Benchmarks for Various Industry Classes in Counties

B. Delworth Gardner

Brigham Young University - Provo

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Benchmarks for Various Industry Classes in Counties and Multi-County Regions in Utah

Nureddin Taqieddin and B. Delworth Gardner

Research Report 17
May 1974

Agricultural Experiment Station
Utah State University, Logan, Utah 84322
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NURREDDIN TAQIEDDIN was formerly a Ph.D. student in Economics at Utah State University and is now with the Jordan Valley Commission, Amman, Jordan.

B. DELWORTH GARDNER is Professor and Head, Economics Department, Utah State University.
BENCHMARKS FOR VARIOUS INDUSTRY CLASSES IN COUNTIES AND MULTI-COUNTY REGIONS IN UTAH*

Nureddin Taqieddin and B. Delworth Gardner

INTRODUCTION

In a recent study, the impact of federal employment on the distribution of economic activity and population among counties and multi-county planning regions in Utah was investigated. A by-product of this study are some data which reveal basic characteristics of the industrial structure of counties and multi-county planning regions in Utah.

These data should be of value to observers of the economy in various parts of Utah who need a rough indicator of the relative importance of various classes of employment. For example, a company manager who contemplates putting a factory in a given county might like to know if that county is producing enough transportation to meet county needs, or must he expect to import transport services. Might the county become more or less self-sufficient in producing transport services as time passes? Light will be thrown on these kinds of questions by the data presented in this report.

The United States Census Bureau and other data agencies categorize economic activity according to industry class. In this study, a broad classification was employed which utilized 11 sectors: agriculture, self-employment, manufac-

turing, mining, construction, transportation, trade, finance, service and miscellaneous, federal government, and state and local government.

We shall proceed with a brief statement explaining how the data are derived and presented. Following that will be a descriptive analysis of the relative concentration of the 11 employment classifications in the 29 counties and 8 multi-county planning regions of Utah.

ECONOMIC-BASE THEORY

Principles of economic-base theory have been used increasingly in recent years in empirical analyses describing regional economies. Economic-base analysis divides all employment within a given area into basic and non-basic components. Basic employment (sometimes called export employment) is defined as labor employed in the production of goods and services which are exported from an area or are paid for by people residing in other regions. In contrast, non-basic employment (commonly referred to as local or service employment) is defined as labor employed in producing goods and services only for local consumption.

\footnote{Research leading to this publication was founded by the Utah Agricultural Experiment Station under project 002.}

\footnote{For a more comprehensive coverage, see Richard B. Andrews, "Mechanics of Urban Economic Base," 
This theory emphasizes the role of basic activity in contributing to economic growth and postulates that total employment in a given area is directly related to basic employment. The reasoning is as follows: an increase in export activity improves the purchasing power of the producing region and induces an expansion in the service sector. Total employment is thus postulated to be some multiple of basic employment.

Basic and non-basic components of total employment are easier to define in principle than to measure in practice. To be sure, certain activities readily lend themselves to classification since they are exclusively directed towards either the export or the local market. Defense or space programs, for example, can be reliably classified as export activities, while a barbershop or a laundromat is obviously a service activity providing non-basic employment. But such clear-cut cases are uncommon and most firms produce for both local and export markets. Moreover, the higher the level of aggregation in employment data (i.e., state employment compared to county employment) the less applicable is this general designation approach. A much smaller proportion of total economic production is normally exported from a whole country than from a county or a metropolitan area.

In addition, if industrial classes are defined very broadly as in this study, an industry group would be more likely to produce for both local and export consumers than if they were narrowly defined. For example, if the industry class included all of agriculture, the output of an area such as a county would be divided between local and export sales, but with a high probability that most of it would be consumed locally. Much would depend on the diversity of the agricultural products produced. On the other hand, if the industry class were sugar processing, quite clearly most of the output would normally go outside the county as export sales.

A method which is often utilized in estimating basic and service components of total employment is the location quotient technique. A location quotient for a given area and a given industry is the ratio between two percentages. The first percentage reflects the share of the given industry in the total employment of the area. The second percentage reflects the share of the same industry in the total employment of another area (referred to as the benchmark area) which is likely to have trade ties with the area in question. For example, if agriculture employs 30 percent of the labor force in a given county, but only 10 percent in a given state (the benchmark area) the location quotient would be 3.

