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Utah State and Local Government Fiscal Impact Model
Working Paper Series: 94-3

Analytical Foundation, Research Findings, and Sensitivity Analysis

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The Fiscal Impact Model (FIM) Working Paper Series is the product of a continuing research project within the Demographic and Economic Analysis Section of the Utah Governor's Office of Planning and Budget. This Office has as a primary function of evaluating state budgetary and planning issues. The Utah State and Local Government Fiscal Impact Model is an analytical process used to evaluate many of these issues. The model was originally developed through the collaborative efforts of the Office's research staff and university faculty. Although the basic structure of the model is at this point institutionalized, refinements occur at practically each application This working paper series documents the ongoing research associated with the development of the model.

Working Paper 94-3 has been partially funded with a grant from the Economic Development Administration. This working paper gives information about analytical foundations, research findings, and sensitivity analysis.

Other papers in the series currently include: Working Paper 94-1: *The Base Period 1992 Utah Multiregional Input-Output (UMRIO-92) Model: Overview, Data Sources, and Methods*, and Working Paper 94-2: *Exports from Utah's Regional Economies*.

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I. INTRODUCTION

The mission of the Demographic and Economic Analysis (DEA) section of the Governor's Office of Planning and Budget (GOPB) is to improve decision-making by providing economic and demographic data and analyses to the governor and to individuals from state agencies, other government entities, businesses, academia, and the public. Toward this end, DEA has developed and utilized the Utah State and Local Government Fiscal Impact Model. This model estimates the economic, demographic, and fiscal impacts of proposed development projects and various other economic events. Originally built during 1990 through the efforts of economists and planners from several State agencies, the University of Utah, and the University of Idaho, the Fiscal Impact Model (FIM) has gained national recognition as an innovative and sound approach to evaluating the economic impacts accruing to state and local governments from economic development. It has been used extensively over the past four years to assess more than 50 economic development projects and economic events; issues have ranged from social services to defense conversion.

Each project analysis completed with the FIM introduces its own unique complexities and thus contributes to a more clear and complete understanding of Utah's economy. Further, each of these analyses focuses and improves our fiscal impact modeling methodologies and techniques. Finally, as GOPB continues to use the model, the value and utility of the model for analytical purposes and for informing the decision-making process becomes more apparent.

GOPB has always been involved in analyses that affect the planning, budget, and economic development policies of the state. The development of the *Utah State and Local Government Fiscal Impact Model* has afforded GOPB a systematic analytical approach to understanding and quantifying impacts. As more demands have been placed on GOPB to perform analyses of various issues and projects, the benefits of using the model have become apparent. These include:

- The FIM method illuminates for decision-makers the fiscal costs as well as benefits of economic growth.
- The FIM discourages the use of unrealistically high economic multipliers.
- The FIM framework focuses research on the fundamental issues.
- The FIM provides an accounting framework that illuminates causal relationships.

- The FIM method tends to restrain the magnitude of incentives within a conservative and reasonable range.
- The FIM framework provides an analytical framework that encourages cooperative economic development efforts between state and local government entities.

The Economic Development Administration has provided financial support for both the initial development of the Fiscal Impact Model and for the continuing research necessary to refine the FIM's application and to critically review accumulated research findings. These funds have come from the 302 (a) planning program for states. Grants under this program help economically distressed states undertake economic development planning, policy-making, and implementation efforts. Since the Economic

Development Administration seeks to fund projects that can be replicated in other states, interested persons are encouraged to contact the Governor's Office of Planning and Budget for more information about Utah's Fiscal Impact Model.

The next chapter sketches the FIM's structure and analytical foundations. Although the FIM's basic structure is the same as when the model was originally built during 1990, its analytical foundations have evolved over the past four years. Each component of the model has been enhanced and updated through time. The third chapter reports the results of GOPB's sensitivity analysis of the FIM. By comparing and contrasting results from GOPB's use of the FIM, it is possible to determine how sensitive the model is to changes in assumptions about a given project's in-state purchases, employment, earnings, and direct tax payments. The fourth chapter concludes with a summary of our findings.

