INDIANA'S EXPORT BASE: A COMPARISON OF EXPORT INDUSTRIES ACROSS INDIANA'S METROPOLITAN STATISTICAL AREAS

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ABSTRACT

Historically Indiana has been known as a rust belt state heavily influenced by manufacturing. Many of those manufacturing jobs disappeared in the 1950's and 1960's, with the intensity of job losses increasing dramatically during the late 1970's and early 1980's. During those years of deindustrialization, some researchers argued that Indiana's export base had changed away from manufacturing towards exportable services, for example, health care. Most of the evidence to support these claims has been anecdotal, however. This study uses the location quotient method to estimate export employment in Indiana's metropolitan statistical areas. The location quotient is calculated as the ratio of the percentage of local employment in a given industry to the percentage of national employment in that industry. Location quotients larger than one imply some part of local production is going outside the local area. For example, a location quotient of 1.5 would suggest that one-third (0.5/1.5) of local employment is related to goods or services sold to consumers outside the local area. The location quotient results indicate that manufacturing still plays a critical role in Indiana with manufacturing exports accounting for more than 50% of all export related jobs. Nonetheless, in some MSAs exportable services such health care, accounting, finance, etc., as well as exportable retail activities such as, department stores, restaurant, etc. have become increasingly important sources of export employment.

INTRODUCTION

The importance of trade to the growth of small open economies such as cities plays a dominant role in much of the economic development literature. This is typified in many ways. Hoyt [27, 28] and Tiebout [50, 51] fashioned Keynesian style urban growth models using exports as the driving force and capturing imports through the affect of leakages on the export multiplier. Jane Jacobs [30] extended this view further by arguing that the wealth of nations was largely the by-product of cities constantly attempting to replace imports and by doing so providing not only growth through import substitution but also exports to lesser developed surrounding areas. Though such simplified models often have failed to provide accurate forecast and, to some extent, have fallen into disfavor, the importance of exports still prevails. DRI [46], one of the nation's foremost forecasting organizations, for example, bases its near-term forecast (2001 and 2002) for the Midwest states on the growth of manufacturing, especially the transportation sector. DRI [46, pp. 38-39] notes: "The

Big Three's [General Motors, Ford, and Daimler-Chrysler] deepest production cuts will idle workers in Toledo, Warren, and Avon Lake, Ohio; Lansing, Wayne, Orion, and Flat Rock, Michigan; Belvidere, Illinois St. Louis, Missouri; Shreveport, Louisiana; Louisville, Kentucky; and Oklahoma City… Manufacturing employment and income losses will reverberate throughout local economies, affecting retail trade, services, real estate markets, and government revenues". At a more micro level, states and cities fiercely compete for major manufacturing plants, state and federal government offices, national and regional headquarters of large corporations, major league sports teams, casinos, and the like. Justification for the large public subsidies used to woo such activities largely rest on the ability of such economic activities to generate export income, which, in turn, results in trickle down multiplier effects.

In more recent years, the export base view of economic development has been plagued by the difficulty in accurately defining exports, by the changing interrelationship between rural and urban areas, and by the increasing tendencies of manufacturers to outsource work whenever possible. Original proponents of the export base model, such as Hoyt [27, 28], sidestepped the issue of defining exports by arguing that for most cities exports were largely, if not entirely, related to a city's manufacturing sector. Early cities such as Pittsburgh, Detroit, and Chicago were clearly dominated by the steel, automobile, and meat packing industries, and to a lesser degree by smaller manufacturing enterprises. Even many smaller cities had significant percentages of employment in manufacturing. Thus, the presumption that most, if not all, exports were somehow tied to manufacturing was, if not totally accurate, nonetheless, a reasonable approximation.

Over time as the growth of manufacturing increasingly moved away from cities and into rural areas and as manufacturers outsourced previously in-house functions, this simple approach to determining exports weakened. The greater substitution of labor by machines allowed for by modern technology resulted in larger plants that were horizontal v. vertical, consequently requiring extensive tracts of land more readily available outside of developed areas. At the same time, transportation costs for both freight and labor declined. This was especially true for ground transportation. The highway network made more markets accessible than had any other conveyance. Moreover, excellent highways increased the supply of suitable manufacturing sites, making such sites relatively cheap. In addition, relatively easy access allowed manufacturing firms to be located relatively long distances from major labor markets, since workers were willing to travel considerable distances. Researchers also found that manufacturing plants located away from urban areas to take advantage of a willing and reliable work force, the absence of labor unions and existence of right-to-work laws, readily available buildings and sites, and community livability. In short, manufacturing plants became more and more "footloose." (Wheat [56, 57,]; Carlino and Mills [12]; Dunne, Roberts, and Samuelson [15]; Nelson and Cosson [37]; Nelson, Drummond, and Sawicki [38]; Nelson [39])

Concurrent with manufacturing decentralization, international competition placed pressure on manufacturers to reduce cost, leading many manufacturers to outsource functions previously done in-house. To a large extent this entailed outsourcing advertising, finance, accounting, legal, custodial and like services. Other manufacturers in attempts to reduce the cost of production workers hired many of these workers from temporary employment agencies.

In addition to the changes taking place in manufacturing, economic growth and technological progress, such as that in medicine, led to large and even medium

size cities supplying highly specialized retail and service goods to residents and non-residents alike. All of these changes made it increasingly difficult to define exports and led to speculations about the changing nature of the export base.

