommodations/Food	2.8	2.9	3.1	2.6	4.9	2.1	3.1	3.2	2.0	1.9	2.8	3.0
81-Other	5.0	5.9	6.5	4.6	3.1	5.0	4.6	4.1	4.5	4.5	4.7	3.8
92-Public Admin	17.2	23.7	15.3	14.7	48.2	15.0	12.5	13.2	18.9	16.7	15.2	16.9
Total	100.0%	100.0%	100.0%	100.0%	97.6%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	100.0%

BEA Regional Economic Accounts, 2010

*Some of the counties had missing data which had to be estimated. However, Forest County did not have enough data in NAICS codes 21 (mining), 52 (finance/insurance), 54 (scientific), and 56 (administration) due to non-disclosure problems. These industries together accounted for approximately 2 percent of Forest County's total earnings, and approximately .06 percent of total earnings for the ten county region as a whole. The highest employment, by percentage, is in bold face for each county. Please contact the author for details on the estimation process.

e) Growth of Earnings by Individual NAICS: 2001-2008

A comprehensive table of counties, region, NAICS Codes, and growth rates for earnings from 2001-2008 can be found in Table 8. The blue bold faced numbers represent the sector with the highest growth and the bold faced red numbers represent the sector with the highest contraction for each county.

The majority of counties had high earnings growth rates (greater than 20 percent) in NAICS 11 (agriculture), NAICS 21 (mining), NAICS 42 (wholesale), NAICS 55 (management), NAICS 56 (administration), NAICS 61 (education), NAICS 62 (health care), NAICS 72 (accommodations/food), NAICS 81 (other), and NAICS 92 (public admin.). The fastest growing sector for the region as a whole was NAICS 21 (mining).

Even though employment in NAICS 31-33 (manufacturing) decreased in every county, except Forest County, earnings in the sector grew in every county except Trumbull County leading to the observation that income per capita in the sector has increased. In NAICS 31-33 (manufacturing) Forest County had the largest growth (46.5 percent).

Overall growth in earnings occurred in every county, with the fastest growth occurring in Forest County and the slowest occurring in Trumbull County. As a whole, the ten county region increased its earnings by approximately 19 percent from 2001-2008.

One must note that even though some of these sectors are growing or shrinking at large rates the overall growth or contraction in earnings numbers may not be that significant because that particular sector may only represent a small portion of total earnings in that county.

Table 8
Earnings Growth of Individual NAICS Industries 2001-2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region	United States
11-Agriculture	79.7%	-10.8%	44.7%	-38.2%	333.2%	606.4%	-29.0%	25.4%	322.4%	-20.1%	31.1%	35.3%
21-Mining	190.6	219.2	54.1	81.2	-	16.7	982.2	108.7	170.4	225.4	170.7	93.5
22-Utilities	29.1	-27.8	42.2	26.9	102.3	90.2	12.6	36.1	-23.1	2.4	18.9	30.6
23-Construction	-7.4	11.5	1.3	-5.2	-22.6	45.0	-23.7	2.8	-5.2	-5.3	1.6	22.7
31-33-Manufacturing	0.8	1.8	9.9	4.8	46.5	17.9	17.8	-20.7	29.0	-9.2	-1.4	9.8
42-Wholesale	42.6	6.1	13.6	27.9	49.7	47.5	34.3	20.6	112.8	97.8	32.7	36.2
44-45-Retail	19.8	-3.7	25.6	9.7	-31.5	-5.5	12.1	8.8	2.8	22.0	9.5	20.7
48-49-Trans. and Ware.	17.0	-23.6	6.9	42.5	17.9	115.1	80.1	-0.9	-20.0	3.3	22.6	25.3
51-Infor	-4.6	6.5	32.0	3.3	49.2	-12.7	5.3	9.3	48.0	-28.5	3.7	13.3
52-Finance/Insurance	23.5	12.6	15.8	50.4	-	15.2	52.1	9.9	4.3	62.1	33.9	36.4
53-Real Estate	-23.0	18.7	27.3	-38.1	95.8	150.5	4.8	-14.0	-6.7	-3.1	-28.9	-2.0
54-Scientific	28.4	177.4	17.1	44.8	-	61.9	4.0	-7.7	32.8	-52.6	23.9	45.3
55-Management	63.8	498.8	256.8	97.4	0.0	64.1	601.3	27.2	64.2	19.0	59.6	44.5
56-Administration	48.1	20.5	19.1	35.1	-	126.9	31.7	40.6	9.5	49.0	39.0	38.1
61-Education	27.0	87.9	50.7	55.4	0.0	56.4	61.3	27.2	44.5	363.0	55.0	61.8
62-Health Care	48.2	63.3	49.8	48.8	100.8	29.7	42.0	51.2	31.1	67.1	46.9	53.3
71-Recreation	-20.1	14.9	-28.2	102.1	109.2	34.7	2.4	-10.6	-23.6	45.5	38.1	39.5
72-Accommodations/Food	20.8	32.7	4.2	39.5	113.3	19.3	4.5	30.6	31.3	30.4	25.4	37.7
81-Other	33.0	45.4	43.5	31.5	67.3	35.8	30.9	7.9	25.7	14.4	27.9	39.3
92-Public Admin.	24.4	24.0	27.8	34.7	253.3	21.4	24.5	17.7	18.1	12.9	26.8	45.3
Overall Growth Rate	17.9%	21.7%	23.3%	23.8%	108.6%	31.7%	25.7%	1.9%	20.4%	14.1%	18.6%	33.5%

BEA Regional Economic Accounts, 2010

*Numbers bold faced in blue represent the sector that has grown the most from 2001-2008 and numbers bold faced in red represent the sector that has contracted the most for each individual county for the same time period. Overall growth rate is defined as the change in total earnings from 2001 to 2008.

IV. Possible Resources for County Import and Export Data

This project explored nine databases in an attempt to ferret out good, reliable sources for data pertaining to imports and exports at the county level. This section will give an overview of the databases covered by this project. The sources will be in order from least helpful to most helpful.

a) **The Northwest Pennsylvania Regional Planning and Development Commission**

(<http://www.nwcommission.org/>)

Through contacts with representatives at The Northwest Commission it was discovered that they do not have import/export data at the county level. However, in conjunction with the Economic Development Corporation of Erie County, they are working on gathering such data through a region-wide logistics survey. The survey is still in the process of being distributed and collected throughout the region.

b) **Office of PennPorts, Pennsylvania Department of Community and Economic Development**

A valid website for the Office of PennPorts does not exist. The Office of PennPorts was contacted multiple times through e-mail (hpacker@state.pa.us) beginning on September 27, 2010, but no response was ever received. Judging by the lack of info found on the web and their lack of a response through e-mail, it has been ruled that the Office of Penn Ports does not have the databases needed for this report.

c) **WISER Trade Data**

(<http://www.wisertrade.org/>)

WISER Trade data is a database that contains data on international exports, but the data only go down to the state level. At the state level, WISER has export data at the 6-digit Harmonized Commodity Description and Coding System (HS)¹ by country of destination, and value and weights by method of transportation (annual data from 1996 and monthly data from January 2006 to present). They also have state international exports at the 3 digit NAICS industry by country, origin of movement and exporter location series, and value and weights by method of transportation (annual data from 1997 and quarterly data from quarter one of 1997). Data can also be obtained by port of exit by country (annual data from 1997 and quarterly data from quarter one of 2001 to present). This is a for-profit website; they sell their data rather than making it publicly available for free.

Even though WISER Trade Data did not have export data at the county level, the employees were extremely helpful. Through e-mail conversations one of their employees disclosed a database that was not previously known to this project. It turned out to be the most useful database for this paper and it will be discussed below.

d) **The US Department of Transportation**

(<http://www.dot.gov/>)

¹ The Harmonized Commodity Description and Coding System (HS) is an internationally standardized system of names and numbers for classifying traded products developed and maintained by the World Customs Organization, which is an independent intergovernmental organization with over 170 member countries based in Brussels, Belgium.
http://www.wto.org/english/thewto_e/coher_e/wto_wco_e.htm#goods_schedules

A search through this website turned up no data on imports or exports, but it did lead to the U.S. Census Bureau's American Fact Finder. The Census Bureau's American Fact Finder had a breakdown of commodity flows at the state level by mode of transportation and the average shipping distances of select commodities organized by NAICS Codes (not all NAICS codes are represented, just a select few). The data base is derived from the 2007 Commodity Flow Survey.

e) **Port of Erie/Port of Conneaut**

(<http://www.porterie.org/>)

(<http://www.conneautportauthority.com/>)

Each the ports' websites only had basic information regarding events held at the ports, camping near the ports, doing basic business with the ports, tourism, and industries located at the ports.

f) **The U.S. Census Bureau's Division of Foreign Trade**

(<http://www.census.gov/foreign-trade/>)

The U.S. Census Bureau's Division of Foreign Trade has international export and import data at the state level. The database lists the top 25 commodities that are imported and the top 25 commodities that are exported for each state. It classifies its commodities by the 6-digit Schedule B code of the HS. The database has data for the years 2006 through 2009, each commodity's share (percentage) of the state's total imports/exports, and the percentage change from 2008 to 2009 for each commodity listed (values are based on the 2009 dollar).

The database also has international export and import data by individual states broken down by Foreign Trade Zones, but the data are only broken down into manufactured commodities and non-manufactured commodities and it does not show the destination or origins of the exports and imports in the tables. However, other tables pertain to state's export destinations and import origins, and list the top 25 destination/origin countries of each state, but yet again it is total exports and imports and is not broken down into NAICS or HS codes.

The Census Bureau's Division of Foreign Trade gathers their data when commodities pass through U.S. Customs, for both importing and exporting. U.S. Customs collects the data and the Census Bureau's Division of Foreign Trade sorts through, organizes, and analyzes the data collected.

After searching through the website, the Division of Foreign Trade was contacted to see if they had any data that was not on their website. The representative there stated that analysis on imports and exports is only done down to the state level in their department.

g) **PIERS Data**

(<http://www.piers.com/index.cfm?page=home>)

Port Import Export Reporting Service (PIERS) data are available for purchase; it is not a free site. The PIERS site suggests that they may have or possibly could compile the necessary data for the project. The site states that they already have complete, accurate, and reliable import and export commodity information, but they do not state what geographical level they have the data available for (country, state, MSA, county). The site also offers customized solutions to data needs such as customized regions, commodities, and trading lanes.

After searching through their site a contact was developed. The contact at PIERS was asked for data on imports and exports, which were categorized by NAICS, at the county level for the past ten years. The contact explained that such a database was not currently available, but that one could be compiled. During conversations it was revealed that PIERS has international import and export data down to the zip code level.

For international import and export data, categorized by NAICS, at the county level it would cost \$12,000 for the past one year, \$32,000 for the past five years, and \$54,000 for the past ten years. Due to budget limitations for this project, these data will not be able to be obtained. If the funds were available this might be the ideal database to use. However, PIERS Data only measures international imports and exports, and do not include domestic imports and exports to and from individual counties to and from other domestic origins within the U.S.

h) USA Trade Online

(<http://www.usatradeonline.gov/>)

As of October 1, 2010, the U.S. Census Bureau took over operation of USA Trade Online (USTO). However, it is not a free website. It is a for-profit website that charges \$25 for single day access to its data, \$75 for a monthly subscription, or \$300 for a year long subscription. A free demo on the website allows a user to explore the types and organization of data that the USTO provides.