II. OVERVIEW OF THE FISCAL IMPACT MODEL

A. The Policy Context of Research Efforts in GOPB

GOPB has as a primary function the evaluation of state budgetary and planning issues. Fiscal impact modeling within the GOPB occurs within the context of various work environment realities that guide GOPB's modeling efforts. Among these are the following:

- Judgement is a necessary and unavoidable aspect of the research environment.
- In order to be relevant and valued, economic analysis within GOPB must be contextualized, integrated, and grounded in concrete policy circumstances.
- Every day staff in GOPB are confronted with urgent, practical problems that demand cogent and correct analyses.
- There is a premium on results that are timely, accurate, and comprehensible.
- What distinguishes a particular research effort as exceptional is the consistent application of good judgement.
- The work must be presented in a form that is comprehensible to non-economists.

The results generated by the FIM inform this larger and ongoing budget and planning process of GOPB. Thus, our research is, by necessity, applied.

B. The Analytical Structure of the FIM

The *Utah State and Local Government Fiscal Impact Model* estimates the economic, demographic, and fiscal impacts of a given economic event or economic development scenario. Economic impacts include employment, earnings, value added, and output. Demographic impacts include population by age group. Fiscal impacts

include revenues by source (e.g., sales, income, property taxes, etc.), and expenditures by type (e.g., state education, total city, etc.). Fiscal impacts are the change in state and local government revenues and expenditures resulting from the economic and demographic impacts. Figure 1 illustrates the functional relationships, including the methods, inputs, and outputs, of the major components of the FIM.

Stated simply, any given economic development proposal, for example, will directly employ Utahns and will purchase goods and services from Utah firms; this creates additional jobs and purchases as the spending and income "multiply" throughout the state economy. The rising employment, incomes, and spending generate additional tax revenue for state and local governments. This additional

economic activity is also associated with increases in the population and these additional people require government services (e.g., education, emergency services, etc.). It is this induced demographic effect that leads to the increases in state and local government spending. In brief, more jobs mean more people who need more government services. The model-generated expenditures and revenues are compared in present value terms so that a more realistic evaluation of the economic development proposal emerges. Utah's FIM is unique in that it attempts to identify the additional costs that development imposes in order to determine a "bottom line" on whether a development is beneficial.

The FIM consists of five functional components. These generate economic, demographic, revenue, and expenditure impacts and the net present value analysis. Each of these components can be thought of as a separate model. The economic component actually is a separate model. The demographic component is based on population to employment ratios from a demographic model used by GOPB to project Utah's population. The revenue component is based on forecasting equations GOPB developed to estimate revenue for the governor's budgeting process. The expenditure component is based on per capita expenditures for various state government services and for each type of local government entity. The five components of the FIM are discussed in more detail below.

1. Economic Impacts

The economic impacts of a given economic development or event are estimated with the Base Period 1992 Utah Multiregional Input-Output (UMRIO-92) model.[1] In

[1]The data sources and methodology used in developing this model are contained in FIM 94-1

general, input-output models identify the inter-industry transactions associated with a particular industry's output. If agricultural output is $250 million, for instance, an input-output model identifies the dollar value of output from other industries, such as fuel and machinery, agriculture requires as inputs in order to produce its $250 million of output. The UMRIO-92 model evaluates how the employment, earnings, and in-state purchases associated with a given project trace through the Utah economy. It generates estimates of the incremental direct, indirect, and induced employment, earnings, value added and output associated with a given scenario. The UMRIO-92 model has been constructed such that it captures the regional variations and linkages that operate within the Utah economy. The regional structure of the model is discussed in the working paper FIM 94-2 which is titled, *Exports from Utah's Regional Economies* and Figure 2 show a map of these regions

Direct economic effects (e.g., in-state purchases, employment and earnings) of a project are assigned to the appropriate region and industry of the UMRIO-92 model. In each analysis, the anticipated employment, earnings, and detailed in-state purchases associated with the proposal are allocated geographically, temporally, and by industry. The additional economic activity from the project initiates a chain reaction of more spending, which, in turn, generates more employment and earnings throughout the state, which generates more spending and so on. These latter effects, known as the indirect and induced effects resulting from the direct effects, are estimated by the UMRIO-92 model.

