THE ROLE OF ECONOMIC STUDIES IN

URBAN TRANSPORTATION PLANNING

U.S. DEPARTMENT OF COMMERCE
Bureau of Public Roads
Office of Planning
Urban Planning Division

August 1965

THE ROLE OF ECONOMIC STUDIES IN URBAN TRANSPORTATION PLANNING

Prepared by J. P. Meck

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

BUREAU OF PUBLIC ROADS
Rex M. Whitton, Administrator

For sale by the Superintendent of Documents, Government Printing Office
Washington, D.C., 20402 - Price 45 cents

ACKNOWLEDGMENTS

We wish to thank Mr. Robert C. Colwell, Director of Program Division, Federal Housing Administration, for so graciously allowing the Bureau of Public Roads to use material contained in a preliminary paper he authored entitled "Urban Economic Growth Studies " (soon to be published under Mr. Colwell's authorship by FHA). Portions of his work appear here (in chapters 1 and 2) either as written or somewhat modified to better suit our own needs.

We are also indebted to many other individuals in the Bureau of Public Roads and various other government agencies who took time to review this document in draft form and to offer their constructive comments. We hope this paper accurately reflects those comments.

The author, however, reserves for himself the responsibility for any inaccuracies the following pages may contain.

CONTENTS

CHAPTER I - AN OVERVIEW

Purpose

This report is intended to provide a general introduction to methods and procedures followed in forecasting economic activity. It is not a technical "manual of procedures" for economic studies. Rather, it is intended as a general guide for those with little or no training in economics to acquaint them with the form economic studies should take for transportation planning purposes. Specifically, its purposes are to:

1. Provide assistance and guidance to those responsible for reviewing economic forecasts required as part of the comprehensive transportation planning process in urbanized areas;

2. Identify some of the important dynamic factors that influence the process of economic development of urbanized areas, with a view toward providing a better understanding of that process;

3. Describe the more commonly used methods of analyzing and forecasting economic activities that have been employed by various transportation study groups; and

4. Provide a listing of useful data sources for economic studies.

The comprehensive transportation planning process with which this report is concerned is that established by Section 9 of the Federal-Aid Highway Act of 1962, as interpreted by Bureau of Public Roads Instructional Memoranda 50-2-63, dated March 27, 1963, and 50-2-63(1), dated September 13, 1963.

Geographic Scope

For comprehensive transportation planning purposes an economic study must indicate the size and structure of the economy of the area which is expected to constitute the urbanized area 20 years or so hence - the forecast period. Forecasts for this area should be made on a basis that will permit updating and possible future revisions in the forecasts.

Uses

The development of an urban transportation planning process provides the basis for future public actions in urbanized areas; namely, the expenditure of funds for transportation facilities. A study of the economic

factors affecting the development of the urbanized area is, therefore, an essential pillar in developing the planning process. These economic studies, however, are not limited in the form they may take, in the techniques employed, nor in the emphasis placed on the subject matter. Decisions regarding these items will, more often than not, be governed by the peculiar nature of the local economy. Moreover, the validity of the results (i.e., forecasts) obtained from economic studies depends more upon the application of "good, old-fashioned common sense" in analyzing the pertinent data than it does on the form or technique actually employed in forecasting.

Although the initial users of these economic studies will probably be planning agencies they, obviously, will also gain the attention of public officials, the press, and the public at large. Consequently, it is imperative that the logic of the structure of the study (for example, a statement of all assumptions underlying the study), the reliability of data employed, and the statements of findings and conclusions be expressed in form and in language that will assure understanding by the wide variety of users and readers. This is of particular importance in presenting economic study results to the public because effective communication with both a professional and lay audience may often be difficult. This is not due solely to the subject matter, because the analytical techniques also involve terminology and notations that may not be widely known or understood.

The Nature of Economics

Economics is a "people-oriented" science. As such, it is something less than precise; especially in the field of forecasting. The end result of all economic activity is, of course, to consume (in one form or another) the goods and services produced in order to satisfy human wants and desires. Prior to consuming them, these goods and services must be produced, distributed, and then exchanged. In the process of exchanging those goods or services he has produced, the businessman hopes to make a profit - to sell them for more than he paid to have them produced. This is what he risked his capital for; this is the reason he is in business; to make a profit by satisfying human wants and desires.

But governments too attempt to satisfy human wants and desires. The major difference is that in the exchange process (that is, in paying taxes for the goods and services produced by government units) no profit is allowed for or, usually, expected. The governing unit, in other words, expects to "sell at cost." It is not "in business" to make a profit, as is the businessman. But both are "in business" to satisfy human wants and desires by producing the goods and services people want and desire.

The crux of the problem in economic forecasting (for the businessman and, to a lesser extent, for government units) should thus be readily apparent; namely, what will the people (i.e., the "market," or society)

want to have produced? When? Where? In what quantities? Interrelated are, of course, the questions: How many people will there be in the future when production takes place? Where will they be located at that time? Will they be able to pay for the goods and services to be forthcoming?

These questions point up the need for forecasting on the part of businesses and governments if outlays of capital are not to be wasted outright or under-utilized. Forecasts (of population, economic activity, land uses, etc.) are made in the attempt to provide answers to the questions posed. The task is the more difficult the farther into the future one tries to see. And, that task is not eased by the nature of economic science; that is, its lack of precision. It does little good, therefore, to protest that this lack of precision is all one can expect as a result of trying to predict what people will do in the future. Rather, it is better to realize that forecasting of any sort simply means good analysis of the best data available. This, in turn, involves the use of judgment. But it is judgment that is enhanced by technical skill and knowledge and tempered by common sense. The quote that follows is designed to focus attention on the vital role judgment must play in forecasting: 1/

> "The popular notion of forecasting - in business and economics as in other fields - is a long, intent look into the crystal ball. Sometimes the magic takes more mundane forms, such as a statistical formula or the crossing of lines on a chart. The forecasts that arise from such processes may even work out fairly well for a while. Nevertheless, all that magic can contribute is essentially a guess, dependent upon the ability of the guesser. Nothing can be obtained from shortcut devices that is not put into them, and in most cases the result will be something less than the full value of the clues and indications that were initially available.
>
> "In contrast to such subjective or pseudoscientific procedures, the essence of a sound approach to forecasting is common-sense analysis of the important forces making for economic change. To appraise the relative importance of those forces and put them into proper relationship with each other, they must be expressed quantitatively on a coordinated basis of timing. To minimize the probability of error, the estimates of their separate values must be modified in the light of their mutual interrelationships and integrated in an internally consistent pattern of ongoing economic development.

1/ From Economic Forecasting by V. Lewis Bassie.

"In this approach, as in any other, judgment is one of the prime requisites. Two others are information and analysis. All three are, of course, interacting.

"At the very outset, the role of judgment must be emphasized. Any forecast is itself essentially a judgment or involves a judgment that the method used in making it is appropriate to the task. Whenever a statistical series is projected into the future, a judgment, or a whole series of judgments, is made. When a forecast is based on expected changes in one dominant factor, such as government expenditures, other factors are judged to be relatively unimportant. Every step requires a decision among possible alternatives. Frequently the component elements are in conflict and are so evenly balanced on each side as to provide little basis for choice. Nevertheless, one or another must be judged appropriate for use under the circumstances.

"It is necessary to know what is happening, as quickly and accurately as possible. Without adequate information about the current situation, there are bound to be errors of judgment and of statistical projection.

"It is also necessary to isolate the strategic factors in the current situation and relate them effectively to other factors and developments. Without techniques for analyzing the course of business, for projecting important statistical measures into the future, and for assessing the quantitative importance of the various forces affecting the level of activity, there can be no consistent validity to judgments about the future.

"Accurate information and valid analytical techniques bolster judgment. But these are assets that cannot be acquired without it. Judgment is necessary both in interpreting the information that defines the starting point and in selecting methods of analysis and appraising their applicability to the specific problem....

"Recently... in a discussion of forecasting procedure, one member of the group charged 'What you have is not a forecasting method at all. It's just a set of rules of conduct.' The truth was out! There is no time machine, no fixed formula, no sure solution. Forecasting is no more than an attempt to utilize the most promising techniques available in solving the specific problem presented by the current situation. By the nature of that problem, there can be no guarantee of accuracy in any structure of specified methodology, in any system of facts or indicators. For what emerges in each situation is a future that is always new in significant aspects. To apply ourselves with rules of conduct that make the most of the intelligence with which we have been endowed is to work for the best we can reasonably expect...."

The National Setting

The economy of the United States has exhibited a phenomenal rate of growth throughout its history. Since colonial times our economy has grown at an annual rate averaging about 2.5 percent. The total annual output of goods and services has increased almost six-fold since 1929 - from $104 billion to its current $600 plus billion. Even more striking, surely, is the fact that over the last 50 years the U.S. economy has grown at a rate averaging about 3 percent per year in "real terms" (that is, in terms of the purchasing power of 1957 dollars). This growth represents a span of time that witnessed the greatest depression 2/ the world has experienced and two of the most devastating World Wars in all history.

For quite a few years, however, in spite of those major upheavals and numerous minor ones we have been enjoying the highest standard of living that any society has ever attained. And our economy has provided this increased well-being even in the face of a rapidly growing population. For example, though our population has doubled over the last half century real output per capita (in 1957 prices) is twice what it was some 50 years ago.3/

Thus, we have a remarkable economy; for in less than five decades it has been beset by two World Wars, a Great Depression, and several relatively minor, similar events. Further, in the same period, its population has grown by leaps and bounds. Yet it has provided a living standard for its people, now numbering in excess of 192 million, that is a challenge to the rest of the world.

But this impressive growth, particularly since the end of World War II, has also created a host of problems - economic, social, and governmental - still to be solved. While the population and the labor force have grown about 50 percent since 1930, the farm population has been declining since earlier in this century. Hence, all of this net population growth has been added to the nonfarm sector of the economy, most of which is urban in character. During the decade 1950-60 this urban growth pattern has become even more pronounced. It is expected, and quite likely, that future population growth will continue to concentrate in and around urban areas. This population growth, spurred by the almost certain prospect of further (perhaps even accelerated) economic expansion in the period ahead, emphasizes the need for extensive, as well as intensive, study and planning to cope with problems created by urban concentrations.

2/ In which, by the way, our annual output of goods and services had actually declined, by 1933, to about 50 percent of its 1929 level.

3/ Even this fact understates the real growth that has occurred because it is impossible to completely quantify the increased quality of much of our real output that, by itself, is an indication of economic progress.

Implications of National Growth for Local Areas

From the urban area concentrations implicit in the above discussion arise the problems of satisfying an increased demand for more land for urban use and for larger public and private investments in land improvement. Since transportation serves as an important catalyst in our economy, the new demands will be directed especially toward adequate transportation facilities. In the future, as in the past, these demands will stem from the new and the revitalized forces in the overall structure and life of urban areas.

In contrast to the substantial growth pattern that has characterized the economy of most of our larger urbanized areas, there are other areas where the change in economic activity has been practically nil - showing neither a substantial increase or decrease. In still other urbanized areas there has been a substantial decline in the level of economic activity with a resulting loss of jobs and of population. In these latter areas of economic decline the outlook for the future is quite different from areas that have been growing. One difference is that the prospects for land use and investment flows (especially private investment) will present problems the converse of those in rapidly growing urbanized areas.

At this point it would do the reader well to review the words of Bassie quoted above. His emphasis upon the use of judgment in forecasting must be borne in mind. Because the comprehensive transportation planning process is concerned with forecasting, or predicting, the future 20 years or so hence, it should be obvious that the task of forecasting can be no more certain for smaller than for larger urbanized areas; 4/ nor, for that matter, will the past or present rate of growth (or decline) an area has exhibited guarantee the future. The point is, of course, that each area is different and each must, therefore, be studied in its own right. Again, the basis for forecasting rests upon a good analysis of adequate information. This is the indispensable condition for obtaining reasonably adequate, logical and, therefore, believable results in forecasting.

4/ In general, however, the converse holds. Due to the loss of offsetting events, the smaller the area under study the greater the margin for error.

CHAPTER II - ECONOMIC STUDIES FOR TRANSPORTATION PLANNING

The Need for Economic Studies

In the earlier section on The Nature of Economics it was pointed out that both governmental units and business firms exist to provide goods and services that people will use because they have a need for them. Since the amount spent by all levels of government just for transportation facilities currently totals billions of dollars annually, it would appear that the sensible thing to do is to plan to "produce" those facilities in "quantities" sufficient to adequately and efficiently satisfy the needs of those who will use them as they go about earning their income, and spending it.

But, since people engage in all sorts of activities of an income-earning and income-spending nature, and since these activities are located at particular points in space, and further, since people travel to and from these various places then, obviously, it is more economical to build the additional transportation facilities between those points in space where, it is anticipated, most of the future travel will occur.1/ In economic parlance this is nothing more than an attempt to realize the greatest return on invested capital; to avoid wasting resources; to be efficient. Here, the capitalist (the supplier of the capital) is the road user, the taxpayer; and that includes most of us.

For transportation planning purposes the overall questions to be answered are two: 1) How much travel will there be in the future study area? 2) Where, within the study area, will this future travel be concentrated?

Before these questions can be answered, however, three more basic questions must be dealt with; namely: 1) How many people will be living in the study area in the future? 2) What specific activities will they be engaged in in attempting to support themselves? and 3) Where, in space, will they live, work, shop, etc., (i.e., Where will these residential and nonresidential space using activities be located?).

1/ Implicit in this statement is the assumption that no facilities currently exist connecting those points; or, if they do exist, that they will not be able to adequately handle future traffic expected. In reality this assumption need not hold, of course.

The forecast derived from the population study is designed to answer the first of these three questions. The economic forecast must answer the second question. The answer to the third is provided by the land use study. Thus, economic studies form an integral part of the comprehensive transportation planning process. As can be seen from the above, they are directly related to the population and the land use studies. Indeed, these three studies must supplement each other for, on the one hand, a population study cannot be accepted if it forecasts a future population twice as great as the study area's ability to support that population. At the other extreme, a land use forecast cannot "forecast" a greater amount of residential and nonresidential activities than the population and economic studies indicate there will be in the future study area.

Thus, if reasonably adequate and logical forecasts can be made of the future population total, the future level of economic activities (in terms of employment, income, car ownership, etc.) and of the future spatial location of these people, jobs, etc., (i.e., of residential and nonresidential activities) within the study area it will then be possible to answer the two overall questions pertaining to the amount and location of travel within the study area. Together, therefore, the economic, population, and land use studies must provide the inputs required for the travel forecasting phase of the comprehensive transportation planning process.

Elements of the Study

Economic studies must seek to express a rational judgment about the future level of economic activity in the study area and the resultant impact this will have on the physical development of the community. (Although it can be done as part of the economic forecast, the distribution of forecasted economic activities is usually accomplished in the land use phase of the planning process. Hence, the above statement refers only to estimated totals of the broad categories of activities anticipated in the future; but not necessarily to their distribution throughout the study area). In thus presenting a forecast of economic activity with its implied demand for land and its various improvements, there are many elements that should be included in the analysis stage of the study at least, if not specifically forecasted.

One of the outputs of the economic study, for which special provision should be made, is a population forecast. This population forecast serves as a consistency check on the forecasted population total produced in the demographic study portion of the planning process. Additionally, it should ensure that the analyst will take account of population change (especially through migration) and the impact this may have on the labor force (quantitatively and qualitatively) and on employment levels (to the extent that the population change will affect the demand for goods and services). A population forecast can usually be obtained from the economic study by applying a labor force participation rate to a forecasted labor force total, which economic studies usually contain. The importance of comparing the economic and the population study results cannot be overemphasized. The procedures for turning a labor force forecast into a population forecast will be demonstrated in a section to follow.

Another very important product of the economic study is a forecast of employment. There is an obvious and direct relationship between changes in employment levels, income levels, and in aggregate demand for goods and services (especially transportation-related services of all kinds). Additionally, for trip generation rate purposes, employment is the best indicator of the number of work-trips to and from zones. In general, from an urban transportation planning point of view, employment is the best single indicator of the level of economic activity to be expected in the study area in the future. It is, therefore, imperative that a complete and thorough analysis of this factor be undertaken by study personnel. The level of detail at which the analysis and forecast of employment should be accomplished is a decision to be made by the study staff. However, it is recommended that the analysis and forecast of employment be carried to at least the two-digit Standard Industrial Classification (SIC) level. 2/

Economic studies should also include a forecast of the labor force for the study area. In deriving this forecast the study staff must consider future in- and out-migration effects on the labor force total and it must take account of the characteristics of the labor force, in terms of its age, sex, race, education, skills, and experience. A relatively young, educated and/or skilled labor supply is potentially "more employable" or "more productive" from a businessman's point of view (all other things being equal) than is a relatively old (or young), uneducated, and unskilled supply of labor. It follows, therefore, that an area possessing labor resources with the former characteristics has a major advantage, in its ability to attract and to hold industries, over areas lacking those labor resource characteristics.

In addition to providing some indication of what the study area has (and will have) to offer in terms of its labor resource, an analysis and forecast of the labor force provides a check on the consistency of the population forecast derived in the demographic study, as noted above. Further, it provides a check on the reasonableness of the employment total forecasted for the study area by "indirectly forecasting" the level of unemployment. For example, the labor force total is equal to the employment total plus the unemployment total by definition. Therefore, by subtracting the forecasted employment total from the forecasted labor force total one can obtain an "indirect" forecast of unemployment. Hence, if the employment and unemployment totals are expressed as percentages of the labor force, then the respective rates can be compared to determine the change that has occurred in them between the base year and the forecast year. A change in the employment rate, over the forecast period, from, say, 96 percent to 93 percent means (again by definition) the unemployment rate has changed from 4 percent to 7 percent. The change in the employment rate may not appear to be very substantial, but its significance may lie in the changed unemployment rate. In the above instance, the unemployment rate

---

2/ To facilitate reading, the definitions of technical terms (e.g., Standard Industrial Classification, labor force, constant dollars, etc.) are contained in the Glossary at the end of this report.

has increased 75 percent. Again, however, this may be a perfectly valid conclusion on the part of the forecaster, given his analysis and judgment. The point to be made in this discussion is not to suggest that any study conclusion be rejected out of hand because of the magnitude of change in some factor, but to caution the reviewer to accept those study conclusions that are justified and to question those that have not been documented or otherwise explained.

