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Economic Interdependence and Local Structure

Repulsion among competing firms was a principal economic force described in the discussion of market areas. However, cohesive forces also operate in regional and metropolitan economies. The complexity and functionality of these local interdependencies contribute to the image of a city as a productive growth machine. Production and marketing interdependencies tend to attract firms toward each other. Economic development officials need to understand existing linkages between firms, how to strengthen existing linkages, and how to establish new, beneficial relationships among firms.

Agglomeration Economies

Agglomeration economies are cost reductions that occur because economic activity is carried on at one place. Alfred Marshall used the concept of agglomeration economies to explain the concentration of specialized industries in particular localities in the 19th century. While critical to local development, agglomerative forces are not well understood. This section will focus on the importance of agglomeration economies but will also discuss some conceptual ambiguities. There are several types of agglomeration economies, ranging from savings that accrue to only one establishment to agglomeration economies that spread throughout an entire region.

INTERNAL AGGLOMERATION ECONOMIES

Internal agglomeration economies are cost reductions that accrue to a firm that expands activity at a particular place. For instance, the expansion of a plant could result in internal agglomeration economies. Since the firm that

expands also receives the benefits of the expansion, the agglomeration economies are "internal"; that is, the benefits are captured by the firm engaging in the expansion.

The spreading of fixed costs over a larger output, greater division of labor, the potential for using alternative technologies, and saving through bulk purchases are sources of internal agglomeration economies. Better use of a manager's time or better use of specialized machinery can result in lower average costs due to increased output. The concentration of headquarters activity undoubtedly allows a substantial internal agglomeration economy.

Economists sometimes refer to economies of scale as efficiencies that result from the expansion of a *firm*. For economies of scale to represent agglomeration economies also, the expansion must be spatially concentrated.

DIRECT SALE/PURCHASE LINKAGES

The tendency for firms that trade with each other to locate in the same region is one of the most important causes of agglomeration. Interindustry agglomeration occurs through forward and backward linkages. Buyers may attract suppliers to a region, or suppliers of inputs may attract a firm more forward in the production chain.

The question of whether sellers are attracted to areas where buyers are located or vice versa is important to development planners. If forward linkages are more important, then a regional policymaker might choose to concentrate on the development of primary production activities such as oil extraction, raw material production, and agriculture, thus eventually attracting firms that use these inputs in the production process. If backward linkages are more effective, then an economic strategy might focus first on the development of final products such as apparel or food canning. Once established, these activities would induce further growth through backward linkages.

Hirschman (1972) argued that underdeveloped countries (and by implication, underdeveloped regions) are characterized by weak interdependencies. Agriculture and extractive activities are major productive activities in less developed countries, and they have weak forward linkages within these economies. The few forward linkages—principally, refining of raw materials—that might be generated by these activities do not encourage significant development that spreads elsewhere in the economy. Oil, mineral, and agricultural products have been exported without encouraging significant additional local economic activity in many African and Arab countries. In some countries where wealth is highly concentrated in the hands of a few, final products such as luxury automobiles, high-end electronics, or branded clothing are imported. Such imports merely create activities that put finishing touches on imported products and create few effective backward linkages that generate further growth.

Are forward or backward linkages more effective in attracting linked industries? Local economic developers (EDs) now believe that generalizations about whether forward or backward linkages are more effective are inadequate. Whether forward linkages are more powerful than backward linkages depends on the industry pairs and specific sets of local circumstances. The issue of how to use linkages in the development process calls for additional empirical research.

LOCALIZATION ECONOMIES

Interindustry linkages among direct trading partners are a special type of localization economy, but localization economies can encompass much broader-based agglomerations. Localization economies occur when increases in the output of an entire group of firms at a particular place result in lower costs for firms in that industry at that location. Economic development officials often design strategies to create a group of closely related industries in order to attract further growth from firms seeking localization economies.

Localization economies are often easier to describe in theory than to operationalize. An imaginative theorist can describe connections between most industries, but local developers need to know whether the theoretical linkages are significant in practice. Observing patterns of expansion and contraction among industries is one way to determine which industries are closely integrated (Cutler, England, & Weiler, 2003).

An enhanced labor pool, specialized machinery, imitation, and the chance to comparison shop are important sources of localization economies.

