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# The Export-Local Employment Relationship

## *in Metropolitan Areas*

**M**OST AREAS OF THE United States have experienced impressive economic expansion in recent years. Investment has taken place in a great variety of activities which produce income and employment. Industrial and commercial facilities have been expanded and government activity has grown. It is often desirable to know the indirect or multiplicative effects of such developments upon the area in which they occur. Since modern economic affairs are highly interdependent, viewing a specific economic event in isolation will ordinarily lead to a great underestimation of its significance.

Thus, a resources development project which increases the availability of certain resources—water and power for example—may have far more wide-ranging economic effects than at first may be apparent. Additional goods and services may be demanded from the community to supply the needs of the new employees and of the productive activities stemming directly from the project. Not only project planners but persons in areas affected by a project find it valuable to be able to anticipate such indirect effects.

Similarly, the location of a new factory in a city will lead to the direct employment of a given number of people. However, under propitious circumstances, the community will—as a consequence of the new plant—experience a growth in employment and income which is a multiple of the expansion which results directly. It is certainly important to city planners and others interested in regional

growth to have a means of estimating these indirect effects. Informed judgments concerning such matters as prospects for labor force and population growth, social and business capital requirements, and growth of the tax base depend upon a means of determining indirect and diffuse consequences of the more apparent, or perhaps more fundamental, changes in the regional economy.

Perhaps the most widely known and generally applied technique for dealing with this type of problem is founded upon the idea that certain economic activities can be identified which generate and support other activities in the community. The appeal of such an approach is obvious. If the supporting activities can be projected and if a stable relationship can be found between supporting and dependent activities, prediction of the total development of an area can be achieved. Or if study of an existing situation reveals an imbalance in the relationship between supporting and dependent activities, future changes in total activity can be anticipated. Numerous studies of American cities—often called economic base or employment multiplier studies—have been grounded upon the concept of supporting activities. Since value added or other monetary measures which might be used to identify a supporting-dependent relationship of economic activities are extremely difficult to obtain on a regional basis, and since employment information is often wanted for its own sake, the vast majority of studies utilizing the concept have been aimed at

identifying supporting and dependent employment.

This article points out some of the factors which make it necessary to exercise circumspection in the utilization and measurement of the relationship between supporting and dependent employment. The point is made that this relationship may be expected to vary with economic circumstances and that its estimated value may be affected by the technique used to measure it. Consideration of these matters may help to improve the precision of the distinction between supporting and dependent employment as a tool of economic analysis.

#### **What Types of Employment Support Community Growth?**

The most commonly encountered definition of supporting employment emphasizes the place of residence of the purchaser of goods and services supplied by the community. Purchases by individuals residing outside the community are deemed to give rise to supporting employment while purchases by those residing within the community are thought to produce dependent employment. Clearly such a distinction is based upon the fact that the national economy displays great regional specialization and, therefore, the potential growth of an area is heavily dependent upon its ability to export. As export industries expand, requirements for localized activities—trade, services, and construction, for example—also enlarge, and community employment tends to increase by some multiple of the growth in export employment. This multiple is known as the employment multiplier.

The most straightforward way to derive an employment multiplier from the distinction between export-oriented and localized employment would be to presume that the relationship between these two types of employment, as measured at a given time, would tend to re-establish itself whenever export

employment is altered. This is, in fact, the general idea underlying most multiplier studies even though they often incorporate more elaborate techniques which usually involve the simultaneous use of a number of estimates of export-oriented and localized employment made over a period of time. By this means they attempt to relate changes in export employment to changes in local employment.

Sometimes an existing relationship between export-oriented and localized employment in a particular area is viewed as evidence of the probable direction of change in total employment. In other words, if export employment is deemed to be high relative to local employment at a given point of time, it is predicted that total employment will tend to rise even without further increases in export employment. The underlying idea in this case is similar to that involved in applying an employment multiplier to a change in export employment, i.e., that there is a predictable relationship between export and local employment toward which the actual relationship tends. Clearly the validity of studies utilizing this idea hinges heavily upon the meaningfulness and accuracy of the distinction made between employees engaged in production for local markets and those whose productive activities are oriented toward export markets.

The use of the distinction between export and local activities as an explanation of total employment change has certain theoretical shortcomings. For example, it seems clear that the relation between these two types of employment may not predict with complete accuracy the consequences of a development of new employment because, among other things, it fails to consider the impact which such employment may have upon imports. For example, a new firm which sells all its output locally may provide goods which were formerly imported. In this case the employment oriented toward local markets could just as

well be expected to have multiplier effects as a similar increase in export employment. In other words, prediction based upon the employment multiplier, derived from export-local employment ratios, need not agree closely with the actual impact of a new development upon the flow of payments in the region.

However, the export-local distinction is meant to provide a relatively easily obtainable rule of thumb, and methods which might trace and analyze with greater exactness the impact of specific developments upon an area are extremely complex and expensive. Therefore, the export-local relationship is perhaps best judged by the predictive value it has for those who utilize it. In that regard, however, it is helpful to recognize that differences in circumstances may cause the relationship to vary from place to place, as well as at different points in time at the same place. The consideration of such circumstances is appropriate when applying, comparing, or projecting existing or historical relationships.