Map

2. Revenue Impacts

The total revenue impact for a given scenario includes incremental state and local government revenues associated with direct, indirect, and induced economic activity. Currently, the FIM estimates impacts to 13 sources of state revenue and five sources of local revenue. Each source of revenue is related to earnings through an earnings elasticity equation. Since the earnings elasticity of a given revenue source is the percentage change in revenue divided by the percentage change in earnings, some basic algebra allows the development of an equation which has the elasticity as a parameter and which relates changes in revenue to changes in earnings. Thus, a given change in earnings estimated in the FIM's economic component implies a given change in revenue.

In the case of state revenue impacts, the elasticity methodology has been a traditional technique used by GOPB to develop revenue estimates as part of the governor's budgeting process. The methodology used to estimate local revenue impacts simply extends what GOPB does with state revenue to local revenue. However, because GOPB has a long history analyzing the sources of state revenue, and because revenue estimates are crucial to the budgeting process, the elasticity equations for state revenue are more thoroughly researched than those for local revenue. In addition, because personal income is a broader measure of the tax base than earnings, GOPB uses personal income elasticities in developing revenue estimates for the governor's budget. But since the UMRIO-92 model of the FIM's economic component estimates earnings, instead of personal income, earnings elasticity equations have been developed for the FIM's revenue component. The

methodology used in developing the earnings equations in the FIM is the same as that used to develop the personal income equations used in the budgeting process.

While other techniques could be used to estimate revenue impacts, elasticity equations are fairly easy to develop and produce estimates which are reasonably accurate relative to other, more sophisticated, alternatives. The elasticities used to estimate state revenue impacts are based on revenue series which have been adjusted in two ways. Since tax rates periodically change, the first adjustment to the revenue series involves the selection of a constant tax rate to apply to the tax base. The second adjustment removes changes in revenue resulting from anomalous changes in the tax base. For example, the construction of the Intermountain Power Project (IPP) during the 1980s produced a windfall in sales tax revenue. Since it was a one time anomaly, the revenue generated from the construction of IPP has been removed from the historical series of sales tax revenue in estimating the earnings elasticity of the sales tax. Since GOPB is not as familiar with local sources of revenue, the local revenue elasticities are based on unadjusted revenue series as reported by the U.S. Census Bureau in its *Government Finances* series.

3. Expenditure Impacts

Incremental state and local government expenditures for a given economic development scenario are based on per capita expenditures for various government services. Currently, the FIM estimates impacts to three categories of state expenditure: public education, higher education, and non-education. Local expenditure impacts are estimated for cities, counties, special districts, and the local share of public education. As the FIM has evolved, it has become apparent that breaking out local expenditures,

at least for cities and counties, into categories of expenditure such as public safety, roads, etc., would make the results more useful for local government officials.

Given per capita expenditures, total expenditure impacts are estimated as the product of per capita expenditure and the population impact, which is estimated in the FIM's demographic component. Per capita expenditure, then, is a parameter in an equation relating total expenditure and population. While most categories of expenditure are related to total population, education expenditure is related to specific age cohorts. Public education expenditure is related to the 5 to 17 year old age group. Though older people are an increasing presence on college campuses, higher education is most directly related to the 18 to 29 year old population. In the case of public education and higher education, per capita expenditures are computed for the relevant age group. In the case of non-education services, per capita expenditures are computed for the entire population.

State government per capita expenditures are derived from the state's budget. Local government per capita expenditures were originally estimated for 1989 and are translated to current dollars with the U.S. Bureau of Economic Analysis' state and local government price deflator. In cases where there are unique and significant direct expenditures associated with a project, the amount by which these differ from the average per capita expenditures must be acknowledged and, where appropriate, treated as well.

4. Demographic Impacts

Demographic impacts for each analysis are derived from age-specific population to employment demographic ratios generated by the Utah Process Economic and

Demographic (UPED) model. GOPB uses UPED to produce long run age-specific projections of Utah's population at the multi-county regional level. These projections are used in the governor's budgeting process.