A forecast of total vehicles for the study area is of significant value as an indicator of future demands for highway transportation facilities; hence, this factor should also be a product of economic studies. Particular emphasis should be placed on the forecast of car ownership. This element of the forecast should be analyzed against a background of trends or changes in vehicle registrations, population, employment, income distribution, and household-consumption patterns.

In addition to and in conjunction with the above elements, economic studies should produce a forecast of income for the study area. Either per capita (i.e., average) income or total family income (on a median basis) can be used. The historical data on the income measure to be forecasted should be reduced to a constant dollar basis before the forecast is made. This will not, in itself, take account of future price level fluctuations but it will provide a more solid base for analyzing the historical income data in conjunction with past employment levels. The income measure used should be a total income measure, so that all forms of income (e.g., wages and salaries, rents, dividends, interest, profits, retirement and unemployment compensation, social security benefits, veterans' payments, annuities, health and welfare payments, etc.) are included. The income measure can be either personal income (income before payment of personal taxes and other deductions) or disposable income (income after payment of personal taxes and other deductions).

To reiterate: all of the factors so far mentioned are forecasted on a study-area basis. The distribution of the forecasted totals is made in a later phase of the planning process. The emphasis is placed on forecasting study-area totals, rather than forecasting on a study-area subunit basis, because the latter procedure is considerably more difficult and, more importantly, is subjected to greater error than the former.

Considerable insight into the nature and character of the study area economy can be gained through a careful inventory and analysis of the area's resources. The analysis of a study area's human and physical resources should be given primary consideration as a means of judging the ability of the area to hold and to attract industries or firms and workers and their families. In short, this examination of the study area's resources, including natural and manmade amenities, provides clues to its future growth prospects in competition with other areas. This holds because, for both labor and business firms (those already established and those just being formed), mobility from one area to another (all other things being equal) depends upon

the concept economists refer to as "opportunity costs."3/ For the profit-maximizing business firm these costs are given by the answer to the question: "What competitive or locational advantages does one area offer that are at least equal to or greater than those offered by other areas?" It was stated earlier that an educated or skilled labor force is an asset to a study area. In terms of the above question this asset, i.e., the quality of an area's labor supply, may be the competitive advantage a business firm is seeking. That is, the more educated and skilled the labor employed, the more productive is that labor and, therefore, the lower the costs of production for a firm in that area compared to areas lacking this resource asset.

To the individual worker the relevant question on opportunity costs is: "Would one area be a 'better' place to work and live in than another?" In this instance, "better" may mean higher wages, more pleasant working conditions, or simply the existence of cultural or educational facilities that would be available to the worker's family, etc. For the individual worker, more than for a business enterprise, mobility from one area to another may be largely dependent on considerations which are non-monetary in nature.

Yet another factor that should be included in economic studies is the often vital role that expenditures by all levels of government play in the study area's economy. It is a simple task to determine how much will be expended by governmental units one or possibly two years in advance, given their budget proposals. Forecasting these expenditures well into the future is quite another matter. For example, anticipating Federal Government expenditures for military and other defense needs 20 years from now becomes an almost impossible task. This is attested to by the recent surprise announcement by the Department of Defense that, in the interest of national economy, it intended to close down a substantial number of military installations. The effects of this decision have not yet been fully appreciated by the local economies affected. But they will be felt eventually - unless some offsetting event occurs in the meantime. The point to be noted is that it is not certain what changes will occur in budgetary patterns (particularly on the expenditure side); yet it is certain that some changes will occur that will directly affect the economy (perhaps profoundly) of some study areas. Hence, to ignore the possibility of these changes occurring is unrealistic. On the other hand, a forecast of substantial changes occurrring in this factor in a particular study area should be fully documented.

The factors so far mentioned do not constitute an all-inclusive list of those that should be included in the economic studies growing out of the comprehensive transportation planning process. Nor was this intended, for

---

3/ Strictly speaking, the use of "opportunity costs" in the above context is slightly different from its normal use by economists. Nevertheless, the principle implicit in the term has not been changed.

this objective would be almost unattainable. Hence, it should go without saying that any factor can and should be included in an economic study if, by including it, it tends to add insight to the overall analyses and forecasts. The need for including other factors in a particular economic study should be decided by the study staff itself. The importance of such factors as increased productivity, the oft-times key role played by capital investment decisions (e.g., decisions to locate large scale enterprises, either public or private, in the study area), the effects of changing hours of work or working conditions, etc., may be of particular significance in certain study areas. Whether they are significant, and to what extent, must be determined by the persons conducting the study.

Data Sources

The gathering of data on the various factors to be included in an economic study is probably the greatest obstacle to be overcome by a transportation study group. While there are several publications that have compiled a comprehensive listing of statistics gathered and published by the Federal Government, there is no single publication that provides the same informational service at the State level. Most of the State governments do publish various kinds of economic data on a yearly basis, although the "completeness" of such data tends to vary from State to State. To the writer's knowledge, there is no standard inventory of local public or private economic data. In some cases locally there is a relative lack of such information. In other instances, the study group may receive most of the data it needs from strictly local sources.

It is expected that maximum use will be made of "secondary data sources" (i.e., data gathered and published by various public and private organizations, as opposed to data collected "first hand" by the study staff itself). Most notable of the public organizations publishing various kinds of economic statistics are the agencies of the Federal Government. A special section listing some of the various public and private agencies publishing useful economic data, along with the kinds of data their publications contain, is presented in appendix A.

At the local level data sources vary considerably from locale to locale. No attempt will be made to list all the potential sources of data at this level. Obvious sources here include local universities, Chambers of Commerce, trade associations, utility companies and the like. No potential source should be overlooked by a study group, for data can and sometimes do turn up in the most "unlikely" places. For example, one study group discovered that a local fund-raising organization had, and would supply to them, employment data for their entire study area that was more complete than the data collected by the State employment security office.

If at all possible, the economic data to be used in the study should be obtained, both by category and geographic subunit, in units of detail compatible with the design of the land use and of the trip generation studies. Since, however, the data required are usually not available on a traffic

analysis zone basis, the geographic framework of available data will at once impose a limit to that needed and present a practical problem difficult and costly to overcome. When the geographic unit of reported data differs from that required for transportation planning purposes then the characteristics of the study area's subunits will have to be inferred from the published statistics or an attempt can be made to obtain them through field surveys. Needless to say, the latter method is the most costly. Consequently, all possible sources of data should be fully explored before undertaking a field survey.

Up to now the term "data" has been used rather restrictively, referring to only basic, unworked raw material from which analyses and forecasts could proceed. However, for transportation planning purposes "data" should be used in the broadest sense possible. Consequently, in the data-collection phase of an economic study the study group should include in its inventory a listing of all economic studies of the study area, its subunits, or its larger region that have been made by other agencies (public or private) within the past five years. It is quite probable that such studies do exist and that, with some modification or up-dating, they can be used in part or in toto in the current study.

It is possible, too, that modifying and/or up-dating a study that has been made by some other group would preclude the necessity for preparing another forecast of economic activity. The economics of adopting this latter course of action - i.e., the savings in time, cost, and effort - should be obvious.

A final word concerning "data" useful to transportation study groups pertains to publications of private organizations specializing in the field of economic forecasting. One such organization is the National Planning Association. This nonprofit, largely business-supported institution makes projections of various economic indicators on a national and regional (and soon on a metropolitan) basis. Their main publications are included in two separate "series," to wit: a "National Economic Projections Series," and a "Regional Economic Projections Series."

The Regional Economic Projection Series (REPS) provides projections for eight regions in the country, and for each State within the respective regions. Some of their projections are made to 1975 for such factors as population, labor force, employment, per capita income, and so forth. These NPA projections can serve as useful independent checks on forecasts made by the transportation study group, or be used directly by the study group in formulating estimates for the study area.

Other organizations have made projections at the national and State levels that should at least be checked into. The general rule to follow on all of the various studies and forecasts one may find concerning the area under study is: if, upon examination, the study conclusions appear reasonably adequate and logical and suitable (i.e., for the forecast year needed) then, by all means, they should be used within (or in place of) the current study.

Presentation of Study Conclusions

The structure of the study needs to be particularly clear regarding the techniques used in the analysis of data and those used in reaching forecast conclusions. For example, a trend line fitted to a time series of a particular statistical factor (such as total employment in a study area) and extrapolated to a future date should be shown mathematically and graphically. However, if the extrapolated measure is not used as the forecast figure the reason(s) for other considerations involved must also be stated. In similar fashion, if a labor force projection is translated into a population "forecast" by means of a labor force participation ratio, the sources from which that participation ratio was derived must be made explicit.

In short, there should be no mystery about how the analyst reached a judgment about the future through his study of past trends and current patterns. Thus, if the study starts with a statement of objectives, proceeds with a careful description of the economy and the resources of the locality, identifies the dynamic elements of mobility in their geographical framework, and documents the way in which the future outlook is reached, the conclusions applicable to those objectives should appear reasonable.

The actual translation of the findings of the study into action plans will be done by others - in public and private walks. Because these individuals will base their decisions largely on the study conclusions, they should be spelled out in terms of specific forecasts of probable events - in light of the best, most recent, data available. Also, the report should present an indication of the likely rates of future change so others may adjust their plans accordingly. A careful report that is presented in such terms can, in itself, be a powerful force in shaping the future course of local events. In other words, it can be self-reinforcing. If the study is properly documented to identify possibly significant, albeit unforeseeable, events in each section, and if designed for periodic revision, the risks involved in public and private actions based on those forecasts can be minimized.

CHAPTER III - METHODS AND TECHNIQUES OF ANALYZING AND FORECASTING ECONOMIC ACTIVITY

The material to follow is by no means complete; it will not describe all forecasting methods that have been, or can be, used in forecasting economic activity for transportation planning purposes. Rather, it will attempt to present only the most commonly used forecasting techniques. Nor should an inference be drawn that a particular method discussed in this chapter is preferred to another. Which one (or more) method is used by a study group will be largely dictated by, among other things, the size of the study area, the amount of time and funds allocated to complete the economic portion of the planning process, the training and experience of personnel who are to do the study, the availability of data required, etc.

Projections and Forecasts

It is quite common to see and hear the terms "projection" and "forecast" used interchangeably. But these are not necessarily synonymous terms. Basically, to "make a projection" means to (simply) feed data into a formula to express a relationship between data that can then be graphically or otherwise portrayed and extrapolated (i.e., projected) forward to a point in the future. As this oversimplification indicates, a projection appears to be, more or less, a rote process. As such, it does not create problems; nor does it really solve problems.

Given the above, rather simple, description of what "projection" means, it cannot be considered synonymous with the term "forecast." To forecast means to predict. And a prediction (of the future level of various measures of economic activity) is necessary for urban transportation planning. A prediction, or forecast, must be based on something more than "a rote process." In short, it may be said that most anyone can make a simple projection but only an analyst can predict, because the analyst will use judgment and follow "rules of conduct."

Therefore, a projection and a forecast, or prediction, mean the same thing - are synonymous terms - only when the analyst does <u>not</u> follow the simple rote process of feeding data into a formula. They are synonymous terms when the analyst applies all the judgment, analysis, past experience, proven techniques, etc., that he can bring to bear on the subject. It makes no difference whether the analyst calls the result he obtained a "forecast," "projection," or "prediction" if he reached that result by not implicitly assuming anything; by knowing to what the data pertain; where they have been obtained, and whether they are comparable; by knowing what

factors have influenced the behavior of the measure in the past and to what extent; by estimating the extent of future influences on that factor; and by considering the output he obtained for the target year in light of the question: All factors considered and given the analysis of the data, can one reasonably expect that particular level (of employment, income, or whatever) will be reached by the target year?

For certain types of planning, economic factors may be forecasted, or projected, to fall within a range, i.e., between a high point and a low point. Again, however, for urban transportation planning purposes forecasting or projecting say, employment, to fall within high and low points does not provide much useful information for developing trip generation rates by traffic analysis zones, for example. Therefore, rather than projecting the various economic factors to fall within a range of values, it is necessary to provide (i.e., to predict) only one, the "most likely," future value or level of each economic measure to be projected in the economic study. It should not be inferred from the above that the analyst's forecasted figure is of the nature of a prophecy to the extent that it is unalterable once made. The up-dating procedures provided for in the transportation planning process will take care of that. The forecast, or most likely figure is, rather, nothing more than the attempt to follow the advice of Bassie (quoted earlier in this report) with respect to forecasting. It is, therefore, "To apply ourselves with rules of conduct that make the most of the intelligence with which we have been endowed...." This <u>is</u> "to work for the best we can reasonably expect."

<u>Forecasting by Projecting Trends</u>

A projection is the process of extrapolating, or extending into the future, a relationship that has been observed to occur historically between two (or more) factors. Graphically this relationship and extrapolation can be portrayed by a line on a chart. One of the factors in this relationship is called the "dependent variable" and the other is called the "independent variable."<u>1/</u> The basis for the projection is the historical pattern of relationship between the independent and dependent variables - the "trend" noted between the two over time.

"Fitting a line" means, therefore, to show this pattern of relationship by means of a line that "best-fits" the data. This is the trend line and the line that is projected forward to a target year. Trend lines may be obtained by: 1) "time-series analysis" (which is the analysis of only one statistical series); or 2) "correlation analysis" (which is the process of analyzing more than one statistical series and the relating of each series to the other to establish a pattern of interrelated movements over time). These two will be discussed in turn.

<u>1/</u> Although in strict logic, causal relationships are practically non-existent in the field of economics; nevertheless, it may be convenient to think of the independent variable as "causing" the changes in the dependent variable.

Trends via Time-Series

Any historical compilation of data may be called a "time-series." For literally, a time-series can pertain to employment levels reported periodically (on a monthly, quarterly, annually, or any other "period" base) or likewise to income, births, deaths, autos registered, fishing licenses issued, output of goods and services, taxes collected, dogs impounded, etc.

Fitting a trend line to portray changes in a time-series is done by the use of a regression equation. The trend line may take a linear (straight line) or nonlinear (curvi-linear) form. The linear, or straight line, form is generally conceded to be the more useful (and the safest) trend to project, mainly because it excludes the sudden and extreme rates of change in the data in either direction. Also, the linear form is easier to fit and to understand.

Curvi-linear, or nonlinear, trends are usually considered more useful in those instances where the rates (rather than the absolute amounts) of change are believed to be more important for measurement and projection. But, except in those unusual cases where a nonlinear trend can be justified, the simpler linear trend has been preferred, because, historically, forecasters have been "wrong" less frequently by using it.

In time-series analysis the dependent variable is the data or series and the independent variable is time (specifically the period of time to which the series pertain). While it may, on its surface, seem ludicrous to say "time" is "causing" the changes noted in the data being considered, yet when the data have been noted to change very little in magnitude and in a consistent manner (and, usually, in the same direction) period after period then, obviously, there is some justification for extrapolating this pattern of change to some point in the future--to "forecast" the future level of this data. Again, however, this is <u>not</u> to say that the forecaster does not attempt to analyze the "real" forces "causing" the changes observed. To assume all other things (i.e., the "forces" bringing about the pattern of change) will remain equal in the future is to say that those forces influencing the dependent variable will continue to operate in the future; and to operate, furthermore, in precisely the same way. Perhaps this would be a valid assumption if forecasting for only 20 months into the future...but for 20 <u>years</u>! Common sense indicates otherwise. Before stating such an assumption, the forecaster must make a deliberate, conscious effort to determine whether his assumption is valid (i.e., realistic); and forecast accordingly.

The most critical factor to be considered in fitting a line to historical data, for forecasting purposes, is the selection of the base year, or starting point.

To illustrate how critical the starting point is refer to figure 1, showing wholesale prices since the beginning of the 19th Century. Both trend line AA and trend line BB were drawn freehand after a simple visual inspection of the data.2/

Trend line AA, in figure 1, lends support to the contention that there is an "upward" trend in wholesale prices. But this "inflationary" trend disappears when a trend line, such as BB, is fitted to the data; when the base year is moved back from 1930 to 1801.

Given trend line BB, therefore, there is little if any reason to believe that a projection of line AA beyond the last year shown can be justified. Other lines could be drawn on figure 1 to show "trends" over several 20- to 30-year periods (e.g., starting at 1815, 1865, and 1920), which trends would undoubtedly point downward.