“Data on U.S. exports of merchandise from the U.S. to all countries, except Canada, is compiled from the Electronic Export Information (EEI) filed by the US Principal Party in Interest (USPPI) or their agents through the Automated Export System (AES). The EEI is unique among Census Bureau data collection methods since it is not sent to respondents soliciting responses as in the case of surveys. Each EEI represents a shipment of one or more kinds of merchandise from one exporter to one foreign importer on a single carrier. Filing the EEI is mandatory under Chapter 9, Title 13, United States Code. Qualified exporters or their agents submit EEI data by automated means directly to the U.S. Census Bureau (USA Trade, 2010)”. This is only for international import and export data.

“The United States is substituting Canadian import statistics for U.S. exports to Canada in accordance with a 1987 Memorandum of Understanding signed by the Census Bureau, U.S. Customs and Border Protection, Canadian Customs, and Statistics Canada. Similarly, under this Memorandum of Understanding, Canada is substituting U.S. import statistics for Canadian exports to the United States. This data exchange includes only U.S. exports destined for Canada and does not include shipments destined for third countries by routes passing through Canada or shipments of certain grains and oilseeds to Canada for storage prior to exportation to a third country. These shipments are reported on and compiled from EEIs (USA Trade, 2010).”

The USTO’s data collection method is a very efficient and accurate way to collect export data. It classifies commodities by schedule B of the HS; there are approximately 8,000 commodity classifications. Export data can be found all the way down to the zip code level based on the Origin of Movement (OM). However, there are some flaws in this system. For example, corn produced in Iowa and then shipped down the Mississippi River to Louisiana for export will have an OM destination of a zip code in Louisiana, not Iowa. Therefore, Louisiana’s exports will be overstated and Iowa’s exports will be understated.

The USTO also allows the user to break import and export data down to the port level. It does not just use coastal ports; it also has Great Lakes ports. However, the OM problem will still persist; just because a good is exported through a port does not mean it originated there and imports coming into the port won't necessarily stay in that area.

i) **The International Trade Administration of the US Department of Commerce**

(<http://www.trade.gov/>)

The International Trade Administration (ITA) of the US Department of Commerce has export data as far down the geographic spectrum as the Metropolitan Statistical Area (MSA). This report is looking for data sources that have true OM specifications at the county level; if the product was manufactured or grown in that county, it counts as that county's export. Therefore, this report is looking for "export" and "import" data that is being shipped into or out of the county, to or from other countries, states, or counties; the ITA web site only offers international import and export data.

The ITA offers publicly available databases for exports to individual countries, world geographic regions, and trading regions (the world geographic regions and trading areas are defined by the ITA) at the state level. It has state level data available for the years 1992 to 2009 and it breaks down exports to the two and three digit NAICS levels for the years 2001-2008 and SIC for the years 1992 to 2000. This website also allows the user to build graphs and charts representing the percentage change of exports over x number of years for the regions selected. The ITA would be extremely useful if looking for export data at the state level. However, time series analysis can not be done accurately because due to improvements in methodology and data collection, the 2008 match rate² of 89 percent (by value) was 11 percentage points higher than the 1992 match rate of 78 percent. As a result, changes in the number of exporters over the 1992–2008 period should be interpreted with some caution. Some portion of the increase in the exporter population was undoubtedly the by-product of measurement enhancements; however, the extent of the effect is unknown (ITA, 2010).

MSA export data are only available for the 2006-2008 period. Available data at the MSA level includes metro area exports ranked from greatest to least exports, exports broken down into NAICS codes, the destinations of the MSA's exports by world trade groups (ASEAN, European Union, NAFTA, etc.), and the percentage each of the state's MSAs contributes to the state's total exports.

The good news is that since the ITA has export data down to the MSA level, and Erie County is a single county MSA, export data can be obtained for Erie County. But the bad news is that none of the other counties being researched are a single county MSA, so the ITA has no data for them. There are 27 of the roughly 365 MSAs in the U.S. are single county MSAs

The website does not provide an e-mail contact option, but it does give a telephone number (1-800-USA-TRAD). After speaking with a contact at the ITA it was confirmed that export data at the county level are not available to the public. They have export data at the OM zip-code based level, but it is non-disclosed information and it has the same problems USTO has with their OM-zip-code based data.

² The percent value of exports that were able to be matched to a specific exporting company.

V. U.S. Data Collection Process for International Exports and Imports (Census Division of Foreign Trade, 2010)

The Automated Export System (AES) is a computer system that collects Electronic Export Information (EEI). It is required by law (Chapter 9, Title 13, United States Code) that companies that export, at a value greater than \$2,500, must report their EEI for goods exported from the U.S and its territories; Canada is exempt³. The EEI must be filed by the U.S Principal Parties in Interest (USPPI) or an authorized agent. Each EEI represents a shipment of one or more kinds of merchandise from one exporter to one foreign importer. The EEI information is automatically submitted to the U.S. Census Bureau. The U.S. Census Bureau then compiles the data in terms of commodity classification, quantities, values, shipping method (air or vessel), state of origin, customs district, customs port, country of destination, and whether goods are domestic goods or re-exports. Since January 1989 data on commodities have been compiled under schedule B Harmonized Classifications of Domestic and Foreign Exports. These transactions are classified under approximately 8,000 different commodities leaving the U.S. Besides being reported by schedule B Harmonized Classifications, product categories are also compiled by the Standard International Trade Classifications (SITC), North American Industry Classification System (NAICS), End-Use Commodity Classification, and Advanced Technology Products. These statistics include data about all 240 U.S trading partners, 400 U.S ports, and 45 districts. These data are continuously compiled and processed. However, the data are not released minute by minute. The data are released monthly, showing up on the website approximately 40-45 days after the end of the month. After the data are posted they can be viewed monthly, quarterly, yearly, and year to date. The Census Bureau has the data all the way down to the zip code level, but it is not available to the public. State level data are the only complete publicly available data and partial MSA data are available.

Import data are compiled similarly. Import data are collected and analyzed by the U.S Customs and Border Protection and the BEA for imports that are valued at \$2,000 or greater. Chapter 9, Title 13, of the United States Code makes record keeping on imports mandatory. These data are compiled in terms of commodity classification, quantities, values, shipping weight, methods of transportation (air or vessel), duties collected, unit prices, market share, country of origin, customs district, customs port, and import charges and duties. Since January of 1989 commodities have been compiled under the Harmonized Tariff Schedules of the United States which contains more than 18,000 import commodity codes. Statistics are also compiled under the Standard International Trade Classifications (SITC), North American Industry Classification System (NAICS), End-Use Commodity Classification, Advanced Technology Products, and American Iron and Steel Groups. The statistics include data about all 240 U.S trading partners, 400 U.S ports, and 45 districts. Import data are also compiled continuously. Documents are collected by the U.S. Customs and Border Protection as shipments arrive at the border. The U.S. Customs and Border Protection then pass the raw data they have collected on to the U.S. Census Bureau. The U.S. Census Bureau then turns the raw data into statistics which are reported monthly, approximately 40-45 days after the end of the calendar month and on a year to date basis. Historic data can be found in reports that

³“Statistics for U.S. exports to Canada are based on import documents filed with Canadian agencies and forwarded to the U.S. Census Bureau under a 1987 data exchange agreement. Under this agreement, each country eliminated most cross-border export documents; maintains detailed statistics on cross-border imports; exchanges monthly files of cross-border import statistics; and publishes exchanged statistics in place of previously compiled export statistics” (Census Division of Foreign Trade, 2010).

summarize data by month and year. Before January of 2010 import data were only reported at the national level, now complete import data are available at the state level and above. Import data do not exist below the state level at levels such as MSA or county.

VI. Analysis of Available Export Data for Erie County

The only website that had export data down to the MSA level was the ITA’s website. This project however, is searching for sources that have import or export data at the county level, and since Erie, Pennsylvania is a single county MSA the data will work as county data for Erie. However, one must remember that these figures only represent international exports, and do not include exports to other economies located with the United States. The ITA only offers limited data at the MSA level and they are represented in the tables below. Table 9 shows Erie County exported over \$1.8 billion of output, which accounted for 4.6 percent of the state’s exports in 2008. For the same year, Erie County was ranked 6th out of Pennsylvania’s 14 MSAs behind Philadelphia-Camden-Wilmington, Pittsburgh, Allentown-Bethlehem-Easton, York-Hanover, and Harrisburg-Carlisle respectively. Erie County increased its international exports approximately 64 percent from 2007 to 2008, despite the recession.

**Table 9
Erie's Total Exports and Percentage of States Total**

Year	2006	2007	2008
Erie’s Total Exports (\$)	1,177,947,352	1,135,300,927	1,861,931,339
Percent of Pennsylvania’s Total Exports	3.9	3.3	4.6

Table 10 represents Erie County’s top five international exports in monetary value and as a percentage of total exports for the years 2006-2008. Each of the top five exports falls into the two digit NAICS category 31-33, manufacturing, so they have been disaggregated to the three digit level in order to see the specific industries that make up the majority of Erie County’s exports. Unsurprisingly, Erie County’s main exporting industry was NAICS 336 (transportation equipment), and has averaged 56.21 percent of total international exports for the time period represented in the table. This was not surprising because Erie County is home to a major General Electric plant, which is a main employer for the county

Table 10
Top Five NAICS Exports for Erie County Pennsylvania 2006-2008*

NAICS	2006 (\$)	2006 Percentage	2007 (\$)	2007 Percentage	2008 (\$)	2008 Percentage
336 - Transportation Equipment	673,372,250	57.2	632,781,376	55.7	1,037,495,506	55.7
333 - Machinery, Except Electrical	145,316,812	12.3	158,670,071	14.0	229,279,009	12.3
335 - Electrical Equipment, Appliances, And Components	58,553,378	5.0	57,656,107	5.1	160,056,275	8.6
325 - Chemicals	(NA)	(NA)	(NA)	(NA)	100,298,461	5.4
332 - Fabricated Metal Products	50,959,013	4.3	64,293,311	5.7	100,285,382	5.4
334 - Computer And Electronic Products	72,308,880	6.1	74,908,779	6.6	(NA)	(NA)
RES - All Others (Residual)	177,437,019	15.1	146,991,283	12.9	234,516,706	12.6
Total	1,177,947,352	100.0	1,135,300,927	100.0	1,861,931,339	100.0

*(NA) means this NAICS Code is not in the top 5 categories for export that year

Table 11 shows the monetary value of international exports to each of the top ten destinations for Erie County. The Asia-Pacific Economic Cooperation (APEC) area is the lead importer of Erie County's exports. The North American Free Trade Agreement (NAFTA) and South America are the second and third leading importers of Erie County exports respectively, but each of their totals only represented about half of the exports to APEC in 2008. However, these world destinations are based on political, economic, and geographic groupings and therefore some countries may be members of multiple groups resulting in values for country groups that cannot be summed to arrive at meaningful totals.

Table 11
Top Ten Export Destinations for Erie County*

Destination	Export Value 2006 (\$)	Export Value 2007 (\$)	Export Value 2008 (\$)
Asia-Pacific Economic Cooperation	803,532,935	724,775,235	1,007,157,682
North American Free Trade Agreement	484,465,218	527,575,975	520,518,011
South America	100,455,498	150,678,672	435,147,838
Asia	255,739,235	101,306,870	361,440,571
European Union	95,663,259	138,457,560	209,795,571
Africa	19,847,556	22,329,045	95,756,614
Association of Southeast Asian Nations	17,231,919	26,850,417	52,935,267
Organization of the Petroleum Exporting Countries	17,283,207	21,374,345	31,691,651
Dominican Republic - Central American Free Trade Agreement	1,405,494	1,700,207	3,010,570
Free Trade Area of the Americas	589,244,032	682,786,983	(NA)

*(NA) means this data is not available

The ITA only offers some data for international exports at the MSA level. Since Erie County is a single county MSA the data found on the ITA website was useful for exploring county level international exports. However, Erie County is the only single county MSA of the ten counties being researched. In order to have some type of insight into the exports of the other counties, an alternative approach needs to be taken. This approach will also be useful to estimate data on total exports for Erie County, not just international exports. This approach is the location quotient approach.