UPED is an example of a hybrid cohort survival-economic base population projection model. Population is projected given assumptions about the economic base and age-specific fertility and survival rates. In general, a given project will expand an area's economic base. Therefore, the FIM's demographic ratios are estimated based on the change in population and employment which results when the area's economic base expands. These ratios are periodically updated as new UPED projections are completed.

5. Net Present Value Analysis

In financial evaluation, net present value (NPV) determines whether a project is financially viable. Projects with positive NPV are viable while those with negative NPV are not. In the NPV analysis, expenditure is subtracted from revenue year by year and the resulting flows are discounted to the current period. It is fairly standard practice in financial evaluation to compute 10 year discounted cash flows. Thus, when evaluating projects with the FIM, GOPB typically estimates revenue and expenditure impacts 10 years into the future.

The justification for discounting is that money has a time value. Assuming money has a time value implies the same net revenue will be worth less the farther in the future it is received. Discounting adjusts net revenue estimates to reflect the year in which they are received. Net revenue received in later years is discounted since it is worth less than net revenue received in the present period.

III. Methodological and Empirical Issues Resulting from Sensitivity Analysis

GOPB has now had approximately four years of experience analyzing the fiscal impact of projects with the Utah State and Local Government Fiscal Impact Model, completing in excess of 50 analyses. This extensive and ongoing use of the FIM has lead to its refinement as methodological and empirical points are illuminated, clarified, and incorporated into the model on a virtually continuous basis. In addition, this experience has elucidated the sensitivity of the model to different modeling circumstances.

The next four chapters present the results of our sensitivity analysis of the FIM. What follows is a listing and short discussion of some of the methodological, analytical, and empirical issues that have emerged as a result of our utilization of the FIM and that have contributed to the refinement of our research techniques and to our understanding of the Utah economy. This process of discovering the responsiveness of the FIM to varying combinations of input data is a type of sensitivity analysis, although it is not the more tedious and detailed comparative static procedure that is generally considered to be a technically correct interpretation of the term. Certainly, in the daily use of the FIM, analysts perform this more narrowly defined type of sensitivity analysis. The sensitivity analysis here is more liberally defined to include a consideration of the broader, and hence more fundamental, considerations that affect the methods and outcomes of our FIM analyses.

A. General Methodological Issues: The Use and Abuse of Models

1. Each analysis embodies unique complexities

Every application of the FIM raises a somewhat different series of issues. Because of these complexities, it is very difficult to make broad generalizations about how to model impacts. For example, manufacturing firms do not necessarily have higher NPVs than service firms. Any given project's NPV is affected by a multitude of project specifics including the total and average wages paid, the level and composition of in-state purchases, industry-specific multipliers, the level of taxation within the industry, the region of the state in which the project is located, and so forth. Each project must be considered on its own merits; each incorporates particular project-specific considerations.

2. The Fiscal Impact Model guides us to systematically identify and treat key issues

The FIM serves as an analytical framework to guide researchers to systematically consider a series of critical questions and assumptions. This structured approach is valuable because it enables GOPB to analyze planning, budgetary, and development issues consistently and ensures that certain fundamental considerations are addressed in each analysis. This approach contributes to the cumulative understanding of the Utah economy and to the improvement of the associated research techniques.

3. Models are not a substitute for judgement

Models exist to inform the decision-maker, not replace them. Because of the considerable complexities of the various issues that arise in undertaking fiscal impact

assessment, no single model can accurately portray reality. Models guide analysts and decision makers to ask the most relevant questions and to identify essential relationships. Any model, including the FIM, simply inform the discussion and becomes one of many considerations that contribute to a more clear and complete understanding of certain aspects of any given project.

