The Utility of the Economic Base Method in Calculating Urban Growth
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The Utility of The Economic Base Method in Calculating Urban Growth

By HOMER HOYT*

SINCE the first definitions of basic and non-basic occupations by Haig in 1928,¹ Nussbaum in 1933,² my own articles and reports from 1936 to 1954,³ John W. Alexander's Economic Base Study of Madison, Wisconsin in 1953⁴ and Richard B. Andrews' nine articles on the economic base in Land Economics from May 1953 to February 1956,⁵ the economic base concept has passed through a stage of critical examination from 1955 to the present time by Tiebout, Blumenfeld, Pfouts and other writers.⁶ It is asserted that the economic base as a method is too simple and crude for the purpose of accurately forecasting the population of an urban region, chiefly because the ratio between basic and non-basic employment is not constant but variable.

There are two different purposes for using the economic base method; the first is to estimate numbers of workers and numbers of population, and the second is to calculate the money flow of imports and exports into an urban region. Consequently, when the economic base method is used for estimating future population, it is not necessary to take into account the dollar wages of basic workers or the dollar value of all basic activities.

Change in Ratio Between Basic and Non-Basic Employment

The ratio between basic and non-basic employment is subject to change as a result of three factors: (1) In time of war the service or non-basic activities are reduced to a bare minimum. As I pointed out in Economic Survey of the Land Uses of Arlington County, Virginia⁷ in 1951, the ratio of private to government jobs, which was as low as 1.10 to 1 in

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1943, rose to 1.46 to 1 in 1947. Most of the government jobs were in fact basic so that, while this does not show the exact ratio of change between non-basic to basic, it does afford an approximation.

(2) As employment in any urban region becomes more diversified and the community produces more of the products which it consumes in its own borders, there is less need to produce goods for export so that the percentage of total workers in basic activities will decline.

(3) As real family incomes increase a lower proportion is spent for the basic necessities of food and clothing and more for houses, which are produced locally, or for services.

In using the economic base method in forecasting future population of an urban region, allowances must be made for changes in the basic-non-basic ratio. Planners have expected too much of the economic base method if they have thought it is a magical formula for predicting future population of an urban region. There just "ain't no sech animal." To predict future population it would be necessary to predict what new industries will locate in a given city, what demand new inventions will create for products now unknown, or what a Khrushchev or a Castro will do in the cold war. The cold war created first a demand for military aircraft, which caused a rapid growth of employment and population in San Diego, Los Angeles, Wichita and other cities producing aircraft; and then the emphasis on the missile brought about a contraction in the demand for aircraft and a reduction of employment in aircraft factories. There is no known electronic device or method which can foretell all the myriad interactions which produce historical events and which produce corresponding changes in our economy. The growth of cities in the United States is now inevitably linked with world politics and their future is inseparably bound up with its aberrations.

In the year 1800, when New York, Philadelphia, Boston and Charleston were the dominant American cities, who would have predicted the future growth of Chicago, St. Louis, Detroit and Cleveland? In the year 1840 who could have forecasted the growth of San Francisco, Salt Lake City or Denver? In 1900 who could have foretold the future population of Los Angeles, Houston, Dallas or Miami? In the year 1960 what method will accurately predict the population of our metropolitan areas in the year 2000? To be sure, the great metropolitan areas are now here and few new cities are likely to spring up in America but many basic forces, even excluding the atomic bomb from consideration, can alter the rates of growth of industrial cities in unpredictable ways.

The fundamental question is whether the economic base has a value in determining city growth even if it is not an infallible device for predicting the exact amount of that growth. Can an urban region grow without any increase in basic activities, or are basic activities necessary at all?

There are refugee colonies in Hong Kong, Karachi, and Jericho in Jordan which are supported by the relief funds of the United States and the United Nations and in which the residents do not work to pay for the food which they consume. Unless the inhabitants of a city are supported by charity, however, they must export something to pay for the food which they consume but do not produce in their own borders. Of course, if the boundaries of a metropolitan area are extended to include part of a state, it is possible for the larger region
to be self-supporting and to require neither imports nor exports to pay for imports. But this is not true of any metropolitan region within the United States which has a high degree of specialization.