#### **Why Do Export-Local Employment Relationships Differ?**

As has been indicated, the relationship between export and local employment varies from city to city and for the same city at different points in time. On the face of it, this result is not surprising and several reasons for such variation are easily discernible.

For example, when numerous studies are examined there appears to be a tendency for locally oriented employment to be relatively high in large cities. This is to be expected since a large city is likely to be more nearly self-sufficient than a smaller one and, therefore, less dependent upon imports. In this regard, a very large city shows characteristics of an entire nation. If an export-local employment relationship were computed for a relatively self-sufficient nation such as the United States, it would of course reveal an extremely large proportion of local employment. How-

ever, in this case an argument to the effect that domestically oriented employment is, in a straightforward sense, supported by export employment would hardly seem defensible. The larger and more diversified an economy is, the more is it likely to display a dynamic character of its own and the less is its growth dependent upon rising exports.

An additional reason for variation of the export-local employment relationship among cities or in a given city at different points in time arises out of the fact that similar amounts of employment may represent far different amounts of income. Thus, export industries made up predominantly of employees receiving high wages and salaries may induce more secondary employment than low income industries of similar size. A further source of variation occurs if studies are made at different stages of growth or when different growth rates prevail. While the exact effects of these factors upon export relative to local employment are difficult to predict, they could be substantial. For example, the development of locally oriented employment may lag behind a rapid growth in export employment. More mature cities thus may serve their communities with a fuller array of secondary services, private and governmental, than those experiencing brisk expansion.

Similarly, the degree of magnification induced by export employment will depend upon expectations concerning the permanency of such employment. An employment change anticipated to be temporary may well have little secondary effect. Likewise, if a surplus labor supply exists in the community, secondary effects of a new development may tend to be relatively small since comparatively little addition to housing and social capital will be required. On the other hand, it is also conceivable that in certain instances local activities rise in anticipation of continued growth of exports, thus tending to increase local employment relatively. Also, the con-

struction sector, which is usually considered to be locally oriented, tends to be extraordinarily large during periods of swift growth. Similarly, a declining city may experience abnormally large local employment since decline is thought to originate in the export sector and it seems probable that induced activities will exhibit a lagged response.

While numerous other sources of variation due to differences in economic circumstances could be detailed, enough has been said to indicate that the export-local employment relationship should not be treated as a constant factor applicable to diverse times and places. Careful consideration of the nature and development of a particular economy would appear to be a necessary prerequisite to fruitful application of the export-local distinction.

Thus far, reasons for variation of the actual relationship between export and local employment have been described. However, in practice the measured relationship may vary from the actual one. The remainder of this article, therefore, concentrates upon the effect which different techniques of estimating the relationship may have upon the value which is obtained.

### **Variation Due To Different Methods of Estimation**

Since the relationship between export and local employment is never directly evident from regularly available statistics, it must be estimated. A variety of methods for making such estimates have been proposed and applied in the past. These methods vary greatly in complexity and in general concept. Therefore, it seems reasonable to suppose that differences in the method used might substantially affect the values which are obtained. It would appear to be useful to those utilizing and interpreting the export-local relationship to know whether differences arising for this reason tend to be substantial or insignificantly small.

Unfortunately, in order to answer this question, it is not workable merely to compare the export-local relationships obtained by the application of alternative methods to different cities or to the same city at various times. As indicated earlier, heterogeneity in economic circumstances influences actual export-local employment relationships and it is not possible to predict offhand whether or not differences in the technique of measurement will tend to cause the estimated values to rise above the actual ones or to fall below them. Therefore, it is conceivable that different techniques of estimation applied to varying circumstances could cause the estimated values to be closer together than the actual ones.

One way of coping with this problem is to apply different techniques to the same situation at the same point in time. When this is done, any variation which may occur in the result will arise from the alternative techniques used rather than from differences in actual economic circumstances. It should perhaps be emphasized that such a comparison does not shed any light upon the validity of the export-local employment distinction. It merely provides evidence concerning the comparability of results obtained in different ways.

In the broadest sense, two types of methods for estimating export employment are commonly used. One, which might be termed the "direct" method, is to survey business firms in an effort to determine what proportion of their sales goes to nonresident buyers. The percentages so derived are then used to establish the relation between export and local employment. Because this method addresses itself to the problem of determining export employment in the most direct imaginable way, it has considerable appeal. Unfortunately, however, it is often difficult to judge the reliability of answers to survey questions. For example, the respondents often may have

only the vaguest notion of the place of residence of their customers.

The other category of methods, which may be termed "indirect," takes a variety of forms but usually depends upon comparison of the structure of production in a "subject" area with a larger "benchmark" area—its potential market—in order to discover industries in which the subject area is relatively more specialized. This may be done simply on the basis of judgment or by the use of more refined techniques. The logic of such a comparison, expressed briefly, is that specialization of production in a subject area relative to a larger benchmark indicates an orientation toward nonlocal markets. While this method is much less expensive than the survey and avoids the difficulty of inaccurate replies from respondents, it presents other problems, some of which are mentioned below.

