

The Hawaii Inter-County Input-Output Study: 2002 Benchmark Report



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**Research and Economic Analysis Division
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ABOUT THIS REPORT

This report has been produced by the Research and Economic Analysis Division (READ) of the Hawaii State Department of Business, Economic Development & Tourism (DBEDT), under the direction of Dr. Pearl Imada Iboshi, Division Head. The report was prepared by Dr. Binsheng Li and Dr. Khem Sharma with input from other READ staff, in particular, Dr. Eugene Tian and Mary Blewitt.

The report is available on the DBEDT Web site, <http://www.hawaii.gov/dbedt/>. For more information about this report please contact the DBEDT Library at (808) 586-2424 or e-mail at library@dbedt.hawaii.gov.

I. INTRODUCTION

This report presents the inter-county input-output (I-O) model for the State of Hawaii using data from the 2002 Economic Census. The Economic Census is compiled by the U.S. Census Bureau every five years and is the main source of detailed industry level data for the State. The 2002 inter-county I-O model updates the 1997 inter-county I-O model and complements the recently completed Statewide 2002 I-O model. Both reports represent the latest refinements in a series of Hawaii inter-industry studies that began in the mid 1960s. Inter-industry or I-O models are accounting representations of the structure of an economy, which allow analysts to examine the possible impacts of changes in the demand for a region's goods and services. The technique was developed by Wassily Leontief in the 1930s for which he was awarded the Nobel Prize in Economics in 1973.¹

The inter-regional I-O accounting framework, first developed by Isard (1951), and later elaborated by Isard et al. (1960), Richardson (1972), Miller and Blair (1985), and Yamano and Ahmad (2006) provides the basic framework for building the inter-county I-O model for Hawaii. In an inter-regional I-O model, linkages between regions (in this case inter-county linkages) are made sector specific both in the supplying region and in the receiving region. Information on how an I-O model works can be found in the State Input-Output Study page of the DBEDT Web site, <http://www.hawaii.gov/dbedt/2002io>.

The inter-county I-O model presented in this report is an extension of the 2002 I-O model for the state, published by DBEDT in May 2006. The state I-O model provides detailed information on sales and purchases of goods and services among industries, final consumers (households, visitors, government, and exports) and factors of production in the entire state. In addition to county-specific information not contained in the state I-O model, the inter-county I-O model also shows the value of goods and services flowing among the various economic sectors *within each county*, and it also accounts for flows that occur among the various sectors *between counties*. This characteristic of detailing the flows between counties is what differentiates an inter-county model from a set of single-county models and the state model and provides a valuable analytical advantage over a state or single-county model.

When an inter-county I-O model is used for economic impact analysis, the specification of the flows between counties permits the estimation of impacts that are not explicit in a state-level or a single-county model. These effects are described in Figure 1 below.

For example, if a new economic activity has been created which increases an industry's final demand in Region 1, the increased demand in Region 1 will create increased output in that region. This increased output in Region 1 will also necessitate new flows of goods and services from Region 2 and Region 3, resulting in increased output in those regions. These effects are referred to as the *spillover effects*. In order to meet Region 1's new demand of goods and services, industries in Regions 2 and 3 will have to expand their production. This may, in turn, create new demand for goods and services produced in Region 1. As a result, output in Region 1 may increase again as a result of increased activity in the first place. These additional effects are known as the *feedback effects*.

¹ Leading texts on input-out analysis are by Chenery and Clark (1959), Miernyk (1965), and Miller and Blair (1985).