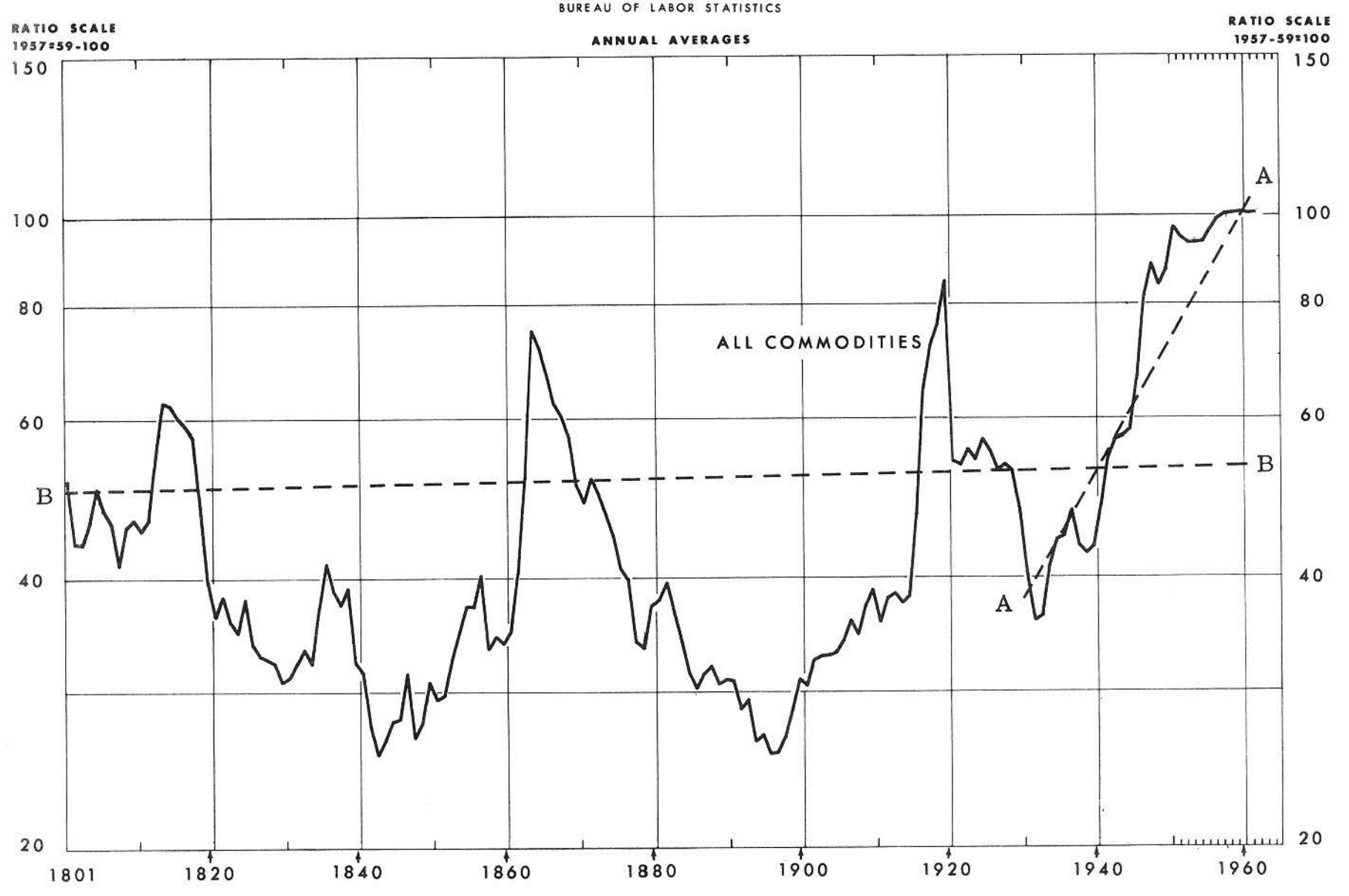
At this point, the reader may have formed the impression that forecasting anything is difficult at best, and that the further into the future one tries to look the less likely he is of being accurate. In general, forecasting is difficult and accuracy cannot be guaranteed, no matter which forecasting tool is employed. In this respect, however, forecasting by the projection of trend lines has much to recommend it. This, too, has been noted by Bassie:3/

> "It is only in projecting over long periods that trend lines play a valid role. In making long-term forecasts, no other device available offers anywhere near a comparable degree of reliability. The forecaster who uses it can always hope that if there are departures from the trend in the interim the series will come back into line by the more distant date forecast."

2/ The "freehand method" is not a precise procedure but for the present illustrative purposes it will suffice. There are several methods for obtaining a line that "best-fits" the data being handled. The most commonly used, both in time series and in correlation analysis, is the "method of least squares." In any particular case, however, that method should be used which best describes the gradual and consistent pattern of change in the data. The step-by-step procedures involved in fitting a line are described in most standard textbooks on "statistics."

3/ Bassie, op. cit., page 70.

Figure 1


WHOLESALE PRICES
BUREAU OF LABOR STATISTICS
ANNUAL AVERAGES
RATIO SCALE
1957=59-100
RATIO SCALE
1957-59=100
150
100
80
60
40
20
ALL COMMODITIES
A
B
1801
1820
1840
1860
1880
1900
1920
1940
1960
BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM

Trends via Correlation

A trend line may also be derived through correlation analysis. This obviously follows because time series is but a special case of correlation. (It is special in that the fitted line simply describes the movement of the dependent variable, the data, relative to the independent variable, the time period). In correlation, however, the line of relationship derived describes the movement of one statistical series (designated the dependent variable) relative to another statistical series (called the independent variable). Thus, when two variables tend to move together, whether in the same direction or in opposite directions, either simultaneously or with a time lag, then one can be used to predict the movement of the other. Correlation, then, is also a line fitting procedure whereby the fitted trend line shows the relationship between two nontime variables. The caution expressed earlier (see footnote 1) concerning cause and effect relationships applies in correlation procedures with even greater force because the independent variable is itself subject to irregular change, up and down. Therefore, great care must be used to determine which of the variables is the independent variable causing changes in the dependent variable. This must be emphasized. Unless it can be shown that the variables are in fact related - that they are subject to common forces or that some other valid relationship exists - no reliance can be placed on the correlation; because it would not be a valid correlation.4/ The point is that even if there appears to be a high degree of correlation between two variables, given the fitted line of relationship, it does not necessarily imply a cause and effect relationship. It implies, rather, a strong linear (or curvi-linear, as the case may be) relationship, i.e., it implies a strong association rather than a causation.

Trend lines derived by correlation techniques may take linear or nonlinear forms as in time series analysis. But correlation also allows the analyst to introduce additional variables to better explain a functional relationship. Nonlinear relationships plus the use of additional variables leads, obviously, to a more complex analysis and, usually, to a higher degree of correlation. But the reviewer should be aware of the fact that the more complex analysis (e.g., the use of additional variables by the analyst to better explain past relationships between variables) will, generally, not ensure a more accurate prediction of the future, because the analyst must then take account of the future interrelationships between the additional variables. In short, while he is becoming more certain about the past in this manner, he is, by the same token, becoming less certain about the future.

4/ This has been demonstrated by many authors of statistical textbooks. Nonsensical or spurious correlations have been derived from random numbers; increases in alcholic beverage consumption have been "correlated" with increases in teachers' salaries; and the Gross National Product has been "predicted" on the basis of Christian Dior's decision concerning the height of women's skirts, etc.

Assuming a trend line is fitted between two statistical series or variables (one of which has been designated the dependent and one the independent variable) and it shows a strong positive or negative coefficient of correlation (i.e., the line slopes upward or downward) how can one be sure this association is on the order of a "cause and effect" relationship, rather than a spurious one? One cannot be sure, especially in so complex a field as economics. On the other hand, common sense tells us, for example, that as incomes increase so too does consumption of goods and services.5/ Alternatively, to believe that sunspots "cause" the business cycles that seem to be a characteristic of a highly industrialized private enterprise economy is to violate our common sense notion of what common sense is.

There are, however, statistical tests that can be employed to determine the strength of the linear relationship between two variables (e.g., analysis of variance) and to test whether a correlation is significant. These tests should be made and the results should be included in the study report.

Other Methods

There is no a priori basis for deciding with certainty that finer levels of detailed analyses will provide more accurate forecasts. In theory, however, a greater depth of analysis should provide better insight to the forces that influence the factors to be forecasted; and, therefore, it should provide a "better" forecast. But, greater detail in the analysis stage will not guarantee more accurate forecasts. Further, although it cannot be pinpointed exactly, there appears to be a point where diminishing returns are encountered as depth of analysis is increased vis-a-vis the forecast results.

5/ Results of research by economists have led to considerable debate as to the exact nature of the relationship between income and consumption, e.g., the amount of consumption out of income at the higher end of the income levels, the "income" concept upon which consumption is based, etc. But this is beside the point, which is that consumption is a function of income. Transportation studies have shown several factors can be used to forecast trip generation rates because of the (apparent) cause and effect relationships between factors. Thus, car ownership ratios per household, incomes, employment, residential density, distance from CBD, etc., have been used to predict trip productions and attractions.

The discussion to follow will describe more detailed methods of analysis; although these methods are thought, by some, to be methods of forecasting. They are methods of analysis, however, and "require" rather than "provide" a forecast of economic activities. This will become clear as the discussion proceeds.

Component (or Sector) Method

The component (sector) technique of analysis is one of the simpler means by which greater depth can be obtained in the overall economic study. In place of (or in conjunction with) analyzing and forecasting aggregate measures of economic activity (for example, total employment, total output, etc.) this method divides the economy into various sectors for analysis and then attempts to predict growth in each sector.

Using this method, the economy may, for example, be divided into such sectors, or components, as heavy manufacturing, light manufacturing, professional services, wholesale and retail trade, government, and "all others." Any other grouping of categories could be used as well. Which categories are used should depend upon the nature of the study area economy. Perhaps no heavy (light) manufacturing occurs in the area; or again, perhaps mining is a major sector of the local economy.

Once the "component parts" of the local economy have been decided upon, the next question to be answered is: what measures of economic activity in each sector shall be analyzed and then projected? A necessary measure is employment in each sector. But other measures should perhaps be used in addition to employment (such as, for example, gross output by sector, earnings per employee, etc.). The measure or measures used are then extrapolated to the future (forecast) year; modified, if necessary, on the basis of special knowledge the analyst possesses about any sector being studied.

No method is free of problems. One that arises using this method is determining how many sectors should be used for significant analytical purposes. Another, perhaps more important, problem is in assigning the various industries to the components being used. For example, how should heavy manufacturing as opposed to light manufacturing be defined? Should a company that employs twice as many persons as another company be classified as "heavy" manufacturing, although it turns out say, scooters, whereas the second makes rockcrushers? Probably not. But should the company making scooters be put into the "light" manufacturing category along with others that produce razor blades, or boxes, or breakfast cereals? This example of the classification problems involved are elementary, but illustrate the point.

An alternative to an on-the-spot classification system is to make use of the Standard Industrial Classification System (the SIC code) developed by

the Bureau of the Budget,6/ and analyze and project economic activity at either the 1-, 2-, 3-, or 4-digit SIC level, depending upon the detail desired.

Step-Down Ratio Method

The step-down ratio method can vary considerably in the amount of detail involved and at the same time be a relatively simple and inexpensive technique of analysis overall, compared to other methods.

Basically, this method rests upon the premise that the level of employment or income, etc., in a small area (e.g., an urbanized area, SMSA, etc.) is "functionally related" to the level of that activity occurring within a larger area (respectively, a county, State, etc.), of which the smaller area is a part. Therefore, by analyzing historical data on the economic factor(s) to be forecasted, ratios are developed to express the functional relationship between the smaller and its larger economic unit.

These ratios "state," in effect, that the study area has historically accounted for, say, 50 percent of total county employment; whereas the county has historically accounted for some percentage of total employment in the State, and so forth for each area-to-area relationship for which ratios are desired (assuming data for each "area" are available).

The ratios that are developed for the forecast years following this procedure are then applied, in turn, to a reliable forecast of some economic factor(s) which is available for the largest areal unit being considered, so as to "step-down to" the study area. For instance, if a reliable forecast of national employment is available and the ratios study area-to-county, county-to-State, and State-to-nation have been developed, the procedure is to "forecast" State employment by applying the State-to-nation ratio to the national forecast. To this "forecast" of State employment the analyst applies the county-to-State ratio and obtains the "forecast" for the county. Finally, a forecast of study area employment is obtained via the study area-to-county ratio.

The validity of the study area forecast obtained through this method depends upon two factors: 1) The validity of the initial forecast that was used (in the example above, this was the national employment forecast); and 2) The reliability of <u>each</u> of the ratios employed in the step-down procedure.

6/ Standard Industrial Classification Manual, Executive Office of the President, Bureau of the Budget, 1957, with Supplement to 1957 edition, 1963. (For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $2.50 and $0.30, respectively.)

Once again it is the judgment of the analyst that plays a crucial role using this, or any other, method. He must judge the validity of the initial forecast to be used and he must judge the reliability of the ratios employed in the step-down process. These are probably the two most difficult tasks to be performed using this method of "forecasting." Basically, the analyst is forecasting the reliability of the national or other forecast used and the stability of the ratios applied to the forecast at the target year.

Numerous variations in the step-down ratio technique are possible. These can bring more, or less, detail into the overall analysis, as desired. One, for example, would be to develop a study area-to-national ratio for some factor and use only this one step-down procedure to get a study area forecast. All other intermediate ratios would be eliminated. Another variation that adds to the detail involved breaks the aggregate measures into sectors or components and develops the area-to-area ratios on a sector basis. Thus, total employment could be divided into manufacturing and nonmanufacturing components. Then the respective study area manufacturing employment-to-county manufacturing employment etc., and study area nonmanufacturing employment-to-county nonmanufacturing employment etc., ratios are obtained. Other variations should readily come to mind. Obviously, the degree of detail engaged in is limited by the historical data available to develop the ratios desired and the availability of a forecast with at least the same amount of detail as in the ratios to be applied to it.

The Economic Base Multiplier Method

The discussion now turns to a somewhat more complicated method of analysis used in economic studies, the economic base multiplier technique. There is some confusion amongst certain study groups concerning this method and what it does or tries to do.

Some of the "economic base studies" that have been made were nothing more than what is implied by that name, i.e., studies of the present economic base of a given area; an attempt to account for all of the economic activities currently going on within the area. As such, they merely described the present economy; hence, they could as well have been called economic inventory, survey, structure, or account studies. It would be difficult to claim that those economic base studies contained both a comprehensive analysis of the local economy and logically adequate and reasonable forecasts of economic activity within the study area. They did not constitute the particular method of analysis to be described in this section. Therefore, in this paper, "economic base studies" will refer to the "economic base multiplier method of analysis."

This method accounts for all economic activity within a study area (i.e., it describes the make-up of the economy) and it analyzes the economy to determine certain interrelationships. But more, it is also a predictive

tool in the sense that, from the analysis of the interrelationships found within the study area economy, it attempts to predict what the net effects will be on the study area in the future, given a forecast of changes in certain sectors of economic activity.

Essentially, the economic base multiplier method attempts to pinpoint present and past sources of production, employment, and/or income. These activities within the study area are then analyzed and subsequently divided into two sectors, or groups: 1) basic, or export, sector of activities, and 2) nonbasic, or nonexport, or local sector 7/.

As its name implies, the export sector is comprised of those persons and firms who sell their goods and services in markets outside the local economy, and thereby bring money into the study area. On the other hand, the nonexport sector is comprised of those persons and firms who serve the needs of only the local economy.

Using this method, the assumption is made that the basic sector activities constitute the prime-mover of all economic activities within the study area, in the sense that any increase or decrease in economic activities within the basic sector will eventually be followed by similar changes in nonbasic activities. As a result of a change occurring within the basic sector the net effect on the entire study area economy will be greater, by some multiple, than the original change in basic sector activities. Because of the "multiple effects" of basic sector changes this method is termed the economic base multiplier technique.

Determining what the basic and nonbasic activities are within a given study area constitutes the heart of this method. This is the problem confronting the analyst. He must decide. His problem is only compounded when he encounters industries, firms, and/or individuals who serve both the local and export markets. In those instances, the activities should be divided between the basic and nonbasic sectors on a proportionate share basis if a more accurate analysis is sought.

Another problem the analyst must resolve pertains to the measurement of basic and nonbasic activities. Specifically, should sales, income, employment, value-added, or physical output, etc., be used in measuring economic activity within the study area? It may be that some of these possible measures will be precluded by the nature of the study area economy. For example, in an area where the major export is a service activity (such as

---

7/ The sectors into which the study area economy is divided have also been referred to by other names, e.g., "basic vs. service," "city-building vs. city-serving," etc. However, the sector titles used in the text discussion are considered more descriptive and accurate.

"government" in Washington, D.C.; "tourism" in Miama, Florida, etc.) measures like value-added or physical output would not be as appropriate as income or employment. Employment is generally used as the measure of economic activities; although, like all others that could serve this purpose, certain problems must still be resolved (regarding, for example, data availability, data adjustments, etc.).

In the following discussion of how this method is applied, several assumptions will be made to simplify matters. First, employment is considered the best unit of measuring economic activity; second, the employment data by industry grouping are available and complete; and third, no problems are encountered in correctly classifying the employment activities by basic and nonbasic sectors.

The first step after obtaining the data, analyzing, and classifying them by export or nonexport sectors is for the analyst to establish a ratio of nonbasic-to-basic employment. As indicated earlier this is the crux of this method. This ratio, nonbasic employment/basic employment, expresses the relationship that is thought to "usually" exist between these two sectors; hence, it is called the "normal" ratio. Since it is supposed to represent the relationship that normally exists between the two sectors, all other things being equal, it should be based on a comparative analysis of employment data covering more than just one point in time. It is imperative, with this method as with any other method that uses "ratios" in its application, that the analyst determine the ratio that historically has prevailed in the study area. But even more importantly, he must also, in effect, forecast any changes that may occur in that ratio between the present and the forecast year.

Given the normal ratio that is obtained, it follows that any changes in basic employment activities will disrupt this ratio of nonbasic-to-basic activities. Since this method assumes that basic sector activities constitute the prime-mover in the study area, it also follows that changes in this sector will be followed by changes of a similar nature in nonbasic activities that, eventually, will bring the now disrupted normal ratio back to "normal."