Leven [32, 33] was one of the first to articulate this new view and to argue that, although demand for a region's exports is still critical to a region's growth, the basic export sector should be expanded to include intangible services that often represent the larger component of exportable activity. Changes in technological efficiencies, economies of scale in production of both goods and services coupled with the ease of transporting goods and services have, in Leven's view, made it feasible for a region to experience growth by exporting intangible services such as routine distribution. He thus advocates redefining services to distinguish between exportable and non-exportable services. Peck [42] applies the possibility of exportable services to suggest how states such as Indiana were able to weather the tremendous loss of manufacturing jobs that started in the 1950's and continued throughout the 1960's, 1970's, and 1980's. He notes that part of the apparent deindustrialization of Midwestern states was nothing more than an outsourcing by manufacturers of various services. To support this contention, he shows that Business Services has been the fastest growing industry in the economy – with an increase of more than four times that of total nonagricultural industries in recent years (Peck, [42, p. 37]). Following the lead of Leven, Peck states that "[w]hile narrow efforts to attract manufacturing industry to deindustrializing areas are well intentioned and understandable, it can be argued that a more realistic revitalization effort would call for a strategy that devotes a good deal of energy as well to the attraction and support of service industries, particularly those where the services provided are exportable in nature."(Peck, [42, p. 37])

In spite of the suggestions that non-manufacturing activities may represent important sources of export income, little evidence exists on the extent to which such activities actually generate exports. Some anecdotal evidence has been used to highlight the importance of medical services as a source of export income to specific hospitals such as the Cleveland Clinic and to specific cities such as New York City. Lowenstein [35] finds that roughly 30,000 workers, more than one-third of New York's health-related employees – produced goods and services for export leading him to conclude that "[a] significant share of New York's health-related workers produce goods and services for export, thus bolstering regional economic growth." Other studies for smaller cities showed similar results, suggesting that even for less specialized services the size of the market in less populated areas was insufficient to warrant such specialization leading cities to export such services to rural areas. Nonetheless, other than these case studies of specific industries or organizations, no comprehensive analysis has been heretofore made of the composition of a local area's exports.[1]

The purpose of this study is to analyze the composition of export employment for eleven Indiana MSAs. The data used cover the period 1988-1995 and represent four-digit SIC codes, allowing very detailed comparisons across MSAs. Exports are calculated using the location quotient method. The results indicate that for most of Indiana's eleven MSAs manufacturing still represents the major source of export employment, even before taking into account indirect export employment due to outsourcing. Nonetheless, the results do differ markedly across MSAs in part due to differences in size and, in at least one instance, due to the interrelationship between two MSAs. The study's findings, moreover, do indicate that important service and retail export employment components have evolved in many Indiana MSAs.

The next section of the paper describes the data used in the study and some general characteristics of Indiana's MSAs. This is then followed by a brief description of the location quotient method of determining export employment. The composition of exports for the Indiana MSAs is then presented. A final section discusses some economic development implications suggested by the study.

DATA AND BASIC CHARACTERISTICS OF MSAs

The data for all of the analyses done in this study are taken from ES202 data files. The ES202 database is derived from company level data collected for unemployment compensation tax collection purposes by each state. Nearly all employers are required to file unemployment insurance ES202 reports to their respective states on a quarterly basis. An employer needs to report to the appropriate state agency if that employer had a paid employee for 20 or more weeks during the year or paid an employee $1,500 or more during any quarter. Firms exempt from the reporting requirement include agricultural enterprises with fewer than 10 employees and sole proprietorships, including those that employ unpaid family members. The data used in the study come from the ES202 files for the years 1988 to 1995 and are at the 4-digit standard industrial classification (SIC) level. The data often have been used to help researchers understand the economic base of cities and other regions, monitor the performance of major development projects, and assist in industry targeting, small business growth, and labor force training.

The data were purchased from MIG, Inc. who provides estimates where disclosures do not allow the actual data to be shown. Many data problems surfaced in the use these data. Literally hours and hours of time and substantial amounts of money were spent cleansing the data of obvious errors. Most of the errors at the 4-digit SIC level appear to be reclassification of industries perhaps because of changes in the nature of work from year to year by one or more firms or simple coding errors. The assistance of local economic development officers to help reconcile data problems also was sought. These officials, in some instances, went to local firms to solicit their input on data misclassifications. The obvious errors in the data have been corrected. Nonetheless, it would be highly presumptive to say the data are error free.

Data in Tables 1 and 2 provide information on the basic characteristics of the 11 Indiana MSAs used in this study. The 11 MSAs studied differ in both size and character. In terms of employment they range from Bloomington, which is the smallest, with 38,372 workers to Indianapolis, which is the largest, with 610,583 workers.

The 11 MSAs also vary considerably in terms of their character. Indianapolis is the state capitol but also has grown considerably in recent years and has a sizeable non-government sector. Bloomington, West Lafayette, Muncie, and Terre Haute are generally thought of as college towns but also have significant non-educational employment. Elkhart is the recreational vehicle capitol of the world and is much more dominated by manufacturing than any of the MSAs. Kokomo, and South Bend have automobile manufacturing plants. Gary is still dominated by the steel industry in spite of massive declines in employment starting in the late 1970's.

Many of the MSAs have witnessed major changes over the past four to five decades. For example, South Bend, once largely dominated by heavy manufacturing, has more recently evolved into a regional retail and medical service center, in part servicing Elkhart, which has continued to specialize in manufacturing.

The data in Table 2 highlight the structural similarities and dissimilarities of the MSAs. All MSAs except Elkhart and Indianapolis have similar percentages of employment in construction, finance-insurance-real estate (FIRE), and wholesale trade. Indianapolis has a larger percentage of employment in FIRE and Elkhart a smaller percentage in FIRE. Indianapolis has historically been a center of insurance activity, and Elkhart may rely upon South Bend for its financial services. The percentage of employment in manufacturing varies the most across metropolitan and non-metropolitan counties. Manufacturing represents about 28 percent of employment in the 11 MSAs but 57 percent of employment in Elkhart, 47 percent of employment in Kokomo, and 38 percent of employment in the non-metropolitan counties. Elkhart and Kokomo offset high percentages of manufacturing with lower percentages of employment in services.