4. Inherent in the estimates of a project's fiscal impacts that are generated by the FIM are conceptual and empirical limitations

The analytical structure and parametric specifications associated with any model impose limits on the context of its application and on the interpretation of its results. Because of these qualifications, policy makers should recognize that the model's estimated fiscal impacts represent reasonable approximations of the magnitude and character of a project's fiscal impact. In the case of the FIM, the estimates generated are most reliable when complete and accurate data about current and future characteristics of the specific project are supplied. *More fundamentally, a project with a clearly negative fiscal impact may still be in the public interest, while projects with a clearly positive impact may not. Project-specific conditions and public welfare must always guide decisions.*

Limitations of the various functional components of the FIM include the following.

a) Economic Impacts. The economic impacts are based on input-output analyses; these assume that the relationships between industries are specified correctly and remain constant. Estimates of these relationships are based on explicit or implicit assumptions about the level of exports, availability of labor, sources of demand,

level of technology, prices, and others. The economic impacts, therefore, are only as accurate as are these assumptions and are subject to a margin of error.

b) Revenue Impacts. The revenue impacts assume average annual elasticities; single year elasticities may deviate from these averages.

c) Demographic Impacts. The demographic impacts are derived from population-employment ratios that have been generated from the UPED model; the actual population-employment ratios for an individual project may vary and should be carefully considered.

d) Expenditure Impacts. The expenditure impacts are subject to empirical limitations and inconsistent accounting conventions. Additionally, a project's expenditure estimates may be misstated by district or area averages because of site specific-conditions. The difference between average and marginal costs for a project must also be considered.

e) NPV Analysis. The NPV analysis utilizes a discount rate to reflect the time value of money to the state. Assumptions about the long term expected rate of inflation and tax rates are implicit. The estimation of expenditure and revenue does not include intangible social costs and benefits.

B. Analytical Issues: Research Findings

1. Bigger is not necessarily better: larger projects do not always yield higher net revenues

Because the FIM considers both the revenues and expenditures of economic development projects or issues, our analyses explicitly recognize that economic growth cannot occur without costs. Consequently, larger projects do not necessarily correspond to proportionately larger net revenues.

2. Growth exacts a variety of costs

Economic growth increases the demand for state and local government services and infrastructure. These incremental operating and capital expenditure burdens must be considered in fiscal impact analyses. Growth requires appropriate prior planning in order to avoid carrying capacity crises and to accommodate financing requirements. Further, not all costs of development are purely financial; environmental degradation and diminution of the quality of life are examples of economic costs which are external to the issue of financing growth. Even though these external costs, known as externalities, are not immediately translated into market transactions, a careful consideration of the long run cumulative effects of externalities must be considered when evaluating economic development possibilities.

3. Industry type does not imply a certain net revenue outcome

For example, we cannot generalize about the net revenues of service compared to manufacturing projects because there are too many project-specific conditions that can turn the analysis. The wages paid, level of in-state purchases, industry multipliers, level of taxation within the industry, region of the state the project is located in, and

quality of the input data all impact the bottom line. Because of these complexities, industry generalizations do not work.

C. Technical Issues: Refining Methods

1. The reliability of the results is greatly affected by the quality of input data

While the analytical structure of the FIM focuses the evaluation of projects, the integrity of results also ultimately rests on the quality of the input data. Significant research must be invested in refining, verifying, and improving input data.

2. Determining direct impacts is the most crucial element of an FIM analysis

Direct impacts include direct purchases by the firm or project as well as direct employment and earnings. Given the specification of the multiplier process, the correct identification and treatment of these input values is, as we have indicated, critical. In addition, where project specific *direct revenues* and *direct expenditures* can be estimated outside the model, these will often have a determinant role in the analysis. Again, while the model guides the analyst to consider particular types of information, it is frequently the quality of judgements made by researchers that finally determines the validity of results.

3. Different types of multipliers are appropriate in particular contexts

Multipliers are built into the FIM's economic component and are, in general, an integral feature of impact analyses. Multipliers specify the mathematical and causal relationship between particular spending, monetary aggregates, income, and production flows in the economy. There are a variety of multipliers that apply to specific theoretical constructs. Because multipliers are implicit in the FIM analyses, it is important to correctly specify and interpret their meaning.