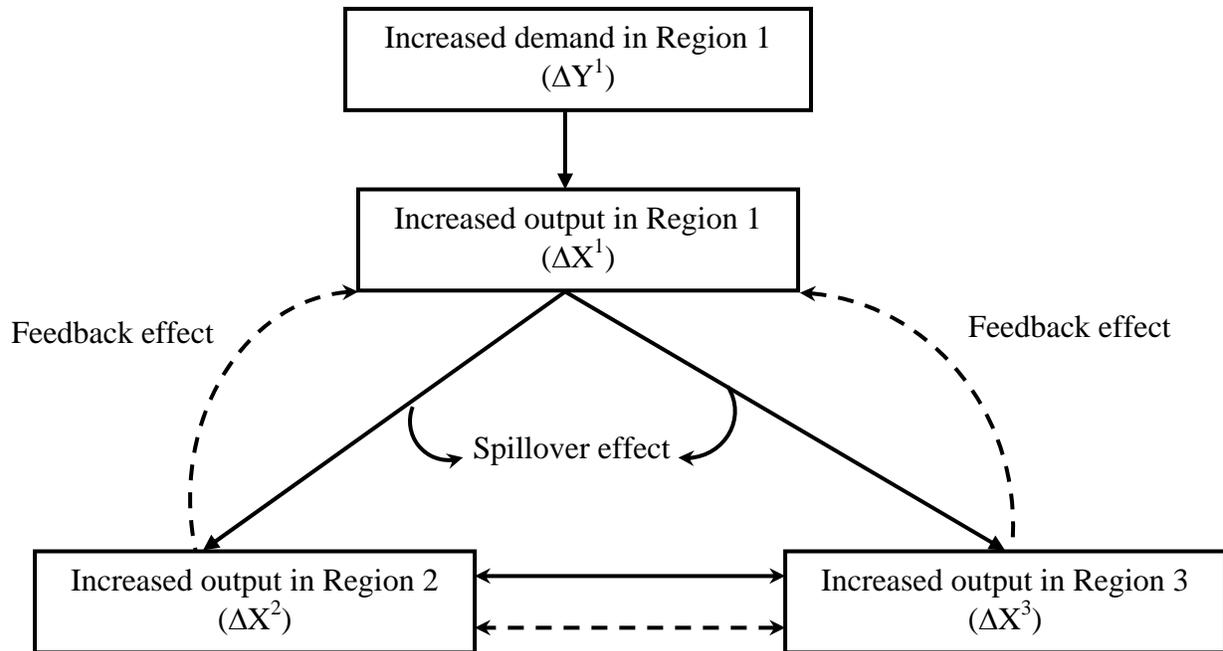


Figure 1. Spillover and Feedback Effects in a 3-region Model

As can be seen in the discussion in the next section, production and consumption patterns in a particular county can differ significantly from the state average patterns recorded in the state I-O table. Besides movements of goods and services between counties, inter-regional flows of factors, factor incomes, and transfers of all kinds can occur in both directions. This suggests that there are benefits in creating an accounting framework that captures interactions and linkages between counties within the context of the state as whole. Since Hawaii’s counties are geographically isolated, the potential problem of workers with different counties of residence and workplace is less important than it would be with adjoining counties.

There are several beneficial uses of the inter-county I-O model over the state model or the single-county model. First, it can be used to better assess impacts of county-specific economic activities. Individual I-O models of each of the counties are included within the larger inter-county I-O structure. The separate representation of each county's intermediate and final demand structure allows the user to account for the differences underlying production and consumption structures among counties.

Second, the inter-county model can provide a useful tool in assessing rural-urban linkages in the state economy. State government policy is sometimes focused on directing economic impacts to less-developed areas. In cases, such as the State of Hawaii, where much of the urban activity is geographically localized, an inter-regional I-O model permits observation and quantification of some urban-rural connections. The effects quantified by the model are the inter-regional spillover and feedback effects, as depicted in Figure 1.

Third, the inter-county I-O model provides a more appropriate modeling framework for producing long-range economic and population forecasts for counties compared to the state I-O model. For

example, the 1997 inter-county I-O model was used in the latest update of the Hawaii long-range economic and population forecasts for the state and its counties. The inter-county model eliminated the need for an additional mechanism to allocate state forecasts to the individual counties.

Despite the advantages of the inter-county model just described, there exist some drawbacks in building an inter-county I-O table. There are some institutions or activities of institutions, which are not easily attributable to a particular county, for instance, activities of the state or federal governments to provide public services. Another problem is posed by firms that have plants or offices in several counties, but their main office is located in one county. If company data are reported out of the main office, attributing the shares of the enterprise to different counties is problematic. Compared to the state I-O table, the inter-county table requires much more detailed data on flows of goods and services between sectors and between counties. The problem is that such data, especially bilateral flows of services and commodities across counties and institutional transfers, are not readily available or do not exist. The lack of sufficient data to produce this Hawaii inter-county I-O model was overcome by using various mathematical approaches to estimate inter-regional commodity and service flows.