The results highlight the importance of specialization, trade, and proximity. Kokomo and Elkhart are able to specialize more in manufacturing because of their close proximity to other MSAs that are relied upon as retail and service providers. South Bend, for example, has become the retail and service center of what has been termed the Michiana area. Elkhart, which is twenty miles from South Bend relies on South Bend for its more specialized retail and service products. Kokomo presumably relies on Indianapolis, which is about 40 miles south, for many of its retail and service products, particularly highly specialized medical services provided by the IU School of Medicine hospitals.

DETERMINING EXPORT EMPLOYMENT

Ideally, export income and/or employment would be determined from detailed information on either the flow of goods and services out of an MSA or alternatively the flow of money for such goods and services into an MSA. Such detailed information is unavailable at the MSA level either for goods or services. An alternative, albeit inferior, method is to estimate that portion of a local industry's employment that exceeds the amount that would satisfy the local area's needs. This is the basis of the location quotient technique. The location quotient is calculated from the formula:

$$LQ_i = \frac{\%\ employment\ locally\ in\ industry_i}{\%\ employment\ nationally\ in\ industry_i} \qquad (1)$$

Location quotients larger than one imply some part of local production is going outside the local area. For example, a location quotient of 1.5 would suggest that one-third (0.5/1.5) of local employment is related to goods or services sold to consumers outside the local area. Since short-term year to year fluctuations in the data might skew the location quotient for any one year, averages over the 1988-1995 period of the percent of local employment in industry i to the percentage of national employment in industry i are used instead. As a specific illustration consider the location quotient for South Bend SIC 3317 – Steel Pipe and Tubes. SIC 3317 had an average of 379 employees over the 1988-1995 period and represented 0.3601 percent of all South Bend employment. Nationally, SIC 3317 represented 0.02823 percent of all jobs during the same period so that the location quotient is given as:

$$LQ_{sic3317} = \frac{0.3601}{0.02823} = 12.76 \quad (2)$$

An estimate of the export employment due to SIC 3317 is thus

$$EXPEMP_{sic3317} = \frac{11.76}{12.76} * 379 = 349 \quad (3)$$

Similar results were calculated for each SIC in each of the ten other Indiana MSAs.

Several weaknesses of this approach potentially distort the estimates of exports used in this study. Three underlying assumptions determine the accuracy of the location quotient approach: 1) per capita local demand for industry i is the same in the MSA as in the nation; 2) the technology used to produce goods or services in industry i is the same in the MSA as in the nation; and 3) the efficiency in producing goods or services in industry i is the same in the MSA as in the nation. There are no easy ways to test these assumptions. For example, many of the Indiana MSAs have location quotients larger than one for bowling alleys. This could be interpreted that these MSAs export bowling services to outlying area. To some extent this may be the case. But more probably, the relatively large location quotient reflects the much greater percentage of ethnic groups in Indiana MSAs v. nationally who like to bowl. Of course, aggregating export employment into broad categories such as retail, services, etc. offsets some of these demand differences, but there is no way to determine their importance to specific export estimates. Moreover, one could also argue that in a very competitive world with a great deal of information, industries would not survive very long in Indiana MSAs if to a large degree assumptions 2) and 3) did not hold. Nonetheless, in spite of these rationalizations, the results presented below must be viewed in light of the underlying assumptions used in their calculations.

ESTIMATES OF EXPORT EMPLOYMENT FOR INDIANA MSAS

Location quotients were estimated using average percentages of local and national employment during the 1988-1995 period by 4-digit SIC industry for each of Indiana's eleven MSAs. In all, there are approximately 8,000 individual 4-digit industries. Industries were then sorted based on whether or not the location quotient was greater than 1.0, denoting export employment, and then aggregated by broad sector. These calculations are found in Table 3 and in Figure 1.

For some of the MSAs such as Elkhart and Kokomo, manufacturing industries represent virtually all of the exports. In Elkhart, manufacturing represents 92 percent of all exports and in Kokomo 85 percent of all exports. These are both highly specialized MSAs with Elkhart and Kokomo leading suppliers of recreational vehicles, mobile homes and automobile parts. Manufacturing albeit to a lesser extent, nonetheless, is the single most important source of export employment for every one of Indiana's MSAs, ranging from a low of 44 percent of all export employment in Indianapolis and South Bend to, as noted above, over 90 percent in Elkhart.

The estimates of the importance of manufacturing exports to Indiana MSAs are unquestionably on the low side given the strong likelihood that a significant

portion of the work traditionally done in-house by manufacturers is now outsourced. Much of this outsourcing is to service industries such as temporary help agencies, legal and accounting firms, advertising agencies, custodial and maintenance firms, and similar types of business services. To the extent that such outsourcing does take place and that proximity to service suppliers is important, it should surface in relatively higher amounts of service related exports and should be a direct function of the size of an MSA's manufacturing export sector. The high degree of specialization of Elkhart and Kokomo and their proximity to other MSAs such as South Bend and Indianapolis require some modification to this hypothesis. The following regression model was estimated:

$$SEXP_i = \beta_o + \beta_1 MEXP_i + \beta_2 MEXP_i * D_i + \varepsilon_i \qquad (4)$$

where $SEXP_i$ equals service sector exports in MSA i, $MEXP_i$ equals manufacturing exports in MSA i, and $MEXP_i*D_i$ is an interaction term where $D_i = 1$ if the MSA is either Elkhart or Kokomo and 0 otherwise. It is hypothesized that $\beta_1 > 0$ and $\beta_2 < 0$. The regression results are given below:

$$\hat{SEXP_i} = 1729.1 + 0.237 MEXP_i - 0.235 MEXP_i * D_i$$
$$t-values: (.73) \quad (4.35) \quad (-3.18) \qquad (5)$$
$$\bar{R}^2 = 0.68 \quad F = 11.72 \quad p\text{-}value(F) = 0.004 \quad n = 11$$