Critical articles on the economic base tend to obscure the vital facts, first, that some basic activities are necessary in every urban community without which it cannot exist; second, that strong and pronounced growth in the population of any community cannot take place without a corresponding growth in basic employment; and third, that the population of any urban region will decline if there is a reduction in the level of basic income below the amount required to pay for its imports.

Past Relation Between Increase in Basic Activity and Population

Criticisms of the method have been directed toward its usefulness in estimating urban community growth. The first question to be answered is whether or not there is any past relationship between increase in basic employment and growth of population. If there is such a relationship in the past, it is reasonable to assume that the same relationship will continue in the future. On the other hand, if cities grow rapidly without any increase in export activities, entirely as a result of increasing the number of service or non-basic workers, then there is no logical reason to use the economic base method as a forecasting tool.

The plain, simple principles of the economic base have been obscured by such statements as: "the distinction between 'basic' and 'non-basic' seems to dissolve in thin air" and that non-basic activities are the permanent and constant element, indeed the truly constant element in the metropolitan area economy.  

Is it possible for a city or urban region to increase substantially without any increase in employment in export industries? It is true that refugees in Hong Kong, Karachi and Jericho have increased the population of those cities, but the basic support of the refugee colonies is relief funds supplied by the United States, Great Britain or the United Nations. There is abundant evidence that the growth of most American cities in recent decades has been the direct result of the increase in basic employment. Examples can easily be cited of this relationship between basic employment and population of urban regions in the 1950–1960 decade.

Houston, Texas. The increase in the population of the Houston metropolitan area (Harris County) from 806,701 in 1950 to 1,232,179 in 1960 was made possible by the increase of its manufacturing employment (chiefly basic) from 68,574 in 1950 to 96,400 in March 1960, and its total employment from 325,300 to 502,500 in the same period.

Dallas, Texas. The population of the Dallas metropolitan area (Dallas County) increased from 398,564 in 1940 to 614,799 in 1950 and to 943,963 in 1960, as a result of the growth in manufacturing employment from 26,700 in 1940 to 52,100 in 1950 and to 107,100 in 1960, and total basic employment from 74,446 in 1940 to 134,730 in 1950 and to 216,000 in 1960.

The economic base principle has a worldwide application. The population of Delhi State in India increased from 488,188 in 1921 to 636,246 in 1931, to 917,939 in 1941 and to 1,744,072 in 1951, as a result of a growth in employment.

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*Southwestern Bell Telephone Company, Dallas, Texas.
from 202,290 in 1921 to 268,307 in 1931, to 351,014 in 1941 and to 639,129 in 1951. It is significant to note that increases in industries that are chiefly basic was most pronounced for the entire period 1921 to 1951, with gains in manufacturing from 52,737 to 155,814, in public force and administration from 10,924 to 118,672, in transport and communications from 11,260 to 33,494 and in banks and finance from 2,287 to 10,086. Thus, population increased three-and-a-half times because manufacturing employment tripled and government employment increased ten times.

Examples could be multiplied of metropolitan regions whose past growth has been the result of the increase in basic activities. The spectacular growth of the Chicago area in its present city limits from 32,949 in 1850 to 309,635 in 1870, to 1,112,575 in 1890, to 3,372,936 in 1929 was caused chiefly by the increase in the value of its manufacturing products (largely basic) from $2.6 million in 1850 to $76.9 million in 1870, to $664.6 million in 1890 and to $3,885 million in 1929.\(^9\)

The population of the Washington, D.C. metropolitan area grew rapidly from 378,605 in 1900 to 571,882 in 1920 and to 1,968,562 in 1960 as a result of the growth in basic federal employment from 26,500 in June 1900 to 90,559 in July 1920 and to 228,000 in 1960.

**San Diego, California.** In the San Diego metropolitan area, where the population increased from 556,808 in 1950 to 1,008,522 in 1960, the manufacturing employment in the period 1947 to 1956 increased from 21,600 to 57,600, and the total employment from 88,600 to 156,900.

Just as the population growth of an urban region is caused by an increase in basic employment, so also are declines in population brought about by a drop in basic employment.