It was stated earlier that this method of analysis is also a predictive tool; that it predicts the total effect on the local economy due to changes forecasted to occur in export activities. Further, it was said that the change in total employment activities would be greater by some multiple than the change in basic activities. Hence the questions: 1) What will be the multiple effects on total employment in the study area because of a forecasted change in basic employment; and 2) How are these multiple effects predicted?

The normal ratio discussed above provides the answers to these questions. Assume, for example, that a normal ratio of two-to-one (2:1)

exists between nonbasic and basic employment in a study area.8/ A 2:1 ratio stipulates that for every two persons employed in nonbasic activities another is employed in export-serving activities. Therefore, if total study area employment is, say, 78,900, then on the basis of the 2:1 ratio, nonbasic employment is 52,600 and basic employment is 26,300.

Since total employment is equal to basic plus nonbasic employment then it also follows from the above that the effect on the total employment level, caused by a change in basic employment, must equal the change in basic employment plus the eventual change in nonbasic employment. The total change in employment can be expressed by a "multiplier" ratio that shows total employment-to-basic employment. In the above example the multiplier is three, because

$$\frac{\text{total employment}}{\text{basic employment}} = \frac{(\text{nonbasic plus basic employment})}{\text{basic employment}} = \frac{(2 \text{ plus } 1)}{1} = \frac{3}{1} = 3.$$

This is another way of saying that, given the normal ratio and a forecasted change in basic employment, the total change in study area employment is found by simply multiplying the change in basic employment by three.

For example, using the above normal ratio of 2:1 the analyst has a multiplier of three, by definition. If basic employment is forecasted to change by 13,700 the total change in employment (after nonbasic employment has adjusted to the change in basic employment, i.e., after the normal ratio is back to "normal") is

$$3(13,700) = 41,100.$$

Adding this forecasted increase in study area employment to the assumed starting level of 78,900 yields an employment total for the forecast year of 120,000. Following this method to its logical conclusion, on the basis of the normal ratio for the study area (i.e., 2:1) the 120,000 would be composed of 80,000 employees in nonbasic activities and 40,000 employees in basic activities.

Table 1 presents an illustration of how industries in the study area may be grouped for analysis purposes using the hypothetical employment figure and normal ratio cited in the preceding discussion.

8/ In reality an infinite number of "normal ratios" can exist. And, it should be noted, these ratios do vary from area-to-area.

Table 1.--Example of employment grouping for the economic base multiplier method

	Total	Nonbasic	Basic
Study Area Employment	78,900	52,600	26,300
Agric. Employment	7,246	3,098	4,148
Non-Agric. Employment	71,654	49,502	22,152
Mining	1,300	124	1,176
Contract Construction	2,562	2,562	---
Manufacturing	13,890	3,917	9,973
Durable Goods	7,926	3,410	4,516
Non-Durable Goods	5,964	1,507	4,457
Trade	16,277	13,460	2,817
Wholesale	4,112	3,047	1,047
Retail	12,165	8,413	3,752
Transportation, Communications, and Public Utilities	6,357	3,711	2,646
Finance, Insurance, & Real Estate	4,306	3,597	709
Service and Miscellaneous	17,298	13,908	3,390
Government (all levels)	9,464	9,023	441
Industry Not Reported 9/	200	200	---

It was noted earlier that one unit of measuring economic activities may be more appropriate than another. Be that as it may, the "more appropriate" unit of measurement may be precluded due to a lack of data; hence, another measure may have to be used instead.

Whatever unit is used to measure economic activities the underlying theory of the economic base multiplier technique is the same. For example, a variation of the "employment multiplier" procedure described above is the "income multiplier." Using the latter as the measure, emphasis is placed upon the flow of incomes (or goods and services) between the basic and nonbasic sectors of the local economy. One can immediately see the connection between the various measures that can be used, because if employment increases (or decreases) so too will income (and so too will the output of goods and services).

The local and export categories can be made quite detailed if desired. Using income as the measure of activities the local and export categories may be subdivided into such additional categories as private export; government exports, local consumption, local investment-housing, local investment-business, etc.

9/ Assumed to be serving the local market only.

While additional detail may be desired to more precisely determine sources of basic activities and thereby put the analyst in a better position to estimate the future, most analysts would no doubt agree that detail for its sake alone only adds to the cost of the economic study. Additional detail is fine; but a more common sense approach in the overall analysis will better ensure more reliable forecasts.

The inherent weakness of the base multiplier method needs repeating at this point: Even if one had complete knowledge and could thereby precisely categorize all economic activity in the study area as either export-oriented or locally-oriented, future estimates of employment (or any other parameter used) would still depend upon the relative stability of the nonbasic/basic ratio developed; and this ratio may not be stable in the long run. Indeed, an argument can be made, a priori, for believing this ratio is inherently unstable; as a direct result of the very growth it attempts to predict.

Given the forecast of total employment for the study area, another question arises: Will there be a great enough change in the labor force to supply the required (expected) employment total? The answer to this question depends upon the independently made population forecast. To answer this question one can apply a population-to-employment ratio to the forecasted population total for the study area; or, going the other way, he can apply this ratio to the forecasted employment total as a cross-check on the population forecast. If the two forecasts diverge substantially, another look at the analysis underlying each forecast would seem called for. If, after such a review, it appears that each forecast seems valid, but yet it also appears, for example, that the future population could not be supported by the future economy, as estimated, this will point up areas requiring attention for public policy purposes (e.g., how will the future unemployment levels be reduced?). What these policies should be is outside the scope of this paper. (For a further discussion of how population and economic studies may be compared for consistency, see the section at the end of this chapter.)

Input-Output (or Interindustry) Method

One of the most detailed methods of analysis that can be (and has been) used in analyzing economic activity for transportation planning purposes is the interindustry approach. The input-output method, as it is also called, will be discussed to present only its general framework of analysis. A discussion complete enough to allow the reader to fully grasp the theoretical and practical implications involved in using this approach in an economic study is beyond the scope and the purpose of this paper.

At the outset it must be pointed out that this method is very costly. It requires the services of (usually several) highly trained and experienced economists over a long period of time; imposingly large and precise data inputs; and usually the facilities of high-speed computers.

Aside from the practical restrictions in using this method (which alone precludes its widespread use for urban transportation planning) some of the theoretical limitations are perhaps even more imposing. 10/

The greatest value in using the input-output method is realized in analyzing the more highly complex, interrelated, and interdependent economies of large study areas. Considering its limitations it would be out of place, for example, in analyzing a "one-industry town" study area. The interdependent nature of a complex, highly industrialized economy tends to justify the use of this analytical tool.

It may be said that all inputs (of raw materials, labor services, etc.) to the many industrial production processes in an economy become the outputs (of goods and services) that eventually are sold for consumption 11/ purposes. While this is true it, also, is too general a statement to provide much useful information for analytical purposes. Therefore, the input-output method attempts to trace the flows of these inputs and outputs between industries and from industries to final market users. 12/

10/ For example, it must be assumed that each industry produces only one homogeneous product. Further, it must be assumed (because of computational and other problems) that the inputs to the productive processes are used in rigidly fixed proportions and that these inputs increase proportionally with increases in outputs.

11/ In this context "consumption" is used broadly. It includes the goods and services purchases of households, governments, and foreigners. It also includes the purchases (investments) by businesses in the form of gross capital formation and increased inventory holdings. The expenditures of these groups are shown in the "final demand" portion of an input-output table. (See, for example, columns 46 through 50 of the "Interindustry Flow of Goods and Services by Industry of Origin and Destination, 1947," figure 2.) The total purchases by these groups shown in figure 2 constituted the Gross National Product for 1947, by definition.

12/ The "between industries" flows of goods and services are considered flows of raw materials and semi-finished (i.e., intermediate) outputs of one form or another. The "industries to final market" flows are considered flows of finished, or final, products and services to households, businesses, governments, and foreigners. All inputs go through the raw materials - intermediate - final output stages. For example, "iron ore" output becomes a raw material input for making the intermediate product "steel." The semi-finished output "steel" becomes one of the many raw material inputs for making the final product "automobiles;" etc.

In effect, the interindustry method "stops the flow process" to determine, at that point in time, answers to the questions: 1) From whom did the industries buy their inputs? 2) To whom did they sell their outputs? and 3) How much did they buy and sell in each instance?

Several interindustry studies have been made of the national economy and of smaller areas. The results of the 1947 national study are presented, in dollar flow terms, in figure 2. 13/ The columns of this matrix provide the answer to the first question posed above by showing purchases (of raw materials and semi-finished goods and services) by industries in columns 1 through 45 from all other producing industries. Columns 46 through 50 show purchases by final market users from the producing industries (i.e., they show final sales of finished outputs; hence, they constitute "Final Demand" for all final outputs).

The rows of the matrix, on the other hand, answer the second question by showing the disposition of all industry outputs. The third question is answered, of course, by the dollar term quantities shown in the row/column blocks.

Some industries buy most of their inputs from, and sell most of their outputs to, a relatively few industries. For example, by referring to figure 2 one can see that the "Amusements" industry (column 41) buys most of its almost $3 billion of inputs from a few major suppliers. On the other hand, it sells its output (shown in row 41) mostly to final markets (i.e., the "Final Demand" columns).

Other industries, at the other extreme, buy inputs from, and sell their output to, many industries (e.g., see column 31 and row 31 for the "Railroad Transportation" industry).

Thus, an input-output table will allow one to trace the input purchases and output sales of any industry from and to all other industries and to final market users. The input-output matrix shows what it also defines, to wit: that the total gross inputs to each and every industry included in the table must equal the respective total gross outputs.

13/ The results of a 1958 national input-output study, conducted by the Office of Business Economics, U.S. Department of Commerce, has been published in the Survey of Current Business, November 1964. However, the dollar transactions or flow table for the 1958 study (i.e., the 1958 table similar in form to the 1947 table presented here) has not been published to date. For a discussion of the 1958 study see the article "The Interindustry Structure of the United States, A Report on the 1958 Input-Output Study," by Morris R. Goldman, Martin L. Marimont, and Beatrice N. Vaccara, Survey of Current Business, U.S. Department of Commerce, Office of Business Economics, November 1964, pp. 10 through 29.

INTERINDUSTRY FLOW O
BY INDUSTRY OF ORIGIN

(All figures in m

INDUSTRY F

INDUSTRY PRODUCING

	1 AGRICULTURE & FISHERIES	2 FOOD & KINDRED PRODUCTS	3 TOBACCO MANUFACTURES	4 TEXTILE MILL PRODUCTS	5 APPAREL	6 LUMBER & WOOD PRODUCTS	7 FURNITURE & FIXTURES	8 PAPER & ALLIED PRODUCTS	9 PRINTING & PUBLISHING	10 CHEMICALS	11 PRODUCTS OF PETROLEUM & COAL	12 RUBBER PRODUCTS	13 LEATHER & LEATHER PRODUCTS	14 STONE, CLAY & GLASS PRODUCTS	15 IRON & STEEL	16 NONFERROUS METALS	17 PLUMBING & HEATING SUPPLIES	18 FABRICATED STRUCTURAL METAL PRODUCTS	19 OTHER FABRICATED METAL PRODUCTS	20 AGRICL, MINING & CONST. MACHINERY	21 METALWORKING MACHINERY	22 OTHER MACHINERY (except electric)	23 MOTORS & GENERATORS	24 RADIOS	25 OTHER ELEC.	26 MOT.
1 AGRICULTURE & FISHERIES	10,856	15,048	783	2,079	19	192	–	9	–	1,211	–	–	49	*	–	11	–	–	–	–	–					
2 FOOD & KINDRED PRODUCTS	2,378	4,910	15	60	9	*	*	30	*	685	*	–	444	2	3	*	–	–	*	–						
3 TOBACCO MANUFACTURES	–	–	828	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–						
4 TEXTILE MILL PRODUCTS	64	2	–	1,303	3,882	3	285	43	25	13	2	444	88	33	–	–	*	*	8	2	1					
5 APPAREL	44	204	–	–	1,963	–	5	20	–	30	–	–	2	3	–	–	*	–	1	*	–					
6 LUMBER & WOOD PRODUCTS	148	81	18	18	2	1,094	385	267	1	45	6	–	17	17	36	28	23	5	34	15	4					
7 FURNITURE & FIXTURES	–	–	–	12	–	–	7	5	–	–	–	–	–	–	–	–	*	–	–	–	–					
8 PAPER & ALLIED PRODUCTS	2	453	65	78	25	5	15	2,597	1,081	331	112	20	54	179	*	*	9	5	79	2	2					
9 PRINTING & PUBLISHING	–	39	–	2	–	–	–	–	767	16	–	–	–	–	–	–	1	–	11	2	1					
10 CHEMICALS	830	1,451	25	800	142	26	63	183	97	2,655	213	604	126	116	99	85	21	18	88	17	5					
11 PRODUCTS OF PETROLEUM & COAL	457	58	*	30	5	74	1	63	3	325	4,829	12	2	50	846	49	7	3	12	9	4					
12 RUBBER PRODUCTS	122	9	–	13	18	9	6	9	3	1	1	41	50	8	*	*	2	2	5	75	2					
13 LEATHER & LEATHER PRODUCTS	–	–	–	2	53	4	7	–	4	–	–	–	1,037	–	–	–	*	*	1	3	11					
14 STONE, CLAY & GLASS PRODUCTS	65	253	1	1	*	14	34	28	–	258	46	7	5	430	180	33	9	6	52	7	10					
15 IRON & STEEL	6	2	–	–	1	10	97	–	–	5	6	14	1	23	3,982	33	172	553	1,374	532	143					
16 NONFERROUS METALS	–	–	–	–	–	2	16	–	14	189	1	*	*	13	324	2,599	94	63	272	24	23					
17 PLUMBING & HEATING SUPPLIES	–	–	–	–	–	–	–	–	–	–	–	–	–	–	15	–	39	41	7	–	–					
18 FABRICATED STRUCTURAL METAL PRODUCTS	–	–	–	–	–	–	5	–	–	–	–	–	–	–	7	–	19	42	18	33	1					
19 OTHER FABRICATED METAL PRODUCTS	83	543	15	*	6	35	132	17	1	130	78	12	16	4	24	4	72	90	213	93	67					
20 AGRICL, MINING & CONST. MACHINERY	59	–	–	–	–	–	–	–	–	–	–	–	–	5	15	7	–	23	–	115	20					
21 METALWORKING MACHINERY	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8	7	6	9	53	51	57					
22 OTHER MACHINERY (except electric)	–	13	–	35	21	14	11	14	35	1	5	–	–	2	27	4	110	43	41	307	68					
23 MOTORS & GENERATORS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	34	7	1	32	29					
24 RADIOS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*	1	–	13	–	–					
25 OTHER ELECTRICAL MACHINERY	–	–	–	–	–	–	–	–	–	1	–	–	–	7	8	46	53	9	125	22	16					
26 MOTOR VEHICLES	111	3	–	–	–	1	–	–	–	–	*	–	–	1	*	*	–	–	32	24	7					
27 OTHER TRANSPORTATION EQUIPMENT	10	–	–	–	–	–	–	*	–	1	*	*	–	*	2	1	–	–	–	–	–					
28 PROFESSIONAL & SCIENTIFIC EQUIPMENT	–	–	–	–	–	–	2	6	32	13	–	–	–	1	*	–	34	3	3	1	2					
29 MISCELLANEOUS MANUFACTURING	4	11	–	4	256	1	16	15	–	29	–	*	22	9	5	*	1	1	18	*	1					
30 COAL, GAS & ELECTRIC POWER	61	193	4	105	36	24	18	123	29	188	556	37	15	204	242	104	13	15	52	23	14					
31 RAILROAD TRANSPORTATION	440	548	21	94	60	143	54	224	68	287	270	36	36	145	423	100	19	37	77	44	12					
32 OCEAN TRANSPORTATION	73	126	3	13	11	9	*	16	*	44	94	*	1	14	30	52	*	*	*	*	*					
33 OTHER TRANSPORTATION	553	367	16	79	25	138	40	117	25	95	470	7	21	70	140	19	6	5	17	10	3					
34 TRADE	1,360	418	38	228	369	60	60	176	31	173	19	55	57	52	216	140	36	54	110	51	22					
35 COMMUNICATIONS	2	41	1	9	19	10	6	8	39	23	15	6	5	10	16	6	3	6	13	6	4					
36 FINANCE & INSURANCE	238	145	1	20	24	77	18	18	23	18	125	7	7	46	44	14	6	14	19	11	7					
37 RENTAL	2,393	91	2	25	96	19	17	26	61	34	–	10	19	18	36	21	4	10	20	6	6					
38 BUSINESS SERVICES	8	533	98	71	97	19	57	22	58	424	42	21	49	11	25	5	16	10	25	12	11					
39 PERSONAL & REPAIR SERVICES	368	119	*	3	3	42	4	4	20	11	13	1	1	31	3	3	1	4	3	2	1					
40 MEDICAL, EDUC. & NONPROFIT ORG'S	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
41 AMUSEMENTS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
42 SCRAP & MISCELLANEOUS INDUSTRIES	–	–	–	24	–	–	–	250	–	110	–	7	–	13	650	456	8	4	3	9	6					
43 UNDISTRIBUTED	–	2,059	132	438	1,310	880	329	201	610	1,740	788	329	323	570	287	101	211	172	1,000	356	250					
44 EATING & DRINKING PLACES	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–					
45 NEW CONSTRUCTION & MAINTENANCE	199	117	1	39	16	12	7	42	15	36	26	12	19	34	81	20	5	5	24	16	6					
46 INVENTORY CHANGE (depletions)	2,660	402	1	120	185	*	14	87	26	140	8	3	33	2	3	102	–	*	3	*	*					
47 FOREIGN COUNTRIES (imports from)	690	2,001	104	208	279	183	6	621	8	594	258	2	35	143	43	573	*	1	6	35	1					
48 GOVERNMENT	813	1,134	104	639	376	338	112	497	335	762	780	114	136	323	573	245	86	113	277	167	86					
49 GROSS PRIVATE CAPITAL FORMATION	DEPRECIATION AND OTHER CAPITAL CONSUMPTION ALLOWANCES ARE INCLUDED IN HOUSEHOLD ROW																–	–	–	–	–					
50 HOUSEHOLDS	19,166	6,262	387	3,286	4,013	2,564	1,063	2,161	3,034	3,431	4,907	1,024	1,140	2,255	3,945	1,519	624	943	2,335	1,178	930					
TOTAL GROSS OUTLAYS	44,263	37,636	2,663	9,838	13,321	6,002	2,892	7,899	6,447	14,050	13,670	2,825	3,810	4,844	12,338	6,387	1,745	2,316	6,445	3,292	1,833					