VII. Location Quotients

a) Location Quotients Defined

A location quotient (LQ) is a statistical measure of concentration. LQs allow local economies, such as counties, to be compared to larger economies, such as the United States in order to uncover specializations of the local economy. The average location quotient for Erie County's NAICS 31-33 (manufacturing) employment for the time period 2001-2008 is calculated in Figure 1 below as an example.

Figure 2
Location Quotient Equation

$$\text{Location Quotient} = \frac{\% \text{ of Erie County's workforce in NAICS 31-33}}{\% \text{ of workforce United States' workforce in NAICS 31-33}}$$

$$\text{Location Quotient} = \frac{15.95 \text{ percent}}{8.78 \text{ percent}}$$

$$\text{Location Quotient} = 1.82$$

This means that the percentage of total employment in Erie County's Manufacturing sector (NAICS 31-33) is 82 percent larger than that of the United States. This same method can be applied to earnings as well.

There can only be three outcomes for LQs; less than one, equal to one, or greater than one. A LQ less than one suggests that local earnings/employment is less than was expected for the given industry based on the national average. This indicates that the particular industry does not meet local demand for the good or service, and therefore the local area must import the good or service from outside of the region. If the LQ is equal to one then the local economy has enough earnings/employment in that sector to meet the local demand (not exceed it) for goods or services produced by that industry, and therefore does not import or export the goods or services produced by that industry. Lastly, if the LQ is greater than one it suggests that the local economy has greater earnings/employment, as a percentage, in that industry than the national average, and therefore the industry produces beyond local demand for the good

or service which allows the region to export that good or service to other economies. LQs greater than one identify industries that export from the local region to other economies.

b) Location Quotients: Average Employment Data 2001-2008

Table 12 shows a comprehensive table of employment LQs derived from average employment for each NAICS super-sector for the time period 2001-2008. LQs greater than one are in bold face and represent estimated exporting NAICS sectors for the county. Average employment numbers were used because during the time period the economy was rather volatile.

The highest employment LQs for Ashtabula, Erie, Mercer, Trumbull, and Venango counties was NAICS 31-33 (manufacturing). NAICS 11 (agriculture) was the highest for Crawford and Forest counties, NAICS 21 (mining) was the highest for Clarion and Warren counties, and NAICS 22 (utilities) was the highest for Lawrence County. NAICS 31-33 (manufacturing) was the highest for the region as a whole, indicating that the key export for the region is still manufacturing.

The LQ for NAICS 11 (agriculture) for Forest County was 5.13 indicating that the county has over five times the nation's percentage of employment in that sector. LQs for NAICS 21 (mining) for Warren and Clarion counties were also over five times the national average. The LQ for NAICS 55 (management) for Warren County was over four times the national average.

LQs only identify possible exporting sectors of the economy. In order to see how much employment/earnings are being devoted to creating the exports, export base analysis must be conducted. This technique will be discussed in Section VIII.

Table 12
Average Employment Location Quotients for the Time Period 2001-2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	1.50	2.04	2.58	0.63	5.13	1.07	1.23	0.53	1.05	2.00	1.11
21-Mining	0.68	5.91	1.54	0.38	-	0.47	0.80	1.00	1.55	5.49	1.16
22-Utilities	1.67	1.53	0.84	0.82	-	1.43	1.05	0.52	1.50	1.57	1.00
23-Construction	1.13	0.95	0.96	0.77	0.70	1.19	0.72	0.75	0.65	0.62	0.83
31-33-Manufacturing	2.10	1.50	2.03	1.82	1.17	1.29	1.76	2.35	1.84	1.76	1.90
42-Wholesale	0.55	0.58	0.48	0.71	0.26	0.78	0.92	0.72	0.62	0.48	0.69
44-45-Retail	1.13	1.21	1.06	1.12	0.63	1.17	1.23	1.21	1.32	1.00	1.15
48-49-Trans. and Ware.	0.89	1.17	0.82	0.62	0.90	0.83	1.01	1.07	1.34	1.79	0.91
51-Infor	0.55	0.37	0.44	0.80	0.27	0.86	0.43	0.45	0.51	0.42	0.59
52-Finance/Insurance	0.51	0.55	0.48	0.88	-	0.98	0.64	0.58	0.64	0.72	0.70
53-Real Estate	0.89	0.52	0.64	0.74	0.20	0.71	0.58	0.82	0.51	0.42	0.70
54-Scientific	0.43	0.36	0.49	0.58	-	0.55	0.41	0.49	0.36	0.56	0.49
55-Management	0.41	0.08	0.14	0.50	-	0.74	0.40	0.59	0.09	4.48	0.60
56-Administration	0.70	0.34	0.62	0.90	-	0.79	0.61	0.85	0.70	0.35	0.75
61-Education	0.52	0.38	1.28	1.46	-	1.16	1.16	0.50	0.32	0.40	0.96
62-Health Care	1.23	1.10	1.27	1.38	1.57	1.41	1.70	1.25	1.52	1.27	1.36
71-Recreation	0.74	0.38	0.80	1.04	0.57	0.82	0.66	0.74	0.50	0.56	0.80
72-Accommodations/Food	1.01	1.07	0.96	1.01	1.59	0.90	1.11	1.02	0.80	0.73	1.00
81-Other	0.99	1.05	1.27	1.05	0.83	1.09	1.10	0.98	1.12	1.13	1.06
92-Public Admin.	0.87	1.36	0.79	0.81	1.90	0.85	0.72	0.78	1.05	0.91	0.84

*Bold LQ represent suggested exporting NAICS sectors.

c) Location Quotients: Comparing Growth and Recessionary Years on Employment Data

Employment LQs were also calculated for the single years of 2006 and 2008 because these years represent different economic times; 2006 being a growth year and 2008 being a recessionary year. Table 13 represents the employment LQs for the year 2006 and Table 14 represents the employment LQs for 2008. In both tables the bold faced numbers represent LQs greater than one and suggest that the NAICS sector is an exporting sector.

The employment LQs for 2006 and 2008 were very similar. There were only a few differences. NAICS 21 (mining) went from being an importing sector for Mercer and Trumbull counties in 2006 to an exporting sector in 2008. NAICS 44-45 (retail) went from being an importing sector for Warren County in 2006 to an exporting sector in 2008. NAICS 48-49 (trans. and ware.) went from being an importing sector for Ashtabula and Lawrence counties in 2006 to an exporting sector in 2008.

NAICS 52 (finance/insurance) went from being an exporting sector for Lawrence County in 2006 to an importing sector in 2008. NAICS 71 (recreation) went from being an importing sector for Erie County in 2006 to an exporting sector in 2008. NAICS 81 (other) went from being an importing sector for Trumbull County in 2006 to an exporting sector in 2008. These are the only differences between the two years.

Both of these individual years resemble the employment LQs found for the time period 2001-2008 suggesting that growth and recessionary periods do not greatly affect employment LQs for the researched region. However, the region being discussed may be an individual case and future researchers should also observe individual employment LQs along with the average.

Table 13
Employment Location Quotients for 2006*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	1.55	2.25	2.71	0.66	5.42	1.03	1.23	0.56	1.09	2.31	1.16
21-Mining	0.72	5.75	1.30	0.38	-	0.47	0.88	0.96	1.57	5.26	1.13
22-Utilities	1.63	1.47	0.86	0.84	-	1.45	0.88	0.56	1.63	1.53	0.99
23-Construction	1.09	0.93	0.93	0.71	0.63	1.12	0.66	0.73	0.64	0.62	0.79
31-33-Manufacturing	2.18	1.53	2.08	1.80	1.16	1.31	1.85	2.38	2.01	1.76	1.93
42-Wholesale	0.55	0.56	0.46	0.73	0.27	0.79	0.87	0.72	0.70	0.50	0.69
44-45-Retail	1.17	1.18	1.08	1.11	0.55	1.12	1.24	1.19	1.31	0.98	1.15
48-49-Trans. and Ware.	0.95	1.02	0.81	0.69	0.76	0.86	1.17	1.08	1.11	1.89	0.95
51-Infor	0.55	0.40	0.46	0.80	0.27	0.91	0.41	0.48	0.52	0.40	0.60
52-Finance/Insurance	0.48	0.55	0.47	0.89	-	1.05	0.64	0.58	0.61	0.76	0.70
53-Real Estate	0.85	0.52	0.64	0.71	0.19	0.71	0.56	0.78	0.48	0.42	0.68
54-Scientific	0.44	0.35	0.48	0.58	-	0.56	0.41	0.44	0.36	0.41	0.48
55-Management	0.40	0.05	0.15	0.57	-	0.72	0.60	0.60	0.12	4.36	0.64
56-Administration	0.65	0.32	0.62	0.90	-	0.85	0.55	0.90	0.69	0.34	0.75
61-Education	0.51	0.38	1.31	1.45	-	1.25	1.19	0.49	0.30	0.46	0.97
62-Health Care	1.25	1.24	1.31	1.45	1.50	1.40	1.73	1.34	1.52	1.40	1.42
71-Recreation	0.76	0.38	0.80	0.99	0.57	0.77	0.63	0.76	0.54	0.54	0.78
72-Accommodations/Food	0.98	1.03	0.94	1.00	1.54	0.89	1.06	1.03	0.81	0.69	0.98
81-Other	1.00	1.07	1.26	1.04	0.77	1.10	1.08	0.97	1.10	1.14	1.06
92-Public Admin.	0.86	1.36	0.79	0.82	2.49	0.86	0.72	0.77	1.05	0.91	0.85

*Bold faced LQS represent suggested exporting NAICS sectors.

Table 14
Employment Location Quotients for 2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	1.51	2.42	2.82	0.67	5.55	1.05	1.24	0.59	1.11	2.49	1.21
21-Mining	0.74	7.15	1.69	0.42	-	0.41	1.07	1.07	1.86	6.83	1.36
22-Utilities	1.75	1.40	0.89	0.90	-	1.54	0.83	0.64	1.71	1.50	1.05
23-Construction	1.16	0.97	0.97	0.74	0.56	1.19	0.69	0.82	0.66	0.68	0.84
31-33-Manufacturing	2.10	1.42	2.18	1.86	1.06	1.38	1.93	2.11	2.17	1.70	1.91
42-Wholesale	0.56	0.56	0.45	0.71	0.20	0.79	0.94	0.76	0.70	0.43	0.70
44-45-Retail	1.17	1.15	1.07	1.09	0.51	1.08	1.25	1.25	1.31	1.06	1.15
48-49-Trans. and Ware.	1.02	1.05	0.84	0.66	0.72	1.09	1.19	1.09	1.18	1.71	0.97
51-Infor	0.54	0.41	0.46	0.75	0.29	0.77	0.42	0.45	0.43	0.37	0.56
52-Finance/Insurance	0.51	0.58	0.49	0.87	-	0.93	0.63	0.62	0.58	0.77	0.70
53-Real Estate	0.86	0.57	0.63	0.68	0.17	0.66	0.56	0.82	0.50	0.44	0.68
54-Scientific	0.44	0.35	0.47	0.55	-	0.57	0.40	0.45	0.36	0.40	0.47
55-Management	0.48	0.04	0.20	0.55	-	0.73	0.52	0.66	0.14	4.17	0.64
56-Administration	0.68	0.33	0.63	0.92	-	0.83	0.57	0.97	0.68	0.36	0.77
61-Education	0.47	0.38	1.22	1.46	-	1.26	1.12	0.45	0.29	0.51	0.96
62-Health Care	1.31	1.23	1.28	1.45	1.55	1.43	1.71	1.33	1.49	1.36	1.42
71-Recreation	0.70	0.39	0.68	1.16	0.54	0.78	0.71	0.75	0.45	0.53	0.82
72-Accommodations/Food	0.94	1.07	0.95	1.01	1.55	0.88	1.02	1.06	0.79	0.74	0.98
81-Other	1.00	1.09	1.28	1.03	0.74	1.11	1.08	1.01	1.08	1.09	1.06
92-Public Admin.	0.88	1.31	0.78	0.83	2.37	0.85	0.69	0.79	1.05	0.84	0.85

*Bold faced LQS represent suggested exporting NAICS sectors.

d) Location Quotients: Average Earnings Data 2001-2008

Table 15 shows a comprehensive table of earnings LQs derived from the average earnings for each NAICS super-sector for the time period 2001-2008. LQs greater than one are in bold face and represent estimated exporting NAICS sectors for the county. The average earnings were used because during the time period the economy was rather volatile.