Variation in estimated export employment resulting from the application of different methods of estimation appears to be substantial. Several methods—ranging from one based primarily upon the survey technique to others using strictly indirect methods—show a considerable range of results when applied to the District cities of Denver and Wichita. Therefore, it would seem that caution must be exercised in comparing export-local employment relationships derived by different methods. To some degree the variation which results from alternative methods appears to be systematically related to the specific technique and the amount of statistical detail used in making the estimates.

The accompanying table presents some examples of the results of applying different methods to Denver and Wichita for the 1950 census year. While no attempt will be made here to explain fully the technique involved in the methods listed in the table, a brief statement of the central idea of each will aid the understanding of the conclusions which are drawn from the results. The reader inter-

### Ratio of Local to Export Employment, 1950

Derived by Different Methods of Identification

Method	Wichita	Denver
I	1.47	1.54
II	2.03	No counterpart
III A	3.64	3.87
B	2.92	3.14
C	2.39	3.01

NOTE: The following sources contain an explanation of each of the methods used in making the ratio estimates shown in the table. The figures for Methods I and II are taken directly from studies of Wichita and Denver. The figures for Method III were obtained from a computation modeled upon that found in the study cited.

Method I: The figures for Wichita and Denver were obtained from studies of the two cities, both of which were primarily based upon survey methods. See *Pattern for Progress, 1957, An Economic Base Study of the Wichita, Kansas, Metropolitan Area*, published by the City of Wichita in 1957, and *Working Denver*, published by the Denver Planning Office in 1953. E. T. Halaas of the University of Denver acted as economic consultant for both studies.

Method II: See "The Employment Multiplier in Wichita," *Monthly Review*, Federal Reserve Bank of Kansas City, September 1952.

Method III: See G. E. Thompson, "An Investigation of the Local Employment Multiplier," *Review of Economics and Statistics*, February 1959.

ested in a more detailed statement of methodology may wish to consult the note to the table in which reference is made to studies utilizing each method. Interested readers may also obtain a technical appendix which discusses problems of methodology and analysis in regard to the methods described in the article as well as other techniques. This appendix may be obtained from the Research Department, Federal Reserve Bank of Kansas City, Kansas City 6, Missouri.

#### Methods of Estimation Used

The figures for Wichita and Denver shown in the line headed Method I were taken from studies directed by the same individual and essentially based upon the direct or survey method described earlier. In the retail trade and services sectors, indirect methods were mainly relied on, however.

The figure for Method II indicates the result of a study of Wichita published several years before the survey from which the Method I result was taken. The larger proportion of the employees classified as engaged in export industries—mostly aircraft industry employees—was assigned on the basis of the author's knowledge concerning the market

orientation of specific industries. However, an indirect technique known as the index of concentration was incorporated into the method used to assign the employees in other industries. As a first approximation, ratios were computed to measure the degree of concentration in various industry classes in Wichita relative to that in the United States. The ratio for each industry consisted of the ratio of Wichita employment per capita in the industry divided by U. S. employment per capita in the industry (an index of concentration). Those industries with ratios greater than one were tentatively considered as serving a market larger than the Wichita metropolitan area, with the proportion of the employment serving the external market indicated by how much the ratio of concentration exceeded 1.00. The logic of the use of a concentration index is comparatively straightforward. If, for example, Wichita devoted more employment per capita to the production of heating equipment than did the United States, the Wichita economy would be considered as more specialized in that industry than the United States. The first approximation yielded by the concentration indexes was then adjusted for factors such as higher than national average per capita income and differing consumption patterns. Because the technique of Method II takes advantage of the dominant structural characteristic of the Wichita economy—the unusual importance of a single export industry—and of the author's knowledge of the economy, it is not readily applicable to most other areas.

Method III was adapted from an export-local employment study of a city other than Denver or Wichita. It further differs from Method II in that the results obtained were not modified on the basis of judgment or special knowledge concerning the area. In other words, the result is that of the straightforward application of an indirect method of estimation.

This method utilizes a "location quotient" technique similar in general principle to the concentration index described earlier. The location quotient, however, is a ratio of the employment in a given industry as a per cent of total employment in a particular (subject) economy to employment in the same industry as a per cent of total employment in another (benchmark) economy. Thus, for example, when a location quotient is computed for the Wichita printing industry in 1950 using the United States as a benchmark, the resulting figure is 1.28. This means that a larger percentage of Wichita's labor force is devoted to the printing industry than in the remainder of the United States and therefore, provisionally, printing might be considered an export industry oriented toward the United States market. Moreover, if Wichita is compared with the Midwest, with Kansas, and finally with south central Kansas, the location quotient rises progressively. The logic of this method would, therefore, imply that the Wichita printing industry is oriented to outside markets, with its primary market orientation being south central Kansas. Conversely, if none of the location quotients had exceeded 1.00, the method would indicate that the industry was oriented toward local markets.