The usefulness of location quotients in breaking down total employment into export and service components depends on the assumption that both the area of concern and the selected benchmark area have identical production technology and consumption patterns for each activity. Thus, if some area (say area A) has a higher concentration of employment in some industry (say industry W) than a benchmark area, i.e., if the location quotient is greater than one, then area A is assumed to be an exporter of the commodity produced by W to the benchmark area. The reverse is true for quotients below one.

The important implication is that any excess of actual industry employment in a given area above that needed to be self-sufficient is interpreted to reflect that industry's basic employment in that area. When this calculation is carried out for each industry class and the basic components are summed over all industries, the sum represents total basic employment in that area. Thus, ba-
sic employment defined by the location quotient method is not intrinsically different from service employment. Rather, it may include service employment if it exists in excess of local self-sufficiency requirements and is thus exported to the benchmark area.

It must be emphasized at this point that location quotients do not indicate absolute levels of employment. They do not permit a ranking of industrial classes in each area by number of employees. They do indicate the relative importance of employment in various industrial classes compared to some benchmark area. It is the structure of the local economy compared to the benchmark that is revealed in location quotient analysis.

The county is the basic economic area discussed first. Three benchmark areas are possibilities for the county: (1) the nation, (2) the state of Utah, and (3) the multi-county region (MCR) in which any county is located. (MCR's have been designated in Utah as basic planning units for supplying many public services.) We consider the relevant benchmark to be the largest area where the location quotient is greater than 1, providing all "lower" quotients also exceed unity. For example, if the nation

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3 The regions used are those suggested by Sherman Fitzgerald in his report, Multi-County Regions in the State of Utah. (Salt Lake City, University of Utah, Bureau of Community Development, 1970), pp. 129-136. See figure 1, p. 25.


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5 The following procedure was utilized in establishing benchmarks: employment ratios were calculated comparing the county with the nation, the MCR with the nation, and the state with the nation. If all ratios exceeded unity, the nation was chosen as benchmark. If any of the ratios were below unity, the same process was tried with the state as the denominator of the ratio, i.e., the county compared with the state and the MCR compared with the state. If both ratios exceeded unity, the state was chosen as benchmark. If either of these ratios were below unity, a new ratio was calculated comparing the county with the MCR. If this ratio exceeded unity, the MCR was chosen as benchmark. If the ratio was below unity, there were no benchmarks and an O appears in the cells of the table.
county and the MCR is calculated. If that quotient is greater than one, the MCR is chosen as benchmark. If not, there is no benchmark, implying the county is an importer of the activity.

Calculations cover employment data in 11 industrial classifications. For each industry in each county, location quotients were calculated for the 11 years of the period, 1960-70, and benchmarks were established. The results are shown in the accompanying tables which indicate for each area, each year, and each industry, the relevant benchmarks as defined above. (The benchmark areas are designated as N, S, or M representing the nation, the state, and the MCR respectively.) Where area A has a lower percentage of activity W than even the MCR a zero appears in the tables.

Let us review what the benchmark notation in the tables actually means. If the benchmark for activity W (say self-employment in table 1-b) for a given county is N (the nation) we can say the following: 1) the location quotients comparing concentrations of W in the county, the MCR, and the state with the nation are all greater than one, and 2) the county, the MCR, and the state all export the products of W to the nation, implying high concentrations of W in the county, in the MCR, and in the state relative to the concentration of W in the nation.

If the benchmark is S (the state) we can conclude the following: 1) the county and the MCR export the products of W to the state, but 2) the state does not export the products of W to the nation. Thus, an S benchmark may reflect a weak concentration of W in the state relative to the nation as well as a strong concentration of W in the county and the MCR compared to the state.

If the benchmark is M (the MCR) then: 1) the concentration of W is greater in the county than the MCR, 2) the concentration of W is less in the MCR than in the state (otherwise, the state would be the benchmark), and 3) there is no way of ascertaining the relative concentrations of W in the state as compared to the nation, in the county as compared to the state, in the county as compared to the nation, or in the MCR as compared to the nation.