The highest earnings LQs for each county, except for Clarion, Forest, Lawrence, and Warren counties, were NAICS 31- 33 (manufacturing). Clarion's highest LQ was NAICS 21 (mining), Forest's highest LQ was NAICS 11 (agriculture), Lawrence's highest LQ was NAICS 23 (construction), and Warren's highest LQ was NAICS 55 (management).

The Earnings LQ for NAICS 11 (agriculture) for Forest County was 5.66 indicating that the county has over five times the national average earnings in that sector. The earnings LQ for NAICS 21 (mining) for Clarion County was over 3.5 indicating that, as a percentage, it has over three and a half times the earnings than the national average. NAICS 55 (management) for Warren County was over four times the national average.

Earnings LQs were also calculated because LQs from earnings data may give different results than employment data. This can happen when income levels are very different in different sectors. LQs identify possible exporting sectors of the economy. In order to see how much employment/earnings are being devoted to creating the exports, export base analysis must be conducted. As stated before, this technique will be discussed in Section VIII.

Table 15
Average Earnings Location Quotients for 2001-2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	0.71	1.06	1.99	0.37	5.66	0.26	0.52	0.15	0.91	0.59	0.55
21-Mining	0.44	3.78	0.84	0.15	-	0.26	0.51	0.20	0.45	1.55	0.48
22-Utilities	2.07	1.57	0.88	0.80	0.19	1.34	0.96	0.46	1.81	1.64	0.99
23-Construction	0.91	0.83	0.75	0.73	0.51	1.83	0.67	0.58	0.48	0.54	0.78
31-33-Manufacturing	2.52	1.78	2.31	2.09	0.91	1.28	2.02	3.38	2.13	1.82	2.34
42-Wholesale	0.49	0.48	0.36	0.65	0.14	0.74	0.80	0.58	0.54	0.46	0.60
44-45-Retail	1.17	1.37	1.19	1.15	0.52	1.20	1.34	1.09	1.34	0.97	1.17
48-49-Trans. and Ware.	1.11	1.47	0.89	0.65	0.85	1.19	1.28	1.03	1.62	1.81	1.02
51-Infor	0.35	0.22	0.28	0.62	0.12	0.59	0.28	0.27	0.37	0.29	0.41
52-Finance/Insurance	0.33	0.37	0.32	0.79	-	0.75	0.52	0.38	0.46	0.57	0.55
53-Real Estate	0.41	0.28	0.45	0.61	0.05	0.87	0.35	0.53	0.34	0.37	0.23
54-Scientific	0.19	0.27	0.29	0.40	-	0.37	0.26	0.24	0.19	0.40	0.31
55-Management	0.19	0.05	0.12	0.37	0.00	0.73	0.36	0.48	0.07	4.18	0.50
56-Administration	0.62	0.26	0.49	0.75	-	0.62	0.72	0.69	0.60	0.18	0.64
61-Education	0.28	0.21	1.79	1.49	0.06	1.17	1.36	0.29	0.21	0.31	0.95
62-Health Care	1.34	1.06	1.48	1.58	1.65	1.42	1.86	1.22	1.59	1.26	1.46
71-Recreation	0.28	0.20	0.42	0.67	0.41	0.56	0.30	0.35	0.21	0.36	0.45
72-Accommodations/Food	0.96	0.92	1.09	0.84	1.63	0.70	1.13	0.91	0.67	0.58	0.89
81-Other	1.27	1.48	1.69	1.21	0.94	1.30	1.24	1.01	1.21	1.23	1.23
92-Public Admin.	1.03	1.47	0.94	0.87	2.56	0.94	0.78	0.73	1.20	1.06	0.90

*Bold LQS represent suggested exporting NAICS sectors.

e) Location Quotients: Comparing Growth and Recessionary Years on Earnings Data

Earnings LQs were also calculated for the single years of 2006 and 2008 because these years represent different economic times; 2006 being a growth year and 2008 being a recessionary year. Table 16 represents the earnings LQs for the year 2006 and Table 17 represents the earnings LQs for 2008. In both tables the bold faced numbers are LQs greater than one and suggest that the NAICS sector is an exporting sector.

The earnings LQs for 2006 and 2008 were very similar. There were only a few differences. NAICS 11 (agriculture) went from being an exporting sector for Clarion County in 2006 to an importing sector in 2008. NAICS 44-45 (retail) went from being an importing sector for Warren County in 2006 to an exporting sector in 2008. NAICS 53 (real estate) went from being an importing sector for Lawrence County in 2006 to an exporting sector in 2008. NAICS 72 (accommodations/food) went from being an importing sector for Trumbull County to an exporting sector in 2008. NAICS 92 (public admin.) went from being an exporting sector for Warren in 2006 to an importing sector in 2008. These were the only differences between the two years. Therefore, export base analysis will be conducted for exporting industries identified in the average earnings LQs for the time period 2001-2008.

Both of these individual years resemble the earnings LQs found for the time period 2001-2008 suggesting that growth and recessionary periods do not greatly affect earnings LQs for the researched region. However, the region being discussed may be an individual case and future researchers should also observe individual employment LQs along with the average.

Table 16
Earnings Location Quotients for 2006*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	0.77	1.75	2.02	0.36	7.16	0.40	0.54	0.15	1.49	0.85	0.65
21-Mining	0.49	4.38	0.65	0.16	-	0.24	0.49	0.20	0.53	1.73	0.50
22-Utilities	1.97	1.37	0.85	0.76	0.21	1.41	0.74	0.45	1.78	1.49	0.93
23-Construction	0.88	0.85	0.74	0.67	0.40	1.84	0.59	0.55	0.46	0.53	0.74
31-33-Manufacturing	2.57	1.77	2.36	2.08	0.88	1.31	2.13	3.54	2.36	1.79	2.41
42-Wholesale	0.50	0.42	0.34	0.68	0.16	0.74	0.74	0.56	0.62	0.48	0.60
44-45-Retail	1.21	1.28	1.23	1.13	0.41	1.12	1.34	1.04	1.29	0.91	1.15
48-49-Trans. and Ware.	1.16	1.33	0.94	0.72	0.66	1.22	1.57	1.06	1.32	1.91	1.07
51-Infor	0.35	0.23	0.29	0.62	0.11	0.57	0.27	0.28	0.41	0.25	0.41
52-Finance/Insurance	0.30	0.34	0.30	0.79	-	0.74	0.50	0.34	0.44	0.59	0.53
53-Real Estate	0.40	0.32	0.51	0.62	0.05	0.96	0.34	0.50	0.32	0.35	0.24
54-Scientific	0.20	0.26	0.28	0.42	-	0.39	0.25	0.22	0.19	0.23	0.30
55-Management	0.18	0.08	0.13	0.43	-	0.87	0.56	0.45	0.08	4.99	0.58
56-Administration	0.55	0.26	0.51	0.76	-	0.67	0.62	0.71	0.59	0.22	0.64
61-Education	0.28	0.22	1.87	1.51	0.05	1.20	1.43	0.30	0.19	0.35	0.97
62-Health Care	1.38	1.12	1.50	1.63	1.58	1.36	1.88	1.36	1.57	1.33	1.51
71-Recreation	0.28	0.19	0.44	0.61	0.41	0.54	0.27	0.34	0.21	0.34	0.42
72-Accommodations/Food	0.94	0.87	1.03	0.84	1.65	0.68	1.05	0.91	0.68	0.55	0.88
81-Other	1.30	1.53	1.75	1.22	0.88	1.33	1.23	0.95	1.21	1.20	1.22
92-Public Admin.	1.04	1.46	0.95	0.88	3.08	0.93	0.78	0.70	1.15	1.03	0.90

*Bold faced LQS represent suggested exporting NAICS sectors.

Table 17
Earnings Location Quotients for 2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	0.84	0.68	2.37	0.26	8.34	0.38	0.26	0.16	1.48	0.42	0.58
21-Mining	0.49	4.69	0.90	0.13	-	0.24	0.78	0.20	0.55	2.12	0.58
22-Utilities	2.22	1.39	0.93	0.85	0.18	1.61	0.77	0.59	2.21	1.62	1.07
23-Construction	0.81	0.83	0.69	0.67	0.34	1.83	0.62	0.67	0.46	0.53	0.76
31-33-Manufacturing	2.54	1.68	2.42	2.21	0.78	1.38	2.20	3.05	2.45	1.85	2.32
42-Wholesale	0.55	0.43	0.34	0.66	0.10	0.83	0.84	0.64	0.61	0.62	0.64
44-45-Retail	1.26	1.32	1.24	1.13	0.36	1.12	1.37	1.24	1.32	1.09	1.21
48-49-Trans. and Ware.	1.21	1.36	0.87	0.71	0.72	1.64	1.55	1.13	1.33	1.85	1.11
51-Infor	0.34	0.22	0.29	0.55	0.11	0.48	0.27	0.30	0.37	0.23	0.39
52-Finance/Insurance	0.33	0.38	0.30	0.82	-	0.68	0.55	0.39	0.45	0.63	0.57
53-Real Estate	0.45	0.34	0.56	0.50	0.07	1.03	0.46	0.62	0.37	0.42	0.22
54-Scientific	0.19	0.43	0.27	0.40	-	0.38	0.24	0.23	0.18	0.23	0.30
55-Management	0.25	0.08	0.16	0.42	-	0.80	0.41	0.53	0.09	3.74	0.53
56-Administration	0.56	0.26	0.47	0.79	-	0.69	0.61	0.84	0.58	0.22	0.67
61-Education	0.27	0.21	1.76	1.50	0.04	1.18	1.34	0.28	0.18	0.51	0.98
62-Health Care	1.45	1.12	1.55	1.58	1.51	1.36	1.82	1.38	1.50	1.34	1.51
71-Recreation	0.23	0.19	0.29	0.87	0.40	0.52	0.32	0.33	0.15	0.38	0.50
72-Accommodations/Food	0.94	0.95	1.03	0.87	1.62	0.68	1.01	1.05	0.67	0.62	0.91
81-Other	1.32	1.58	1.72	1.22	0.84	1.34	1.23	1.09	1.19	1.21	1.26
92-Public Admin.	1.02	1.40	0.91	0.87	2.85	0.89	0.74	0.78	1.12	0.98	0.90

*Bold faced LQS represent suggested exporting NAICS sectors.

f) Location Quotients: Earnings vs. Employment 2001-2008 Averages

The results from the average earnings and employment LQs for the time period 2001-2008 were very similar; however, there were some differences. Differences may be caused by high or low pay rates in the counties being researched relative to the U.S. Table 18 highlights the differences between estimated importing/exporting sectors for earnings and employment. NAICS sectors marked by an asterisk represent sectors where LQs for earnings estimate it as an exporting sector and LQs for employment estimate it as an importing sector; visa versa.