The results suggest that each additional manufacturing export job in an MSA is associated with about one-quarter of one export service job, except in the cases of Elkhart and Kokomo where each additional manufacturing export job has virtually no impact on export service employment. There are three potential problems with the estimated equation. First, the equation uses a very small data set, eleven observations, to estimate the impact of one aggregate on another. The relationship even if accurate between service exports and manufacturing exports does not highlight the specific industries in either sector that generate the indirect exports. Moreover, the smallness of the data set makes it less likely that the error terms are approximately normal and that the standard hypothesis tests are thus valid. Second, two sources of bias potentially exist in the estimate of $\hat{\beta}_1$. Malizia and Feser [36] argue that the extent and quality of a region's service sector play a role in where manufacturing firms locate and expand. If this is the case, then a positive exogenous change in services thereby increasing ε_i would not only increase $SEXP_i$ but also indirectly $MEXP_i$ thereby leading to simultaneous equation bias for $\hat{\beta}_1$, most likely positive. Perhaps even more likely, the equation is misspecified. Much of the growth in manufacturing has taken place in non-metropolitan areas with low population densities. It is very likely that such manufacturing relies to a large extent on nearby MSAs for business services. If the size of an MSA's manufacturing export sector is correlated with the size of the non-MSA manufacturing exporters who use the MSA's business services, then the estimate of $\hat{\beta}_1$ will partly capture the effects

of this missing variables. Assuming that the correlation is positive, the bias in $\hat{\beta}_1$ would also be positive.[2]

Keeping in mind the possibility that the estimated impact of manufacturing exports on service exports might be biased on the high side, estimates were made of the indirect manufacturing exports. For all of the MSAs except Elkhart and Kokomo indirect manufacturing service exports were estimated as 0.237* $MEXP_i$. For Elkhart and Kokomo, indirect service exports were calculated as 0.002* $MEXP_i$. Manufacturing and service export employment was then adjusted to take into account these indirect exports. The adjusted values are shown in the last two rows of Table 3. The adjustments substantially change the importance of manufacturing exports. After adjustments, none of the MSAs has less than 50 percent of its export in the manufacturing sector, and seven of the eleven MSAs have manufacturing export employment exceeding 60 percent of all export employment. For all eleven MSAs, manufacturing export employment represents around 70 percent of all MSA export employment.[3]

In order to investigate more fully the importance of manufacturing versus non-manufacturing exports, the largest 10 export industries in each MSA are shown in Table 4. Results in Table 4 again indicate the important role manufacturing exports play to Indiana MSAs.

Of the top ten export industries in each of the eleven MSAs, manufacturing SICs constitute 65 out of the 110 industries. Within the manufacturing sector, SIC 37, Transportation Equipment, dominates. (For more on the importance of this industry to Indiana's economy, see reference [29].) Much of Indiana's history has been tied to producing transportation related products. For example, Elkhart has been a leader for several decades in the production of motor homes, travel trailers, and campers (SICs 3716 and 3792). Similarly, Kokomo's economy has been largely built around motor vehicle parts and accessories (SIC 3714). South Bend although losing Studebaker's back in the early 1960's still has major employers specializing in motor vehicle parts and accessories (SIC 3714) and is in the process of acquiring a new General Motors plant that will build a sports vehicle designed after the Hummer military jeep. Fort Wayne, moreover, has had a long history of producing truck and bus bodies (SIC 3713), as well as producing various automobile parts and accessories (SIC 3714).

However, not all of Indiana's MSAs specialize in transportation related production. Gary, for example, remains extremely specialized in blast furnace and steel mill related production (SIC 3312). Indeed, this single SIC represents 42.1 percent of all of Gary's export employment. Likewise, Evansville specializes in refrigerators, primary aluminum and plastics production (SICs 3632, 3334, and 3089) while Bloomington specializes in refrigerators, household audio and video equipment, and electrical industrial apparatus (SICs 3632, 3651, 3629).

The only business related service that surfaces as one the largest export industries in any of the MSAs is trucking and courier services (SIC 421.1). This SIC is one of the top five export employment industries in Gary, Muncie, Indianapolis, and Fort Wayne. It represents the third largest export employment industry across all MSA's. Numerous other business service industries such as Advertising Agencies (SIC 7319), Building Maintenance Services (SIC 7349), Help Supply Services (SIC 7363), Computer Programming Services (SIC 7371), Computer Related Services n.e.c. (SIC 7379), Business Services n.e.c. (SIC 7398), Legal Services (SIC 8111),

Engineering Services (SIC 8711), and Architectural Services generate export employment in several MSAs but the amounts are not very large.[4]

Several non-manufacturing related export industries also generate significant export employment. Eating and dining places (SIC 5810) is in the top 10 export employment industries in 6 of the MSAs and across all MSAs is the fifth largest producer of export jobs. Presumably the need for relatively large markets for somewhat specialized foods results in such establishments being located in MSAs and servicing outlying areas. Department Stores (SIC 5311) also represent another major retail exporter. MSAs such as Bloomington, Muncie, Kokomo, Terre Haute, and Lafayette have become centers of retail activity for both their MSAs and surrounding populations. To a lesser degree, SIC 5311 also generates exports in Indianapolis, Evansville, and Fort Wayne.[5]

Service industries that appear to be important sources of export employment to Indiana's MSAs are largely in the health care area. Many of the MSAs have export employment related to one or more of the following: General Medical and Surgical Hospitals (SIC 8062), Intermediate Care Facilities (SIC 8052), Home Health Care Services (SIC 8082), and Nursing and Personal Care Facilities (8059). Indeed, with the exception of Elkhart, where all of the ten largest export employment industries are in manufacturing, the other 10 MSAs have at least one, if not more, health service export industries.

The export data in Table 4 further highlight how resource advantages, history, and development policies contribute to an MSA's exports. Bloomington, for example, is very near the Indiana lime quarries resulting in significant export employment from Lime Stone Production (SIC 3281). Indianapolis historically has been a center for the location of insurance companies thereby accounting for the relative importance of Fire, Marine, and Casualty Insurance (SIC 6331). South Bend, for its size, has a large number of private and public universities, accounting for the importance of Schools and Educational Services (SIC 8299). In addition, a major psychiatric facility in South Bend, The Madison Center, has recently expanded its specialization in treating pediatric mental disorders. The center's service to a 5 county region generates export employment in Individual and Family Social Services (SIC 8322).