If there is no benchmark (table notation of 0) we can draw only one conclusion: the concentration of W is less in the county than in the MCR. We can say nothing about relative concentration in the county as compared to the state or nation, in the MCR compared to the state and nation, or the state compared to the nation. Thus, it is clear that these tables do not reveal everything that one might wish to know about relative concentration of any activity in all areas.

But if the caveats in the foregoing paragraph are kept clearly in mind, the tables do portray some interesting differences among counties and among MCR’s in economic structure.

**ACTIVITY CONCENTRATION**

Benchmarks are discussed and summarized for counties and then for MCR’s.

County Data

Tables I-a through I-k show the rele-

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A question might be raised about why the tables contain the benchmarks rather than the location quotients from which the benchmarks are derived. These quotients would have to be given for each county if comparisons were to be made. This would complicate the tables and the benefits of showing this information did not seem to exceed the costs of the complication.
vant benchmarks by county for individual industrial groups over the period 1960-70.  

Agriculture

The most common benchmark is S (table 1-a). Most counties had higher concentrations of agricultural employment than the average concentrations in the state and the MCR's. The fact that no county had the nation as a benchmark, however, indicates that the state of Utah as a whole is not an important agricultural state relative to the nation. Of course, Utah exports some agricultural products such as turkeys, feeder livestock, and wool. But if looked at as a whole employment in agriculture is not so important relatively in Utah as in the nation. This would rule out the nation as a benchmark for all counties.

Carbon, Davis, Grand, Salt Lake and Weber Counties had lower concentrations of agricultural employment than MCR's (0 benchmarks) and Salt Lake, Davis, and Weber Counties contain more than half of the state's population. Morgan, Summit, and Tooele counties had concentrations of agricultural activity higher only than that of their respective MCR's, but their MCR's did not export agricultural products to the state.

The benchmarks for agriculture rather clearly portray the "dualistic" character of Utah's economy. Almost without exception the counties with benchmark S are rural counties, located at the state's periphery, that depend heavily on employment in agriculture and other primary industry groups. On the other hand, those counties with benchmarks 0 and M are located along or near the Wasatch Front, Utah's urban, service and manufacturing heartland. The position of Summit, Tooele, and Morgan counties is interesting in that they are important agricultural counties and yet are part of large urbanized MCR's. Thus, they export agricultural products to their respective MCR's, but their MCR's are not significant enough agriculturally to export to the state.

A consistent change in benchmarks over time can be interpreted as a shift in the economic structure of the county, the MCR, the state, or the nation. For example, if the benchmark changes from 0 to M, an increase in activity concentration for the county relative to the MCR is implied. If it changes from M to S, then the activity has shifted in favor of the MCR relative to the state, since the location quotient of both the county and the MCR relative to the state must exceed one, etc. An erratic year-to-year change from N to M or to S or 0 is likely to indicate quotients which are very close to unity so that minor fluctuations in employment can tip the magnitudes of the ratios above and below unity. These cases are frequently encountered in some tables, but interestingly, not in the first one dealing with agriculture.

Self-employment

Self-employment (excluding agricultural self-employment) is a broad and pervasive employment class. In most counties the benchmarks changed to a larger area over the decade 1960-70.

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7 Employment data used are average annual employment seasonally adjusted. The state data were provided by the Department of Employment Security while national data were obtained from Statistical Abstracts of the United States, various years for self- and agricultural employment, and from the Department of Labor Statistics, Employment and Earnings in the United States, 1909-1970, Bulletin 1312-7, for the remaining categories.
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* N stands for nation, S for state, M for multi-county region and 0 indicates concentrations less than those of all the benchmarks.
Thii suggests an increasing importance of self-employment at all levels from the county to the state. While some counties had concentration levels lower than their respective MCR's in 1960, by 1970 most of these counties had qualified for N benchmarks, suggesting that the county, its MCR, and the state were all exporting to the nation by the end of the period. Two counties, Utah and Wasatch, showed a declining trend. Tooele County had no relative advantage in self-employment throughout the period.