The effect of the increase and decrease of basic employment upon population is shown by the case of Akron, Ohio. Akron was one of the fastest growing cities in the United States from 1910 to 1920, when its population jumped from 69,067 to 208,435 as a result of the upsurge in factory employment, chiefly in the manufacture of automobile tires, from 23,450 in 1910 to 87,898 in 1919. When rubber tire employment dropped from 87,898 in 1919 to 46,100 in 1921, the Akron population fell from 208,435 in 1920 to 172,000 in 1922. When the rubber factories and other Akron factories again increased their number of workers from 46,100 in 1919 to 68,596 in 1926, with 65,726 in 1929, the Akron population increased from 172,000 to 249,000. When again factory employment in Akron dropped from 65,726 in 1929 to 38,500 in 1932, Akron population dropped from 255,000 in 1930 to 238,000 in 1933, with thousands of workers on relief. Again, when Akron factory employment rose from 38,500 in 1932 to 117,942 in 1943, Akron population rose from 238,000 in 1933 to 274,000 in 1944.

A decline in basic employment in an urban region is not necessarily registered immediately in commensurate decline in population of the region. Some transient workers leave the city; other workers who are discharged continue to live in the city but receive unemployment compensation or live on past savings. However, the weakening effect of a reduction in basic workers upon the economy of the region soon becomes apparent.

The Wichita, Kansas case illustrates what happens when there is a substantial

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\(^9\) Homer Hoyt, *One Hundred Years of Land Values in Chicago* (Chicago, Illinois: University of Chicago Press, 1933), pp. 481, 482.
cut in basic employment. As a result of the government requirements for military aircraft, employment in Wichita (Sedgwick County) area aircraft factories (basic employment) jumped from 5,160 in 1947 to 42,850 in 1957, with 33,000 employed at the peak in the Boeing plant alone. Total employment shot up from 60,870 in 1947 to 130,500 in 1957, while the population of Sedgwick County rose from an estimated 203,149 to 312,131, a gain of 53.6 percent in the same period.

As a result of the curtailment in production of military aircraft, aircraft production in Sedgwick County was reduced from 42,850 in 1957 to 30,150 in July 1960. In the summer of 1960 there were 12,000 to 16,000 persons seeking employment in the Wichita labor market area; department store sales dropped 17 percent; there were hundreds of vacant houses and apartments advertised for sale or rent and permits for new dwelling units in Wichita City dropped from 3,045 in 1955 to 1,144 in 1959. The population of the area has registered a slight gain since 1957, but it is at a very slow rate compared to that of the ten years from 1947 to 1957. In the three years from January 1, 1957 to December 31, 1959, the number of electric meters increased by only 2,356, or at the rate of 785 a year, while in the ten years prior to that the increase was 52,808, or at the rate of 5,281 a year.

The Wichita metropolitan area has other basic sources of employment besides military aircraft, such as trade, finance and other manufacturing, since it had a population of 203,149 in 1947 as a distributing center before aircraft production became dominant, but it is obvious that the increase in military aircraft employment—all basic—was the primary cause of the rapid upsurge in population from 1947 to 1957 and that the decline in military aircraft employment, not counteracted by an increase in other basic employment, was primarily responsible for the slackening of the rate of growth from 1957 to 1960.

**Forecast of Future Population by Economic Base Method**

With such overwhelming evidence of the causal relationship between increase in basic employment and population, planners, public utility companies, chambers of commerce, market analysts and population experts have projected future population growth of specific urban regions upon the predicted growth of basic employment and particularly of basic manufacturing.

**Denver, Colorado.** The median forecast of the increase of population of the Denver metropolitan area, consisting of Denver, Jefferson, Arapahoe and Adams Counties, from 780,000 in 1957 to 1,600,000 in 1980, made by the Inter-county Regional Planning Commission of Denver, was based on the premise that its manufacturing employment would increase from 48,800 in 1957 to 126,452 in 1980; that federal government employment would increase from 20,700 to 39,276 in this period and that total employment would rise from 296,526 to 576,000 in this 23-year period.12

**Los Angeles and Other California Cities.** The Los Angeles metropolitan area increased in numbers from 4,000,000 in 1947 to 6,000,000 in 1957 as its manufacturing employment rose from 387,100 to 771,800 in the same period. Quoting Dean James Gillies of the University of California at Los Angeles:

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11 Kansas State Employment Service.