CONCLUSIONS AND DISCUSSION

The results of this study imply that in some aspects the nature of exports in Indiana MSAs has changed and that in other ways it has not. The eleven Indiana MSAs have traditionally been considered as smokestack cities in the Midwestern manufacturing belt. The smokestacks may be less sooty and the plants very different from those of past ages but, nonetheless, manufacturing remains a critical force in their successes or failures. For most of these MSAs, manufacturing export employment is more than twice as large as the next source of export employment. For some MSAs such as Elkhart, Kokomo, Fort Wayne, and Lafayette manufacturing export employment is more than five times as large as the next largest source. The relative importance of manufacturing is even greater in terms of income given that manufacturing earnings are considerably higher than those in services, the next largest generator of export jobs for most MSAs. In addition, Indiana's MSAs have always been closely tied to the health of the vehicle transportation sector. Data from the 1988-1995 period indicate this still is the case. The vehicle transportation sector is by far the single most important sector to many of Indiana MSAs and its indirect impacts

on other industries such as steel and aluminum production make it important to still other MSAs such as Gary and Evansville.

The results of this study also highlight some important lessons about both the past and future of MSAs such as those in Indiana. It appears very clear from the results that agglomeration economies related to specific industries (i.e., localization economies) remain an extremely powerful force. Though much growth in manufacturing has taken place in non-metropolitan areas, evidence from the study indicates that MSAs such Elkhart, Kokomo, Indianapolis, Evansville, Bloomington, Fort Wayne, Gary, and South Bend still maintain sizeable amounts of export employment in traditional industries. Many of these industries have a long history some, such as steel in Gary and automobiles in South Bend, dating from as far back as the early part of the 20th century. Presumably, the advantages that exist from non-metropolitan location (e.g., cheap non-developed sites) fail to offset the gains that some manufacturers enjoy by locating in close proximity to other firms in their industry.[6]

The results also provide a picture of what the future may hold for MSAs such as those in Indiana. As growth in employment and population tend to shun metropolitan areas for non-metropolitan locations, MSAs will continue to service these non-metropolitan producers and consumers through provision of specialized goods and services. This role of MSAs shows up very clearly in the importance of various medical service activities as sources of export employment. Nearly all of the MSAs export hospital services, presumably to near by non-metropolitan residents. Various other medically related activities such as nursing homes, intermediate care facilities, home health care services and the like also surface as important sources of export employment for Indiana's MSAs. The provision of specialized goods and services to non-metropolitan producers and consumers also surfaces in the relative importance of retail exports. Many of the MSAs have significant export employment related to eating and dinning places and to department stores. Presumably, as consumers have more income and more households decide to live in developments outside of metropolitan areas, the demand by these households for highly specialized consumer type goods supplied by malls in metropolitan areas provides export employment. To a lesser extent, the results further indicate that non-metropolitan businesses further purchase a wide assortment of business services. Much of this harkens back to Stigler's [47] application to cities of Adam Smith's sage observation that the division of labor is only limited by the extent of the market. By servicing producers and consumers in their own metropolitan areas, as well as those in surrounding non-metropolitan areas, metropolitan areas not only extend the size of the market and the degree of specialization possible, but also insure their very existence.

Table 1
Employment by Industry and MSA

	MSAs													
Industry Categories	Bloomington	Elkhart	Evansville	Terre Haute	Muncie	Lafayette	Indianapolis	Fort Wayne	Gary	Kokomo	South Bend	Non-Metro	Total
Agriculture	515.00	675.00	1286.00	579.88	779.88	749.87	7022.13	2210.00	2124.25	632.38	597.00	8108.4	25279.87
Mining	185.00	35.00	1804.50	551.88	33.38	47.38	846.63	285.00	62.75	34.88	22.00	3852.75	7761.125
Construction	2209.00	3426.00	7607.13	2780.50	1851.13	3049.12	36399.50	10151.00	14633.13	1209.88	5817.00	27909.75	117043.1
Manufacturing	9340.00	54770.00	30509.25	12666.88	11070.88	18551.25	124793.50	68785.00	54521.12	19299.88	22190.00	218337.9	644835.6
Transportation, Comm. P.U.	1673.00	2675.00	4891.00	2888.13	3694.50	2013.37	41139.50	13122.00	14946.25	1339.75	5456.00	30689.63	124528.1
Wholesale	1373.00	5210.00	7423.25	2353.75	1739.62	1885.25	43951.75	13693.00	9881.62	1120.75	7136.00	31502	127270
Retail	11497.00	13789.00	27560.88	15210.38	10902.38	14738.63	140751.25	43427.00	47594.88	9128.50	22983.00	125632.5	483215.4
Finance, Ins., Real Estate	2060.00	2829.00	5791.63	2206.38	1735.25	3534.25	53100.50	13436.00	8695.38	1413.00	6673.00	31281.75	132756.1
Services	9520.00	13245.00	32651.50	12601.12	11262.62	14042.50	162579.12	46666.00	53667.63	7035.13	32750.00	101863.4	497884.0
Total	38372.00	96654.00	119525.13	51838.88	43069.62	58611.63	610583.88	211775.00	206127.00	41214.13	103624.00	579178.1	2160573