Labor Pool

When firms in the same industry locate together, they may contribute to the development of a skilled labor pool that benefits all firms in the industry. Employment fluctuations may increase the location advantage of an area with a concentration of skilled labor. If many firms in an industry were located in the same region, then variations in demand for one firm's output might be offset by countervailing increases in another firm's production. Hiring peaks might even out. Furthermore, if a local industry had sufficiently large skill requirements, it might even be feasible to develop a school to train workers. Such schools or training programs would not only improve the quality and availability of labor but also enhance the retraining. Thus, community colleges often have excellent training programs designed to meet local labor-market requirements. Labor agglomerations are particularly important to advanced technology clusters because advances in knowledge increasingly require cooperation among persons in a variety of subjects.

Specialized Machinery

The ability to share specialized machinery and other factors of production is another source of localization economies. For example, an area may start developing as a distribution and warehousing center. When the area attains a large enough volume of activity, the market may be sufficient to support a distribution equipment firm that sells, repairs, or modifies loading and handling equipment. (Notice the backward linkage effect.) As a consequence of the improved availability of specialized distribution equipment, all distribution and warehousing firms in the area may operate more efficiently. Currently, specialized air cargo shipment facilities offer a similar type of specialization.

Imitation, Modification, and Innovation

Firms in the same industry may be able to imitate and copy one another more readily if they are located together. Therefore, they may be able to respond to changes in their industry quicker than if they were isolated from their competitors. Of course, the firm that is copied may be harmed, so in this instance, it would be better off in an isolated location, where copying would be more difficult. However, managers may not know which firm will develop leading innovations. On average, the "sharing" of information may benefit the group. In industries with numerous and scattered innovations, such as fashion or computer games, all firms may be better off if they have locations that allow them to imitate quickly. Furthermore, a firm that copies two changes is in a better position to innovate additional changes by combining or modifying changes that were taken from other firms. Thus, particularly in fast-changing industries, economies from industrial imitation, modification, and innovation tend to be important sources of localization economies.

Comparison Shopping

Another localization economy can be traced to the desire of individuals to compare products. Individuals may prefer to shop for shoes in a regional shopping mall because they can compare the merchandise in four or five different stores in fewer trips. Firms selling similar products may repel one another under some circumstances, but when consumers have a demand for display variety, similar competing establishments may locate together. An additional shoe store in a regional shopping mall may actually benefit all the shoe stores by making the mall a more desirable place to shop for shoes. The additional store may lower the percentage of mall shoe shoppers who purchase at each existing store, but total sales may increase due to the greater number of shoppers. Retail establishments selling complementary products may also tend to cluster. For instance, theaters and restaurants often locate together, reflecting the fact that people like to eat out before or after seeing a show.

Households are the direct beneficiaries of display variety because their shopping costs are reduced. But some of these advantages may be captured by retailers due to greater sales. Shopping center developers may also benefit if they can charge retailers higher rents because of the popularity of the shopping center. Automobile alleys and urban restaurant areas are examples of agglomerations based on display variety. Display varieties of agglomeration that are national or international in scope include the Khan Film Festival, the Paris Air Show, and numerous sales-oriented conventions.

URBANIZATION ECONOMIES

Urbanization economies are the most diffuse type of agglomeration economy. They are cost savings that accrue to a wide variety of firms and households when the volume of activity in an entire urban area increases. The firms that share in urbanization economies may be unrelated. Urbanization economies may be attributed to several sources.

Infrastructure

Urbanization economies may result from potential economies of scale in public infrastructure, such as roads, sewers, and public services. A region's infrastructure becomes inputs into a wide variety of private production and consumption activities. When significant economies of scale exist in infrastructure provision, increase in the size of an urban area will allow lower per-unit infrastructure costs. These cost savings may be passed to producers and consumers, perhaps in the form of lower taxes.

Division of Labor

Urbanization economies may also result from a more extensive division of labor. In a small town, many stages of production and distribution must be carried out within a plant because the local market cannot support specialty firms. Activities that cannot be carried out within the plant must be purchased from elsewhere or not performed at all. The extra costs of importing will tend to place the firm at a competitive disadvantage relative to other producers.