12 Inter-County Regional Planning Commission, *Future Population Denver Metropolitan Area*, March 15, 1960, Table I.
"Between 1947 and 1956 the population of California increased from 9,672,000 to 13,260,000, or by 3,592,000. During the same period the total private non-agricultural employment increased by 1,174,000 and manufacturing employment increased by 494,000, or by about 59,000 positions a year."

"Assuming no change in the economic base of the state, and this is a conservative assumption, it will be necessary to provide approximately 2,000,000 positions in manufacturing between 1960 and 1980 if the population growth forecast for the state is to be maintained."13

"While a newly developing area can expand as a result of an inflow of investments from other regions, it is rather generally accepted that in the long run no area can grow and develop without some base industries. Base industries are defined as those that produce goods and services for sale outside of the immediate area in which they are located. This sale generates a flow of income and capital into an area, which causes an expansion of plant and equipment, which in turn creates new employment opportunities and induces population to come to the region."14

Thus, in the opinion of Dean Gillies, the expected population growth of California will not be realized without an increase in basic manufacturing:

"If the demographers are correct in their prediction of California’s population growth, the corollary of the proposition is that there will be (1) tremendous expansion of manufacturing operations within the state, or (2) large scale unemployment within the state, or (3) the growth simply will not take place."15

In short, it has not yet been demonstrated that an urban region can grow substantially in population by an increase in its non-basic industries only. It may reduce its reliance on imports by greater diversification, but a new impetus to growth must come primarily from basic employment.

The fact that a large urban region with its plants, pools of skilled workers and all of its service workers is in a position to attract new basic industries to supplant declining basic industries does not refute the economic base analysis, but only confirms it. If all the basic activities were withdrawn from a city, it would have no means of paying for its imports and its residents would starve to death unless they were supported by relief, invested income or some form of income from outside the area. A metropolitan area may coast for a while, living on accumulated savings, but no metropolitan area of any size can continue to maintain itself if its economic base, with its export activities, is seriously impaired. Our own history affords too short a time to pass judgment. Our great metropolitan centers are in a nation still rapidly growing in wealth and population, with a higher and higher proportion of income going for services, for advertising, amusement and recreation, tobacco and liquor. Still in the decade from 1950 to 1960, of the central cities in 24 metropolitan areas in the United States having a population of 1,000,000 or over, all have lost population except Los Angeles, Houston, Dallas, Milwaukee, Kansas City, Atlanta, Seattle and San Diego. It is significant to note that the metropolitan areas which have had the greatest rate of growth in the past decade—Los Angeles (53.2 percent), Houston (56 percent), Dallas (44 percent) and San Diego (80.2 percent)—have also had a corresponding rate of growth in manufacturing employment, as I have shown in this article. While the entire metropolitan areas of the other urban regions have continued to grow in the past decade, which, if an examina-

13 James Gillies, Industry’s Role in Metropolitan Growth, a Public Management Problem (Los Angeles, California: Real Estate Research Program, University of California, 1960), No. 9, pp. 41.
14 Ibid., p. 38.
15 Ibid., p. 40.
tion were made would doubtless be due to some expansion in basic activities in some form or other, none had a rate of growth higher than 30 percent except Washington, D.C. with 34.5 percent. The striking growth of the metropolitan areas where the increase of basic employment has been the highest certainly will not refute the economic base theory or gain converts for those who would abandon it. If export industries are expendable and replaceable so easily, the mayors and chambers of commerce of these great central cities such as New York, Philadelphia and Boston, which have lost population, certainly want to know the address of the new industries that will be so attracted by the fact that these metropolitan areas have the largest number and variety of consumer services in the world. If the presence of consumer services is so powerful a force, why has the rate of growth of New York, Chicago, Philadelphia, Boston and Detroit, which have the most of these services, declined in the past decade while the rate of growth of Los Angeles, San Diego, Houston and Dallas, which started out at a far lower level of consumer services, far outstripped that of the older, larger cities? Is it not a fact that these California and Texas cities grew because they offered more opportunities for the growth of basic employment?