Inter-regional I-O models have been applied in many empirical studies to address a wide range of policy issues and to analyze their impacts on other regions. For example, Brian *et al.* (2006) described current uses of inter-county I-O models and their applications to understanding a range of policy issues, such as global value chains and production fragmentation, technology flows, productivity and determinants of growth, industrial ecology and sustainable development. Fernando and Urena (2006) introduced a new method of regionalization and disaggregation which takes into account the gross value added of each sector in every region and the transport infrastructure used by these regions.

To analyze the inter-regional feedback effects and the degree to which change originating in one region has capacity to influence activity levels in another region, Bui *et al.* (2000) applied an inter-regional I-O model on a case study of HoChiMinh City and the rest of Vietnam. Harries *et al.* (1998) separated the Lincoln County into the Caliente area and the rest of Lincoln County. Following procedures outlined by Robinson (1997), Holland (1991), and Robinson and Lark (1993), Harries *et al.* (1998) used an inter-regional model to give local decision makers an idea of potential socio-economic and fiscal impacts from changes in local economic activity.

Inter-regional I-O models are also used to estimate the damages and losses by unscheduled events, such as earthquakes, flood, and other major natural disasters. Okuyama *et al.* (1999) estimated the inter-regional impacts of the Great Hanshin earthquake in Kobe, Japan, in 1995 using a two-region inter-regional I-O model. Okuyama *et al.* (2002) applied a sequential inter-industry model to assess the impacts of the Great Hanshin earthquake in such a way to enable transportation into the I-O framework. Other recent studies using the inter-regional I-O model include Allan *et al.* (2004), Zhang (2005), Patrick and Wang (2005), and Rey (1999).

The model presented in this report uses data from the 2002 Economic Census of Hawaii industries, produced by the U.S. Census Bureau in 2005.

Section II of this report describes the inter-county I-O table in terms of the inter-industry transactions table and different multipliers. Section III illustrates the use of the inter-county I-O table using two examples, one dealing with impacts of increased visitor expenditures in Maui County in 2005

and other relating to the economic impacts of a hypothetical rail transit project on Oahu. Mathematical details of constructing an inter-regional (in this case inter-county) I-O model are provided in Appendix A. Industry classification, data sources, and estimation procedures of different components of the I-O table are discussed in Appendix B. The estimation of inter-county transactions table and the balancing procedures are described in Appendix C.

II. RESULTS AND DISCUSSION

This section highlights differences among counties in terms of their production and consumption patterns as shown by the inter-county transactions table, followed by a description of various I-O multipliers derived from that table. For simplicity, an aggregated 5-sector 4-county table is presented here. More detailed county-specific data are provided in a series of Appendix Tables. Two versions of detailed inter-county I-O models are developed in this study: the first is a 20-sector 4-county model, and the second includes 67 sectors for Honolulu (similar to the 2002 State I-O table) and 20 sectors for each of the neighbor island counties. Data limitations made more detailed analysis of the neighbor islands counties impractical. The complete 20 sector 4-county and more detailed (67 sectors for Honolulu and 20 sectors for other counties) transactions tables, direct requirements tables, and total requirements tables are available along with this report at the DBEDT Web site.

Various types of multipliers are provided for both 5-sector and more detailed models. For comparison, these multipliers are computed for three different types of I-O models: the single region state I-O model, the inter-county (inter-regional) I-O model, and four single region I-O models for each of the four counties. The multipliers derived from the State I-O table can be larger or smaller than those derived from the inter-county and single region county I-O tables. The size of the multiplier will depend on differences in patterns of production and consumption between individual counties and the state as a whole. However, the multipliers obtained from the single region county I-O tables will always be smaller than those obtained from the inter-county I-O table. The reason is that the inter-county table accounts for both inter-regional spill-over and feedback effects, while the single region county table does not account for such inter-regional effects.