In accordance with the approach of the study from which Method II was taken, location quotients were computed for each industry in Wichita and Denver in relation to the United States and three smaller regional economies surrounding the subject economy. If the location quotient of an industry exceeded 1.00, it was taken to be externally oriented and toward the economy for which it showed the highest location quotient value. If all location quotients fell below 1.00, the industry was viewed as having a local orientation. However, only a portion of employment in industries serving an external market was considered to be export in nature. This portion was determined by computing a



“specialization” ratio which expressed the proportion by which actual employment in each industry of the subject economy exceeds what it would have been if the same percentage of total employment had been devoted to it as in the subject and benchmark economies combined. Thus, employment in the various subject economy industries was allocated between export and local in proportion to the specialization of the economy, as indicated by the appropriate industry ratios.<sup>1</sup>

### Conclusions

Unfortunately, the amount of generalization which can be done on the basis of a study of two cities is quite limited. One major conclusion which can be drawn is the simple fact that the technique of estimation can substantially affect the computed relation between export and local employment. Thus, it seems quite possible that, when estimates based upon different techniques of estimation are compared, the difference between them may be significantly larger, or perhaps significantly smaller, than can be attributed to actual differences in economic circumstances.

In addition, indirect techniques of estimation apparently tend to yield smaller amounts of export employment than the survey method. This result may be partly related to the fact that surveys are conducted on a much more disaggregated basis than is indirect estimation. While indirect methods must utilize data for

more or less inclusive industry categories, surveys proceed at least partially on a firm-by-firm basis. In general, it might be supposed that the use of more detailed information is likely to yield a greater proportion of export activity. For example, if services are considered as a whole, indirect analysis may reveal no export employment, or only a small amount, whereas a more detailed analysis might show that employment in hotels, medicine, services, etc., was heavily export oriented.

This implied generalization—that more detailed industry categories will reveal more regional specialization—seems to be borne out by the application of Method II utilizing varying degrees of industry detail. The letters A, B, and C under Method III in the table indicate progressively more refined industry classification. In both the Denver and Wichita studies, the correspondence between degree of industry detail and ratio value is complete.

In summary, it may be said that in estimating, comparing, or applying the export-local employment relationship, consideration must be given to the method of estimating export employment. Differences in the method of estimation used can cause a significant divergence in the export-local ratio. It appears quite possible that these differences have some systematic elements which are inherent in the method of estimation and in the amount of detail used in making the estimate.

In addition, the export-local relationship may be expected to vary with differences in economic circumstances. Thus, factors such as size of the area, expectations concerning future growth of export industries, specialization of the area, and the income of basic employees should be kept in mind when export-local relationships derived in one area are applied to another, or when applications are made at different points in time. Careful consideration of such factors should add to the precision of the results achieved.

<sup>1</sup>Method III involved the selection of potential benchmark areas, and the selection of different potential benchmarks can affect the amount of export employment found. For example, when a state rather than a substate area was used as the smallest potential benchmark, the amount of basic employment obtained was increased somewhat. An analysis of factors governing the influence of a shift in the size of benchmark economies, as well as other technical matters and discussion of additional techniques of estimation, are included in the appendix.

# Cattle Numbers and Beef Production

WHEN THE DEMAND for beef is relatively steady at high levels, as in recent years, fluctuations in prices farmers receive for beef cattle are accounted for largely by changes in supplies. In the March 1959 issue of the *Monthly Review*, the relationship between cattle prices and per capita beef and veal supplies, as measured by per capita consumption, was analyzed for the postwar period. This analysis demonstrated that, on an average, for each 1 per cent change in annual supplies, the price received by farmers for beef cattle changed 1¾ per cent in the opposite direction.

An important factor influencing beef and veal supplies has been the number of cattle in the Nation. The correlation between numbers and supplies, however, has not been so close as that between supplies and prices. Other factors, such as composition of the cattle inventory, the rate of buildup—or liquidation—of numbers, feed supplies, feeding practices, prices, and imports also have influenced supplies. The timing of marketings can be altered within a rather wide range, and supplies may move in the opposite direction from cattle numbers for limited periods.

Thus, while the general level of beef and veal supplies has been determined largely by size of the Nation's cattle herd, the specific level of supplies during any year also has been influenced substantially by other factors. Per capita beef and veal supplies have varied with the phase of the cattle cycle, and the annual fluctuations frequently were more severe than the annual changes in cattle numbers. Since the magnitude of price changes has been substantially greater than supply changes, beef cattle prices have tended to fluctuate sharply from year to year.