Internal Economies

Establishments that sell to a variety of firms and households may also achieve cost reductions as the urban area expands because larger markets will allow firms to achieve internal economies of scale. Internal economies may be passed forward to customers in the form of lower prices or backward to the factors of production in the form of higher compensation.

Averaging of Random Variations

Larger urban markets allow for an averaging of variations in economic activity, a larger group of industries than suggested by localization economies. A drop in sales to one customer or group of customers may be offset by new orders from other customers. Mills and Hamilton (1984) summarized this aspect of agglomeration economies:

> [The] most important of such agglomeration economies is statistical in nature and is an application of the law of large numbers. Sales of outputs and purchases of inputs fluctuate . . . for random, seasonal, cyclical and secular reasons. (p. 18)

Thus, to the extent that business ups and downs are uncorrelated, a firm in an urban area will have fewer scheduling production problems than if it were located in a smaller place. Similarly, labor changes can be accommodated more easily in a large urban area. If a chief financial officer or a tax accountant quits, finding a replacement will be a more significant problem in a small town than in a metropolitan area.

Urban Diseconomies

As the size of an economic concentration increases, diseconomies appear, so urbanization economies may be offset by urban diseconomies. Examples of urban diseconomies may be inconvenience, anxiety, delay, and aggravation, which many people associate with metropolitan regions. The higher wages paid in large cities may reflect the compensation necessary to offset the negative psychological costs of work in congested areas.

Some enterprises are more disadvantaged by suburban diseconomies than others. However, there does not appear to be a size so large that overall urban diseconomies outweigh the economies associated with size. For instance, productivity generally increases as metropolitan size increases. Therefore, urbanization economies tend to outweigh urban diseconomies over the range of city size observed in the world today.

RECAP

The impacts of agglomeration economies range from specific to diffuse. The most specific agglomeration economies accrue to a plant. Agglomeration economies affecting pairs of firms are also rather specific. Economies that result when an industry or an industrial cluster expands are slightly more diffuse. Urbanization economies are the most diffuse type of agglomeration economy. They depend on the size of the entire urban area, and the benefits of the agglomeration are shared by a wide variety of businesses.

External economy industries such as fashion, publishing, and financial activities tend to concentrate in large urban areas because they require diverse inputs and information. These are generally rapid-change industries where inputs (including information) must be rapidly obtained.

Cluster Analysis

The concepts of agglomeration have been incorporated into the broader concept of cluster economies. Economic clusters are a new paradigm for analyzing an interdependent group of activities that make up an area's economic core. Michael Porter (1998b) is credited with one of the major components of the cluster concept, the "competitive diamond," shown in Figure 4.1. The diamond was originally developed to explain a nation's advantage in trade. Currently, it is recognized that the intensity of the interactions among elements of the triangle are enhanced by geographic proximity. Hence, clusters are considered to be the drivers of many local economies.

Consider the four major components of a cluster:

1. *Firm strategy, structure, and rivalry:* Vigorous competition among firms can strengthen all firms in the group. Furthermore, the success of the local cluster depends on strategies of individual firms as they position themselves in a national and international market. Thus, cluster analysis includes focus on firms as well as industries.

2. *Demand conditions:* Local consumers who anticipate national preferences or who demand products that "catch on" elsewhere provide advantages to local producers. For instance, a Mexican restaurant chain is more likely to get a successful start in the Southwest because the local demand may favor Mexican foods. Areas with high incomes often anticipate demands as incomes in other regions increase.

3. *Related and supporting institutions:* A group of suppliers of intermediate inputs that is engaged in competitive efforts to produce higher-quality or less costly inputs are integral to a successful cluster. These institutions not only include direct supplies of intermediate inputs but also include tangential enterprises that employ similar technologies or production processes.

4. *Factor input conditions:* This element includes not only the cost of factor inputs such as labor, land, capital, and entrepreneurship but also the quality and terms of the inputs available. Available resources for new ventures, such as equity capital, appropriate labor, and supporting public institutions, are considered particularly important.