F GOODS AND SERVICES
AND DESTINATION, 1947

(llions of dollars)

URCHASING

FINAL DEMAND

:7	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	TOTAL GROSS OUTPUT
–	–	–	–	–	–	4	4	–	5	1	8	–	2	–	–	–	–	116	–	–	250	865	92	1,008	1,276	569	21	9,785	44,263
*	–	–	*	–	–	5	21	1	81	6	34	71	9	–	–	–	–	2	251	*	9	134	3,469	2	608	1,528	728	–	22,141	37,636
–	–	–	–	–	–	–	–	*	–	–	*	–	–	–	–	–	–	–	–	–	7	45	–	–	77	217	3	–	1,485	2,663
18	2	9	36	147	9	47	76	8	–	8	7	27	*	–	–	*	29	4	–	15	580	–	47	61	919	101	21	1,469	9,838
2	–	*	*	100	10	2	*	*	*	*	3	15	1	–	–	–	20	16	*	12	150	21	1	214	301	193	1	9,987	13,321
67	3	10	41	46	33	5	65	60	–	5	1	28	*	–	135	1	*	1	–	17	444	5	2,330	174	170	14	36	67	6,002
5	–	102	1	26	20	1	–	*	–	–	*	–	*	41	78	–	–	4	–	–	199	–	198	78	35	52	569	1,459	2,892
39	4	17	48	33	20	75	69	4	2	–	4	568	2	1	–	2	62	26	–	145	836	57	170	44	154	59	–	344	7,899
5	–	1	5	–	–	2	–	*	36	4	20	98	33	213	–	2,234	27	173	13	321	585	30	–	*	72	156	89	1,491	6,447
62	10	9	178	111	22	55	167	55	32	5	20	73	3	*	–	7	198	222	2	30	1,181	42	635	305	812	186	–	1,964	14,050
24	1	2	18	31	11	2	8	471	270	87	448	200	2	15	780	*	57	56	1	8	357	15	617	56	680	177	*	2,437	13,670
53	2	2	31	496	12	5	37	1	1	–	130	63	1	7	*	–	71	4	–	5	468	4	56	94	168	21	8	709	2,825
7	*	*	1	13	3	8	10	*	–	–	2	2	–	–	–	–	34	6	–	14	283	–	1	108	84	30	17	2,065	3,810
57	23	7	92	192	6	26	59	17	12	1	2	37	*	–	–	–	25	6	–	3	363	59	1,741	99	205	17	15	341	4,844
930	118	13	196	1,102	370	16	35	44	153	–	6	–	1	–	–	–	–	–	–	130	719	–	876	57	605	13	–	–	12,338
366	40	26	654	176	62	55	170	6	45	–	2	–	*	–	–	–	–	*	–	21	524	2	315	98	167	5	–	19	6,387
35	1	–	32	8	6	–	–	*	–	–	–	–	–	–	–	–	–	–	–	7	106	–	878	64	42	7	60	397	1,745
67	*	–	9	10	31	1	–	*	7	–	1	–	–	–	–	–	–	–	–	9	248	–	1,564	15	67	4	145	13	2,316
326	28	63	211	956	62	68	38	5	26	5	7	59	1	–	–	1	32	6	–	46	1,138	24	652	127	280	38	74	537	6,445
96	–	–	–	3	14	–	–	28	3	–	*	–	–	–	–	–	57	*	–	11	261	–	116	105	566	82	1,640	66	3,292
90	7	6	19	223	12	8	*	–	8	–	1	–	–	–	–	–	–	–	–	6	264	–	–	17	205	11	734	31	1,833
565	50	2	82	402	195	26	3	6	47	–	12	8	–	16	–	–	146	1	–	53	1,717	–	338	288	990	84	3,450	1,080	10,312
317	17	5	52	–	51	10	–	1	5	–	4	–	–	–	–	–	3	–	–	10	257	–	3	33	85	11	128	–	1,095
4	8	243	95	19	15	4	–	–	–	–	–	3	1	–	–	*	23	–	–	2	74	–	–	56	113	83	296	639	1,692
158	57	165	350	599	53	21	18	17	30	–	8	6	49	–	–	5	62	4	–	25	608	–	716	161	244	76	1,331	673	5,723
*	–	–	12	4,401	*	–	–	8	*	–	131	20	*	–	*	–	1,054	*	–	70	671	1	36	401	1,020	151	2,982	3,128	14,265
–	*	–	–	12	295	–	–	*	38	76	132	–	–	–	–	–	2	–	–	14	456	–	1	18	324	1,245	1,203	171	4,001
36	2	3	9	70	23	176	24	*	–	–	2	–	*	–	–	7	52	176	–	6	229	–	22	32	184	79	260	630	2,119
45	20	30	61	22	3	26	156	2	4	5	4	10	*	–	–	149	164	46	53	112	638	21	32	43	187	85	511	1,934	4,756
68	8	6	39	62	28	10	25	1,272	443	4	91	493	10	63	3,016	5	307	163	54	–	23	219	30	27	355	195	–	133	9,205
100	11	13	50	228	37	14	31	151	410	3	58	75	5	6	422	27	29	52	2	10	798	253	706	74	590	332	266	2,061	9,952
*	–	*	*	1	*	2	10	*	–	218	–	–	–	–	–	–	–	–	–	5	2	–	–	–	1,340	126	–	102	2,292
29	3	8	19	67	13	5	14	35	195	35	253	311	3	4	125	29	14	190	2	6	1,102	97	572	38	314	186	103	3,860	9,855
183	18	34	83	56	74	39	48	40	30	6	423	202	7	43	747	135	386	292	7	80	808	1,061	2,506	149	987	45	2,336	27,107	41,657
23	3	4	13	16	10	6	9	18	18	2	42	326	66	85	62	429	123	66	11	–	83	11	44	–	38	148	–	1,269	3,173
32	7	9	23	22	21	6	18	48	24	120	298	1,002	5	1,851	555	22	118	93	26	–	–	72	400	–	135	32	–	6,993	12,814
32	2	9	19	21	20	11	35	46	24	7	147	1,961	52	211	208	58	710	402	180	–	–	386	84	–	–	223	804	20,289	28,855
54	3	25	32	76	10	51	57	9	22	2	33	1,706	86	143	37	64	121	17	95	–	421	55	134	–	3	38	–	179	5,097
5	*	*	1	3	2	1	4	16	11	5	264	1,415	16	113	25	68	559	76	22	30	2,294	228	819	–	–	83	271	7,333	14,301
–	–	–	–	–	–	–	–	–	–	*	*	–	–	16	–	–	–	85	–	–	350	–	–	–	–	5,078	–	7,856	13,385
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	7	392	–	14	–	–	–	128	–	–	2,403	2,944
38	1	*	3	–	–	1	–	–	–	–	35	386	10	106	34	20	1	1	13	–	12	–	1	–	30	1	–	–	2,233
463	45	204	822	490	406	227	1,049	356	61	214	73	2,320	88	617	547	575	1,303	960	269	–	–	536	–	–	–	–	–	–	24,711
–	–	–	–	–	–	–	–	–	–	–	11	–	–	–	–	–	–	152	–	–	1,030	–	–	–	–	–	–	12,075	13,270
28	2	7	16	44	23	7	18	265	1,118	1	134	182	178	32	4,084	3	56	342	25	–	–	73	7	–	–	5,464	15,709	154	28,704
4	–	*	2	7	8	47	157	*	–	–	–	–	–	–	–	–	–	–	–	851	–	–	–	–	22	–	–	–	4,887
16	1	1	2	15	11	54	141	7	41	302	33	–	33	105	–	–	–	–	3	69	12	–	–	–	–	1,313	–	1,325	9,275
514	64	62	274	656	120	134	191	1,142	1,075	256	766	3,750	344	1,111	3,997	212	503	170	318	74	2,176	1,410	470	73	831	3,458	216	31,308	63,685
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
339	534	595	2,092	3,303	1,880	856	1,989	5,066	5,675	914	6,205	26,240	2,165	8,015	14,003	1,044	7,951	9,199	1,456	–	1,801	4,254	11,492	–	847	30,058	218	2,116	220,474
312	1,095	1,692	5,723	14,265	4,001	2,119	4,756	9,205	9,952	2,292	9,855	41,657	3,173	12,814	28,855	5,097	14,301	13,385	2,944	2,233	24,711	13,270	28,704	4,802	17,320	51,060	33,514	191,625	769,248

,000

Given the interindustry relationships and the outputs of each industry that he has established, the analyst must then determine how many employees were required to produce the output of each industry, respectively. Therefore, additional data on labor productivity, hours of work, etc., are required on an industry-by-industry basis. This information, on employees required per unit of industry output, is used, in turn, to determine total industry employment required to produce the respective total industry output. An employment total for the economy is obtained by simply summing the employment totals of all industries.

With a knowledge of how much labor inputs are required to produce the known outputs, an input-output model can then be used to "forecast" the level of employment that would be required to supply a different output total for the economy on an industry-by-industry basis. A major problem is, therefore, to accurately forecast demands for final goods and services for the final markets (columns 46 through 50) at the target year. Then, working back through the various interindustry flows of semi-finished outputs, one can determine (i.e., "forecast") the labor and other inputs that would be required to produce the new output totals.

A major shortcoming to the input-output method should immediately be apparent. It was noted earlier that this method analyzes the economy at one point in time. The new industry-by-industry inputs of labor, etc., that are required to produce the forecasted output totals are usually determined on the basis of factors prevailing at the time the interindustry relationships were established. That is, the new inputs required to produce the new outputs are based on the level of prices, the state of technology (or production methods), input costs (labor and material), labor productivity, etc., prevailing at the time the industries were first analyzed. While it may be realistic to believe that the above factors, and the linkages established between final markets and the industries supplying those outputs, do not change substantially in the short run; and that interindustry relationships, per se, are likewise valid for some short period of years and some ranges of outputs, it is still true that the urban transportation planning process requires long range forecasts (20 to 25 years). Twenty years cannot be considered a "short" period of time. Certainly, in a dynamic economy, all of the above factors are subject to change over a 20-year period. However, in an effort to keep the above factors "current" over this time span an analyst may attempt to project changes in them, and then adjust labor and other input requirements accordingly. But this is not a simple task.

A few concluding comments concerning input-output analysis are in order. The primary contribution of an input-output matrix is to be found in the manner in which it points up the flow of goods and services between industries. A knowledge of such relationships may be of considerable value for purposes other than, and in addition to, urban transportation planning.

It should also be recognized that an interindustry study is not a method of forecasting; it does not provide a forecast, it requires one. Thus, changes in final demands are as much an "input" to the model as the output from one industry is an input to another. An input-output matrix, or table of coefficients, can only distribute a final demand forecast to specific industry segments. However, when used with this limitation in mind, input-output analysis can force a set of consistency checks that could not otherwise be made. For example, levels of activity in one industry that depends upon another industry's output for all or some of its inputs cannot be greater than the second industry's ability to supply those quantities of inputs. Hence, this would point up potential bottlenecks in the production processes where additional productive capacity (and capital) would be needed. Moreover, it may show that the forecasted output goals cannot be met in general due to an anticipated shortage in labor or raw material inputs.

The discussion so far has centered around the rationale of input-output analysis and has used the national table as an example. Those transportation studies that have used the interindustry approach in conducting their economic study have had to rely on the national table of coefficients developed in the 1947 study. This occurred because regional or local area data were not readily available and it would have been too costly, both in time and money, to collect data first hand to develop local industry coefficients. Hence, the necessity of having to use national inter-industry relationships for a local area study is a major disadvantage in this type of analysis; nor, for that matter, is this liability overcome even if the national coefficients are modified by the analyst to better reflect local area conditions or, secondly, if the national coefficients are current ones vis-a-vis those that prevailed in 1958 or 1947.

Perhaps in the final analysis the question of whether or not this technique will be employed by a transportation study group will be strictly academic since most urban transportation planning organizations will, in all probability, not have the funds, time, specialized personnel, etc., to devote to an interindustry economic study. It is, in reality, an economic problem, per se; for there are other phases of the transportation planning process also competing for these same limited resources.

Alternative Methods

In "real world" situations most of the analytical methods so far discussed can become quite comprehensive in their application. Especially is this true of those methods considered more sophisticated theoretically than others to begin with. As a consequence of this, the discussion of the various methods of analysis has attempted to be as simple and straightforward as possible. Yet it is in recognition of problems that may be encountered in carrying out some of the more sophisticated methods of analysis that other alternatives may be used.

It will be recalled that the crux of the economic base multiplier method is to precisely and accurately divide employment activities into either a basic employment sector or a nonbasic employment sector (or some proportion of both). All else follows logically therefrom; i.e., the dichotomy completed, estimates of growth are made for basic sector activities, the normal and multiplier ratios are applied to these estimates, and the total change in study area employment is thereby determined.

An alternative to the possible pitfalls involved in the economic base multiplier method is to avoid the necessity of determining whether employment is "basic" or "nonbasic" to begin with. In lieu thereof, the decision may be made to analyze all employment by one-digit Standard Industrial Classification (SIC) categories. These are industry "Divisions" A through J and they cover the entire field of economic activities (respectively, the Divisions are: agriculture, forestry, and fisheries; mining; construction; manufacturing; transportation, communication, electric, gas, and sanitary services; wholesale and retail trade; finance, insurance, and real estate; services; government; and nonclassifiable). The analysis is then carried to the two-, three-, or four-digit SIC level (as deemed necessary) for those industry Divisions that presently constitute major, or dominant, employment activites.

A "major employment activity" may be defined as an industry or firm that employs a certain percentage of total study area employment. If, for example, an industry Division in the study area currently (i.e., at the time the economic study is started) accounted for four percent (4%) or more of total study area employment that Division may be considered a major, or dominant, employment activity, and the analysis and forecast of employment in that industry would be carried to at least the two-digit SIC level. This would be done for each industry Division meeting the "four percent or more" criterion.

It is immediately apparent that this alternative method of analysis offers distinct advantages over other methods. First, a costly and time-consuming survey of industry enterprises to determine whether a firm sells locally or to "foreign" markets, i.e., to determine a nonbasic/basic ratio, is not needed. The primary information required is whether an industry (or firm) accounts for at least four percent of the total number employed in the study area. If it does, then that industry or firm should be more closely analyzed to better determine its growth prospects.

Another related advantage in using this method rather than the economic base multiplier technique, for example, is that "linkages" between industries do not have to be quantified. The development of linkages, between industries that sell "locally" but to other industries or firms that sell part or all of their output in the export market (and who, therefore, would be considered "basic" employers), should properly be accomplished when analyzing the economy in terms of the "basic-nonbasic" approach. Again, however, this costly and time-consuming aspect of the economic base multiplier approach is simply avoided when applying the "4% or more" criterion.

Even more importantly, from the viewpoint of overall comprehensiveness it is better to analyze the current position, and assess the future growth, of all dominant, or major, centers of economic activity in a study area rather than simply assume that some historical relationship (e.g., that observed between nonbasic and basic employment or between the nation - region - State - county and study area) will not change over a 20-year forecast period (or that it will change by some given amount). As time goes on little remains constant. It is known, for example, that costs, prices, and output can change simply because of changes in worker productivity. But couple the latter with changes in technology (e.g., new methods of production, new products, etc.) and profound influences now operate on the "historical relationships" noted above. Or again, what will the multiple effects be on a forecasted employment total for a study area when a "basic" industry or firm discontinues certain operations or moves out of the study area altogether?

It is not suggested that analyzing the study area employment prospects in terms of the dominant employer approach (i.e., applying the "4% or more" criterion) will provide "better, more valid, numbers" as far as estimated employment totals are concerned. It is suggested, however, that this approach may put the analyst himself in a better position to assess what those future employment numbers will be; for in this method, as in all the others, the validity of the results obtained depends primarily upon how well the analyst does his job.

A second alternative is to use the method of analysis recently put forth by the Office of Business Economics, Department of Commerce.14/ This method can be useful in helping to analyze changes in employment (or income, population, etc.) on a regional, State, county, or other areal unit base for which statistics are available. (Alternatively, it is possible to use "region," "State," etc., in a nongeographic context. Hence, the data can be analyzed on a number of different bases.)

The method itself relates changes in, say, regional employment, for example, to national employment changes. Changes occurring over time in regional employment are examined in two ways vis-a-vis changes occurring in national employment during the same time period. First, an increase (decrease) in employment in an area is considered to be partly a result of the existence of rapid (slow) growth industries in the region, in terms of the rapid (slow) growth of all industries nationally.

14/ For a more complete discussion of this method than will be presented here see Lowell D. Ashby's article "The Geographic Redistribution of Employment: An Examination of the Elements of Change," Survey of Current Business, U.S. Department of Commerce, Office of Business Economics, October 1964, pp. 13-20.