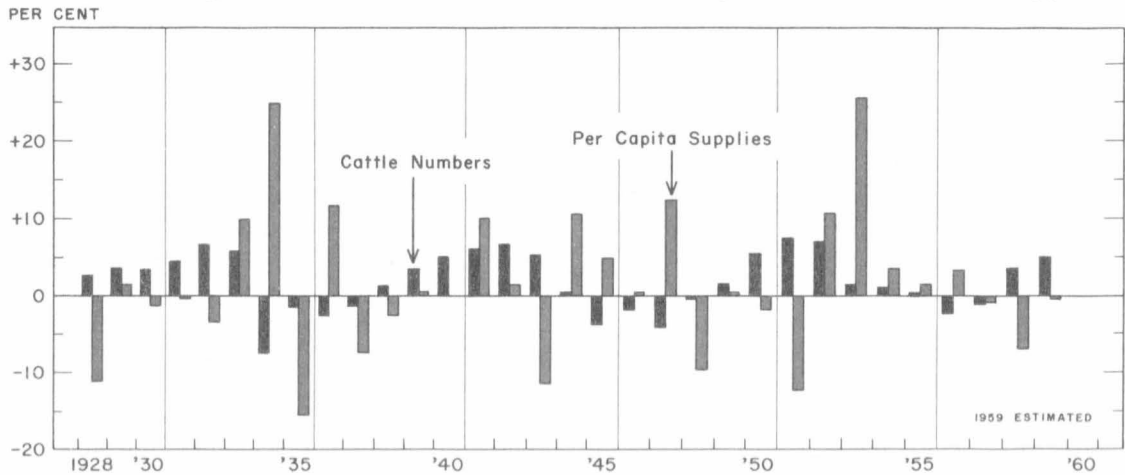
## The Cattle Cycle and Beef Supplies

The cattle cycle is usually identified as a cycle in cattle numbers and is based on the annual January 1 inventory of numbers on farms, as estimated by the U. S. Department of Agriculture. These cycles are measured from each low phase of the cycle to the succeeding low phase. Factors from both within and outside the beef industry influence and perpetuate the cyclical pattern. Biologic and economic influences inherent to the cattle industry result in the existence of rather regular, recurring cycles, but these are frequently given impetus or are altered and otherwise influenced by such outside factors as changes in demand and conditions which affect feed supplies, such as drought.

The collective decisions of cattle producers to expand, maintain, or reduce their herds result in the changes which give the beef industry its cyclical characteristics. Biologic, economic, and physical factors are often similar for large segments of the industry, causing similar reactions by many producers. Because these actions occur simultaneously, the industry tends to make larger adjustments than are needed.

The cycle in per capita beef and veal supplies does not coincide directly with the cattle inventory cycle, but tends to lag behind the peaks and troughs of the inventory cycle by a year or two. Supplies fluctuate more sharply than do cattle numbers—both from year to year and during the cycle. From year to year, however, the change in supplies, when compared with numbers, is often relatively greater than changes in the same two factors, if measured for the complete cycle. For example, in the most recently completed cycle (1949-58), the largest annual change in

## Annual Changes In Cattle Numbers and In Per Capita Beef and Veal Supplies



NOTE: The percentage change in cattle numbers is that which occurs during the year (from January 1 to January 1 of the next year) while the change in per capita supplies is from the previous year.

cattle numbers was a 7 per cent increase, while the largest annual change in per capita supplies was a 25 per cent increase. The largest annual change in supplies was three times larger than the largest annual change in numbers. Over the cycle, cattle numbers increased 26 per cent from the low of January 1, 1949, to their high on January 1, 1956. Per capita beef and veal supplies increased by 50 per cent from their low in 1951 to their high in 1956. Thus, during the cycle, the change in supplies was only twice as large as the change in numbers.

#### The Cycle — At Close Quarters

When cattle numbers reach the low point of the cycle, the number of cattle available for slaughter declines and per capita beef and veal supplies become smaller. Under these circumstances — unless demand has diminished — beef cattle prices tend to rise. This causes cattle producers to become more optimistic and encourages them to expand their operations. To do this, they retain more heifers and cull their cows less severely. As a result, slaughter and per capita supplies fall

even lower, prices rise higher, and further expansion is induced.

During this early phase of the cycle, per capita beef and veal supplies decrease because cattle are being withheld from slaughter for the purpose of expanding numbers. Other characteristics of this phase include a sharp increase in the proportion of steers slaughtered in relation to total slaughter, which results from the reduced cow and heifer slaughter. Steer slaughter also frequently declines in absolute amounts as the calf crops become smaller and a larger proportion are fed for longer periods of time. Calf slaughter drops sharply as fewer calves are marketed as vealers and more are held for herd replacements and feeder stock.

Because of rising cattle prices, it becomes more profitable to feed cattle. A larger share of the calf crop and other classes of cattle are put into feedlots for finishing. Feeders bid actively against packers for partly finished cattle and many are returned to feedlots. Thus, fewer low-grade cattle are available for slaughter, but the proportion of grain-fed cattle tends to increase. Because more cattle are

fed and they are fed longer, the average grade and slaughter weight increase — partly offsetting the influence of the decrease in numbers slaughtered. However, supplies of lower-grade beef are limited as fewer cows, grass-fattened cattle, and other low-quality cattle are marketed. This reduction frequently is partly offset by increased imports of beef. The relatively greater rise in lower-quality beef prices attracts imports from beef-producing nations where grain feeding is less prevalent.

As the buildup in the cow herd continues, the size of the calf crop increases and beef supplies begin to rise as these animals reach marketable age. This can be considered as the second stage of the cattle cycle which is denoted by increasing cattle numbers and growing beef and veal supplies. With per capita beef and veal supplies increasing, cattle prices tend to weaken. The rate of gain in the buildup of cattle numbers is moderated, further increasing beef and veal supplies. Cow and heifer slaughter increases relative to steer slaughter, more cattle are marketed without feeding or when only partly finished, and more calves are slaughtered. Cow, heifer, and lower-grade steer slaughter increases more than slaughter of most other classes and prices of these classes tend to decline more during this phase of the cycle.