A *multiplier* is the change throughout the economy resulting from a change in a particular sector of the economy relative to the initial change. In this context it is useful to distinguish between *direct*, *indirect*, and *induced* effects. A *direct effect* is the original change in the activity of a particular sector of the economy. *Direct effects* result from this initial exogenous change to final demand. *Direct effects* include changes in a particular industry's employee earnings, employment, or output, resulting from an initial exogenous change to the industry's final demand. *Indirect effects* include changes in other industries resulting from the changes in the original industry. *Induced effects* include changes throughout the economy resulting from the change in household spending, which results from the changes in employee earnings. *Total effects* are simply the sum of *direct, indirect and induced effects.*

Multipliers can be thought of as the ratio of the total effect to the direct effect. They can either have a unit of measure, such as jobs per dollar of output, or not have a unit of measure, in which case the multiplier is a pure number. Employment, income, and output multipliers are the most frequently used, although multipliers for other economic variables can be constructed.

The terms *Keynesian, economic base,* and *input-output* multiplier are often used. While each of these three types of multipliers result from different analytical frameworks, they are conceptually equivalent. In the textbook case, *Keynesian multipliers* measure the change in aggregate final demand relative to the change in a particular exogenous component of final demand. The *economic base multiplier* measures the change in aggregate total gross output relative to the change in the economic base. An alternative formulation of the *economic base multiplier* in terms of

employment is the change in total employment relative to the change in basic employment. Although the economic base is an aggregate concept, one method of determining the base is to determine the basic component of each industry within the economy, and then sum these basic components. The identification of the basic component of individual industries provides a link between the economic base multiplier and input-output multipliers. Input-output multipliers can be thought of as industry level economic base multipliers. In the sense that a change in the basic component of a particular industry implies a change in the industry's final demand, the input-output multiplier is a Keynesian multiplier.

4. The export base includes both direct and indirect exports

Regional economic theory informs the construction and application of the FIM. A clear understanding of several key concepts from this body of research is especially relevant to correct FIM analyses. Among these are the following: *export base, basic, non-basic or residentiary, location quotient* and *exports.* The *export base,* or *basic* component, of a region's economy is that part of total gross output produced for use outside the region. The *non-basic*, or *residentiary*, component of a region's economy is that part of total gross output produced for use within the region. A *location quotient* measures the relative importance of a particular activity within a regional economy as compared to the national economy. A *location quotient* of two means a particular activity within a given region is measured to be twice as important as compared to the nation.

Within a sub-state regional context, *exports* are the sale of goods and services to firms and consumers located outside the region. Sales within the region of goods

and services to firms or consumers residing outside the region, but temporarily located in the region for one reason or another, are also considered exports. Perhaps tourism is the best example of this second type of export, but major construction projects financed from sources external to the regional economy are another example. In general, any activity financed from sources external to the regional economy is considered an export. Exports can be thought of as total gross output less regional requirements.

The input-output modelling efforts connected to the FIM have generated export estimates. These estimates are particularly valuable for a number of reasons, notably, in this context, because the identification of exports is central to regional economic analysis. Working Paper FIM 94-2, *Exports from Utah's Regional Economies*, contains an explanation of these issues.

5. Trade margins in any given situation are determined by a variety of factors including the relative competitiveness of a specific market

A *trade margin* is the difference between the price a distributor receives when selling a product and the price they paid for the product. The determination of appropriate trade margins has received ongoing research effort in conjunction with GOPB's FIM work. Trade margins are relevant when considering the effect of a project's instate purchases when the products are sold in Utah but produced elsewhere. The issue is the portion of value added in the production-distribution of the product that should be attributed to the Utah economy. There are retail, wholesale, and transportation margins, among others. Explicit treatment of trade margins in FIM work

is relevant because, otherwise, the value added to the state economy is grossly overestimated.