Hans Blumenfeld's statement that no community (i.e. metropolitan area) which during the last century passed the half million mark has lost population, is offered as proof that cities of that size will maintain themselves indefinitely. Rome, with a population of 1,000,000 at the time of Augustus, declined to 17,000 by the ninth century and, although based on 'power and wealth,' the decline in its population was just as much due to a decline in this power base—its economic base—as if its population had been supported on the exports of jars of olive oil. Nineveh and Babylon were once great cities, Ninevah having a power base and Babylon a power and commercial base, and both are now only mounds of clay. The recent growth of Moscow, New Delhi, Karachi, Cairo and Athens was all due to a power base—increasing government employment at the capital. Blumenthal cites Leningrad as a striking example of the ability of a city to survive despite loss of its basic functions. Leningrad's population had expanded to 2,416,000 in 1916, as a result of the growth of basic war industries, but by 1920 its population had fallen to 722,000 after Moscow became the new capital. Leningrad was able to increase its population to 1,690,061 in 1926, and to 3,191,000 at the latest census, only by securing new basic industries. On the other hand, Moscow, which had a population of 2,000,000 in 1917, or less than that of Leningrad, after declining to 800,000 in 1920, increased in numbers as the new capital and power center of Russia to 4,137,000 in 1939 and to over 5,000,000 according to the last census. Certainly these are "striking examples" of the immediate effect of the rise and fall of basic activities upon the population of a city.

There are of course numerous examples in the United States of cities whose population has drastically declined after their sole economic base was exhausted, such as the mining cities of the West. The population of Virginia City, Nevada declined from 40,000 in 1873 to 603 in 1950, and the population of Leadville fell from 40,000 in 1880 to 4,081 in 1950. The chief present support of these once glamorous mining camps is tourists. The population of Decatur, Illinois has re-

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ently declined and there are 1,100 vacant houses there because a large industry closed down. Large metropolitan areas have diversified supports—the residents often have income from capital invested elsewhere—so that it is a complex problem to show the exact effect of the decline or increase in any single basic support. When the single basic support is isolated the effect on population of any change in it becomes immediately apparent.

The most important contribution of the economic base theory, in my opinion, is its function in furnishing a sound method of analyzing the economic structure of an urban region. The basic supports of any metropolitan area are not constant but are subject to continual fluctuations. The ratio between basic and non-basic employment is not fixed but variable. In our affluent society a constantly higher percentage of the national income is devoted to services so that the value of exports of any city that is required to pay for imports of food and products not produced in that city may diminish. Future studies of the economic base of urban regions should seek to measure these changes, and by application of a consistent method of measurement of the economic base, show the changes in the proportion of basic employment. Material for future studies is provided by the United States Census of Population by national, state and local tabulations of employment by types for cities and metropolitan regions.

Further analysis of the economic base should consist of two different types of inquiry: first, those relating to future basic employment, total employment and population, which is measured in terms of numbers of persons; and second, the value of the imports or exports of an urban region, which is measured in dollars.

If the purpose of a study is to estimate future population, then it must be recognized that there is no magic formula for predicting future historical events or the population of any specific urban region. If future population growth of any urban area is considered a desirable goal or a requisite for planning, then a careful study must be made of what new basic industries or services may be attracted to the specific city, or what existing basic activities or services might expand their employment. It is a study of possibilities or probabilities only, and not of certainties, and it is not possible to predict or estimate the exact effect of the new basic employment upon total population. The overwhelming weight of the evidence does indicate, however, that if there is no fresh accession of the numbers engaged in basic employment or in the dollar incomes of those engaged in basic activities, the particular urban region will thereafter grow very slowly if it grows at all.

An entirely different approach is necessary if the problem is to determine the dollar value of the imports or exports of an urban region. There is of course a relationship between the amount of wages or salaries of basic workers and the number of non-basic workers, since high-income families can support more in the service lines than the low-income families. However, a different technique can be employed in measuring the dollar amount of imports or exports of an urban region from that which is applicable to the problem of numbers of basic or non-basic workers.

Editor's Note. In the May 1961 issue of Land Economics Homer Hoyt will describe a new method by which the dollar value of the imports into any urban region in the United States can be approximately determined.