The Inter-county Transactions Table

Output, Labor Income and Employment

Output, labor income and total employment for the five aggregated sectors by county are summarized in Table 1. Accordingly, in 2002, Honolulu accounted for 75.3 percent of total output, 78.1 percent of total labor income, and 72.8 percent of total jobs in the State. Maui and Hawaii counties accounted for about 9-11 percent each and Kauai about 4-5 percent of the State total output, income and employment.

Except for agriculture for which Hawaii County had the most jobs, Honolulu accounted for the largest shares of total output, total income and total jobs in the State for all of the aggregated sectors in Table 1. For the government sector, Honolulu's share was 84-87 percent of the State total. Honolulu also accounted for significant shares of total agricultural (including commercial fishery and agricultural and fishery services) output (41.8 percent), labor income (44.0 percent), and employment (31.2 percent), although these shares were much smaller compared to those for the other industries.

As expected, other counties' shares of total agriculture's contributions to the State economy were substantially higher than those for other industries. For instance, Hawaii County accounted for 30.2 percent of total output, 27.1 percent of labor income, and 39.8 percent of total jobs in agriculture in the

State. Kauai accounted for 7.1 percent and Maui accounted for 20.9 percent of total agricultural output in the State.

Counties also differed significantly in terms of their sectoral composition of total output, labor income, and employment. For example, as shown in Table 1a, agriculture contributed to 3.1 percent of total output, 3.2 percent of total labor income, and 8.2 percent of total jobs in Hawaii County, compared to less than 1 percent of total output, labor income, and just 1.0 percent of total jobs in Honolulu. The government is another sector in which counties differed significantly. The government sector accounted for 17.5 percent of total output, 34.7 percent of labor income, and 25.4 percent of total jobs in Honolulu, compared to 6–10 percent of total output, 15–22 percent of labor income, and 11–15 percent of total jobs in other three counties. More detailed industries' contributions to total output, labor income, and value added and jobs are presented in Appendix Tables A-1 through A-4.

Inter-industry Purchases and Sales

As can be seen in Tables 2 and 3, Honolulu made a sizable portion of total sales to industries located in the other three counties. For instance, Honolulu accounted for about 11–13 percent of total input purchases (mostly materials and services) by the construction industry in other counties. For other industries, the share purchased from Honolulu was about 6–8 percent in most cases. Except for some inputs to the manufacturing (food processing) industry, the flows of industries' inputs among Hawaii, Kauai and Maui counties were quite small.

In terms of the 5-sector model shown in Table 3, the shares of manufacturing intermediate input in total input purchases were generally higher in other counties than in Honolulu. This is largely a function of local sugar, pineapple, macadamia nuts and other agricultural products used as inputs to food processing on the neighbor islands. Shares of both intermediate input and value added in total purchases of manufacturing were lower in Honolulu, mainly because of a higher share of imported inputs from outside Hawaii. For example, imports from outside the state accounted for more than half (55.6 percent) of total manufacturing input purchases in Honolulu, compared to 21–42 percent in the other three counties. The shares of intermediate input, intermediate sales, labor income, and value added in total input purchases for 20 industries are provided in Appendix Tables A-7 to A-10.

For some industries, Honolulu purchased sizable amounts of intermediate sales from other counties. For example, Honolulu purchases accounted for 42.1 percent of total intermediate sales of agriculture (Table 2, first row, \$36.4 million) and 57.2 percent of intermediate manufacturing sales in Hawaii County (Table 2, third row, \$45.7 million) and a little over one-third of total intermediate manufacturing sales in Maui and Kauai counties. Maui County accounted for about 6–16 percent of total intermediate sales of agriculture in Hawaii, Honolulu, and Kauai counties.

Final Demand

Table 4 summarizes total final demand provided by Hawaii producers (excluding imported final demand) and their major components by county. Of \$52.4 billion of total final demand provided by Hawaii producers in 2002, Honolulu accounted for 74.1 percent, Maui 11.7 percent, Hawaii County 9.8 percent, and Kauai 4.4 percent. Personal consumption expenditures (PCE) had the highest share in total final demand in all counties. Visitor expenditures (VE) carried larger shares of total final demand in other counties than in Honolulu. Another notable difference among counties was a significantly larger

share of federal government expenditures in the City and County of Honolulu than in other counties (about 17 percent vs. 1 – 2 percent), primarily because of the military bases on Oahu. While the shares of out-of-state exports in total final demand were similar across counties, the out-of-county but within-state export shares were appreciably larger for neighbor island counties than for Honolulu (7.3-8.2 percent vs. 2.7 percent).