One aspect of trade margin determination is the issue of whether there is a difference between retail trade margins in rural as compared with urban Utah settings. At this point, it is unclear as to what percent mark-up accurately captures the increased output of retailers and wholesalers in rural Utah resulting from visitor spending, although this assumption may understate the increase in output for two reasons. First, the fact that an increase in retail output in a rural city probably induces an associated increase in wholesale output in that region is ignored. Second, while a retail mark-up of 15 percent on visitor spending in a large urbanized center such as Salt Lake, where suppliers are plentiful and competition is keen, may be accurate, 15 percent may be low in a developing urban center such as Cedar City, where suppliers are limited and competition is not that keen. One basis of comparison is the mark-ups associated with various components of Personal Consumption Expenditures (PCE) from the National Income and Product Accounts (NIPA), and the National Input-Output Accounts (NIOA), maintained by the U.S. Bureau of Economic Analysis (BEA). While BEA produces quarterly estimates of PCE for the NIPA, the NIOA are benchmarked every five years in conjunction with the quintennial economic censuses conducted by the U.S. Bureau of the Census. The most recent NIOA benchmarking available is for 1982. For PCE as a whole, the retail and wholesale mark-ups, respectively, were 12.4 percent and 3.8 percent.

6. Choosing an appropriate discount rate for any project is difficult and controversial

The choice of a discount rate is another important consideration for FIM analyses. The discount rate represents the rate of return which has been foregone as a result of committing capital resources to the present use. The discount rate for state projects which has been used by the Demographic and Economic Analysis Section of the Governor's Office of Planning and Budget, and which is applied to constant dollar flows, is computed as follows:

[(the state borrowing rate) x (1 + the marginal tax rate)] - (the expected rate of inflation)

The discount rate is therefore larger as the state borrowing rate and the marginal tax rate are larger and the rate of expected inflation is smaller. If a project has all positive flows and a positive NPV, a lower discount rate will result in a larger NPV. The current discount rate GOPB is using is 4.01 percent, though this is periodically revised to incorporate changes in the state borrowing rate, marginal tax rates, and the expected inflation rate.

In FIM work, it is important to note that both revenues and expenditures are discounted. Therefore, in the case of positive cash flows, it is only the magnitude but not the relationship which has been affected by the discounting procedure.

D. Sensitivity of Results to Nature of Project

Table 1 presents the results of 23 projects GOPB has analyzed with the FIM. As discussed in the previous three sections, the results of any given project analysis are sensitive to a variety of theoretical, empirical, and methodological issues. The 23

project analyses summarized in Table 1 provide examples of how sensitive results are to these various issues.

An important point is that bigger firms do not always generate higher NPVs. Comparing Project 2, an aerospace firm, with Project 11, a publishing firm, illustrates this point. The aerospace firm had more employment than the publishing firm, but the publisher generated a higher NPV for state and local government. The aerospace firm would have had almost 7,400 employees earning an average wage of about $34,000, generating a total employment impact of almost 18,000 jobs and $460 million in earnings. These 18,000 jobs were estimated to support a population of over 32,000. However, because most of the firm's instate purchases were from relatively low paying industries, the additional government revenue generated was low relative to the government expenditure required to provide services for the 32,000 people. Thus, although the aerospace firm generated a NPV of $170 million, the revenue-expenditure ratio was only 1.40, which compares with a NPV of $197 million and a revenue-expenditure ratio of 2.01. The difference is that the publisher paid its employees more on average than the aerospace firm and while the publisher's in-state purchases were relatively small, they were from relatively high paying industries. Thus the total employment, population, and expenditure impacts per employee at the publisher were smaller than at the aerospace firm, but the revenue impacts were larger. Hence, the publisher's NPV was higher.

Another point made in the previous sections is that the project's direct effects have the largest influence on the results. This point is well illustrated by Project 10 in Table 1, the semiconductor firm. When this firm was analyzed, government officials

were considering whether to forgive its tax liability as an incentive to induce it to locate in Utah. The NPV of $164 million presented in Table 1 does not consider this incentive. However, the present value of the firm's direct tax payments was about $120 million. The firm was going to build a state of the art plant costing more than $1 billion, which would have made it the most valuable industrial enterprise in Utah. The present value of the firm's property tax liability was about $110 million of the $120 million. Thus, if these tax incentives are included in the analysis, the firm's NPV is about $40 million instead of $160 million. In this case, then, as in many of the analyses GOPB completes, the largest influence on the results was the firm's direct tax payments. The FIM's parameter values were largely irrelevant to the results in this case. No reasonable combination of input-output multipliers, revenue elasticities, per capita expenditures, and population-employment ratios will influence the results as much as eliminating direct tax payments with a present value of $120 million.