Table 2
Percentage of Employment by Industry and MSA

	MSAs												
Industry Categories	Bloomington	Elkhart	Evansville	Terre Haute	Muncie	Lafayette	Indianapolis	Fort Wayne	Gary	Green Bay	South Bend	Non-Metro	Total
Agriculture	1.3%	.7%	1.1%	1.1%	1.8%	1.3%	1.2%	1.0%	1.0%	1.0%	.6%	1.4%	1.2%
Mining	.5%	.0%	1.5%	1.1%	.1%	.1%	.1%	.1%	.0%	.1%	.0%	.7%	.4%
Construction	5.8%	3.5%	6.4%	5.4%	4.3%	5.2%	6.0%	4.8%	7.1%	5.3%	5.6%	4.8%	5.4%
Manufacturing	24.3%	56.7%	25.5%	24.4%	25.7%	31.7%	20.4%	32.5%	26.5%	25.8%	21.4%	37.7%	29.8%
Transportation, Comm. P.U.	4.4%	2.8%	4.1%	5.6%	8.6%	3.4%	6.7%	6.2%	7.3%	8.8%	5.3%	5.3%	5.8%
Wholesale	3.6%	5.4%	6.2%	4.5%	4.0%	3.2%	7.2%	6.5%	4.8%	6.5%	6.9%	5.4%	5.9%
Retail	30.0%	14.3%	23.1%	29.3%	25.3%	25.1%	23.1%	20.5%	23.1%	21.4%	22.2%	21.7%	22.4%
Finance, Ins., Real Estate	5.4%	2.9%	4.8%	4.3%	4.0%	6.0%	8.7%	6.3%	4.2%	6.5%	6.4%	5.4%	6.1%
Services	24.8%	13.7%	27.3%	24.3%	26.1%	24.0%	26.6%	22.0%	26.0%	24.6%	31.6%	17.6%	23.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 3
Estimated Exports by Sector and Indiana MSA: 1988-1995 Averages

Sector	Bloomington		Elkhart		Evansville		Fort Wayne		Gary		Indianapolis	
	Workers	% of Total	Workers	% of Total	Workers	% of Total	Workers	% of Total	Workers	% of Total	Workers	% of Total
Agriculture	82.8	0.5	7.6	0.0	7.0	0.0	3.7	0.0	32.7	0.0	25.8	0.0
Mining	165.5	1.1	0.0	0.0	1239.2	3.1	135.6	0.2	14.0	0.0	268.8	0.2
Construction	385.9	2.5	258.5	0.5	1788.4	4.4	1072.1	1.6	4501.8	6.0	5623.0	3.8
Manufacturing	7813.7	50.0	46461.5	91.8	22779.7	56.1	47093.5	70.6	43139.3	57.4	64650.0	44.3
Transportation, Comm. P.U.	244.0	1.6	180.9	0.4	1597.5	3.9	3999.4	6.0	7332.1	9.8	12387.0	8.5
Wholesale	376.9	2.4	1904.5	3.8	1571.3	3.9	3377.6	5.1	2698.5	3.6	9835.4	6.7
Retail	3662.8	23.4	299.6	0.6	3346.3	8.2	1470.4	2.2	5420.3	7.2	16298.1	11.2
Finance, Ins., Real Estate	556.1	3.6	160.8	0.3	860.3	2.1	3439.8	5.2	1083.9	1.4	16176.7	11.1
Services	2334.8	14.9	1317.6	2.6	7414.5	18.3	6145.4	9.2	10878.7	14.5	20827.7	14.3
Total	15622.4	100.0	50591.1	100.0	40604.2	100.0	66737.4	100.0	75101.4	100.0	146092.4	100.0
Adjusted Manufacturing	9664.3	61.9	46543.9	92.0	28174.8	69.4	58246.9	87.3	53356.2	71.0	79961.5	54.7
Adjusted Services	484.2	3.1	1235.1	2.4	2019.4	5.0	0	0	661.8	0.9	5516.3	3.8

Adjusted manufacturing includes estimated indirect manufacturing exports that are part of service exports. These indirect manufacturing exports are eliminated from services to determine adjusted services. See text for how this adjustment was made.

Table 3 (comt.)
Estimated Exports by Sector and Indiana MSA: 1988-1995 Averages

Sector	Kokomo		Lafayette		Muncie		South Bend		Terre Haute		Total	
	Workers	% of Total	Workers	% of Total	Workers	% of Total	Workers	% of Total	Workers	% of Total	Workers	% of Total
Agriculture	155.8	0.8	97.3	0.4	85.8	0.5	36.0	0.1	9.5	0.0	544.0	0.1
Mining	20.5	0.1	25.7	0.1	12.4	0.1	0.0	0.0	477.7	2.3	2359.3	0.5
Construction	39.1	0.2	416.9	1.9	276.5	1.5	1440.0	4.4	582.6	2.9	16384.7	3.2
Manufacturing	17498.5	85.3	15082.5	67.0	8597.7	47.6	14275.8	43.9	9772.8	48.0	297165.0	58.4
Transportation , Comm. P.U.	85.8	0.4	158.5	0.7	2272.9	12.6	1517.2	4.7	898.5	4.4	30673.8	6.0
Wholesale	177.5	0.9	318.3	1.4	387.4	2.1	1981.8	6.1	552.0	2.7	23181.3	4.6
Retail	1073.8	5.2	2949.8	13.1	2335.8	12.9	2496.9	7.7	4819.7	23.7	44173.4	8.7
Finance, Ins., Real Estate	86.6	0.4	600.0	2.7	239.7	1.3	1406.5	4.3	345.5	1.7	24955.9	4.9
Services	1371.6	6.7	2854.7	12.7	3864.2	21.4	9329.0	28.7	2909.4	14.3	69247.6	13.6
Total	20509.1	100.0	22503.7	100.0	18072.4	100.0	32483.2	100.0	20367.7	100.0	508685.0	100
Adjusted Manufacturing	17529.6	85.5	18654.6	82.9	10633.9	58.8	17656.9	54.4	12087.3	59.3	352509.9	69.3
Adjusted Services	1340.5	6.5	0	0	1829.0	10.11	5948.9	18.3	594.9	2.9	13902.7	2.7

Adjusted manufacturing includes estimated indirect manufacturing exports that are part of service exports. These indirect manufacturing exports are eliminated from services to determine adjusted services. See text for how this adjustment was made.