How is cluster analysis related to agglomeration economies? Cluster analysis clearly evolved from agglomeration economies, and agglomeration economies
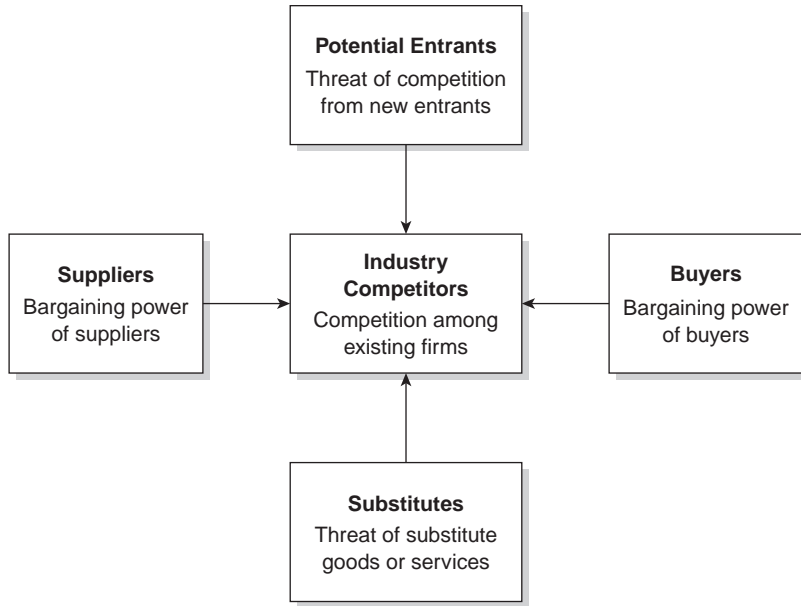
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Figure 4.1   The Competitive Diamond

are critical to most clusters. Some observers have wondered whether clusters are merely a new terminology for an established idea (Martin & Sunley, 2003). One distinctive feature of cluster analysis is the emphasis on the dynamics of competitive advantage. Comparative advantage suggests that a region should produce products at a low cost relative to other areas. Competitive advantages include static cost efficiency and also the ability of a cluster to differentiate and innovate new products and product lines in order to remain competitive as markets change. Competitive advantage connotes a dynamic process. Another feature of cluster analysis is the recognition that beneficial relationships between firms can be very subtle. For instance, a community might establish a reputation as a cultural center. This reputation might affect firms in a variety of industries, including manufacturing.

   In practice, cluster analysis at the local level involves determining which groups of firms are important to the region and identifying the nature of the linkages among them. Sometimes the linkages are difficult to uncover in the absence of direct market transactions. Once the diamond has been identified, actions to strengthen and build on the existing institutions and linkages can be considered. However, the implementation of cluster analysis remains largely subjective, so policy analysts must use their best judgment in implementation.

Measures of Economic Structure

While agglomeration economies are an important theoretical concept for understanding economic structure, we also need means to measure and analyze economic activities. This section describes some of the important empirical tools used by urban and regional economists. We start by describing a widely used way of categorizing industries. Next, location quotients (LQs) are explained, and then, techniques for using LQs for estimating exports are illustrated. Coefficients of specialization are the final topics discussed in this section.

NORTH AMERICAN INDUSTRIAL CLASSIFICATION SYSTEM (NAICS)

"Tell me your industries and I'll tell you your future," said Wilbur Thompson. Understanding how firms are grouped into industries is important because economic development officials often analyze communities according to what industries they have. The North American Industrial Classification System (NAICS) is a commonly used means of categorizing economic activities. It was developed in consultation between United States, Canada, and Mexico to provide comparability between the three countries. Business *establishments* (think plants, not firms) are assigned to an industry based on the type of output they produce. Each industry has an NAICS code. Establishments are assigned to industries based on what they produce. The codes "nest," so that the first two digits identify the broadest sector and additional digits narrow the activity. For instance, NAICS 33121, "Iron, steel pipe, and tube from purchase steel," is a subsector of NAICS 3312, "Steel product manufacturing from purchased steel." All primary metal manufacturing is included under NAICS 331, "Primary metal manufacturing." Data for international trade are available based on industries classified according to the UN's SITC (Standard International Trade Classification) code system, which is very similar to NAICS.