The issues discussed above also included the fact that industry type does not determine whether the NPV is positive or negative. The role of tourism in rural Utah's economy is becoming an increasingly important issue. Project 18 in Table 1, the Shakespearean Festival, demonstrates tourism can have positive fiscal impacts. Though the Shakespearean Festival is small relative to other projects GOPB has analyzed, it still accounts for almost 5 percent of the employment and earnings in Iron County. The festival also generates about $700,000 of net revenue annually for Utah state and local governments. Project 5, a resort hotel proposed for Moab also demonstrates tourism can have positive fiscal impacts. Although this hotel's average

wage was below the state's, because its guests were expected to spend a relatively large amount of money, it's NPV was almost $2.3 million.

While industries such as tourism, which are often perceived to have negative fiscal impacts in rural Utah, can have positive fiscal impacts, large industrial enterprises, which are often perceived to have positive fiscal impacts in rural Utah, can have negative fiscal impacts. The U.S. Department of Energy's high level nuclear waste monitored retrieval storage (MRS) facility is a case in point. Because the cost of providing government services is relatively high in Southeastern Utah, which included a proposed site for the MRS, the revenue generated by a project needs to be relatively high for it to have a positive NPV. Although the MRS would have paid relatively high wages, because the facility was a federal installation which would have paid no direct taxes, the expenditure impact resulting from the additional 2,100 people in the area would have exceeded the incremental revenue generated by the additional economic activity.

It is interesting to note that of the 23 projects presented in Table 1, only two, Project 12, the MRS discussed above, and Project 8, a telemarketing firm, had negative NPVs. The telemarketer's NPV was negative because its average wage, direct tax payments and in-state purchases were low. While we do not have a good idea of whether the typical Utah firm generates a positive NPV, since state and local governments balance their budgets, the average NPV does not appear to be much greater than zero. Thus, it appears the main reason the firm's presented in Table 1 generate positive NPVs is that the Utah Department of Community and Economic Development discourages low-paying firms from applying for tax incentives.

IV. SUMMARY FINDINGS AND CONCLUSION

Over four years have passed since the inception of the *Utah State and Local Government Fiscal Impact Model*. In the interim, the model has been extensively used to evaluate over fifty economic issues. Table 1 is a summary presentation of the research results of twenty three of these analyses. As is clear from the this summary, the model has been used on a wide range of industries and issues. Further, each analysis is deduced from unique input data that derives from different economic circumstances. Most importantly, the results of the research have affected public policy decisions.

As has been indicated in this paper, the FIM is not a static structure. Once constructed, it established something of an inertia of its own. The vital research effort that surrounds and characterizes the FIM demonstrate the value of the model in the applied research setting of GOPB. The continued research agenda that sustains this modeling project contributes to the cumulative understanding of the structure, functioning, and dynamics of the Utah economy.

Utah will continue to attract good new businesses to the state. It is important to establish a basis for the use of tax incentives. Currently, five criteria must be met before Governor Michael O. Leavitt's administration will support tax incentives to attract new businesses:

1) The business must be willing to make a substantial capital investment in Utah, signaling that it will be a long-term member of the community.

2) The business must bring new dollars into the state. That generally means the business must export goods or services outside of Utah, not just recirculate existing dollars.

3) The business must pay higher than average wages in the area where it will be located, increasing Utah's overall household income.

4) The same incentives offered the outside business must be available to existing in-state businesses. We must not discriminate against our home-grown businesses.

5) The incentives must clearly produce a positive return on investment determined by state economic modeling formulas.

GOPB wishes to recognize the funding support of the Economic Development Administration. This funding has allowed GOPB to devote resources towards the development of databases and models that otherwise would not exist. The Governor's Office of Planning and Budget is committed to making information from this work readily available to interested researchers throughout the country and to build upon this research in order to continually improve economic conditions in Utah.