For Ashtabula, Venango, and Warren counties the employment LQs for NAICS 11 (agriculture) indicate the sector is an exporting sector, but the earnings LQs indicate that it is an importing sector. Just the opposite it true for Lawrence and Mercer counties; employment LQs indicate NAICS 11 (agriculture) is an exporting sector while the earnings LQs indicate it is an importing sector. For Crawford and Venango counties the employment LQs for NAICS 21 (mining) indicate that the sector is an exporting sector, but the earnings LQs indicate that it is an importing sector. For Mercer County the employment LQ for NAICS 22 (utilities) indicate the sector is an exporting sector, but the earnings LQ indicate that it is an importing sector. For Ashtabula County the employment LQ calculated for NAICS 23 (construction) indicate that it is an exporting sector, but the earnings LQ indicate that it is an importing sector. For Forest County the employment LQ for NAICS 31-33 (manufacturing) indicate that it is an exporting sector, but the earnings LQ indicate that it is an importing sector. For Ashtabula and Lawrence counties the employment LQs for NAICS 48-49 (trans. and ware.) indicate that it is an importing sector, but the earnings LQs indicate that it is an exporting sector. For Ashtabula, Clarion, Erie, and Trumbull counties the employment LQs calculated for NAICS 72 (accommodations/food) indicate that it is an exporting sector, but the earnings LQs calculated indicate that it is an importing sector. Just the opposite is true for Crawford County; the employment LQ indicate NAICS 72 (accommodations/food) as an importing sector, but the earnings LQ indicate it is an exporting sector. For Ashtabula and Trumbull counties the employment LQs for NAICS 81 (other) indicate that it is an importing sector, but the earnings LQs indicate that it is exporting sector. For Ashtabula and Warren counties the employment LQs for NAICS 92 (public admin.) indicate that it is an importing sector, but the earnings LQs indicate that it is an exporting sector.

Looking at the ten county region as a whole, instead of individually, there are only three differences. Employment LQs indicate that NAICS 11 (agriculture) and NAICS 21 (mining) are exporting sectors, but the earnings LQs indicate that they are importing sectors. This implies that these two sectors were relatively low-paying sectors compared to the U.S. The other difference is in NAICS 48-49 (trans. and ware.). Earnings LQs indicate it is an exporting sector, while employment LQs indicate it is an importing sector. This implies that this sector was relatively high-paying compared to the U.S.

Table 18
Earnings vs. Employment Location Quotients*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	*					*	*		*	*	*
21-Mining			*						*		*
22-Utilities							*				
23-Construction	*										
31-33-Manufacturing					*						
42-Wholesale											
44-45-Retail											
48-49-Trans. and Ware.	*					*					*
72-Accommodations/Food	*	*	*	*				*			
81-Other	*							*			
92-Public Admin.	*									*	

*Sectors marked by and asterisk represent significant differences in earnings and employment LQs.

VIII. Export Base Analysis

a) Export Base Analysis Defined

Export base analysis takes the LQ discussed earlier a few steps further. The LQ suggests what industries are exporting from the focus region, while export base analysis estimates the earnings/employment amount that is provided for the focus region's economy by economies outside of the focus region. In other words local employment/earnings are being provided by outside economies because the outside economies are buying the goods/services produced by the industry within the local economy. Therefore, these results can be looked at as employment devoted to exporting or monetary value of goods exported to economies outside of the focus region. Industry earnings is defined as what the industry has paid to employees over the given year and industry employment is defined as the number of employees employed by the industry for the given year.

There are some assumptions of export base analysis that one must keep in mind in evaluating the findings: (1) local consumption of the product/service is the same nationally as locally, (2) labor productivity is the equal across all regions, and (3) all local demands are met by local production first.

To find the suggested earnings/employment amount being provided to the focus region by economies outside of the focus region (exports) one must subtract the larger economy's specific industry percentage of total earnings/employment from the focus region's same industry's percentage of total earnings/employment, and then multiply it by the total earnings/employment of the focus region's industries. Figure

3 gives the equation for export base analysis, and provides a simple example. The results of this equation will give the suggested amount of earnings/employment provided for a specific focus region sector by economies other than the focus region's through export activity.

Figure 3
Local Industry's Exports Equation*

$$\begin{aligned}
 \text{Local Industry's Exports} &= ((\text{focus region sector's percent of total}) - (\text{national sector's percent of total})) * (\text{total of focus region's sectors}) \\
 \text{Local Industry's Exports} &= ((\text{Erie County Manufacturing } 24.77) - (\text{U.S. manufacturing } 11.83\%)) * (\$5,881,027,375) \\
 \text{Local Industry's Exports} &= \mathbf{\$760,982,990}
 \end{aligned}$$

*The percentages in the tables are rounded. To find Erie County's estimated manufacturing exports actual percentages were used. Therefore, if the numbers in Figure 3 are calculated as shown, a slightly different answer is obtained.

b) Export Base Analysis: Employment

Export base analysis was done for employment for the average employment for the time period 2001-2008. Table 19 is a comprehensive table of the indicated exporting NAICS sectors for each county, as well as the region as a whole, and the calculated employment numbers for export base activities. The bold faced numbers represent the NAICS code with the largest employment number for export activities.

Export base analysis for employment can be explained as the number of employees in the given exporting sector that are allocated for producing exports. For example, export base analysis suggests that Erie County had 11,579 employees in NAICS sector 31-33 (manufacturing) allocated for the production of exports. Export base analysis on employment identifies the number of employees in each sector that are employed to produce exports.

For Ashtabula, Crawford, Erie, Trumbull, Venango and Warren counties the highest number of employees used for export activities was in NAICS sector 31-33 (manufacturing). The highest export employment for Clarion and Forest counties was in NAICS sector 92 (public admin.), and Lawrence and Mercer counties' highest export employment was in NAICS sector 62 (health care). Erie County had approximately 22 percent more total employees for export activities than the next highest County (Trumbull County).

When export base analysis on employment was calculated and added up individually, export based employment for the ten counties was 84,978 employees. When export bases analysis on employment was calculated for the region as a whole, export employment is represented by 73,703 employees. Therefore, the difference between the two calculations (11,275) represents total employment allocated collectively by all ten counties for export activities among the ten counties. In other words 11,275 employees within the ten county region are allocated to producing goods/services that are consumed by other counties within the region.

This approach could be used to estimate export earnings/employment on a county to county basis. In other words this methodology could be used to estimate exports from one county to another. For example, take a two county region and perform export base analysis on them individually and collectively

and take the difference between the sum of the export employment for each county and the export employment for the region as a whole. Set the difference aside, sum the individual counties' export employment calculated earlier and calculate the percent make up of each county. Finally multiply the difference by the percentages, this will give you export employment in each county that is allocated to producing exports to export to the other county. An actual example of this will be done with earnings data in part e of section VIII.

Table 20 is a comprehensive table of the indicated exporting NAICS sectors for each county, as well as the region as a whole, and the export employment as a percentage of total employment for each individual exporting sector. For example, Erie County's NAICS 31-33 (manufacturing) sector uses approximately 45 percent of its employment to produce exports. At the bottom of the table total export base employment as a percentage of total employment for each county is also included. For example, of total employment Erie County devotes approximately 14 percent towards export production.

The highest export employment as a percentage of total employment for that sector for Ashtabula, Erie, Mercer, Trumbull, and Venango counties is found in NAICS 31-33(manufacturing). The highest export employment as a percentage of total employment for that sector for Crawford and Forest counties is found in NAICS 11 (agriculture), for Clarion and Warren counties NAICS 21 (mining), and for Lawrence County NAICS 22 (utilities). For the ten county region as a whole NAICS 31-33 (manufacturing) has the highest export employment as a percentage of total employment.

Forest County has the highest percentage (32.1) of its total employment as export employment, and the region as a whole has 13.8 percent of its total employment as export employment.

Table 19
Export Base Analysis for Average Employment for the Time Period 2001-2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	501	466	1,475	-	248	56	296	-	27	432	1,246
21-Mining	-	545	125	-	-	-	-	-	74	478	437
22-Utilities	109	39	-	-	-	61	11	-	45	40	-
23-Construction	368	-	-	-	-	481	-	-	-	-	-
31-33-Manufacturing	4,614	950	4,049	11,579	42	1,071	4,171	12,471	1,932	1,378	42,257
44-45-Retail	672	490	298	2,005	-	741	1,584	2,341	927	1	8,943
48-49-Trans. and Ware.	-	120	-	-	-	-	22	234	296	536	-
55-Management	-	-	-	-	-	-	-	-	-	780	-
61-Education	-	-	254	1,504	-	134	200	-	-	-	-
62-Health Care	1,061	219	1,168	5,929	160	1,660	4,262	2,561	1,351	547	18,918
71-Recreation	-	-	-	123	-	-	-	-	-	-	-
72-Accommodations/Food	41	104	-	110	115	-	456	150	-	-	-
81-Other	-	65	692	422	-	220	347	-	175	155	1,902
92-Public Admin.	-	1,083	-	-	361	-	-	-	165	-	-
Totals	7,366	4,082	8,061	21,673	926	4,425	11,350	17,756	4,992	4,347	73,703

*Bold faced numbers represent the NAICS Code with the largest employment number for export activities.

Table 20
Percentages of Total Employment for Export Base Activities by Individual NAICS Codes for Average Employment for the Time Period 2001-2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	33.52%	50.91%	61.30%	-	80.50%	6.12%	18.52%	-	4.73%	50.01%	10.07%
21-Mining	-	83.07	35.13	-	-	-	-	-	35.33	81.77	13.71
22-Utilities	40.15	34.72	-	-	-	30.20	5.04	-	33.16	36.18	-
23-Construction	11.11	-	-	-	-	15.80	-	-	-	-	-
31-33-Manufacturing	52.47	33.44	50.81	45.10	14.25	22.74	43.21	57.41	45.52	43.14	47.43
44-45-Retail	11.54	17.37	5.80	10.34	-	14.17	18.99	17.02	24.52	0.03	13.41
48-49-Trans. and Ware.	-	14.51	-	-	-	-	1.05	6.35	25.58	44.20	-
55-Management	-	-	-	-	-	-	-	-	-	77.66	-
61-Education	-	-	21.98	31.66	-	13.79	13.70	-	-	-	-
62-Health Care	18.52	9.38	21.06	27.36	36.21	29.00	41.05	19.86	34.35	21.23	26.56
71-Recreation	-	-	-	3.67	-	-	-	-	-	-	-
72-Accommodations/Food	1.26	6.70	-	1.01	37.23	-	9.77	2.07	-	-	-
81-Other	-	5.05	21.38	4.41	-	8.53	8.90	-	10.42	11.60	5.89
92-Public Admin.	-	26.55	-	-	47.41	-	-	-	4.31	-	-
Percentage of Total Employment	15.4%	18.9%	18.0%	13.5%	32.1%	10.6%	18.1%	16.8%	18.9%	20.9%	13.8%

*The bold faced numbers represent the sector that has the highest percentage of its employment used for export activities. For each individual NAICS sector the percentage represents the percentage of total employment in that particular sector this is used for export activities. The "Percentage of Total Employment" represents the percentage of all employment in the county that is used for export activities.

c) **Export Base Analysis: Earnings**

Table 21 is a comprehensive table of the indicated exporting NAICS sectors for each county, as well as the region as a whole, and the calculated earnings numbers for export base activities. The numbers calculated through this process actually represent the earnings paid to employees to produce exports for that sector. However, it is the best estimation system available to determine the value of exported goods. One must keep in mind that companies must make a profit to stay in business and since these estimations were calculated using earnings data they do not include the mark up on the good/service companies place on their product/service to make a profit. Therefore, the estimated value of exported goods/services is underestimated.