Table 4
Ten Largest Export Industries by Indiana MSA

Bloomington			Gary			Muncie		
SIC	Exports	% of total	sic	Exports	% of total	sic	Exports	% of total
5810	2063	13.2	3312	31582	42.1	3714	3161	17.5
3632	1959	12.5	421.1	4609	6.1	421.1	1872	10.4
3651	1888	12.1	8062	3571	4.8	5810	1044	5.8
3841	946	6.1	5810	1970	2.6	3612	711	3.9
3534	935	6.0	4931	1835	2.4	3544	705	3.9
3629	734	4.7	2911	1387	1.8	8062	681	3.8
5311	439	2.8	5051	1361	1.8	8052	592	3.3
8062	319	2.0	5541	1171	1.6	8082	500	2.8
3281	306	2.0	1629	1126	1.5	3691	430	2.4
7041	275	1.8	154.1	974	1.3	5311	362	2.0
	9867	63.2		49592	66.0		10061	55.7
Elkhart			Indianapolis			South Bend		
SIC	Exports	% of total	sic	Exports	% of total	sic	Exports	% of total
3716	6767	13.4	3724	8175	5.6	8299	2647	8.2
3792	5605	11.1	2834	7545	5.2	3231	1663	5.1
2451	3967	7.8	3694	6755	4.6	8082	1237	3.8
2834	2291	4.5	421.1	6300	4.3	8322	1062	3.3
2434	1567	3.1	5810	5865	4.0	3714	995	3.1
3714	1547	3.1	3714	4744	3.2	8072	934	2.9
3713	1425	2.8	8059	4438	3.0	3732	879	2.7
2531	1354	2.7	6331	3507	2.4	4226	857	2.6
3086	1341	2.7	8052	3406	2.3	5932	838	2.6
3442	1319	2.6	3647	3402	2.3	5411	829	2.6
	27187	53.7		54142	37.1		11944	36.8
Evansville			Kokomo			Terre Haute		
sic	Exports	% of total	sic	Exports	% of total	sic	Exports	% of total
3632	3789	9.3	3694	7171	35.0	5961	2082	10.2
3334	3675	9.1	3714	6203	30.2	2834	1482	7.3
3089	2574	6.3	3651	1196	5.8	3715	1203	5.9
8062	2260	5.6	3356	1096	5.3	3694	930	4.6
2834	1931	4.8	5810	424	2.1	5810	840	4.1
2821	1860	4.6	3363	389	1.9	5311	808	4.0
8059	1224	3.0	8059	322	1.6	2673	665	3.3
5651	1171	2.9	3465	253	1.2	3081	663	3.3
1221	1048	2.6	5311	232	1.1	8062	657	3.2
154.1	988	2.4	7379	228	1.1	2631	546	2.7
	20524	50.5		17519	85.4		9879	48.5
Fort Wayne			Lafayette			Total		
sic	Exports	% of total	sic	Exports	% of total	sic	Export	% of total
3714	3776	5.7	3715	1905	8.5	3312	31878	6.3
3663	3214	4.8	2879	1357	6.0	3714	20429	4.0
3621	2923	4.4	3711	1340	6.0	421.1	16310	3.2
6311	2916	4.4	5810	1333	5.9	3694	14949	2.9
421.1	2836	4.2	3354	1198	5.3	5810	13900	2.7
3713	2376	3.6	3566	1141	5.1	2834	13401	2.6
7363	2101	3.1	2096	956	4.2	8059	10713	2.1
3357	1926	2.9	3825	802	3.6	3716	9401	1.8
3544	1917	2.9	5311	658	2.9	3724	8175	1.6
8059	1741	2.6	8062	612	2.7	8062	8110	1.6