Most production facilities have unique qualities. Conceptually, no matter how detailed the level of desegregation, many plants in the NAICS category will produce different products. Aggregation of things that are not alike is an important limitation on the use of NAICS or any other effort to categorize businesses according to what they produce. Furthermore, establishments often produce outputs in more than one NAICS category. A farm may produce both poultry and corn, just as a manufacturing facility may produce paper and cardboard boxes. Because a plant may produce more than one output, NAICS categorizes all employment and sales of a facility according to the major product line. A local analyst who considered only the official employment reports

would not fully understand the local employment structure. NAICS can lead to an underestimation of the variety of goods and services produced in an area.

Another problem is created by disclosure rules. Governmental data collection systems normally avoid providing information that could disclose data about a singe plant. Thus, if a county has only one facility that produces bread, no information will be revealed about that NAICS code. However, information about the bakery will normally be included in the aggregated data on food manufacturing. When researchers seek to describe the economic structure of an area based on secondary data, they face a trade-off between a detailed level of industrial desegregation and a detailed level of geographic desegregation. The disclosure rule presents a particular problem for small areas, where detailed information is scarce.

LOCATION QUOTIENTS

The LQ is a tool for assessing a region's specialization in an industry. The industrial composition of a local economy may be better understood by comparing the local industrial structure with that of other cities or with the country as a whole than by examining a local economy in isolation. For instance, suppose it was determined that fabricated metals accounted for 12% of total employment in a community. While this information may be useful for some purposes, it does not indicate whether the economy is concentrated in metal fabrication compared with other places.

The employment LQ is the ratio of (a) the percentage of regional employment in a particular industry to (b) the comparable percentage in a benchmark area. The country is usually the benchmark area, although states or a group of similar regions may also be used as reference points. Accordingly, the LQ for industry i is generally expressed as

$$LQ_i = \frac{e_i/e_t}{US_i/US_t},\tag{4.1}$$

where LQ_i is the location quotient for industry i, e_i is the local employment in industry i, e_t is the total local employment, US_i is the national employment for industry i, and US_t is the total national employment.

LQs can be useful tools for identifying industries in which a region has a disproportionate level of employment. An LQ equal to 1 for a particular industry means that the region has the same percentage of employment in that industry as the nation. An LQ less than 1 implies that the area has a less than proportionate share of employment in a particular industry, while an LQ greater than 1 implies a greater than proportionate concentration of employment.

The reasons a community has a concentration of employment in particular industries can often be traced to a current or historical location advantage. If an industry is underrepresented locally, a development planner might investigate why employment is low and what can be done to increase it. This is not to say that communities should strive to develop economies with structures that are similar to the U.S. average. Therefore, good judgment is important in determining how to interpret LQs.

Table 4.1 shows the LQs for three major metropolitan regions. They are roughly consistent with our casual knowledge of these regions. For instance, New York has high LQs in apparel, printing, and FIRE (finance, insurance, and real estate). The Los Angeles LQ in transportation equipment reflects the area's heavy concentration in aerospace production. The dominance of petroleum and chemicals in Houston is consistent with our perception of the Texas economy.

The picture of industrial structure given by the LQ will change depending on the level of industrial detail used in the calculations. For instance, the data in Table 4.1 reflect the two-digit level of industrial detail. Houston is obviously highly concentrated in the chemical industry when the classification is limited to two digits. However, Houston does not have high concentrations in all aspects of chemical production. If the two-digit chemical industry were divided into more narrowly defined sectors, Houston would be seen to have LQs significantly less than 1 for some chemical activities and a very high LQ for petrochemicals.

LQs are a versatile tool. The variable being analyzed and the area used for comparison can be tailored to fit the research question. While employment is the most frequently considered variable, measures of activity have included value added, sales, and occupation, and others. Furthermore, while the nation is normally used as a benchmark, a comparison of a region's percentage of activity in industries with that of similar cities or a state has been useful. For instance, ED officials may wish to compare their areas' economic structure with the average employment structure of other cities of similar size. Finally, EDs have used an LQ for linked activities, LQ_L. For instance, grain storage facilities could be used as an indication of specialization with reference to grain production:

$$LQ_L = \frac{(g_s/g_P)}{(G_S/G_P)}, \tag{4.2}$$

where LQ_L is the location quotient for linked activities, g_s is the local grain storage in cubic feet, g_p is the local grain production, G_S is the U.S. grain storage in cubic feet, and G_p is the U.S. grain production.