Export base analysis for earnings can be explained as the earnings paid in the given sector to produce exports. For example, export base analysis suggests that Erie County paid \$760,982,990, on average, in earnings to employees in NAICS 31-33 (manufacturing) to produce exports for the time period 2001-2008. Now, Erie County is not truly paying the employees, economies outside of the region are paying for the employees by buying the product that is being produced and exported by the sector. This is why export base analysis on earnings can be used as an estimator for the value of goods/services being exported out of the region.

For Ashtabula, Clarion, Crawford, Erie, Mercer, Trumbull, Venango, and Warren counties NAICS 31-33 (manufacturing) is the main exporting sector, with Trumbull County exporting the most at approximately \$1.2 billion. Forest County's main exporting industry is NAICS 92 (public admin.) and Lawrence County's main exporting sector is NAICS 23 (construction). Trumbull County exports the most with a total export value of approximately \$1.34 billion, but Erie County is a close second with total exports valued at approximately \$1.23 billion. With the exception of Erie County, Trumbull County exports approximately 150 percent more than the next closest county (Mercer).

When export base analysis on earnings is calculated and added up individually, exports for the ten counties total \$4,714,202,800. When export base analysis on earnings is calculated for the region as a whole, exports total \$4,226,791,830. Therefore, the difference between the two calculations (\$487,410,970) represents total export activity among the ten counties. In other words exports with a value of \$487,410,970 are exported between counties in the ten county region.

Table 22 is a comprehensive table of the indicated exporting NAICS sectors for each county, as well as the region as a whole, and the export base earnings as percentage of total earnings for each individual sector. At the bottom of the table total export base earnings as a percentage of total earnings for each county is also included.

Table 21
Export Base Analysis for Average Earnings for the Time Period 2001-2008* (\$000)

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	-	452	14,822	-	4,374	-	-	-	-	-	-
21-Mining	-	19,230	-	-	-	-	-	-	-	3,819	-
22-Utilities	12,136	3,153	-	-	-	4,052	-	-	5,726	3,504	-
23-Construction	-	-	-	-	-	82,885	-	-	-	-	-
31-33-Manufacturing	257,685	63,758	217,087	760,983	-	49,611	254,837	1,214,286	117,711	67,402	3,002,394
44-45-Retail	16,292	16,946	17,618	59,400	-	19,758	48,488	24,516	19,981	-	218,651
48-49-Trans. and Ware.	5,416	11,283	-	-	-	9,549	20,323	4,005	18,760	19,199	12,119
55-Management	-	-	-	-	-	-	-	-	-	49,970	-
61-Education	-	-	15,188	39,721	-	3,517	10,527	-	-	-	-
62-Health Care	46,626	3,896	63,972	324,024	5,405	59,172	173,130	90,549	49,664	17,465	833,903
72-Accommodations/Food	-	-	3,764	-	1,655	-	7,933	-	-	-	-
81-Other	14,600	12,390	36,173	46,008	-	16,776	18,834	2,131	7,036	5,962	159,724
92-Public Admin.	7,374	53,883	-	-	22,271	-	-	-	29,225	6,315	-
Totals	360,130	184,991	368,624	1,230,136	33,706	245,321	534,070	1,335,487	248,103	173,635	4,226,792

*The bold faced numbers represent the sector that has the highest dollar amount of exported goods/services.

Table 22
Percentages of Total Earnings for Export Activities by Individual NAICS Codes for Average Earnings for the Time Period 2001-2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	-	5.71%	49.68%	-	82.34%	-	-	-	-	-	-
21-Mining	-	73.56	-	-	-	-	-	-	-	35.61	-
22-Utilities	51.58	36.34	-	-	-	25.52	-	-	44.89	38.84	-
23-Construction	-	-	-	-	-	45.44	-	-	-	-	-
31-33-Manufacturing	60.32	43.69	56.76	52.24	-	21.99	50.52	70.41	52.95	45.09	57.21
44-45-Retail	14.58	26.81	15.91	13.16	-	16.62	25.65	7.86	25.33	-	14.74
48-49-Trans. and Ware.	9.94	32.18	-	-	-	15.79	21.95	2.64	38.26	44.69	1.83
55-Management	-	-	-	-	-	-	-	-	-	76.09	-
61-Education	-	-	44.17	32.97	-	14.69	26.65	-	-	-	-
62-Health Care	25.46	5.56	32.44	36.64	39.38	29.45	46.27	18.06	37.09	20.90	31.56
72-Accommodations/Food	-	-	8.26	-	38.80	-	11.18	-	-	-	-
81-Other	21.47	32.37	40.98	17.35	-	23.23	19.32	1.31	17.60	18.74	18.42
92-Public Admin.	3.05	32.15	-	-	60.90	-	-	-	16.80	5.27	-
Percentage of Total Earnings	25.13%	26.64%	26.37%	20.92%	38.60%	16.49%	25.31%	30.97%	28.07%	25.03%	22.27%

*The bold faced numbers represent the sector that has the highest percentage of its earnings used for export activities. For each individual NAICS sector the percentage represents the percentage of total earnings in that particular sector that is used for export activities. The "Percentage of Total Earnings" represents the percentage of all earnings in the county that is used for export activities.

d) Export Base Analysis: Earnings Percentages vs. Employment Percentages

Tables 20 and 22 have been brought forward in order to make it easier for the reader to do a side-by-side comparison. These can be found on the next page.

Earnings and employment are two distinctly different measurements of the economy. Therefore, direct comparisons between them are not possible. However, direct comparisons between their percentage make ups are.

When comparing earnings and employment percentage make up of the sectors most comparisons were rather similar. The largest discrepancy among percentages occurred in NAICS 11 (agriculture) for Clarion County; 5.71 percent of the sectors earnings were used for export activities while 50.91 percent of its employment was used for export activities. This was the largest discrepancy, but there were a few other noticeable ones; NAICS 48-49 (trans. and ware.) for Clarion and Mercer counties, NAICS 61 (education) for Crawford, and NAICS 81 (other) for Clarion and Crawford counties. Overall, export base analysis for earnings matches up well with the export base analysis for employment.

Table 20

Percentages of Total Employment for Export Base Activities by Individual NAICS Codes for Average Employment for the Time Period 2001-2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	33.52%	50.91%	61.30%	-	80.50%	6.12%	18.52%	-	4.73%	50.01%	10.07%
21-Mining	-	83.07	35.13	-	-	-	-	-	35.33	81.77	13.71
22-Utilities	40.15	34.72	-	-	-	30.20	5.04	-	33.16	36.18	-
23-Construction	11.11	-	-	-	-	15.80	-	-	-	-	-
31-33-Manufacturing	52.47	33.44	50.81	45.10	14.25	22.74	43.21	57.41	45.52	43.14	47.43
44-45-Retail	11.54	17.37	5.80	10.34	-	14.17	18.99	17.02	24.52	0.03	13.41
48-49-Trans. and Ware.	-	14.51	-	-	-	-	1.05	6.35	25.58	44.20	-
55-Management	-	-	-	-	-	-	-	-	-	77.66	-
61-Education	-	-	21.98	31.66	-	13.79	13.70	-	-	-	-
62-Health Care	18.52	9.38	21.06	27.36	36.21	29.00	41.05	19.86	34.35	21.23	26.56
71-Recreation	-	-	-	3.67	-	-	-	-	-	-	-
72-Accommodations/Food	1.26	6.70	-	1.01	37.23	-	9.77	2.07	-	-	-
81-Other	-	5.05	21.38	4.41	-	8.53	8.90	-	10.42	11.60	5.89
92-Public Admin.	-	26.55	-	-	47.41	-	-	-	4.31	-	-
Percentage of Total Employment	15.4%	18.9%	18.0%	13.5%	32.1%	10.6%	18.1%	16.8%	18.9%	20.9%	13.8%

*The bold faced numbers represent the sector that has the highest percentage of its employment used for export activities. For each individual NAICS sector the percentage represents the percentage of total employment in that particular sector this is used for export activities. The "Percentage of Total Employment" represents the percentage of all employment in the county that is used for export activities.

Table 22

Percentages of Total Earnings for Export Activities by Individual NAICS Codes for Average Earnings for the Time Period 2001-2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	-	5.71%	49.68%	-	82.34%	-	-	-	-	-	-
21-Mining	-	73.56	-	-	-	-	-	-	-	35.61	-
22-Utilities	51.58	36.34	-	-	-	25.52	-	-	44.89	38.84	-
23-Construction	-	-	-	-	-	45.44	-	-	-	-	-
31-33-Manufacturing	60.32	43.69	56.76	52.24	-	21.99	50.52	70.41	52.95	45.09	57.21
44-45-Retail	14.58	26.81	15.91	13.16	-	16.62	25.65	7.86	25.33	-	14.74
48-49-Trans. and Ware.	9.94	32.18	-	-	-	15.79	21.95	2.64	38.26	44.69	1.83
55-Management	-	-	-	-	-	-	-	-	-	76.09	-
61-Education	-	-	44.17	32.97	-	14.69	26.65	-	-	-	-
62-Health Care	25.46	5.56	32.44	36.64	39.38	29.45	46.27	18.06	37.09	20.90	31.56
72-Accommodations/Food	-	-	8.26	-	38.80	-	11.18	-	-	-	-
81-Other	21.47	32.37	40.98	17.35	-	23.23	19.32	1.31	17.60	18.74	18.42
92-Public Admin.	3.05	32.15	-	-	60.90	-	-	-	16.80	5.27	-
Percentage of Total Earnings	25.13%	26.64%	26.37%	20.92%	38.60%	16.49%	25.31%	30.97%	28.07%	25.03%	22.27%

*The bold faced numbers represent the sector that has the highest percentage of its earnings used for export activities. For each individual NAICS sector the percentage represents the percentage of total earnings in that particular sector that is used for export activities. The "Percentage of Total Earnings" represents the percentage of all earnings in the county that is used for export activities.

e) **Measuring County to County Exports**

Figure 4 represents the step by step process to estimate the value of exports one county exports to another.