In the third stage of the cycle, numbers are decreased and per capita supplies frequently increase sharply. This may be induced by a lower level of prices, but may also occur as a result of drought or some other feed crisis. As will be shown in a later section, cattle producers do not always liquidate numbers when prices decline. However, when liquidation does start, per capita beef and veal supplies usually increase substantially. Because preceding calf crops have been large, the supply of steers and heifers available for slaughter is large. Liquidation of part of the cow herd also adds to beef supplies. Cow and heifer slaughter usually accounts for more

than half of total slaughter during this phase of the cycle. Feeding becomes less profitable, average slaughter weights decline, and calf slaughter increases. Beef and veal supplies are usually largest and cattle prices tend to reach their lowest levels during this phase.

In the last stage of the cycle, the calf crop becomes smaller as the size of the cow herd is decreased and potential future supplies of beef and veal are reduced. During this stage of the cycle, cattle numbers decrease and per capita beef and veal supplies also decline. With lower per capita supplies of beef and veal, cattle prices start to rise — causing a reversal of liquidation trends. Cow, heifer, and calf slaughter declines relative to steer slaughter, and the stage is set for another buildup in cattle numbers.

### **The Recent Cycle**

The most recent complete cattle cycle started from a low of 76.8 million head of cattle on January 1, 1949, rose to a peak of 96.8 million head on January 1, 1956, and then declined to less than 93.4 million head on January 1, 1958. This cycle varied significantly from previous cycles, but before examining it in detail, some factors which have affected post-World War II developments in the cattle industry should be reviewed.

An important influence has been the development of a very strong demand for beef by American consumers. Incomes have been high and increasing — resulting in increased demand for the high-quality foods, including beef. Population also has been growing rapidly and has contributed to the larger demand for beef. An indication of increased demand is that consumers paid substantially higher prices for beef and veal in 1958 and 1959 despite the fact that supplies only decreased moderately. Per capita supplies of beef and veal declined about 8 per cent from 1956 to 1958, while cattle prices increased sharply during that period.

Another factor of importance to the beef industry has been the large increase in feed production that has resulted from the application of improved technology. A high level of meat output is dependent upon feed supplies. Feeding has been encouraged by the large feed supplies which have been a factor in causing prices of feed grains to decline relative to cattle prices.

A third factor has been improvements in technology and practices within the beef industry that have resulted in increased production and efficiency. Improvements in breeding and feeding practices and use of feed additives have increased the output per animal and the efficiency with which feed is used. The trend toward marketing younger but more highly finished cattle has caused increased efficiency in beef and veal production. A larger proportion of the Nation's cattle numbers than formerly is composed of the beef breeds which produce more meat per animal than do dairy animals. The milk cow herd has declined rather steadily and less beef and veal is produced from dairy animals.

These and other factors influenced the most recent cycle (1949-58) and gave it some unique characteristics. The buildup in beef cattle numbers actually started in 1948, but was more than offset by a decline in dairy cattle numbers that year. In 1949, cattle numbers increased slightly and per capita beef and veal supplies, which had dropped sharply in 1948, also increased slightly. However, during the next 3 years cattle numbers increased sharply — by 5.3 per cent in 1950, 7.3 per cent in 1951, and 7 per cent in 1952. Per capita beef and veal supplies declined 2 per cent in 1950 and 12 per cent in 1951 which, when coupled with very strong demand factors partly associated with the Korean conflict, resulted in sharp price rises from previously existing levels.

By 1952, the increase in the size of the beef herd was sufficient to cause per capita

beef and veal supplies to increase by 11 per cent from 1951, as well as enabling cattle numbers to be expanded. The average price received by farmers for beef cattle in 1952 was 15 per cent lower than in 1951. The rapid buildup in the beef herd was halted and, as a result, per capita beef and veal supplies expanded by more than a fourth in 1953, and prices declined by 23 per cent from the 1952 average level.

Such an extreme drop in prices could have been expected to reverse the upward trend in beef cattle numbers, but they continued to increase for 3 more years, although at a very substantially reduced rate of a little under 1 per cent per year, on an average. Beef and veal supplies also continued to expand — by about 3 per cent per year. During these 3 years (1953-55), many of the adjustments usually associated with the declining phase of the cycle occurred. Cow and heifer slaughter increased sharply and, in 1955 exceeded steer slaughter, although never exceeding 50 per cent of total slaughter, as in previous cycles. The average slaughter weight decreased and the number of calves slaughtered increased during the years 1953-55. Annual average cattle prices declined slowly during that period.

By January 1, 1956, cattle numbers on farms had reached an alltime high of 96.8 million head. However, a combination of drought in major range areas, low prices which resulted from the long buildup in beef and veal supplies, and a large increase in total meat supplies in 1956 caused a downturn in cattle numbers that year. Cattle numbers declined 2.4 per cent, but the sharp increase in per capita beef and veal supplies usually associated with a turn in the cycle did not occur. In 1956, per capita beef and veal supplies increased only 3.1 per cent and average annual cattle prices declined only 4.5 per cent from 1955 levels. The sharp adjustment made during the 3 previous years tended

to prevent any large increase in supplies or decline in prices.