Table 4.1   Location Quotients in Three Major Urban Counties: 2005

Industry	Cook County, Illinois	New York County, New York	Los Angeles County, California
Base Industry: Total, all industries	1	1	1
NAICS 11, Agriculture, forestry, fishing, and hunting	0.02	0	0.2
NAICS 21, Mining	0.08	0	0.2
NAICS 22, Utilities	0.38	ND	0.73
NAICS 23, Construction	0.64	0.25	0.64
NAICS 31–33, Manufacturing	0.9	0.18	1.04
NAICS 42, Wholesale trade	1	0.86	1.2
NAICS 44–45, Retail trade	0.79	0.53	0.86
NAICS 48–49, Transportation and warehousing	1.45	ND	1.1
NAICS 51, Information	1	2.61	2.13
NAICS 52, Finance and insurance	1.45	2.92	0.88
NAICS 53, Real estate and rental and leasing	1.12	2.19	1.15
NAICS 54, Professional and technical services	1.38	2.29	1.13
NAICS 55, Management of companies and enterprises	1.32	1.8	1.26
NAICS 56, Administrative and waste services	1.11	1	0.99
NAICS 61, Educational services	1.62	2.13	1.29
NAICS 62, Health care and social assistance	1.01	0.85	0.81
NAICS 71, Arts, entertainment, and recreation	0.9	1.58	1.14
NAICS 72, Accommodation and food services	0.87	0.82	0.9
NAICS 81, Other services, except public administration	1.11	1.19	1.7
NAICS 99, Unclassified	0.75	1.94	0.08

NOTE: ND, not disclosable.

In this case, a very low LQ for grain storage facilities might lead a development planner to attempt to encourage someone to start a grain storage enterprise since there may be a local need for storage facilities.

ESTIMATING EXPORT EMPLOYMENT WITH LOCATION QUOTIENTS

One of the most important aspects of regional structure is the distinction between activities that sell goods and services to nonresidents (export activities) and activities that provide goods and services to local residents (nonbasic activities). This section describes how a region's export industries can be identified. The next chapter elaborates the importance of export activities in the local growth process.

To establish the link between LQs and estimates of export employment, consider an LQ greater than 1. An LQ greater than 1 means that the region has more individuals employed in the particular industry than would be expected based on benchmark patterns. A likely explanation for a higher-than-average proportion of regional employment in a particular sector is that some of the sector's workers are producing exports—products that are sold outside the region. If this explanation is valid, an LQ greater than 1 means that some percentage of the employees in that industry are producing for export. Conversely, an LQ less than 1 means that the product is underproduced locally and, hence, must be imported. Exact self-sufficiency is signified by an LQ equal to 1.

Let s_i equal the self-sufficient employment level, and set the LQ equal to 1.

$$\text{LQ} = 1 = \frac{(s_i/e_t)}{(\text{US}_i/\text{US}_t)} \tag{4.3}$$

or

$$s_i = (\text{US}_i/\text{US}_t)e_t, \tag{4.4}$$

where US_i represents U.S. employment in industry i, US_t is the total employment in the country, and e_t equals total local employment. Equation 4.4 may be modified to show export employment as the employment in excess of the self-sufficient level in industry i.

$$x_i = e_i - s_i \tag{4.5}$$

or

$$x_i = e_i - e_t \, (\text{US}_i/\text{US}_t), \tag{4.6}$$

where x_i is the employment in industry i. Total export employment in the region is the sum of the export employment in the individual sectors. Therefore, total regional export employment, x_t, may be expressed as

$$x_t = \sum x_i. \tag{4.7}$$

Critique

Unfortunately, the LQ is an imprecise indicator of the extent of importing and exporting. When the initial assumptions are examined, other explanations for the size of LQs become apparent.

1. When analysts assume that an LQ of 1 implies exact self-sufficiency, they overlook the possibility of cross-hauling. For instance, a General Motors (GM) car may be produced and exported from a region at the same time as other brands are being imported. If cross-hauling existed, an area with an LQ of 1 could be exporting and importing a product simultaneously.

2. If workers in a region are more productive than workers elsewhere, an LQ_i less than 1 might be appropriate for a community, even though the industry was an exporter of the product. Conversely, an unproductive sector could have a high LQ_i, even though it produced only for local consumption. To minimize the problem of worker productivity differences, value added or total output could be used to develop the LQ.