Among the 11 industrial classifications, self and government employment are the only ones which represent broad industrial categories. Employment in these groups might comprise a combination of some or even all of the other categories, but mostly it is services. The increasing share of self-employment in the economies of most counties would thus seem to reflect the growing importance of services.

While the composition of self-employment is largely services (including domestic workers and unpaid family workers), economic-base theory stipulates that an increase in service employment should develop around some kind of basic employment. Indeed, tables I-g, I-j, and I-k show that state and local government employment, federal employment, and to a lesser extent trade, provided such a growing economic base in most counties in Utah.

Manufacturing

Manufacturing employment was not relatively high in Utah compared to the nation, and explains the absence of any N benchmark (table I-c). Still it is clear that what manufacturing exists in the state was clearly dominated by only a few counties, Box Elder, Salt Lake, and Utah, which had S benchmarks. Several other counties, Garfield, Morgan, San Juan, Uintah, and Weber, had concentrations consistently higher than those of their corresponding MCR's. Juab and Sanpete counties had increasing benchmarks over time, with concentration levels comparing favorably with the MCR's at the beginning and with the state toward the end of the period. Several counties (e.g., Sevier) had erratic benchmark behavior while about half of the counties had concentrations below those of their respective MCR's.

Mining

The relative importance of mining in many counties, MCR's, and in the State of Utah as a whole is clearly indicated in table I-d. About half of the state's counties had N benchmarks, and these included both rural and urban counties. Two counties, Davis and Rich, had concentrations only above those of their respective MCR's and the remaining counties had relatively no significant mining activity.

Construction

Table I-e reflects a highly unstable picture for construction employment throughout the state and even for some counties over the time period. If a few counties where a consistent tendency over time could be detected, this tendency was toward a relative decline in construction employment. (See, for example, Weber, Utah and Salt Lake Counties). Apparently Utah exported construction employment to the nation up to and excluding 1965, but not thereafter. Most counties, however, showed either no important relative concentrations or highly fluctuating ones, suggesting location quotients close to unity for construction employment.

Transportation

Carbon, Grand, and Salt Lake Counties had N benchmarks, suggesting the rela-
Table I-b. Benchmarks for Utah Counties by Year, 1960-70, Self Employment *+  

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* N stands for nation, S for state, M for multi-county regions, and 0 indicates concentrations less than those of all the benchmarks.

+ Does not include agriculture.
Table I-c. Benchmarks for Utah Counties by Year, 1960-70, Manufacturing

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* N stands for nation, S for state, M for multi-county regions, and 0 indicates concentrations less than those for all the benchmarks.
Table I-d. Benchmarks for Utah Counties by Year, 1960-70, Mining*

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*N stands for nation, S for state, M for multi-county regions, and 0 indicates concentrations less than those of all the benchmarks.*
ative importance of transport employment in these counties, their MCR's and the State of Utah compared to the nation (table I-f). Cache, Millard, Sevier, and Utah Counties had transportation shares which compared favorably only with their respective MCR's all through the period. Beaver, Iron, and Weber Counties had N benchmarks at the beginning of the period, but ended with only M benchmarks. Other counties either had no significant or unstable transportation employment. It is somewhat noteworthy that the state was not the benchmark even once for a single county.

Trade

Only Salt Lake County had an N benchmark throughout the period (table I-g), although Iron, Kane, and Washington Counties grew into this category near the end of the period. This is a significant result. If any county has N as a benchmark, the state must be an exporter to the nation. Over much of the decade only Salt Lake County could qualify for the N benchmark, which implies that this one county must have carried a very large portion of the trade employment that would permit the state as a whole to export trade services to the nation. This result should not be surprising to anyone who knows well the economy of Utah. Salt Lake City and County are situated in the middle of Utah's urbanized Wasatch Front. They have over one-third of the state's population, and thus largely dominate the trade employment of the state.

Several counties had employment ratios in trade only higher than their MCR's, and generally these counties had trade centers that served the entire MCR. About half of the state's counties, however, had 0 benchmarks, implying little importance in trade employment.