Figure 4
Identifying the Value of County to County Exports

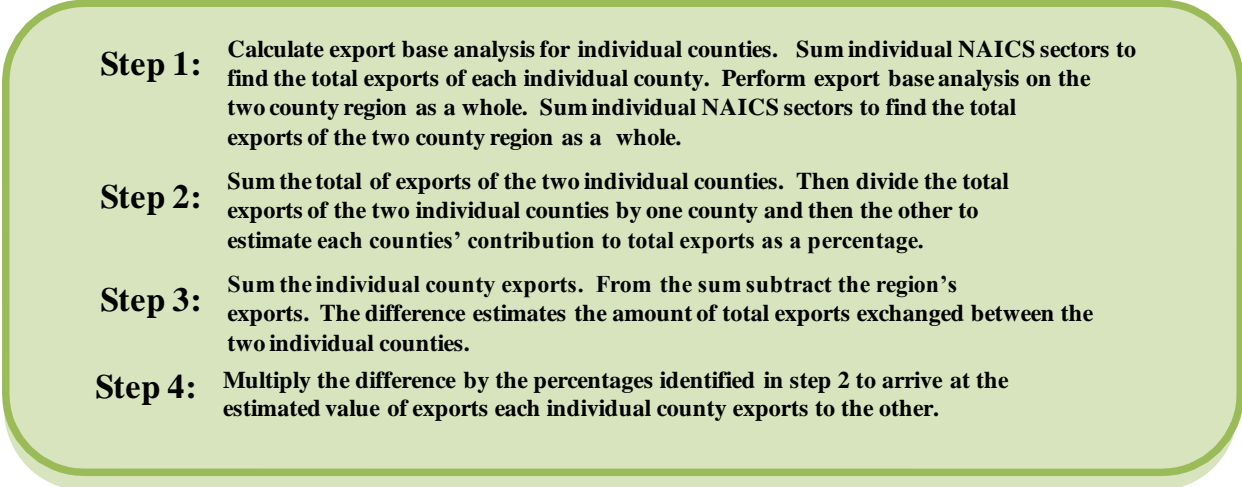
- 
- Step 1:** Calculate export base analysis for individual counties. Sum individual NAICS sectors to find the total exports of each individual county. Perform export base analysis on the two county region as a whole. Sum individual NAICS sectors to find the total exports of the two county region as a whole.
 - Step 2:** Sum the total of exports of the two individual counties. Then divide the total exports of the two individual counties by one county and then the other to estimate each counties' contribution to total exports as a percentage.
 - Step 3:** Sum the individual county exports. From the sum subtract the region's exports. The difference estimates the amount of total exports exchanged between the two individual counties.
 - Step 4:** Multiply the difference by the percentages identified in step 2 to arrive at the estimated value of exports each individual county exports to the other.

Table 23 represents the data necessary to accomplish the process described in Figure 4. After following the steps outlined in Figure 4 on the data present in Table 22 it has been estimate that Erie County exports a total value of \$30,420,339.12 in goods and services to Ashtabula County and Ashtabula County exports a total value of \$8,588,837.53 in goods and services to Erie County. This methodology can be applied to any two counties or even any two groups of counties. Figure 5 walks the reader through the process to arrive at the answers obtained above.

Table 23
Export Base Analysis on a Two County Region (\$000)*

NAICS	Erie	Ashtabula	Erie/Ashtabula Region
11-Agriculture	-	-	-
21-Mining	-	-	-
22-Utilities	-	14,896	7,158
23-Construction	-	-	-
31-33-Manufacturing	865,236	254,349	1,119,585
42-Wholesale	-	-	-
44-45-Retail	53,053	24,344	77,397
48-49-Trans. and Ware.	-	10,896	-
51-Infor	-	-	-
52-Finance/Insurance	-	-	-
53-Real Estate	-	-	-
54-Scientific	-	-	-
55-Management	-	-	-
56-Administration	-	-	-
61-Education	48,652	-	32,264
62-Health Care	383,667	69,685	453,352
71-Recreation	-	-	-
72-Accommodations/Food	-	-	-
81-Other	54,260	18,491	72,751
92-Public Admin.	-	3,987	-
Totals	1,404,868	396,649	1,762,508

*The bold faced numbers identify the county's and region's NAICS sector that contributes the most to its total exports. This is for the single year of 2008.

Figure 5
Estimating Exports Between Counties

1.	Erie County Exports Ashtabula County Exports Two County Region as Whole Exports (\$1,404,868,300) (\$396,648,620) (\$1,762,507,740)
2.	Sum of Two Individual Counties' Exports Erie's Percentage = 77.98% (\$1,801,517,000) Ashtabula's Percentage = 22.02%
3.	Sum of Two Individual Counties' Exports - Two County Region as Whole Exports = \$39,009,000 (\$1,801,517,000) (\$1,762,507,740)
4.	Erie's Exports to Ashtabula Ashtabula's Exports to Erie (\$39,009,000)(77.98%) (\$39,009,000)(22.02%) \$30,419,000 (\$8,590,000)

IX. Applying an Adjustment Factor to the Counties

Earlier it was discovered that the International Trade Administration of the U.S. Department of Commerce (ITA) had export data available down to the MSA level. Therefore, this source was only good for Erie County since it is a single county MSA. However, these data can be used to estimate a multiplier that can be assigned to each of the other nine counties. The application of a multiplier is useful because export base analysis generally results in a conservative estimation of exports because it is based solely off earnings data.

The ITA data reveal that Erie County had international exports totaling \$1,861,931,339 in 2008. Export base analysis suggests that Erie County had total exports of \$1,404,868,300; this is all exports not just international exports and therefore the multiplier developed will still be conservative. Export base analysis therefore only represents approximately 75.45 percent, resulting in a multiplier of approximately 1.33 (1/.7545). In other words, export base analysis results in values that are at least 24.81 less than the actual value because international exports are approximately 33 percent higher than the value arrived at through export base analysis. This adjustment factor can now be applied to the other nine counties to arrive at more accurate estimations of exports at the county level. It can also be used to identify increases in exports at individual NAICS levels for Erie County.

Table 24 is a comprehensive table of all ten counties, NAICS Codes, and estimated exports for 2008. Table 25 is a comprehensive table of all ten counties, NAICS Codes, and estimated exports with the adjustment factor included for 2008.

Table 24
Export Base Analysis on Earnings for 2008 (000)*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	-	-	24,039	-	9,807	-	-	-	5,283	-	
21-Mining	-	34,066	-	-	-	-	-	-	-	10,222	
22-Utilities	14,896	2,406	-	-	-	8,164	-	-	9,548	3,724	11,430
23-Construction	-	-	-	-	-	83,504	-	-	-	-	
31-33-Manufacturing	254,349	56,456	243,573	865,236	-	68,551	308,295	915,004	154,162	69,539	2,932,245
44-45-Retail	24,344	15,023	23,958	53,053	-	12,434	54,292	62,447	19,585	4,212	264,559
48-49-Trans. and Ware.	10,896	9,327	-	-	-	35,451	43,613	18,648	11,084	21,625	77,832
53-Real Estate	-	-	-	-	-	777	-	-	-	-	
55-Management	-	-	-	-	-	-	-	-	-	49,102	
61-Education	-	-	17,755	48,652	-	4,287	11,798	-	-	-	
62-Health Care	69,685	9,378	87,555	383,667	6,130	59,145	194,621	156,772	49,722	25,986	1,042,662
72-Accommodations/Food	-	-	1,286	-	2,243	-	954	6,381	-	-	
81-Other	18,491	16,488	42,792	54,260	-	21,206	20,038	14,281	6,913	5,981	199,721
92-Public Admin.	3,987	51,873	-	-	37,561	-	-	-	19,731	-	
Totals	396,649	195,017	440,960	1,404,868	55,741	293,520	633,612	1,173,534	276,029	190,390	4,528,449

*The bold faced numbers identify the county's NAICS sector that contributes the most to its total exports.

Table 25
Export Base Analysis on Earnings with Adjustment Factor Applied for 2008*

NAICS	Ashtabula	Clarion	Crawford	Erie	Forest	Lawrence	Mercer	Trumbull	Venango	Warren	Ten County Region
11-Agriculture	-	-	31,861	-	12,998	-	-	-	7,002	-	-
21-Mining	-	45,150	-	-	-	-	-	-	-	13,547	-
22-Utilities	19,743	3,189	-	-	-	10,820	-	-	12,655	4,936	15,149
23-Construction	-	-	-	-	-	110,675	-	-	-	-	-
31-33-Manufacturing	337,109	74,826	322,828	1,146,768	-	90,856	408,608	1,212,729	204,323	92,166	3,886,342
44-45-Retail	32,266	19,911	31,754	70,315	-	16,480	71,958	82,766	25,958	5,582	350,641
48-49-Trans. and Ware.	14,441	12,362	-	-	-	46,986	57,804	24,715	14,691	28,661	103,157
53-Real Estate	-	-	-	-	-	1,030	-	-	-	-	-
55-Management	-	-	-	-	-	-	-	-	-	65,079	-
61-Education	-	-	23,532	64,483	-	5,682	15,637	-	-	-	-
62-Health Care	92,359	12,430	116,044	508,505	8,125	78,390	257,947	207,783	65,901	34,441	1,381,924
72-Accommodations/Food	-	-	1,705	-	2,972	-	1,264	8,458	-	-	-
81-Other	24,508	21,852	56,716	71,915	-	28,106	26,558	18,928	9,163	7,927	264,707
92-Public Admin.	5,284	68,752	-	-	49,782	-	-	-	26,152	-	-
Totals	525,711	258,472	584,440	1,861,986	73,877	389,026	839,777	1,555,380	365,844	252,340	6,001,921

*The bold faced numbers identify the county's NAICS sector that contributes the most to its total exports.

X. Conclusion

Unless the county represents a single county MSA there are not any publicly available (free) sources from which to find export data at the county level. Even if a county solely represents an MSA, the data available are limited, and only measure international exports. PIERS Data and U.S.A. Trade Online can compile such data, but at a cost. Therefore, in order to see what a county is exporting without a monetary cost to the researcher, location quotient analysis can be used. After the exporting NAICS sectors have been identified through location quotient analysis export base analysis can be performed to estimate export employment and export earnings (export value). Also discussed was a methodology that allows estimates of individual county to county, or region to region export values to be estimated. This process has yet to be uncovered through literature review and may represent something that has never been done before. This methodology could be used to redefine the Bureau of Economic Analysis' Economic Areas.

Appendix

Definitions of NAICS Codes

The following NAICS definitions are from the Census, 2002 resource

NAICS 11 (Agriculture, Forestry, Fishing, and Hunting)

The Agriculture, Forestry, Fishing and Hunting sector comprises establishments primarily engaged in growing crops, raising animals, harvesting timber, and harvesting fish and other animals from a farm, ranch, or their natural habitats.

The establishments in this sector are often described as farms, ranches, dairies, greenhouses, nurseries, orchards, or hatcheries. A farm may consist of a single tract of land or a number of separate tracts which may be held under different tenures.

The sector distinguishes two basic activities: agricultural production and agricultural support activities. Agricultural production includes establishments performing the complete farm or ranch operation, such as farm owner-operators, tenant farm operators, and sharecroppers. Agricultural support activities include establishments that perform one or more activities associated with farm operation, such as soil preparation, planting, harvesting, and management, on a contract or fee basis.

Excluded from the Agriculture, Forestry, Hunting and Fishing sector are establishments primarily engaged in agricultural research and establishments primarily engaged in administering programs for regulating and conserving land, mineral, wildlife, and forest use.

NAICS 21 (Mining)

The Mining sector comprises establishments that extract naturally occurring mineral solids, such as coal and ores; liquid minerals, such as crude petroleum; and gases, such as natural gas. The term mining is used in the broad sense to include quarrying, well operations, beneficiating (e.g., crushing, screening, washing, and flotation), and other preparation customarily performed at the mine site, or as a part of mining activity.

The Mining sector distinguishes two basic activities: mine operation and mining support activities. Mine operation includes establishments operating mines, quarries, or oil and gas wells on their own account or for others on a contract or fee basis. Mining support activities include establishments that perform exploration (except geophysical surveying) and/or other mining services on a contract or fee basis (except mine site preparation and construction of oil/gas pipelines).