3. If there are significant regional variations in the level of demand, the LQ will not necessarily reflect the extent of exports or imports. For instance, cities in warm climates have had a disproportionate level of employment in air-conditioning maintenance. However, this difference is due to greater local demand compared with the rest of the United States rather than significant exportation of such goods and services.

4. The estimated level of exports depends on the level of industrial detail and product differentiation. As pointed out previously, when broad industrial categories are examined, the LQs tend to be closer to 1 than when more detailed industries are examined. A region could have a low LQ in manufacturing, indicating no exports, but some sectors within manufacturing may be exporters. Similarly, Detroit is a net exporter of automobiles, but it also imports models of cars not made in Detroit due to product differentiation. Because of the existence of cross-hauling, the volume of exports estimated by the LQ technique will be subject to error. Cross-hauling of identical products could even occur under some circumstances. Generally, the more detailed the industrial breakdown, the greater the exporting sector will appear. Thus, the direction of bias due to the failure to disaggregate completely or due to product differentiation is predictable.

5. An LQ of 1 indicates self-sufficiency only in a closed national economy. However, the United States imports products from the rest of the world. Hence, the average community with an LQ of 1 for a particular good or service may still be exporting or importing some of the commodity.

Rebuttal

Most local economic development experts now consider the use of LQs alone to be inadequate for determining the multiplier. They may be useful as a first-cut approximation to determine industries that require further examination, however. Empirical studies indicate that the number of individuals in the export sector is normally underestimated when LQs are used to estimate exports because even an industry with low LQs may be engaged in exporting some of its product even when very similar products are being imported. However, the technique has three important advantages that are responsible for its continued popularity.

First, LQs are an inexpensive way to describe a region's exports because they can be constructed from published data. Second, LQs can help estimate indirect exports. For instance, a city that exports computers may have a high LQ in molded plastic parts because the plastic is embodied in the computer and indirectly exported. Finally, the LQ technique applies equally to commodities and services.

The Minimum-Requirements Technique

Some analysts believe that a more accurate picture of the local export sectors can be obtained by the minimum-requirements technique. Whereas the LQ technique normally uses the entire national economy as a benchmark, the minimum-requirements approach bases the self-sufficient employment level on analysis of similar areas. For instance, suppose you wish to determine the export employment for a region with a population of 100,000. The minimum-requirements approach could involve examination of, say, 10 cities of similar size. The cities might be selected based on other common characteristics such as location or per capita income. The city with the smallest LQ in an industry (i.e., smallest percentage of employment) would be presumed to represent the minimum requirement needed by a city to satisfy its domestic needs. Thus, it represents the self-sufficient level. The minimum-requirements approach normally results in a higher level of estimated exports than the LQ technique. A variant of the minimum-requirements technique might use some other threshold, such as the fifth smallest LQ, as the minimum requirement for self-sufficiency. The threshold depends on the official's justification of the choice. Total export employment would be all employment above the minimum-requirement threshold.

SURVEYS TO DETERMINE EXPORT ACTIVITIES

Distinguishing export from nonbasic activities can be accomplished most accurately by surveying individual businesses in the area and asking the managers (perhaps the sales director) who their customers are and where they are

located. If their local customers are themselves exporters, then the researcher must also account for the fact that the intermediate inputs are ultimately exported as well. For instance, a locally made electronic component may be exported when it is included in an airplane manufactured locally but sold outside the area. Even in a small economy, conducting a survey would be costly. When using surveys, the LQ technique may be useful in targeting industries "likely" to be exporters prior to doing the survey.

COEFFICIENTS OF SPECIALIZATION

The coefficient of specialization measures the extent to which a region's structure differs from some standard such as the national industrial structure. The coefficient is a simple measure of the degree to which a region's economic structure is similar to or different from that of the nation as a whole. To calculate the coefficient of specialization, the percentage of local employment in each industry is compared with a comparable national percentage. The sum of the positive differences (or the absolute value of the negative differences) is the coefficient of specialization.

A coefficient of 0 would indicate that the region had exactly the same percentage of employment or other variable from each sector as the nation. The maximum coefficient would approach 100; for instance, residents of a region might receive all their income from sources not available elsewhere in the United States. A coefficient of specialization is high or low by comparison with other areas. The more detailed the industrial structure, the larger the coefficient of specialization.