Finance

As with trade, Salt Lake was the only county where employment in finance activity was proportionately higher than in the state, reflecting its great importance as a financial center in Utah. (Table I-h) Salt Lake County's benchmark was S however, rather than N, implying that the State of Utah imports financial services from the nation. Cache, Carbon, Grand, Iron, Sevier, Uintah, Utah, Washington, and Weber Counties had relatively higher employment in finance activities than their respective MCR's. This is expected since these counties contain regional marketing centers with financial institutions. The rest of the counties generally had no significant relative employment in finance activity.

Service and Miscellaneous

Salt Lake and Utah Counties had S benchmarks for service and miscellaneous activities (table I-i). Both have large universities and other sources of service employment. Cache, Garfield, Grand, Kane, Sevier, Uintah and Weber had a higher share in this category than their respective MCR's. Carbon, Duchesne, Millard, Sanpete and Washington appear to have experienced a relative decline in their shares of service employment, which apparently fell below their respective MCR averages during the period. The remaining counties had relatively little employment in this category.

Government

The last two tables strikingly reveal the great impact of government employment across the State of Utah. About two-thirds of the 29 counties had benchmark N for federal employment in nearly every year (table I-j). Thus, in the majority of cases, counties, MCR's and the state all had higher concentrations of federal employment than the nation as
Table I-f. Benchmarks for Utah Counties by Year, 1960-70, Transportation

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* N stands for nation, S for state, M for multi-county region and 0 indicates concentrations less than those of all the benchmarks.*
a whole. Interestingly, even more counties had \( N \) benchmarks for state and local government employment than federal employment (table I-k). Cache, Grand, Juab, Morgan, Salt Lake, Sanpete, Summit and Utah Counties did not have as much relative federal employment as their MCR's, while only Davis and Tooele had lower shares of state and local employment than their MCR's. Both of these counties had very heavy relative concentrations of federal employment.

Some of the benchmark tables for counties show great consistency over time while others show significant benchmark changes. Consistency depends on two factors: (1) how close the location quotients are to unity, and (2) how important the industrial class is in the county and benchmark areas. If any of the location quotients slips over or under one, then the relevant benchmark may well shift around between them. On the second point, if the industrial class employment is not very significant as a component of total employment in any of the four areas, then a substantial change in employment in any area (such as opening a new mine) may well cause the location quotient to increase sharply and alter the relevant benchmark.

Multi-County Region Data

Location quotient analysis was also applied to multi-county regions, yielding patterns of relative employment concentration among these planning units of the state.

Tables II-a to II-k contain the relative concentrations of various industrial classes in the eight multi-county regions. (These regions, as well as the counties included in each, are shown in figure I.) Although the MCR and the county tables include analogous data which can be read and interpreted similarly, (except, of course, the MCR is deleted as a benchmark) a few conclusions are worth noting.

Table II-a reveals the high concentration of agricultural employment relative to the state in all MCR's except the second and the third. As would be expected, MCR's 2 and 3, which include metropolitan areas Salt Lake City and Ogden, had low relative concentrations of agricultural employment compared to the state. Since Utah was not an exporter of agricultural products to the nation, no MCR could have a benchmark of \( N \). This table clearly shows that Utah is a heterogenous state, with a non-agricultural hinterland comprising the rest of the state.

Self-employment (table II-b) had increased relative concentrations in MCR's 1, 5, 6, 7, and 8 over the decade, while it experienced a decrease in MCR 4 containing Utah and Wasatch counties. Consistent with the county data, in 1967 apparently Utah ceased being an importer of self-employment and became an exporter, permitting the N benchmark after that time. MCR's 2 and 3 had consistently lower levels of concentration throughout the decade than the state.

Three MCR's (1, 3 and 4) had consistently higher concentrations of manufacturing employment relative to the state, while a fourth, MCR 7, experienced a relative increase in manufacturing employment in the second half of the decade. The remaining MCR's had relatively low concentrations throughout the decade.

The high concentration of mining employment in nearly all MCR's (except MCR's 1 and 2) and the state relative to the nation as a whole, is clearly indicated in table II-d. This result is consistent with that obtained from the corresponding county table. Likewise, the volatility and declining trend of relative construction employment are re-
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* N stands for nation, S for state, M for multi-county region and 0 indicates concentrations less than those of all the benchmarks.
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Table II-c. Benchmarks for Multi-county Regions of Utah, 1960-70, Manufacturing*

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*N stands for nation, S for state, M for multi-county region and O indicates concentrations less than those of all the benchmarks.

