

A P P E N D I X E

O V E R V I E W O F I M P L A N



OVERVIEW OF IMPLAN

This appendix provides additional clarification of the workings of the IMPLAN input-output model. It provides a step-by-step account of how IMPLAN estimates economic impacts using new residential development as an illustrative example. Definitions of key *italicized* terms are provided in footnotes for the benefit of the reader. This section begins with an overview of the data that IMPLAN uses internally, and moves forward through the process of how the model estimates the impacts of the construction phase of the proposed casino.

A. *What is IMPLAN?*

IMPLAN is a widely-accepted and utilized software model. At the heart of the model is an input-output dollar flow table.¹ For a specified region, the input-output table accounts for all dollar flows between different sectors of the economy. Using this information, IMPLAN models the way a dollar injected into one sector is spent and re-spent in other sectors of the economy, generating waves of economic activity, or so-called “economic multiplier” effects. The model uses national industry data and county-level economic data to generate a series of multipliers, which in turn estimate the total economic implications of economic activity.

At the heart of the model is a national input-output dollar flow table called the Social Accounting Matrix (SAM). Unlike other static input-output models, which just measure the purchasing relationships between industry and household sectors, SAM also measures the economic relationships between government, industry, and household sectors, allowing IMPLAN to model transfer payments such as unemployment insurance. Thus, for the

¹ The data regarding inter-sector relationships used for this analysis are from 2007.

specified region, the input-output table accounts for all the dollar flows between the different sectors within the economy.

1. National Industry Data

The model uses national production functions for nearly 500 industries to determine how an industry spends its operating receipts to produce its commodities. The model also uses a national matrix to determine the *byproducts*² that each industry generates. To analyze the impacts household spending, the model treats households as an “industry” to determining their expenditure patterns. IMPLAN couples the national production functions with a variety of county-level economic data to determine the impacts for our example.

2. County-Level Economic Data

In order to estimate the county-level impacts, IMPLAN combines national industry production functions with county-level economic data. IMPLAN collects data from a variety of economic data sources to generate average output, employment, and productivity for each of the industries in a given county. It also collects data on average prices for all of the goods sold in the local economy. In the case of our example, IMPLAN uses an average of all the economic data across the nine Bay Area counties to estimate the impacts to the region.³ IMPLAN gathers data on the types and amount of output that each industry generates within the region. In addition, the IMPLAN model uses county-level data on the prices of goods and household expenditures to determine the consumption functions of regional households and local government, taking into account the availability of each commodity within the specified geography.

² The byproducts refer to any secondary commodities that the industry creates.

³ The Bay Area is defined as Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma counties.

3. Multipliers

IMPLAN combines this data to generate a series of type-SAM multipliers for the local economy. The multiplier measures the amount of total economic activity that results from an industry (or household) spending an additional dollar in the local economy. Based on these multipliers, IMPLAN generates a series of tables to show the economic event's *direct*, *indirect*, and *induced* impacts to gross receipts, or output, within each of the model's 500 industries. These outputs are described below:

- ◆ **Direct Impacts.** Direct impacts refer to the dollar value of economic activity available to circulate through the economy. In the case of new residential development, the direct impacts are equal to the new households' discretionary spending. The direct impacts do not include household savings and payments to federal, state, and local taxes, as these payments do not circulate through the economy.

It should be noted that impacts from retail expenditures differ significantly between the total economic value of retail and the amount available to circulate through the local economy. The nature of retail expenditures accounts for this difference. The model assumes that only the retail markup impacts the local economy, particularly for industries heavily populated with national firms such as gas stations and grocery stores. Since local stores buy goods from wholesalers and manufacturers outside of the area, and corporate profits also leave the local economy, only the retail markup will be available for distribution within the local economy. To the extent that retailers' headquarters are located within the county or region, the model allocates their portions of the impacts to the local economy.

- ◆ **Indirect Impacts.** The indirect impacts refer to the "inter-industry impacts of the input-output analysis."⁴ In the new housing example, indirect impacts results from spending by the local and regional

⁴ IMPLAN Pro User's Guide, 2000.

companies that the new households buy goods and services from. Retail establishments, restaurants, personal service providers, and other firms use the payments they receive from new households to buy equipment and supplies, rent space, pay their employees, etc. These expenditures have an impact on the economy.

- ◆ **Induced Impacts.** The induced impacts refer to the impacts of household spending by the employees generated by the direct and indirect impacts. In other words, induced impacts result from the household spending of employees of business establishments that the new households patronize (direct) and their suppliers (indirect). The model accounts for local commute patterns in the geography. For example, if 20 percent of construction workers who work in the region live outside of the region, the model will allocate 80 percent of labor’s disposable income into the model to generate induced impacts. The model excludes payments to federal and state taxes and savings based on the geography’s average local tax and savings rates. Thus, only the disposable incomes from local workers are included in the model.

B. Specifying the “Event” and Running the Model

Once the model is built for the specified geographies, it is time to specify the “event” that the model will analyze and run the model.

1. Specifying the “Event”

The “event” refers to the total economic value of industry output that we are interested in analyzing. In the case of the ongoing economic impacts of a new residential development, the “event” would be the total household incomes of the households that buy or rent the homes.

2. Running the Model

Once the event is specified, IMPLAN runs the event through the model to generate the results. IMPLAN applies the local data on average output per worker and compensation per worker to determine the direct impacts. It then applies the value of the event to the national production functions and runs a number of iterations of this value through the production functions for the local economy to determine the indirect and induced impacts. During each iteration, the model removes expenditures to government, savings, and for goods bought outside of the local economy so that the results only include those dollars that impact the local economy.

C. Summarizing the Impacts

Once the model is run, IMPLAN generates a series of output tables to show the direct, indirect, and induced impacts within each of the model's 500 sectors. IMPLAN generates these tables for three types of impacts: output, employment, and value added. The nexus study is concerned with the employment impacts.

- ◆ *Output* refers to the total economic value of the project in the local economy.
- ◆ *Employment* shows the number of employees needed to support the economic activity in the local economy. It should be noted that for annual impacts of ongoing operations, the employment figure shown represents the amount of employment needed to support that activity for a year. Furthermore, IMPLAN reports the number of jobs based on average output per employee for a given industry within the geography. This is not the same as the number of full-time positions.
- ◆ *Value Added* shows the total income that the event generates in the local economy. This income includes:

- *Employee Compensation* – total payroll costs, including benefits.⁵
- *Proprietary Income* – payments received by self-employed individuals as income.⁶
- *Other Property Type Income* – payments for rents, royalties, and dividends.⁷
- *Indirect Business Taxes* – excise taxes, property taxes, fees, and sales taxes paid by businesses. These taxes occur during the normal operation of businesses, but do not include taxes on profits or income.⁸

⁵ IMPLAN Pro User's Guide, 2000.

⁶ IMPLAN Pro User's Guide, 2000.

⁷ IMPLAN Pro User's Guide, 2000.

⁸ IMPLAN Pro User's Guide, 2000.