Like LQs, the coefficient of specialization is a versatile tool. It can be used to examine sales, value-added sales, demographic composition, and so forth.

OCCUPATIONAL STRUCTURE

Industries describe what an area produces, but occupations describe how an area produces. For instance, two regions may both have high LQs in the aerospace industry. However, one place might manufacture airplane, and the other might design airplanes. Hence, the airplane industry in the producing region would have predominately production workers, and the design region would have a concentration of engineers. Policymakers have historically examined a region's industries to understand its economic structure. More recently, information about local industries has been supplemented by information about occupational structure to allow "cross-hair" targeting (Thompson & Thompson, 1985) and indicate future regional growth and location patterns (Riefler, 2007).

Markusen (2004) described some ways in which occupational structure can assist in development planning.

1. A region's export competencies may be reflected in the skills of the labor force rather than the types of industries or natural resources. An area may manufacture medical devices, but whether the area's strength is in low-cost production or precision tool making may be revealed only by considering the occupation.

2. Some occupations have a propensity for generating new business, and so they might be a key factor in business formation. A preponderance of some occupations may explain why some areas have high rates of innovation and business start-ups.

3. An understanding of the occupational structure may inform labor force development efforts. Firms are increasingly concerned with the quality and availability of key local labor skills.

4. Occupational concentrations may occur even in the absence of a concentration of employers. For some occupations, the location of the employer and the location of the workplace spans significant distances.

5. The presence of some occupations such as "artists" or "educators" may attract other business in seemingly unrelated fields.

Markusen (2004) suggested that regional development officials may play an important role in attracting certain types of occupations based on the types of public infrastructure, supporting institutions, and quality of life available locally. Accordingly, policies may influence occupational structure.

Other Aspects of Regional Structure

An industrial focus, including the distinction between export and nonbasic activities, is the traditional way to understand a local economy. Concern with occupational characteristics is emerging. However, the structure of a local economy includes more than its industrial and occupational composition. A detailed understanding of an area's structure might include demographic, ownership, market, political, and social factors as well. All these factors may influence the course of economic development.

Summary

Economic development officials need to understand existing linkages between firms and industries within a local economy so that they can strengthen existing linkages and help build new ones. This chapter examines the cohesive forces that tend to link firms within a region and the quantitative tools that can be used to understand local economic structure.

Agglomeration economies result in cost reductions due to spatial concentration of activity. Internal agglomeration economies are attributed to an

increase in one firm's activities in a single place. Firms that trade with each other often benefit from locating in proximity. Localization economies accrue to firms in a particular industry. Localization economies have been attributable to development of a qualified labor pool, specialized equipment, imitation/ modification/innovation, and comparison shopping. Urbanization economies are the most diffuse type of agglomeration economy resulting from an expansion in overall economic activity in an area. Shared infrastructure and economies from averaging of random variations are sources of urbanization economies.

Economic clusters view local interdependencies from a broader and more dynamic perspective. Clusters build on the concept of competitive advantage.

The NAICS is a widely used system of organizing information about industries. Industries nest into categories that are increasingly detailed.

LQs are a popular technique for comparing the size of a local industry with that of the industry's importance in the national economy. The LQ formula is

$$LQ = \frac{\text{Percentage of local employment in industry } i}{\text{Percentage of national employment in industry } i} \qquad (4.8)$$

LQs may be used with sales, value added, or other measures of activity in addition to employment.

An LQ greater than 1 indicates that the industry is more dominant in the local economy than nationally. Given a set of very strict assumptions, the LQ has been used to estimate export employment. Although LQs are an imperfect tool for describing a local economy and estimating exports, they are widely used because they are an inexpensive technique, they reflect indirect exports, and they apply to both goods and services.

All employment above the level necessary to set an industry's LQ to equal 1 can be considered export employment. Alternatively, the minimum-requirements technique uses the minimum LQ from a group of similar cities as a benchmark. All employment above the level for the benchmark LQ is considered export.

The coefficient of specialization shows the extent to which an area's industrial structure differs from that of the nation or some other point of comparison.

This chapter was primarily concerned with industrial structure. However, economic development analysts should be aware that other types of structure can influence an area's economic future.