Second, an increase (decrease) in an area's employment level is also due to that region increasing (decreasing) its share of each of its industries, given the growth rate of each of those particular industries nationally.

The first of these elements of change (regarding the distribution of industries) is termed the "industrial mix" of an area. The second (pertaining to the share of each of its industries) is the area's "competitive mix." The algebraic sum of these two elements is the "net total effect" on employment (i.e., the actual change in employment).

Again it must be noted that this method of analysis is similar to others in that it describes the changes that have occurred between two points in time. It is left to the analyst to explain why those changes occurred and to determine the future outlook for study area industries.

It is of interest to note that the Office of Business Economics is attempting to develop a technique for projecting employment on various geographic bases using Dr. Ashby's analytical method.

Population Forecasts Based on Labor Force or Employment Forecasts

Forecasts of the "population" and of "economic factors affecting development" of the study area must be included in a comprehensive transportation planning process. These two forecasts are and should be the respective results of separate and distinct studies. But it is also imperative that they be checked for consistency with each other.

For example, a demographic study that forecasts a future population greater than the future economy's ability to support that population indicates a basic inconsistency between the population and economic studies. In similar fashion an inconsistency is indicated when the economic study forecasts labor force or employment totals higher than the numbers of persons who will be available in these categories, given the population forecast. Any apparent inconsistencies between the population and economic forecasts call for a thorough review of the data, assumptions, and analytical and forecasting procedures involved in each study. Hopefully, this will resolve discrepancies.

Even with a thorough review of the respective studies, the study staff may be convinced that the forecasted population, labor force, and employment totals are valid; they may find no discrepancies in procedures etc., that substantially change the original forecasts. If, after such a review of each study, it is determined that the future economy will not be able to fully support the future population (i.e., not enough jobs are anticipated to handle the expected labor force; resulting, therefore, in a higher than usual unemployment level for the future study area) this will indicate

areas toward which public policies should be oriented (to deal with the anticipated unemployment). Again, what those policies should be is beyond the scope of this paper.

The question that naturally arises is: How does one determine whether the population and economic studies are consistent with each other? The answer to this question means, in effect, that population "forecasts" must be included in economic studies; or "forecasts" of the labor force and employment (and, by definition, unemployment) must be derived from population forecasts. Again, how can this be done to determine whether population and economic forecasts are consistent with each other?

The first step is to obtain the "labor force participation rate" for the study area. Historical data are available in urbanized areas pertaining to the total population, the total noninstitutionalized population, the total civilian population, or the total noninstitutionalized population 14 years of age or over, etc. Data are also available for the total labor force, civilian labor force, etc. A labor force participation rate is obtained by simply relating one of the labor force concepts to a population group. For example, one commonly used participation rate is the "civilian labor force participation rate." This rate is obtained by dividing the civilian labor force by the civilian noninstitutionalized population 14 years of age or older. 15/ If this rate came out to be, say, 50 percent, it would simply indicate that one-half of the indicated population is in the indicated labor force.

The labor force participation rate that is used should depend upon the characteristics of the study area's population and labor force. For example, if a study area has had a relatively large proportion of military personnel stationed there, they should be taken into account. Alternatively, if a study area has had no armed forces personnel stationed in its locale (and none are expected) then, in this case, the "total labor force" is equal to the "civilian labor force" and the rate that is derived depends entirely on the denominator used. 16/

15/ The term "civilian" means that military forces are excluded. The term "noninstitutionalized" means persons confined to prisons, mental institutions, etc., are excluded.

16/ In addition to taking account of age and military characteristics of the labor force and population, labor force participation rates can also reflect sex and racial characteristics of those in the labor force, by age groupings, educational levels, etc. Hence, many different "participation rates" can be derived.

Assume that for a particular study area the relationship, civilian labor force/civilian noninstitutionalized population 14 years of age and over, is:

$$\frac{120,000}{200,000} = 3/5 = 60 \text{ percent}$$

and that this participation rate is consistent with the study area's past experience. Assume further that this ratio or rate is expected to remain constant over the forecast period.17/ This rate is then applied to the population total derived from the demographic study. Assume this population forecast is 260,000. Then

$$260,000\ (.60) = 156,000$$

is the labor force "forecast." The 156,000 labor force total derived in this manner should agree in general with the labor force total forecasted as a result of the economic study.

The above procedure is reversible, of course (i.e., the reciprocal of a labor force participation rate can be applied to a labor force forecast to obtain a population "forecast"). The latter can then be compared with the population forecast obtained from the demographic study. 18/

Thus, using a labor force participation rate or its reciprocal, one can check the consistency between the demographic and economic studies.

Quite often, however, economic studies do not include forecasts of the labor force. Instead, they may only include forecasts of employment totals. What then?

The same procedure should be followed in the latter instances. That is, determine the labor force participation rate that is expected to be prevailing at the target, or forecast, year. Apply this participation rate to the population total at hand for the target year. Again, this will produce a labor force figure. At this point another step is required. The labor

---

17/ The participation rate that is applied to the population forecast figure must obviously be the one that is expected to be controlling in the forecast, or target, year.

18/ For additional discussion and example of the procedures involved in checking the results of population and economic studies see Population Forecasting Methods, A Report on Forecasting and Estimating Methods by Frank V. Hermann, U.S. Department of Commerce, Bureau of Public Roads, Urban Planning Division, June 1964, pages 39-41.

force is equal to the number employed plus those unemployed. The labor force total is "known" as a result of applying the appropriate labor force participation rate to the population forecast. The economic study itself provides the employment forecast. Therefore, given the above definition of the labor force, the unemployment total is also known (by subtracting the employment total from the labor force total). The absolute figures of the labor force, employment, and unemployment that have been obtained by the above procedures are not very useful as a standard against which one can judge the consistency between the population and economic studies. Hence, the employment and unemployment totals should be restated as percentages of the labor force to allow the reviewer to grasp the implications of the forecasted population, labor force, and employment totals, and thereby to judge the validity of and consistency between the demographic and economic studies. To recall an earlier discussion,19/ an economic study that implicitly shows the unemployment rate diverging substantially over the forecast period from the study area's "normal" unemployment rate (whatever that rate may be) is indicative of a basic inconsistency between the economic study and the demographic study. Alternatively, the anticipated change in the unemployment rate may be quite consistent with the overall results of both the economic and demographic phases of the urban transportation planning process.20/

19/ See section "Elements of the Study" in chapter II.

20/ Implicit in this discussion is the assumption that job opportunities constitute the major force attracting people to an area (and vice-versa - the lack of productive employment opportunities in an area is the prime cause of people leaving, since usually they remain there unemployed only if they do not have the wherewithal to move, knowledge of jobs elsewhere, and/or the required education or skills to take advantage of job opportunities elsewhere).

APPENDIX A - SOURCES OF ECONOMIC DATA FOR FORECASTING PURPOSES

A considerable amount of statistical data required in forecasting economic activities for transportation planning purposes can be found in many publications of the Federal and State Governments. This appendix will discuss in detail some of their publications containing economic data. Also, it will present a listing of publications, by source and content, to give the reader a general idea of what is available in the way of economic data and where they may be found.

FEDERAL GOVERNMENT

A relatively complete list of data available from the Federal Government can be found in the following publications:

1. Statistical Services of the United States Government, Executive Office of the President, Bureau of the Budget, (Rev. Ed.), 1963.

2. Directory of Federal Statistics for Metropolitan Areas, Advisory Commission on Intergovernmental Relations, October 1962.

Both publications can be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402, for $1.00 each.

The first publication listed above describes the Federal Government's statistical system, in general. It indicates the organization of this program and it describes the relationship of this program to and between other statistical programs. It discusses the manner in which data are collected, processed, and presented. Further, it describes in topical form the principal social and economic statistical programs of the various Federal agencies. Lastly, it lists all of the principal statistical publications each agency is responsible for, states briefly what each publication contains, and when it is published.

The second publication listed presents, in tabular form and on a topical basis, a listing of the various types of data published by Federal agencies. The tables included in that publication show when the statistics are published, by whom, and the geographic units to which the respective data pertain.

U. S. Department of Commerce, Bureau of the Census

A census of the U.S. population is conducted every 10 years (in years ending with a zero), and the results published, by the U.S. Bureau of the Census. The latest decennial census statistics on the population are as of April 1, 1960. Thus, the "current" Census of Population data were five years old on April 1, 1965. For this reason it may be considered necessary to update these data if they are to be used.

The Census of Population report that is of most interest as far as data for urban transportation planning are concerned is that listed officially as "Series PC (1) - 1C to 53C: Chapter C. General Social and Economic Characteristics." The "Chapter C" series runs from 1C to 53C since separate data are provided for each of the 50 States, the District of Columbia, Puerto Rico, and a U.S. summary.

"Chapter C" presents, for each State, statistics on the labor force, as well as on employment, unemployment, occupation group, industry group, place of work, place of residence, means of transportation to work, income statistics for families and unrelated individuals, and so forth. These subjects are given for the States as a whole and for some of their defined areas (e.g., for counties, urbanized areas, standard metropolitan statistical areas, and urban places).

It should be noted that this series on "General Social and Economic Characteristics" is based on a 25 percent sample of the households interviewed in the census.

The statistics contained in Chapter C can be used as benchmarks. Also, when they are used with the relevant 1940 and 1950 Census of Population data, trend lines can then be established and, of course, be extrapolated to a forecast year. But caution must be exercised when using any time series data to be certain they are comparable.

In addition to all of the "censuses" the U.S. Bureau of the Census is responsible for conducting, it collects and disseminates information from sample surveys on a monthly, quarterly, and annual basis. The publications of the Bureau of the Census that are particularly suitable for economic forecasting purposes include the following: 1/

1/ Those entries preceded by an asterisk (*) may be found more useful for economic forecasting purposes than those not so marked. Also, unless otherwise noted, copies of the publications listed in this appendix are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402. Where known, the per copy price is shown in parentheses after each entry. Since prices are subject to change, current price lists should be obtained before ordering any of the listed publications.

Census of Population. Conducted every 10 years in years ending in "0."

Volume I. Characteristics of the Population. (Issued also as separate State reports (4 reports for each State) in Series PC(1) A, B, C, and D, containing data as outlined in chapters A-D below. Price for individual reports varies.)

Chapter A. Number of Inhabitants.

Contains population counts only (for the State, counties, SMSA's, urbanized areas, etc.).

Chapter B. General Population Characteristics.

Contains data on race, age, sex, marital status, etc., (for the State, counties, SMSA's, urbanized areas, etc.).

*Chapter C. General Social and Economic Characteristics.

Contains data on the labor force, employment, unemployment, weeks worked in 1959, year last worked, occupation group, industry group, class of worker, place of work, place of residence in 1955, means of transportation to work, income of persons and families, etc., (for the State, counties, SMSA's, urbanized areas, etc.).

Chapter D. Detailed Characteristics.

Contains data on most of the subjects covered in chapter C, cross-classified by age, color, etc. Also includes greater detail on families, occupations, industries, etc., (for the State, counties, SMSA's, etc.).

Note: Volume I (containing chapters A, B, C, & D) is available as a single book for each of the States and the several territories, respectively. (Price varies.)

*Volume II. Subject Reports. Series PC(2).

Consists of 30 reports on particular subjects. Cross-classifications shown on a detailed basis for families, migration, education, employment, unemployment, occupation, industry, income, journey to work, etc., (for the U.S. and regions, and in some cases for States and SMSA's).

*Volume III. Selected Area Reports. Series PC(3).

Consists of five reports on selected social and economic characteristics of the population for 509 "State economic areas," for standard metropolitan statistical areas, for Americans overseas, and according to the size of place and to the type of place where the individual resided. (Price varies.)

Census of Housing. Conducted every 10 years in years ending in "0."

*Volume I. States and Small Areas. Series HC(1). (55 individual reports, one for each State, the District of Columbia, Puerto Rico, Guam, Virgin Islands, and a U.S. summary.)

Contains data on occupancy characteristics (such as tenure, vacancy status, number of persons), structural characteristics condition, automobiles available, facilities and equipment, financial characteristics, etc. (Data for the State, SMSA's, urbanized areas, etc.) (Price varies.)

Volume II. Metropolitan Housing. Series HC(2). (202 individual reports.)

Contains cross-tabulations of housing and household characteristics. Data restricted to SMSA sizes of 100,000 or more inhabitants. (Price varies.)

*Volume III. City Blocks. Series HC(3). (421 individual reports.)

Contains data for a limited number of characteristics for cities and other urban places having 50,000 inhabitants or more and for 172 places that requested inclusion in the block statistics program and reimbursed the Bureau for the cost of such inclusion. Reports available for 421 cities and localities. (Price varies.)

Volume IV. Components of Inventory Change. Series HC(4).

Part 1A, 1950-1959 Components; Part 1B, Inventory Characteristics; Part 2, 1957-1959 Components. Part 1A and 1B each consist of 18 individual reports, one for each of 17 large metropolitan areas and a report for the United States and regions; Part 2 consists of 10 reports, one for each of 9 large metropolitan areas and a report for the United States and regions. (Price varies.)

Volume V. Residential Finance.

Part 1, Homeowner Properties; Part 2, Rental and Vacant Properties. (Price $4.00 and $2.00, respectively.)

Census Tract Reports. Series PHC(1).

Contains population and housing data (e.g., age, race, sex, marital status, residence in 1955, employment status and other labor force characteristics, occupancy, tenure, color of occupants, number of housing units in structure, number of persons in unit, automobiles available, etc.) for each of 180 tracted areas in the U.S. and Puerto Rico. (A "tracted area," in general, covers an SMSA.) (Price varies.)

Census of Business (retail, wholesale, and selected service trades). Conducted every 5 years, most recently for 1963. To be conducted in the future for years ending in "2" and "7." Volumes of the 1963 Census of Business will follow the pattern for 1958 as indicated below. Individual reports to be incorporated in the 1963 volumes have been published. (Prices vary.)

Volume I. Retail Trade, Summary Statistics.

Contains data by kind of business on sales, size and employment, size of establishment, etc., (for U.S. and geographic areas). (Price for 1958 edition $7.50.)

*Volume II. Retail Trade, Area Statistics.

Contains data by kind of business, including number of establishments, employment, payrolls and sales (for States, counties, SMSA's, etc.). (Price for 1958 edition $14.50.)

Volume III. Wholesale Trade, Summary Statistics.

Contains data on size of establishment by employment, receipts, etc. (Price for 1958 edition $6.75.)

*Volume IV. Wholesale Trade, Area Statistics.

Contains data by kind of business, on number of establishments, sales, employment, payrolls, etc., (for States, counties, SMSA's, etc.). (Price for 1958 edition $6.00.)

Series CBD. Central Business District Reports. (98 individual reports, one for each of 97 SMSA's and a summary.)

Contains data primarily on retail trade by kind of business (for selected central business districts, SMSA's, etc.). (Price $0.25 for 1958 edition of each CBD report.)

Census of Manufactures. Conducted every 5 years, most recently for 1963. To be conducted in the future for years ending in "2" and "7." Volumes of the 1963 Census of Manufactures will follow the pattern for 1958 as indicated below. Individual preliminary reports have been published and will be incorporated in the 1963 volumes when data are final. (Prices vary.)

Volume I. Summary Statistics. (Price for 1958 edition $5.75.)

*Volume II. Industry Statistics. Parts 1 and 2.

Contains data on 430 industries pertaining to employment, payrolls, value added, size of establishments, materials consumed, etc., (for the U.S. and, for certain items, for States). (Price for 1958 edition $7.00 each part.)

*Volume III. Area Statistics.

Contains data on size and number of establishments, employment, payrolls, value added, etc., (for States, counties, SMSA's, selected cities, etc.). (Price for 1958 edition $7.00.)

Census of Transportation. To be conducted every 5 years in years ending in "2" and "7" (note that the 1963 Census of Transportation was the first of the kind). The final published reports will contain data on commut ng patterns, employment, traffic flow, commodity class shipments, revenues, etc., (for the U.S. and for States). This Census is divided into four major programs:

National Travel Survey.

Truck Inventory and Use Survey. (Price $0.50 for U.S. Summary, $0.25 for each geographic division report, $0.20 for each State report.)

Bus and Truck Carrier Survey.

Commodity Transportation Survey.

Census of Governments. Conducted every 5 years for years ending in "2" and "7." This Census provides data on the number and characteristics of governments including employment totals, payrolls, revenues, expenditures, debts, value of taxable property, etc., overall, and for some items by type of function (for the Federal, State, county, and other governmental units).

Volume I. Governmental Organization. (Price $2.00.)

Volume II. Taxable Property Values. (Price $1.00.)

*Volume III. Compendium of Public Employment. (Price $3.50.)

*Volume IV. Governmental Finances. (4 individual reports: school districts, counties, and municipalities and townships, and a compendium.) (Total price $7.40.)

*Volume V. Local Government in Metropolitan Areas. (Price $4.00.)

Volume VI. Topical Studies. (5 individual reports.) (Total price $2.65.)

Volume VII. State Reports. (Price varies.)

Other Bureau of the Census Reports and Publications

Current Population Reports. The following "Series P" reports are published by the Bureau of the Census. (Price by subscription $4.00 per year.)

Series P-20, Population Characteristics.

Six to eight issues per year present data on such subjects as households, families, mobility, school enrollment, and marital status.

Series P-23, Technical Studies.

This series, published occasionally, presents data on such subjects as estimates of illiteracy by State, estimates of median age at high school and college graduation, lifetime occupational mobility, and socioeconomic characteristics of the population.

*Series P-25, Population Estimates.

This is published monthly and special issues are published from time to time. The monthly reports present current estimates of the U.S. population; other reports present projections of national population, estimates for States by age and sex, and estimates for selected SMSA's.