NAICS 22 (Utilities)

The Utilities sector comprises establishments engaged in the provision of the following utility services: electric power, natural gas, steam supply, water supply, and sewage removal. Within this sector, the specific activities associated with the utility services provided vary by utility: electric power includes generation, transmission, and distribution; natural gas includes distribution; steam supply includes provision and/or distribution; water supply includes treatment and distribution; and sewage removal includes collection, treatment, and disposal of waste through sewer systems and sewage treatment facilities.

NAICS 23 (Construction)

The construction sector comprises establishments primarily engaged in the construction of buildings or engineering projects (e.g., highways and utility systems). Establishments primarily engaged in the preparation of sites for new construction and establishments primarily engaged in subdividing land for sale as building sites also are included in this sector.

Construction work done may include new work, additions, alterations, or maintenance and repairs. Activities of these establishments generally are managed at a fixed place of business, but they usually perform construction activities at multiple project sites. Production responsibilities for establishments in this sector are usually specified in (1) contracts with the owners of construction projects (prime contracts) or (2) contracts with other construction establishments (subcontracts).

NAICS 31-33 (Manufacturing)

The Manufacturing sector comprises establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products. The assembling of component parts of manufactured products is considered manufacturing, except in cases where the activity is appropriately classified in Sector 23, Construction.

Establishments in the Manufacturing sector are often described as plants, factories, or mills and characteristically use power-driven machines and materials-handling equipment. However, establishments that transform materials or substances into new products by hand or in the worker's home and those engaged in selling to the general public products made on the same premises from which they are sold, such as bakeries, candy stores, and custom tailors, may also be included in this sector. Manufacturing establishments may process materials or may contract with other establishments to process their materials for them. Both types of establishments are included in manufacturing.

NAICS 42 (Wholesale Trade)

The Wholesale Trade sector comprises establishments engaged in wholesaling merchandise, generally without transformation, and rendering services incidental to the sale of merchandise. The merchandise described in this sector includes the outputs of agriculture, mining, manufacturing, and certain information industries, such as publishing.

The wholesaling process is an intermediate step in the distribution of merchandise. Wholesalers are organized to sell or arrange the purchase or sale of (a) goods for resale (i.e., goods sold to other wholesalers or retailers), (b) capital or durable non-consumer goods, and (c) raw and intermediate materials and supplies used in production.

Wholesalers sell merchandise to other businesses and normally operate from a warehouse or office. These warehouses and offices are characterized by having little or no display of merchandise. In addition, neither the design nor the location of the premises is intended to solicit walk-in traffic. Wholesalers do not normally use advertising directed to the general public.

NAICS 44-45 (Retail Trade): The Retail Trade sector comprises establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise.

The retailing process is the final step in the distribution of merchandise; retailers are, therefore, organized to sell merchandise in small quantities to the general public. This sector comprises two main types of retailers: store and non-store retailers.

In addition to retailing merchandise, some types of store retailers are also engaged in the provision of after-sales services, such as repair and installation. For example, new automobile dealers, electronic and appliance stores, and musical instrument and supply stores often provide repair services. As a general rule, establishments engaged in retailing merchandise and providing after-sales services are classified in this sector.

NAICS 48-49 (Transportation and Warehousing)

The Transportation and Warehousing sector includes industries providing transportation of passengers and cargo, warehousing and storage for goods, scenic and sightseeing transportation, and support activities related to modes of transportation. Establishments in these industries use transportation equipment or transportation related facilities as a productive asset. The type of equipment depends on the mode of transportation. The modes of transportation are air, rail, water, road, and pipeline.

The Transportation and Warehousing sector distinguishes three basic types of activities: subsectors for each mode of transportation, a subsector for warehousing and storage, and a subsector for establishments providing support activities for transportation. In addition, there are subsectors for establishments that provide passenger transportation for scenic and sightseeing purposes, postal services, and courier services.

NAICS 51 (Information)

The Information sector comprises establishments engaged in the following processes: (a) producing and distributing information and cultural products, (b) providing the means to transmit or distribute these products as well as data or communications, and (c) processing data.

The main components of this sector are the publishing industries, including software publishing, and both traditional publishing and publishing exclusively on the Internet; the motion picture and sound recording industries; the broadcasting industries, including traditional broadcasting and those broadcasting exclusively over the Internet; the telecommunications industries; the industries known as Internet service providers and web search portals, data processing industries, and the information services industries.

NAICS 52 (Finance and Insurance)

The Finance and Insurance sector comprises establishments primarily engaged in financial transactions (transactions involving the creation, liquidation, or change in ownership of financial assets) and/or in facilitating financial transactions. Three principal types of activities are identified:

1. Raising funds by taking deposits and/or issuing securities and, in the process, incurring liabilities. Establishments engaged in this activity use raised funds to acquire financial assets by making loans and/or purchasing securities. Putting themselves at risk, they channel funds from lenders to borrowers and transform or repackage the funds with respect to maturity, scale, and risk. This activity is known as financial intermediation.
2. Pooling of risk by underwriting insurance and annuities. Establishments engaged in this activity collect fees, insurance premiums, or annuity considerations; build up reserves; invest those reserves; and make contractual payments. Fees are based on the expected incidence of the insured risk and the expected return on investment.
3. Providing specialized services facilitating or supporting financial intermediation, insurance, and employee benefit programs.

NAICS 53 (Real Estate, Rental, and Leasing)

The Real Estate and Rental and Leasing sector comprises establishments primarily engaged in renting, leasing, or otherwise allowing the use of tangible or intangible assets, and establishments providing related services. The major portion of this sector comprises establishments that rent, lease, or otherwise allow the use of their own assets by others. The assets may be tangible, as is the case of real estate and equipment, or intangible, as is the case with patents and trademarks.

This sector also includes establishments primarily engaged in managing real estate for others, selling, renting and/or buying real estate for others, and appraising real estate. These activities are closely related to this sector's main activity, and it was felt that from a production basis they would best be included here. In addition, a substantial proportion of property management is self-performed by lessors.

The main components of this sector are the real estate lessors industries; equipment lessors industries (including motor vehicles, computers, and consumer goods); and lessors of nonfinancial intangible assets (except copyrighted works).

NAICS 54 (Professional, Scientific, and Technical Services)

The Professional, Scientific, and Technical Services sector comprises establishments that specialize in performing professional, scientific, and technical activities for others. These activities require a high degree of expertise and training. The establishments in this sector specialize according to expertise and provide these services to clients in a variety of industries and, in some cases, to households. Activities performed include: legal advice and representation; accounting, bookkeeping, and payroll services; architectural, engineering, and specialized design services; computer services; consulting services; research services; advertising services; photographic services; translation and interpretation services; veterinary services; and other professional, scientific, and technical services.

NAICS 55 (Management of Companies and Enterprises)

The Management of Companies and Enterprises sector comprises (1) establishments that hold the securities of (or other equity interests in) companies and enterprises for the purpose of owning a controlling interest or influencing management decisions or (2) establishments (except government establishments) that administer, oversee, and manage establishments of the company or enterprise and that normally undertake the strategic or organizational planning and decision making role of the company or enterprise. Establishments that administer, oversee, and manage may hold the securities of the company or enterprise.

Establishments in this sector perform essential activities that are often undertaken, in-house, by establishments in many sectors of the economy. By consolidating the performance of these activities of the enterprise at one establishment, economies of scale are achieved.

NAICS 56 (Administration, Support, Waste Management, and Remediation Services)

The Administrative and Support and Waste Management and Remediation Services sector comprises establishments performing routine support activities for the day-to-day operations of other organizations. These essential activities are often undertaken in-house by establishments in many sectors of the economy. The establishments in this sector specialize in one or more of these support activities and provide these services to clients in a variety of industries and, in some cases, to households. Activities performed include: office administration, hiring and placing of personnel, document preparation and

similar clerical services, solicitation, collection, security and surveillance services, cleaning, and waste disposal services.

The administrative and management activities performed by establishments in this sector are typically on a contract or fee basis. These activities may also be performed by establishments that are part of the company or enterprise. However, establishments involved in administering, overseeing, and managing other establishments of the company or enterprise, are classified in Sector 55, Management of Companies and Enterprises. These establishments normally undertake the strategic and organizational planning and decision making role of the company or enterprise.

NAICS 61 (Educational Services)

The Educational Services sector comprises establishments that provide instruction and training in a wide variety of subjects. This instruction and training is provided by specialized establishments, such as schools, colleges, universities, and training centers. These establishments may be privately owned and operated for profit or not for profit, or they may be publicly owned and operated. They may also offer food and accommodation services to their students.

Educational services are usually delivered by teachers or instructors that explain, tell, demonstrate, supervise, and direct learning. Instruction is imparted in diverse settings, such as educational institutions, the workplace, or the home through correspondence, television, or other means. It can be adapted to the particular needs of the students, for example sign language can replace verbal language for teaching students with hearing impairments. All industries in the sector share this commonality of process, namely, labor inputs of instructors with the requisite subject matter expertise and teaching ability.

NAICS 62 (Health Care and Social Assistance)

The Health Care and Social Assistance sector comprises establishments providing health care and social assistance for individuals. The sector includes both health care and social assistance because it is sometimes difficult to distinguish between the boundaries of these two activities. The industries in this sector are arranged on a continuum starting with those establishments providing medical care exclusively, continuing with those providing health care and social assistance, and finally finishing with those providing only social assistance. The services provided by establishments in this sector are delivered by trained professionals. All industries in the sector share this commonality of process, namely, labor inputs of health practitioners or social workers with the requisite expertise. Many of the industries in the sector are defined based on the educational degree held by the practitioners included in the industry.

NAICS 71 (Arts, Entertainment, and Recreation)

The Arts, Entertainment, and Recreation sector includes a wide range of establishments that operate facilities or provide services to meet varied cultural, entertainment, and recreational interests of their patrons. This sector comprises (1) establishments that are involved in producing, promoting, or participating in live performances, events, or exhibits intended for public viewing; (2) establishments that preserve and exhibit objects and sites of historical, cultural, or educational interest; and (3) establishments that operate facilities or provide services that enable patrons to participate in recreational activities or pursue amusement, hobby, and leisure-time interests.

NAICS 72 (Accommodation and Food Services)

The Accommodation and Food Services sector comprises establishments providing customers with lodging and/or preparing meals, snacks, and beverages for immediate consumption. The sector includes both accommodation and food services establishments because the two activities are often combined at the same establishment.

NAICS 81 (Other Services; except Public Administration)

The Other Services (except Public Administration) sector comprises establishments engaged in providing services not specifically provided for elsewhere in the classification system. Establishments in this sector are primarily engaged in activities, such as equipment and machinery repairing, promoting or administering religious activities, grant making, advocacy, and providing dry cleaning and laundry services, personal care services, death care services, pet care services, photofinishing services, temporary parking services, and dating services.

Private households that engage in employing workers on or about the premises in activities primarily concerned with the operation of the household are included in this sector.

NAICS 92 (Public Administration)

The Public Administration sector consists of establishments of federal, state, and local government agencies that administer, oversee, and manage public programs and have executive, legislative, or judicial authority over other institutions within a given area. These agencies also set policy, create laws, adjudicate civil and criminal legal cases, provide for public safety and for national defense. In general, government establishments in the Public Administration sector oversee governmental programs and activities that are not performed by private establishments. Establishments in this sector typically are engaged in the organization and financing of the production of public goods and services, most of which are provided for free or at prices that are not economically significant.

Government establishments also engage in a wide range of productive activities covering not only public goods and services but also individual goods and services similar to those produced in sectors typically identified with private-sector establishments. In general, ownership is not a criterion for classification in NAICS. Therefore, government establishments engaged in the production of private-sector-like goods and services should be classified in the same industry as private-sector establishments engaged in similar activities.

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