+Does not include agriculture.
Table II-d. Benchmarks for Multi-county Regions of Utah, 1960-70, Mining*

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Table II-e. Benchmarks for Multi-county Regions of Utah, 1960-70, Construction*

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Table II-f. Benchmarks for Multi-county Regions of Utah, 1960-70, Transportation*

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* N stands for nation, S for state, M for multi-county region and 0 indicates concentrations less than those of all the benchmarks.
flected in the data of table II-e.

In all the remaining categories except for government employment, the general tendency is for a few MCR's to have relatively high ratios relative to the state and/or the nation, while the remaining MCR's have no concentration advantage relative to the state. In transportation, MCR's 2, 3, 6, and in the early 60's 8, had higher concentrations than the state and the nation. In trade, MCR's 3 and 8 had generally higher ratios than the state and the nation. While in finance, MCR 3 leads the state and together with MCR 4 it leads the state in service and miscellaneous as well.

Finally, the predominance of government employment in Utah is again revealed by the data of the last two tables (II-j and II-k). It should be noted that the MCR with the lowest concentration of federal employment throughout the decade is MCR 4, which includes Utah and Wasatch Counties.

If the focus is placed on the MCR rather than the industrial classification as is done in table III, the following conclusions emerge. MCR 1 had relative employment concentration below the state average in trade, finance, and servicemiscellaneous, but was higher than the state average in agriculture, self-employed (toward the end of the decade), manufacturing, and government. Similarly, MCR 2 had relatively low concentration in almost every category except transportation and government. MCR 3 had relatively high ratios in all activities except agriculture and self-employment. MCR 4 had relatively high employment concentration in agriculture, manufacturing, mining, construction and service-miscellaneous. It had relatively low employment proportions in self-employment, transportation, trade, finance and federal government. The remaining MCR's all had relatively high employment in agriculture, self-employment, mining, and government. They had changing concentration levels in construction and relatively low levels in transportation (except for MCR 6), trade, finance, and service-miscellaneous.

SUMMARY AND CONCLUSION

Economic base analysis was employed to derive benchmarks for 11 industrial classes of economic activity pertaining to the 29 counties and 8 multi-county planning regions (MCR's) of Utah. The selection of a relevant benchmark provides one indication of the relative importance of these classes in the county or MCR compared with the MCR, state, or nation.

Table III contains the summarized results. The county and MCR data show remarkable consistency. Not only is tremendous relative importance of government (federal, state and local) to the economy of Utah borne out in this table, but government employment has gained in importance over the decade of the 1960s. Mining is the other industrial class which is relatively more important in the counties and MCR's of Utah than in the nation as a whole, but its importance is not increasing.

Agriculture and self-employment are relatively important on average in the counties and the MCR's compared to the state of Utah as a whole, and self-employment is increasing in importance. Construction and transportation may well have declined in relative importance over the 1960 decade. These two classes plus manufacturing, trade, finance, and service and miscellaneous classes are not relatively important in most counties and MCR's in Utah compared to the state and the nation.
### Table II-g. Benchmarks for Multi-county Regions of Utah, 1960-70, Trade

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### Table II-h. Benchmarks for Multi-county Regions of Utah, 1960-70, Finance

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### Table II-i. Benchmarks for Multi-county Regions of Utah, 1960-70, Service and Miscellaneous

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* N stands for nation, S for state, M for multi-county region and 0 indicates concentrations less than those of all the benchmarks.
### Table II-j. Benchmarks for Multi-county Regions of Utah, 1960-70, Federal Government

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### Table II-k. Benchmarks for Multi-county Regions of Utah, 1960-70, State and Local Governments

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### Table III. Summary of Benchmarks and Time Trends for Industry Classes in Utah

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1. N is the symbol indicating the nation is the benchmark, S is the benchmark for the state, M for multi-county regions, and O indicates no benchmark.

2. + stands for a time trend that is significantly up in some counties, - for a down trend in some counties, and O suggests no clear trends either up or down.