Note: Issue No. 286 (July 1964) of Series P-25 contains projections to the year 1985 (with extension to 2010) for the United States by age and sex. Four series of projections are provided and the methods are discussed in considerable detail. Issue No. 301 contains illustrative projections of the population of States, 1970 to 1985, using the same four series.

Series P-28, Special Censuses.

This is published occasionally and presents the results of special censuses conducted at the request and the expense of local areas.

*Series P-60, Consumer Income.

Advance summary and final detailed reports are published annualy presenting income data based on the Current Population Survey.

*Series P-65, Consumer Buying Indicators.

This is published quarterly and presents data collected in the Current Population Survey, providing information on households intending to buy automobiles, houses, and selected items of household equipment.

Special Census of Manufactures Reports.

MC 58 (S) - 1, Manufacturing Activity in Government Establishments. (Price $0.10.)

MC 58 (S) - 2.1 to 2.9, Location of Manufacturing Plants by Industry, County, and Employment Size, 1958. (Nine reports for specified major industry groups.) (Total price $6.25.)

*MC 58 (S) - 3.1 to 3.9, Location of Manufacturing Plants by County, Industry, and Employment Size, 1958. (Nine reports for geographic divisions.) (Total price $4.50.)

*Annual Survey of Manufactures.

This is published annually (except for years when Census of Manufactures is conducted) and contains data on value added by manufacture, value of shipments, employment, man-hours, capital expenditures, etc., (for geographic divisions, States, SMSA's, and, since 1960, for large industrial counties).

Other special Publications.

*Statistical Abstract of the United States.

This book is published annually and contains summary statistics from governmental and nongovernmental sources on the industrial, social, political, and economic organization of the United States. (Price $3.75 for 1965 edition.)

*County and City Data Book, 1962.

This publication presents data for each State, county, standard metropolitan statistical area, urbanized area, unincorporated urban place of 25,000 population or more, and for each city of 25,000 population or more. (Price $5.25.)

*Historical Statistics of the United States, Colonial Times to 1957.

This volume contains more than 8,200 statistical time series, largely annual, extending back to the earliest years for which the data are available; with specific source notes, definitions of terms, description of development and reliability of the data, detailed subject index, and descriptive text. (Price $6.00.)

*Historical Statistics of the United States, Colonial Times to 1957: Continuation to 1962 and Revisions. (Price $1.00.)

*County Business Patterns.

Published annually beginning with 1964 edition. Previously published every 2 to 3 years. Contains data on employment, payrolls, and number of reporting units, by industry group, for employers covered by the old-age, survivors, and disability insurance programs (by counties).

*U.S. Census of Population, 1960, Availability of Published and Unpublished Data. (Price $0.50.)

U.S. Census of Housing, 1960, Availability of Published and Unpublished Data. (Price $0.25.)

Note: The last two items, above, can be obtained by writing to U.S. Bureau of the Census, Washington, D.C. 20233.

U.S. Department of Commerce, Office of Business Economics

The primary source of income and production estimates for the nation, regions, and States is provided in publications of the Office of Business Economics. Useful economic data are contained in the following publications:

*U.S. Income and Output, 1958.

Contains data on the gross national product, national income by type and industry, personal income and distribution, per capita personal income, disposable personal income, personal consumption expenditures by type, etc. (Price $1.50.)

*Personal Income by States since 1929.

Issued in 1956 this report presents personal income statistics by type and source for regions and States. (Price $1.50.)

*Survey of Current Business.

A monthly publication that shows changes in about 2,500 statistical series including national income and gross national product, personal and farm income, business investment in plant and equipment, etc. (Price by subscription $6.00 per year.)

*Business Statistics.

Published every 2 years in odd numbered years and contains historical data on the series in the Survey of Current Business; with explanatory notes and exact source references. (Price $2.00.)

U. S. Department of Labor, Bureau of Labor Statistics

The Department of Labor is responsible for publishing various statistics on the labor force, employment, unemployment, etc., that are most useful for economic forecasting purposes. This section will discuss publications of the Department of Labor's Bureau of Labor Statistics (BLS).

The next section will discuss publications of the Department of Labor's Bureau of Employment Security (BES). It will also discuss joint BLS-BES publications.

The Bureau of Labor Statistics publishes, among other items, "Employment and Earnings" on a monthly basis. This publication is divided into the following four sections:

Section A - Labor Force, Employment, and Unemployment;
Section B - Payroll Employment, by Industry;
Section C - Industry Hours and Earnings; and
Section D - Labor Turnover.

These data are obtained from several sources. The data in section A are obtained from a monthly personal interview sample consisting of 35,000 households in 357 areas across the country (hence are referred to as "household data"). This sample is made by the Bureau of the Census for BLS and provides a comprehensive listing of the labor force and its characteristics.

The data in section B (and C) are obtained from a monthly mail questionnaire sampling of business and government establishments that collectively employ about 25 million workers. These data are submitted from payroll records of the establishments (hence are sometimes called "establishment" or "payroll data") in a voluntary program with the State employment security agencies, and BES and/or BLS.

From these statistics, national and State trends can be established for industries and (in some cases) by areas within States. It is important to note also that employment estimates are revised as necessary and raised to benchmarks on the basis of quarterly reports that State employment security agencies compile from reports submitted by employers whose employees are covered by State unemployment insurance laws. The quarterly reports submitted by these employers account for about three-fourths of all nonfarm employment. This is where the phrase "covered employment" is derived. Benchmark data for those nonfarm employees not covered by State unemployment insurance laws are obtained from information supplied from other public and private agencies (e.g., Interstate Commerce Commission, Civil Service Commission, Social Security Administration, etc.). Revised national benchmark data on all nonagricultural employment are published in summary form by BLS in its publication entitled "Employment and Earnings Statistics for the United States, 1909-64," Bulletin 1312-2, (1964). On the other hand, data on employment and earnings (annual averages by industry) by States and metropolitan areas are contained in "Employment and Earnings Statistics for States and Areas, 1939-63," BLS Bulletin 1370-1, (1964).

In addition to being a primary source of periodic data pertaining to the characteristics of the labor force, the Bureau of Labor Statistics also reports on changes in wholesale and retail price levels and presents data on standard budgets from time to time as a result of a sampling of selected cities in its Survey of Consumer Expenditures. Special BLS reports include projections of employment by industry and occupation. BLS publications of interest include the following:

*Employment and Earnings.

A monthly publication containing detailed data on the labor force, employment, and unemployment based on sample of 35,000 households. Includes also data on employment in nonfarm industries (by industry) based on payroll records. National estimates are presented by the labor force data; national, State, and local area employment, by industry division, also presented. (Price $0.50 per copy. By subscription $4.00 per year.)

*Employment and Earnings Statistics for the United States 1909-64 (Bulletin No. 1312-2, December 1964).

Contains monthly and annual averages for national employment, and hours and earnings series published in the monthly report. (Price $3.50.)

*Employment and Earnings Statistics for States and Areas, 1939-63 (Bulletin 1370-1, 1964).

Contains annual averages for the most important industries in 50 States and 151 metropolitan areas on employment and hours and earnings. (Price $3.75.)

*Monthly Report on the Labor Force.

Joint BLS-BES publication that contains both household and establishment data pertaining to the labor force, employment, unemployment, and hours and earnings. Insured unemployment totals presented for States and 150 major labor market areas. (See discussion in next section.)

*Consumer Price Index.

A monthly publication analyzing changes in consumer prices by component of expenditures and in terms of the base year price index. Contains a national price index with detail by component for certain cities.

Special Labor Force Reports.

*No. 27, Self-Employment in the United States, 1948-62.

*No. 28, Employment Projections by Industry and Occupation, 1960-75.

Note: A complete list of the Special Labor Force Reports can be obtained free of charge (as can the Reports, per se) from the Bureau of Labor Statistics, Office of Manpower and Employment Statistics, Washington, D.C. 20212.

U.S. Department of Labor, Bureau of Employment Security

The Bureau of Employment Security (BES) is responsible for statistics relating to the unemployment insurance program operated jointly by the Federal and State Governments. BES reports statistics on those employed and unemployed persons who are "covered" by State unemployment insurance laws.

Among other items, BES publishes "Employment and Wages of Workers Covered by State Unemployment Insurance Laws and Unemployment Compensation for Federal Employees, by Industry and State" on a quarterly basis (with the fourth quarter edition containing an "average" for the year). Data in these quarterly publications are supplied to BES by the State agency administering the State unemployment insurance laws. Additionally, the respective State agencies receive monthly reports concerning civilian employee data from Federal agencies within the State. Thus, in the publication cited above, there is provided a virtual census of covered employees of both public and private employers by State and various industry groupings.

A joint BLS-BES publication, "Monthly Report on the Labor Force," combines data from each Bureau under a single cover. For example "household data" (concerning the labor force and its characteristics) and "establishment data" (pertaining to industry employment, hours, and earnings) are supplied by BLS, in summary fashion, from sources noted in the discussion of "Employment and Earnings." Statistics on insured unemployment are provided by BES through State unemployment insurance program operations.

The "household data" can be used to supplement data contained in the "Chapter C" series of the Census of Population since the Bureau of the Census collects both sets of data from the same source (households) and employs the same definitional concepts.

In similar fashion, trends derived from BLS "establishment data" can be directly linked to trends in unemployment insurance data since, again, the definitions and sources are the same (i.e., establishments, reporting voluntarily or by law).

The State employment security agency, per se, remains, however, the best single source of detailed, up-to-date employment data for the study area being considered in the transportation planning process. Consequently, an effort should be made to contact and work with that agency (see discussion under STATE GOVERNMENTS). The names and addresses of the State agencies that are affiliated with BES in the operation of unemployment insurance programs in the several States are included at the end of this appendix. The following documents contain BES data useful for forecasting economic activities:

*Employment and Wages of Workers Covered by State Unemployment Insurance Laws and Unemployment Compensation for Federal Employees.

Quarterly data on national totals of employment and wages for 10 SIC industry divisions, 79 major groups, and over 400 industry groups. State and regional statistics included for 8 industry divisions, 66 major groups, and 36 industries.

*Monthly Report on the Labor Force.

A joint BES-BLS publication that contains both household and establishment data pertaining to the labor force, employment, unemployment, and hours and earnings. Insured unemployment totals presented for States and 150 major labor market areas.

U.S. Department of Labor, Office of Manpower, Automation, and Training

The Office of Manpower, Automation, and Training, (OMAT) is primarily responsible for the coordination of statistics and research in the field of manpower resources, requirements, use, and training as these are affected by technological change. Also, this office must analyze and interpret data in the development of manpower policy.

*Manpower Report of the President.

This annual message to the Congress is prepared by OMAT for the President. It contains data from many of the sources discussed above and presents a general background analysis of post-World War II trends in all segments of the economy. Data are presented on a national, regional, and State basis in some cases. (Price $1.50.)

U.S. Treasury Department, Internal Revenue Service

The Internal Revenue Service has a primary responsibility in the reporting of statistics on personal and business incomes and on other personal and business financial data. The following document is published in odd numbered alternate years but provides data for several years.

*Statistics of Income - Supplemented Report, State and Metropolitan Area Data for Individual Income Tax Returns - 1959, 1960, and 1961.

This publication contains data for each of the 50 States and for 100 of the largest SMSA's concerning State and local sales taxes, income taxes, sources of income, etc. (Price $0.55.)

STATE GOVERNMENTS

It is not possible to list in this report all of the sources or types of data available from each State. However, in this section several of the more general State sources of data will be mentioned. The reader should realize that the names of the public agencies from which data may be obtained will vary from State to State as will the type of data. Furthermore, what may be a department in one State may only be a small office in another, or may be nonexistent. Users of socio-economic data should investigate all possible sources for their own particular State to determine exactly what is available.

State Bureau of Employment Security

The Employment Security Agency in each State (plus the District of Columbia and Puerto Rico) is responsible for administering the State unemployment insurance law. Under this law most employers in private industry must submit quarterly reports of monthly employment, total and taxable wages, and of tax contributions, etc., toward the State unemployment insurance program based on the number of employees on their payroll for the pay period ending nearest the 15th of the month. (In some States employers with less than 4 employees or less than 3 employees, depending upon the State, are not subject to their State law.) The employment count of workers in private industry includes all corporation officials, executives, supervisory personnel, clerical workers, wage earners, persons on paid vacations, piece workers, and part-time workers. The employment count reports workers in the State of the physical location of their job.

In addition to the exclusion of certain employers, as noted above, the employment count excludes: 1) workers who earned no wages during the entire applicable pay period due to strikes or work stoppages, temporary layoffs, illness, or unpaid vacations; 2) workers who earned wages during the month without earning any during the applicable pay period; and 3) proprietors, the self-employed, unpaid family workers, farm workers, and domestics in private households.

The respective State agency is also provided with quarterly reports on most Federal civilian employment totals for all Federal agencies located in the State and who are covered by Title XV of the Social Security Act (the program of "Unemployment Compensation for Federal Employees"). Federal civilian employees not reported are those excluded for security reasons (e.g., CIA employees). Military personnel are also reported to the State agency by special arrangement.

Most, but not all, States have unemployment insurance laws that provide coverage for either State or local government employees or both. But tabulations on the number of State and local government employees in all the States represent, therefore, an unknown proportion of the total of such employees.

The State agencies report the employment and wage data they receive to the U.S. Department of Labor's Bureau of Employment Security. BES, in turn, publishes the data in Employment and Wages of Workers Covered by State Unemployment Insurance Laws and Unemployment Compensation for Federal Employees (see prior discussion).

The data in the above publication, based on quarterly reports to State agencies, provide a virtual census of workers of "covered" private employers and the Federal government (i.e., those workers "covered" by unemployment insurance laws). The data in this BES publication represents the largest universe of monthly employment and quarterly wage information, by industry and by State, regularly available in the country. The employment figures may be used to measure month-to-month trends, and in most cases to compare one industry with another, with assurance that such comparisons are valid (given the limitations of coverage noted).

Many State agencies have figures available on employment and wages, for both private employers and the Federal Government, and provide coverage by county and for important local labor market areas. A number of the agencies can furnish such data for detailed industries within the industry groups for which totals are shown in the BES publication. Requests for such detailed information should be made directly to the State agency at the address listed at the end of this appendix.

OTHER POTENTIAL STATE DATA SOURCES

Colleges, Universities, and Research Foundations

Many State institutions such as colleges and universities engage in economic research studies and make projections of important economic indicators from time to time. Some of these studies are made regularly in the Bureaus of Business and Economic Research at State universities, or they may be available as a result of independent research projects by faculty members. None of these should be overlooked as potentially valuable data sources.

State Economic Development Commissions

Some States have "Departments" or "Commissions" or similarly named agencies responsible for promoting the attractiveness of the State's resources in luring new industries into the State. A logical function of these agencies is to project future economic developments to show the State's potential for industrial growth. Hence, this State agency may have data available that is useful for local area forecasting.

*Tax Assessor's Records

The records of the local tax assessor may prove quite valuable in providing economic data (mostly on employment) as well as population and

land use data. The type of data available depends on the "completeness" of the record keeping and assessing procedures. These vary considerably from place to place, hence, they should not be ignored.

*Public Utility Companies

Local public utility companies are faced with many of the same types of problems confronting transportation study groups; namely, where to make investments of millions of dollars in facilities that will best meet the future demands for the particular service. Therefore, public utility companies often make forecasts of population, economic, and land use developments in local areas; since they too must be "ready to serve" when needed. It is apparent that recently completed studies by these companies should be closely examined with the view toward using them in whole or in part for transportation planning purposes.

Private Organizations

Several private research organizations collect, analyze, and project various economic indicators on national, regional, State, and local area bases from time to time. For example, the National Planning Association publishes, among other items, a "Regional Economic Projections Series" that includes projections to the year 1975 of population, labor force, employment and other factors for regions, States, and certain SMSA's. Some of their publications provide projections that can be used as independent checks on the results of the economic and population aspects of the transportation planning process. Their publications also contain comparable historical data on economic factors that may prove useful to transportation study groups. A complete listing of their publications, and procedures for obtaining them, can be obtained by writing to the National Planning Association, Center for Economic Projections, 1606 New Hampshire Avenue, NW., Washington, D.C., 20009.