Figure 1
Export Employment by Sector and MSA

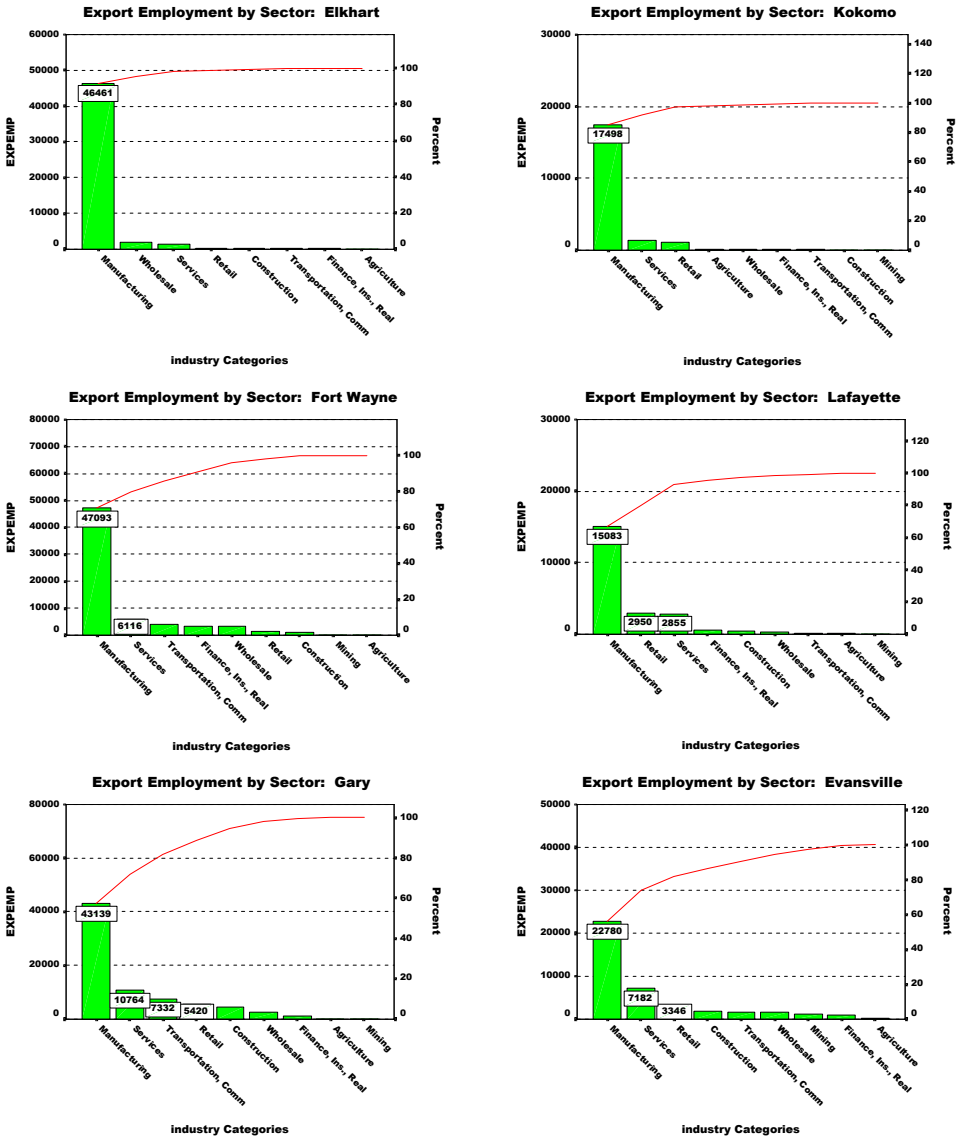
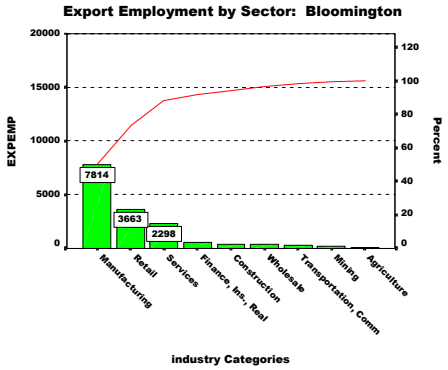
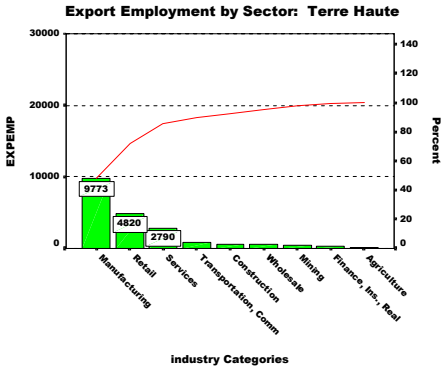
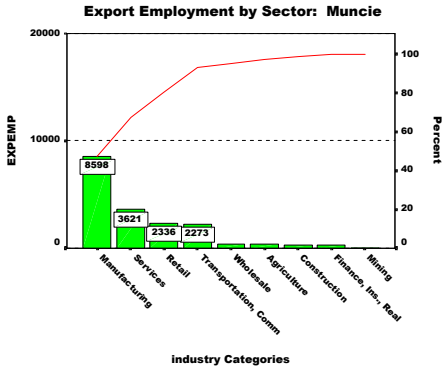
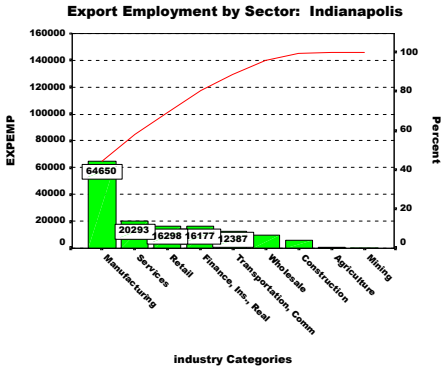


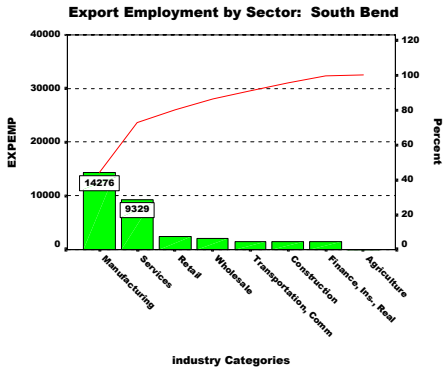
Figure 1 (continued)











ENDNOTES

[1] Beck, et. al. [7] reports on studies analyzing the economic impacts of universities on local areas.

[2] Studenmund (48) shows that with two independent variables the bias takes the following form:

$E(\hat{\beta}_1) = \beta_1 + \beta_2 * f(r_{12})$, where r_{12} is the correlation coefficient between the included and omitted variable. If the omitted variable represents non-MSA manufacturing exports, then the sign of β_2 is presumably positive. Moreover, if the sign of the correlation coefficient r_{12} between non MSA manufacturing exports and MSA manufacturing exports is also positive, the bias in β_1 will also be positive.

[3] An attempt was also made to determine indirect wholesale export employment. A regression equation similar to that for service exports was estimated. Although the equation was statistically significant, its estimates for many of the MSAs of the indirect manufacturing exports found in wholesale were larger than the level of wholesale exports.

[4] The only two business service industries to show up as important export employment industries are the Help Supply Services (SIC 7363) in Fort Wayne, and Computer Related Services n.e.c. (SIC 7379) in Kokomo.

[5] Exports generated by SIC5311 rank 11th in Indianapolis, 22nd in Evansville, and 51st in Fort Wayne. Surprisingly, SIC5311 does not generate exports in South Bend in spite of a major mall complex that seems to serve both South Bend and surrounding areas. It is possible that this is a coding error since SIC 5411, Grocery Stores, is one of the 10 largest South Bend exporters.

[6] Henderson, Kuncoro, and Turner [26] have shown the powerful force externalities related to agglomerations have on the growth and location of manufacturing employment. Also see Granger and Blomquist [23] who conclude that [w]hile amenities are a location factor, our results show that urban agglomeration and scale economies remain paramount in location decisions of manufacturing establishments."

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