Another small decline in total cattle numbers occurred in 1957, but was accompanied by a 1 per cent decline in per capita beef supplies and a 15 per cent increase in the average price received by farmers for beef cattle. Beef cattle numbers actually increased in 1957 as more calves, heifers, and steers were held in the Nation's herds, but dairy cattle numbers declined enough to offset the increase in beef cattle numbers. The sharp improvement in range and pasture conditions late in the year was an important cause of the liquidation phase of the cycle being stopped after only 2 years — the shortest on record. This brought to a close a remarkable cattle cycle in which cattle numbers increased by over a quarter in the upswing, but declined only 3.6 per cent during the decline. The cycle was 9 years long and, at its end, per capita beef and veal supplies were 20 per cent larger than at its beginning, but the average prices received by farmers for beef cattle were about the same at both ends. During these 9 years, however, there were very sharp fluctuations in both beef and veal supplies and cattle prices.

### **The Current Situation**

The reversal of the downtrend in cattle numbers during 1958 was induced partly by the rise in prices which accompanied reduced per capita supplies of beef and veal. Concurrently, vastly improved range and pasture conditions over extensive areas — where drought had caused reduction in herd size—resulted in a sharp increase in demand for replacement cattle to rebuild herds. This demand for replacement cattle was an added force in causing prices to rise.

There was only a slight decline in beef cow numbers during the short downward phase of the last cycle. Beef cow numbers declined less than 5 per cent between Janu-

ary 1, 1955, and January 1, 1958, compared with a decline of over 20 per cent in many previous cycles. Because cow numbers remained high, calf crops continued to be relatively large and provided ample numbers of young stock for herd expansion.

An increase of over 3 per cent in cattle numbers occurred in 1958, nearly offsetting the decline of the 2 preceding years. Per capita beef and veal supplies declined 7 per cent in 1958 — a normal situation during the initial period of increasing cattle numbers. Average prices received by farmers for cattle, however, rose over one fourth — as a result of lower beef supplies and increased demand for replacement stock. About 4 million beef cattle and calves were added to the Nation's herds in 1958, but milk cattle numbers declined 700,000, so that total cattle and calf numbers increased 3.3 million. About 1.2 million cows, 1.2 million calves, 800,000 steers, and 800,000 heifers were added to the beef cattle industry. A reduction of 5 million in cattle and calf slaughter made the increase in numbers possible.

By January 1, 1959, beef cattle as well as all cattle and calf numbers were back to near record-high levels. More beef cows, heifers, steers, and calves were on the Nation's farms. These provided the potential for increased beef production but, because of generally favorable price levels and record feed supplies, the increase in production was absorbed by the rapid rate of expansion in cattle herds instead of being made available for consumption. Consequently, total beef and veal supplies did not increase enough during 1959 to offset the increase in population, and per capita supplies actually declined. The number of cattle and calves slaughtered during 1959 was about 2.1 million head less than during 1958. Calves accounted for about 1.5 million of this decrease. Although numbers slaughtered in 1958 were 5 million head fewer than the previous year, the increase in cat-

tle and calf numbers that year was only about two thirds as large as in 1959. A larger calf crop in 1959 and the larger January 1 inventory enabled a greater increase to occur in cattle and calf numbers during 1959.

On January 1, 1960, there were 101.5 million head of cattle and calves on the Nation's farms—5 per cent more than year-earlier numbers. There were 68.5 million head of beef cattle, of which 27.3 million were cows, 7.4 million were heifers, 11 million were steers, and 21.1 million were calves. Heifer, steer, and calf numbers were 8 per cent larger than on January 1, 1959, and at a record high. The large increase in young stock again provides the potential for increasing cattle numbers or slaughter, or both, this year.

The rate of buildup in cattle numbers was rapid in 1959, but moderated during the last quarter of the year. Cattle prices had trended downward from midspring highs during the summer and early fall months of 1959. Led by a break in feeder cattle and slaughter cow prices during October, cattle prices declined sharply during the last quarter of the year. Cattle slaughter increased and, during the last 2 months of 1959, was 7 per cent larger than year-earlier levels. Calf slaughter also increased but remained slightly below year-earlier rates during the last 2 months of the year. The largest relative increase in numbers slaughtered was for cows and heifers which had averaged 42 per cent of total cattle slaughter during the first 3 quarters of 1959, but averaged 47 per cent during the last quarter.