State Employment Security Agencies Affiliated with the U.S. Bureau of Employment Security

(As of May 1965)

ALABAMA.....Department of Industrial Relations, State Office Building, Montgomery 36104

ALASKA.....Employment Security Division, Department of Labor, Box 2661, Juneau 99801

ARIZONA.....Arizona Employment Security Commission, State Employment Service, 1717 West Jefferson Street, Phoenix 85007; Unemployment Compensation Division, P.O. Box 6123, 1720 West Madison St., Phoenix 85005

ARKANSAS.....Employment Security Division, Department of Labor, Employment Security-Welfare Building, Box 2981, Little Rock 72203

CALIFORNIA.....Department of Employment, 800 Capitol Avenue, Sacramento 95814

COLORADO.....Department of Employment, 1210 Sherman St., Denver 80203

CONNECTICUT.....Connecticut Employment Security Division, Hartford 06115

DELAWARE.....Employment Security Commission, 801 West St., Wilmington 19809

DIST. OF COLUMBIA...United States Employment Service for the District of Columbia, Employment Security Building, Room 617, Sixth and Pennsylvania Avenue, NW., Washington 20001; District Unemployment Compensation Board, Sixth and Pennsylvania Avenue, NW., Washington, 20001

FLORIDA.....Industrial Commission, Caldwell Building, Tallahassee 32301

GEORGIA.....Employment Security Agency, Department of Labor, State Labor Building, Atlanta 30334

GUAM.....Department of Labor and Personnel, Government of Guam, Agana 96910

HAWAII.....Employment Service Division, Department of Labor and Industrial Relations, 825 Mililani St., Honolulu 96813

IDAHO.....Employment Security Agency, P.O. Box 520, 317 Main Street, Boise 83701

ILLINOIS.....Employment Security Administrator, Department of Labor, 165 North Canal St., Room 200, Chicago 60606

INDIANA.....Employment Security Division, 10 North Senate Avenue, Indianapolis 46204

IOWA.....Employment Security Commission, 1000 East Grand Avenue, Des Moines 50319

KANSAS.....Employment Security Division, State Labor Department, 401 Topeka Boulevard, Topeka 66603

KENTUCKY.....Bureau of Employment Security, Department of Economic Security, New Capitol Office Building, Frankfort 40601

LOUISIANA.....Division of Employment Security, Department of Labor, Employment Security Building, 2200 Baton Rouge Expressway, P.O. Box 4094, Capitol Station, Baton Rouge 70804

MAINE.....Employment Security Commission, 20 Union St., Augusta 04332

MARYLAND.....Department of Employment Security, 1100 North Eutaw Street, Baltimore 21201

MASSACHUSETTS.....Division of Employment Security, 881 Commonwealth Avenue, Boston 02215

MICHIGAN.....Employment Security Commission, 514 Boulevard Building, 7310 Woodward Avenue, Detroit 48202

MINNESOTA.....Department of Employment Security, 369 Cedar Street, St. Paul 55101

MISSISSIPPI.....Employment Security Commission, P.O. Box 1699, 1520 West Capitol Street, Jackson 39205

MISSOURI.....Division of Employment Security, Department of Labor and Industrial Relations, 421 East Dunklin Street, Jefferson City 65102

MONTANA.....Unemployment Compensation Commission, Unemployment Compensation Commission Building, P.O. Box 1728, Helena 59601

NEBRASKA.....Division of Employment, Department of Labor, 550 South Sixteenth Street, P.O. Box 4600, Lincoln 68509

NEVADA.....Employment Security Department, P.O. Box 602, Carson City 89701

NEW HAMPSHIRE.....Department of Employment Security, 32 South Main Street, Concord 03301

NEW JERSEY.....Division of Employment Security, Department of Labor and Industry Building, John Fitch Plaza, Trenton 08625

NEW MEXICO.....Employment Security Commission, P.O. Box 1799, 924 Park Street, SW., Albuquerque 87103

NEW YORK.....Division of Employment, Department of Labor, State Office Building Campus, Albany 12201

NORTH CAROLINA.....Employment Security Commission, P.O. Box 589, Jones and North McDowell Streets, Raleigh 27602

NORTH DAKOTA.....North Dakota Employment Service, 207 East Broadway, Box 568, Bismarck; Unemployment Compensation Division, 201 East Broadway, P.O. Box 1537, Bismarck 58502

OHIO.....Bureau of Unemployment Compensation, 145 South Front Street, P.O. Box 1618, Columbus 43216

OKLAHOMA.....Employment Security Commission, Will Rogers Memorial Office Building, Oklahoma City 73105

OREGON.....Department of Employment, 403 Labor and Industries Building, Salem 97310

PENNSYLVANIA.....Bureau of Employment Security, Department of Labor and Industry Building, Seventh and Forster Streets, Harrisburg 17121

PUERTO RICO.....Bureau of Employment Security, 414 Barbosa Avenue, Hato Rey, San Juan 00923

RHODE ISLAND.....Department of Employment Security, 24 Mason Street, Providence 02903

SOUTH CAROLINA.....Employment Security Commission, 1225 Laurel Street, P.O. Box 995, Columbia 29202

SOUTH DAKOTA.....Employment Security Department, 607 N. Fourth Street, Aberdeen 57401

TENNESSEE.....Department of Employment Security, Cordell Hull State Office Building, Nashville 37219

TEXAS.....Texas Employment Commission, TEC Building, Austin 78701

UTAH.....Department of Employment Security, Industrial Commission, 174 Social Hall Avenue, P.O. Box 2100, Salt Lake City 84110

VERMONT.....Department of Employment Security, P.O. Box 708, National Life Drive, Montpelier 05602

VIRGINIA.....Virginia Employment Commission, 703 East Main Street, P.O. Box 1358, Richmond 23211

VIRGIN ISLANDS.....Virgin Islands Employment Security Agency, P.O. Box 1092, Charlotte Amalie, St. Thomas 00802

WASHINGTON.....Employment Security Department, Employment Security Building, P.O. Box 367, Olympia 98501

WEST VIRGINIA.....Department of Employment Security, State Office Building, California and Washington Streets, Charleston 25305

WISCONSIN.....Wisconsin State Employment Service, P.O. Box 1607, 4802 Sheboygan Avenue, Madison 53701; Unemployment Compensation Department, P.O. Box 644, 4802 Sheboygan Avenue, Madison 53701

WYOMING.....Employment Security Commission, ESC Building, Center and Midwest Streets, P.O. Box 760, Casper 82602

GLOSSARY OF ECONOMIC TERMS AND CONCEPTS USED IN THIS REPORT

In the field of economics, as in other sciences, its practitioners have given many words and phrases a precise technical meaning that is quite different from that found in popular usage. Because of this, and their appearance in this paper, they are here defined.

CONSUMER PRICE INDEX - A monthly compilation of the Bureau of Labor Statistics, U.S. Department of Labor. The CPI states the current level of prices reflecting the buying patterns of wage earners and clerical workers (for both families and single workers living alone) on the basis of an average price level for about 400 items that prevailed in a base period. The CPI currently published by BLS uses the base period 1957-1959 (i.e., 1957-1959 = 100).

ECONOMICS - The science that studies how a nation (region, or other area) uses its relatively scarce resources to influence the material growth and welfare of its citizens in terms of the production, exchange, distribution, and consumption of the goods and services they need and/or desire.

ECONOMIC GROWTH - The persistent or long-term increases in real per capita income in a nation (region, State, etc.).

EMPLOYMENT - In the strict sense this refers to the use of the factors of production in the production process. More commonly it refers only to the use of labor. See LABOR FORCE.

FACTORS OF PRODUCTION - The sources, or origins, of the "raw materials" which are combined in the process of production. Broadly these resources are land, labor, capital, and enterprise.

FINAL PRODUCTS - Goods and services purchased for final consumption or use and not for resale or further processing or manufacturing. For example, cotton yarn sold to a housewife (perhaps to make socks for family members) is a finished product. Final products are also referred to as "final market sales." See INTERMEDIATE PRODUCTS.

INDEX NUMBER - A statistical estimate which measures the relative change in some variable (such as prices, output, etc.) between some base period, counted as 100, and other periods of time. See CONSUMER PRICE INDEX.

INTERMEDIATE PRODUCTS - Goods and services purchased for further processing and manufacturing or for resale. For example, cotton yarn purchased by a business firm that makes socks is an intermediate product. Intermediate products are also referred to as "semi-finished goods." See FINAL PRODUCTS.

LABOR FORCE - Includes all persons 14 years of age and over, employed or unemployed. See below for a more complete definition of labor force and its component parts. Also, see table 2 for a numerical example showing the relationship between population, labor force, employed, unemployed, and nonworkers between two points in time.

MONEY INCOME - Income from various sources and not adjusted for changes in the level of prices. See REAL DOLLARS.

REAL DOLLARS - Income, output, or other dollar statistics reduced to dollars of the same purchasing power. Reducing dollars to a base period year (i.e., taking account of price level changes) means that valid comparisons can be made over time in terms of changes in the physical amounts of goods and services (that have been produced or that can be bought, etc.). Real dollars are also referred to as "deflated" dollars.

STANDARD INDUSTRIAL CLASSIFICATION SYSTEM - This is a system for classifying the economic units that produce goods and services in all fields of economic activity (such as contract construction, manufacturing, services, government, etc.) based on the Standard Industrial Classification Manual (1957 Revised). Also referred to as "SIC" code. See Standard Industrial Classification Manual, Bureau of the Budget, U.S. Government Printing Office, Washington, D.C., 1957, (with Supplement to 1957 Edition, 1963). (Price $2.50 and $0.30, respectively.)

LABOR FORCE CONCEPTS AND COMPONENTS

a. The "total labor force" consists of the civilian and military noninstitutionalized population 14 years of age and over, who are employed or unemployed.

b. The "civilian labor force" is the same as a, above, but excludes the armed forces.

c. The employed and unemployed components:

(1) The employed are those noninstitutionalized persons, 14 years of age and over, who are either

(a) "With a job and at work" (i.e., those who did any work for pay or profit, or who worked without pay for 15 hours or more on a family farm or in a family business); or

(b) "With a job but not at work" (i.e., those who did not work and were not looking for work but who had a job or business from which they were temporarily absent due to bad weather, industrial disputes, or strikes, vacation, illness, or other personal reasons).

(2) The unemployed are those noninstitutionalized persons, 14 years of age and over, who do not have a job but are looking for work. A person is considered to be "looking for work" if he is actually trying to find work or if he made such efforts within the past 60 days and is awaiting the results of those efforts. Also counted as unemployed are those waiting to be called back to work from a temporary (i.e., less than 30 days) layoff; those who are scheduled to start on a new job within the next 30 days; and those who would have been "looking for work" but believed no work was available in their customary trade, or were temporarily ill.

d. Those not in the labor force are called "nonworkers" and include housewives, students, retired persons, and others who do not meet either the employed or unemployed criteria in c, above. The armed forces are, by definition, "employed" i.e., "with a job and at work."

Table 2.--Relationship between Population, Labor Force, Employment, Unemployment, and Nonworkers
January 1965 and March 1965
(000's)

	January 1965	March 1965
Total Population	193,371	193,734
Less: Those under 14 years of age	56,119	56,127
Less: Inmates of institutions 14 years of age and over	1,950	1,956
Noninstitutional population 14 years of age and over	135,302	135,651
Less: Those not in civilian labor force: (see below for components)	59,603	59,039
Total labor force (civilian plus armed forces)	75,699	76,612
Less: Armed forces	2,707	2,703
Civilian labor force:	72,992	73,909
Employed:	68,996	70,169
At work (active employed)	66,634	67,732
With a job but not at work (inactive employed):	2,362	2,437
Idle due to bad weather	257	145
Industrial dispute	81	39
On vacation	345	401
Temporary illness	1,073	1,242
Other personal reasons	607	611
Unemployed:	3,996	3,740
On temporary layoff or scheduled to start new job (sometimes called "frictional" unemployment)	237	205
Those unsuccessfully "looking for work" (sometimes called "depression" unemployment)	3,759	3,535
Not in civilian labor force:	59,603	59,039
Homemakers (nonworking housewives, men house keeping during wives' illness, etc.)	35,910	35,519
Students not working	14,328	14,219
Retired and others	9,364	9,303

Source: Employment and Earnings, February 1965 and April 1965, Bureau of Labor Statistics, U.S. Department of Labor.

SELECTED BIBLIOGRAPHY

Alexander, John W., An Economic Base Study of Madison. Madison, University of Wisconsin, 1953.

Arnold, Robert K., and others, The California Economy, 1947-1980. Menlo Park, Stanford Research Institute, 1960.

Ashby, Lowell D., "The Geographical Redistribution of Employment: An Examination of the Elements of Change." Survey of Current Business, vol. 44, No. 10, p. 13-20. Washington, U.S. Government Printing Office, 1964.

Balestra, Pietro, and Rao, N. Koteswaya, Basic Economic Projections: United States Population, 1965-1980. Menlo Park, Stanford Research Institute, 1964.

Barna, Tibor, ed., The Structural Interdependence of the Economy. New York, John Wiley and Sons, 1955.

Bassie, V. Lewis, Economic Forecasting. New York, McGraw-Hill, 1958.

Berman, Edward B., Impact of Local Government Policies on Local Capital Formation and Output. St. Louis, Washington University, 1960.

Borts, George H., and Stein, Jerome L., Investment Return as a Measure of Comparative Regional Economic Advantage. St. Louis, Washington University, 1960.

Burns, Leland S., and Case, Fred E., A Preliminary Study of the Los Angeles Regional Economy. Los Angeles, University of California, 1962.

Chapin, F. Stuart, Jr., and Weiss, Shirley F., Urban Growth Dynamics in a Regional Cluster of Cities. New York, John Wiley and Sons, 1962.

Chenery, Hollis B., and Clark, Paul G., Interindustry Economics. Ibid, 1959.

Creamer, Daniel, Changing Location of Manufacturing Employment. Part I: Changes, by Type of Location, 1947-1961. New York, National Industrial Conference Board, 1963.

Cutter, Addison T., Changing Economic Profiles of Selected U.S. Cities. Cleveland, Federal Reserve Bank of Cleveland, 1962.

Duncan, Otis Dudley, and others, Metropolis and Region. Baltimore, John Hopkins Press, 1960.

Economic Studies and Data Sources: Selected Bibliography for State and Metropolitan Areas. Center for Economic Projections. Regional Economic Projections Series Report 64-II. Washington, National Planning Association, 1964.

Freund, John E., and Williams, Frank J., Modern Business Statistics. Englewood Cliffs, Prentice-Hall, 1958.

Fuchs, Victor R., Changes in the Location of Manufacturing in the U.S. since 1929. New Haven, Yale University, 1962.

Hamburg, Morris, and Norton, John H., An Evaluation of Selected Data Requirements and Availability for Urban Economic Planning and Development in Pennsylvania. Philadelphia, University of Pennsylvania, 1963.

Henderson, James M., and others, Four Papers on Methodology. Upper Midwest Economic Study. Minneapolis, University of Minnesota, 1961.

Hirsch, Werner Z., "Interindustry Relations of a Metropolitan Area." The Review of Economics and Statistics. XLI, pp. 360-69, Nov., 1959.

Hoch, Irving, Forecasting Economic Activity - Consumer Expenditures. Chicago, Chicago Area Transportation Study, 1958.

_____, Forecasting Economic Activity - Production and Employment Forecast. Ibid., 1959.

Hoover, Edgar M., and Chinitz, Benjamin, The Role of Accounts in the Economic Study of the Pittsburgh Metropolitan Region. Washington, Resources for the Future, 1960.

Hunker, Henry L., and Wright, Alfred J., Factors of Industrial Location in Ohio. Columbus, Ohio State University, 1964.

Industry in the Northern Virginia Region - Present and Future. Washington, Hammer and Co., 1961.

Isard, Walter, and others, Industrial Complex Analysis and Regional Development. Massachusetts, The Technology Press, and New York, John Wiley and Sons, 1959.

_____, Methods of Regional Analysis: An Introduction to Regional Science. Ibid., 1960.

_____, and Bramhall, D.F., "Regional Employment and Population Forecasts via Relative Income Potential Models." Regional Science Association - Proceedings. Vol. 5, pp. 25-47, 1959.

Koows, A., and Kindsey N., A Proposed Input-Output Study for New Jersey. New Brunswick, Rutgers University, 1963.

Langford, Thomas W. Jr., and Hamburg, Morris, Selected Methods of Analysis for Urban Planning and Development in Pennsylvania. Harrisburg, Pennsylvania Department of Internal Affairs, 1964.

Levin, Charles L., Regional Income and Product Accounts: Construction and Applications. St. Louis, Washington University, 1960.

Mahar, James F., and Coddington, Dean C., Economic Forces Behind Colorado's Growth, 1870-1962 with Projections to 1970. Denver, University of Denver, 1963.

McCarthy, James F., Highways, Trucks and New Industry. Washington, American Trucking Association, 1963.

Meyer, John R., "Regional Economics: A Survey." American Economic Review, vol. LIII, No. 1, pt. 1, pp. 19-54, 1963. (See especially Professor Meyer's extensive bibliography of reference material, pp. 48-54.)

Metropolitan Area Industry Employment and Population Estimates, 1950, 1957, 1960, 1962. Center for Economic Projections. Regional Economic Projections Series Report 64-VI, pt. 1. Washington, National Planning Association, November, 1964.

Moore, Frederick T., and Petersen, James W., "Regional Analysis: An Inter-industry Model of Utah." The Review of Economics and Statistics, vol. 37, pp. 368-83, November, 1955.

1960 Growth Factors - 1980. Portland, Metropolitan Planning Commission, 1962.

Perloff, Harvey, and others, Regions, Resources and Economic Growth. Baltimore, John Hopkins Press, 1960.

Spiegelman, Robert G., Review of Techniques of Regional Analysis with Particular Emphasis on Applicability of these Techniques to Regional Problems. Menlo Park, Stanford Research Institute, undated.

State Population, Net Migration, Labor Force, and Industry Employment Trends to 1975. Center for Economic Projections. Regional Economic Projections Series Report 65-I. Washington, National Planning Association, March 1965.

Thompson, Wilbur R., A Preface to Urban Economics Toward A Conceptual Framework for Study and Research. Washington, Resources for the Future, 1963.

Tiebout, Charles M., The Community Economic Base Study. Supplementary Paper No. 6. New York, Committee for Economic Development, 1962.

U.S. Bureau of Public Roads, Population Forecasting Methods, A Report on Forecasting and Estimating Methods. By Frank V. Hermann. Washington, Department of Commerce, 1964.

U.S. Treasury Department, Internal Revenue Service, Federal Statistics Users' Conference Statistics of Income - 1959, 1960, and 1961, Individual Income Tax Returns, State and Metropolitan Area Data. Washington, U.S. Government Printing Office, 1962.

Wolfbein, Seymour L., Employment and Unemployment in the United States, A Study of the American Labor Force. Chicago, Science Research Associates, 1964.

Zettel, Richard M., and Carll, Richard R., "Summary Review of Major Metropolitan Area Transportation Studies in the United States." Institute of Transportation and Traffic Engineering. Special Report. Berkeley, University of California, 1962.