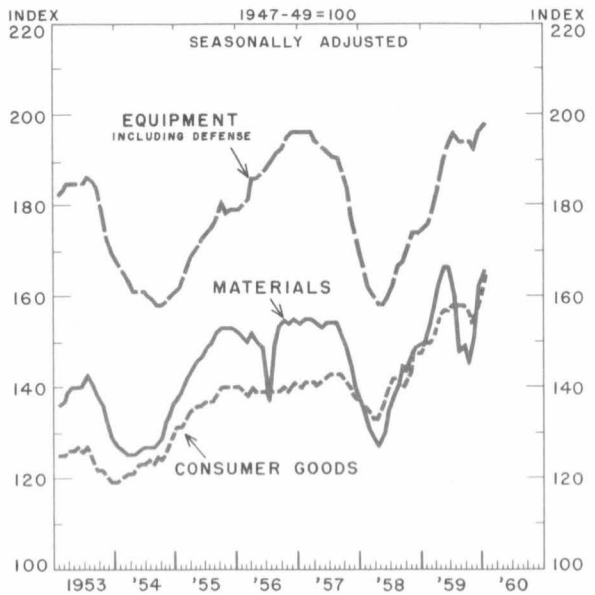
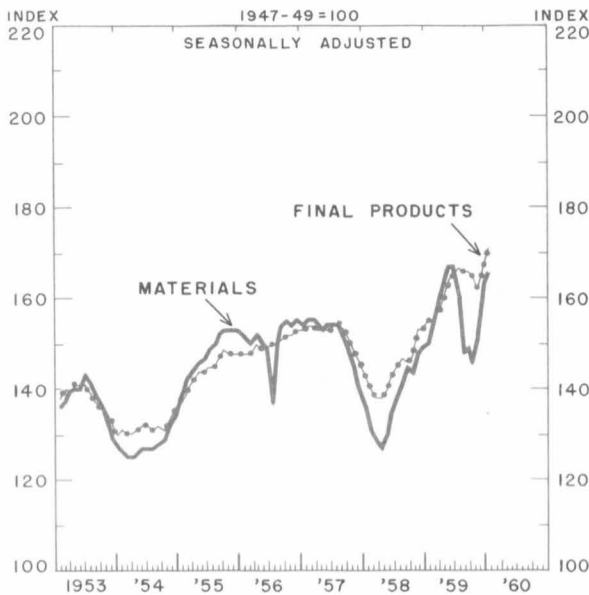
Increases in the proportion of cow, heifer, and calf slaughter are usually an indication of a decrease in the rate of buildup in cattle numbers. Thus, it appears that the rate of expansion in cattle numbers is moderating. However, cattle prices are still at considerably more favorable levels than at the peak of production of most previous cycles and feed supplies are plentiful, indicating that

cattle numbers are likely to continue increasing but probably at a slower rate this year. Even a reduction in the rate of buildup results in increased slaughter rates and increased supplies of beef and veal. At the current stage of the cycle, per capita beef and veal supplies probably would increase, even if the buildup in cattle numbers were to be as large this year as in 1959. An increase in both the size of the inventory and cattle slaughter can result from the large increase in young cattle numbers. It would take a large increase in cattle numbers to absorb all of these animals into the Nation's beef herd.

Increased numbers of cattle and calves on feed also indicate that beef supplies will increase. There were 7.2 million head of cattle and calves on feed on January 1 in 26 important feeding states—a record high and 9 per cent more than on January 1, 1959. The increase in beef production anticipated for this year because of the larger number of cattle that are expected to be slaughtered may be offset partly by lower average slaughter weights. The average slaughter weight last year reached a record high, and less favorable feeding prospects this year may result in somewhat lower average slaughter weights. The last pounds of weight put on a fattened animal are the most expensive in terms of feed and, by placing less finish on cattle and marketing at lower weights, feeding efficiency can be improved.

Per capita beef and veal supplies, according to estimates made last fall by the USDA, will be around 90 pounds this year—3 per cent larger than in 1959. This estimate was based on a continued buildup in cattle numbers. Present trends indicate the rate of buildup may have moderated, which may result in a somewhat larger increase in supplies. However, price developments and pasture and range conditions this spring could significantly influence the rate of buildup and, consequently, per capita beef and veal supplies.

## New Market Groupings — Revised Index of Industrial Production



### BANKING IN THE TENTH DISTRICT

District and States	Loans				Deposits			
	Reserve City Member Banks		Country Member Banks		Reserve City Member Banks		Country Member Banks	
	Dec. 1959	Jan. 1959	Dec. 1959	Jan. 1959	Dec. 1959	Jan. 1959	Dec. 1959	Jan. 1959
Tenth F. R. Dist.	-2	+9	-1	+6	-4	-4	-1	†
Colorado	†	+14	-1	+10	-3	-2	-1	+1
Kansas	-4	+4	-2	†	-1	-6	†	-1
Missouri*	-5	+9	†	+16	-8	-5	†	+2
Nebraska	-2	+6	-2	+7	†	-2	+1	-3
New Mexico*	**	**	†	+12	**	**	-3	-3
Oklahoma*	-1	+7	-3	+3	-4	-3	-2	+2
Wyoming	**	**	†	+8	**	**	-4	-2

\*Tenth District portion only.

\*\*No reserve cities in this state.

† Less than 0.5 per cent.

### PRICE INDEXES, UNITED STATES

Index	Jan. 1960	Dec. 1959	Jan. 1959
Consumer Price Index (1947-49=100)	125.4	125.5	123.8
Wholesale Price Index (1947-49=100)	119.3	118.9	119.5
Prices Rec'd by Farmers (1910-14=100)	231	228	245 r
Prices Paid by Farmers (1910-14=100)	299	297	298

r Revised.

### TENTH DISTRICT BUSINESS INDICATORS

District and Principal Metropolitan Areas	Value of Check Payments	Value of Department Store Sales
	Percentage change—1960 from 1959	Percentage change—1960 from 1959
	Jan.	Jan.
Tenth F. R. Dist.	0	-1
Denver	+3	+2
Wichita	+2	-10
Kansas City	+2	+3
Omaha	-7	-2
Oklahoma City	+4	-7
Tulsa	-2	-1