Of total PCE of \$23.1 billion for the state in 2002 provided by local producers (i.e., excluding imported goods and services from out-of-state producers), Honolulu accounted for 76.8 percent, Maui 10.2 percent, Hawaii County 9.3 percent, and Kauai 3.6 percent. Similarly, of total visitor expenditures of \$9.0 billion provided by local producers, Honolulu accounted for 58.2 percent, Maui 21.8 percent, Hawaii County 11.7 percent, and Kauai 8.2 percent.

Industries' shares in total PCE and those for visitor expenditures including imports from out-of-state producers are presented in Appendix Tables A-5 and A-6, respectively. As shown in Appendix Table A-5, except for considerably higher shares of within-state imports and real estate and rentals and somewhat lower shares of finance and insurance in other counties, industries' shares in total PCE were fairly similar across counties. For all counties, as well as the state as a whole, real estate and rentals accounted for the largest share of total PCE, followed by health services, retail trade, finance and insurance, other services, and eating and drinking. Out-of-state imported goods and services made about 20 percent of total PCE.

As can be seen in Appendix Table A-6, in terms of industries' proportions, visitor expenditure patterns were significantly different across counties. The hotel sector accounted for the largest share of total visitor expenditures in all counties, except for Honolulu. For Honolulu, the transportation sector had the largest share, accounting for more than one-fourth of total visitor expenditures. The hotel sector's share for Honolulu was much smaller than that for other counties, accounting for nearly one-third. The second largest sector was real estate and rentals for Hawaii, Maui and Kauai counties, while it was hotel for Honolulu, which accounted for about 24 percent of total visitor expenditures. The real estate and rentals sector ranked third for Honolulu, followed by eating and drinking. The next largest contributors to the visitor expenditure in other counties included eating and drinking, transportation, and retail trade.

Multipliers

Type I and Type II final demand multipliers for output, earnings² and total jobs calculated from the 5-sector state, inter-county, and single-region county I-O models are given in Table 5. As explained more fully in Appendix A, final demand multipliers measure the volume of economic activity related to a dollar change in final demand. A Type I multiplier shows the economic activity produced by the initial final demand change (called the direct effect) and the purchases of inputs from local industries necessary to supply the final demand change (called the indirect effect). A Type II multiplier accounts

² Following BEA's RIMS II methodology (BEA, 1997), earnings is calculated as the sum of wages and salaries, proprietors' income, directors' fees, employer contribution to health insurance less personal contribution to social insurance. Earnings are typically about 15 percent smaller than the sum of employee compensation and proprietors' income, which is traditionally known as labor income.

for the direct effect, the indirect effect, plus the economic activity produced by the consumption spending related to the earnings induced by the direct and indirect effects of the final demand change (called the induced effect).

Everything else being equal, multipliers are larger when the economic activity that is generated remains within the economy. Economic activities that promote more wages for residents rather than more imports generally have higher multipliers. In all cases, multipliers obtained from the single-region county models are smaller than those obtained from the inter-county model. An economic activity is likely to require more imports of labor and goods in a single-region. Except for a few cases (agriculture and services earnings multipliers for Honolulu and manufacturing and government earnings multipliers for Hawaii, Kauai and Maui counties), single-region county output and earnings multipliers are also generally lower than the corresponding state output and earnings multipliers. However, no particular pattern could be observed for job multipliers.

As can be seen in Table 5, the differences between the inter-county multipliers and the single-county multipliers are much larger for other counties than for Honolulu. This is because industries in other counties are more dependent on their inputs from Honolulu than the other way around. As a result, not accounting for inter-county flows in single-region county I-O models would have bigger impacts in other counties than in Honolulu.

Type II multipliers are larger than Type I multipliers in all cases because the former also account for induced effects in addition to the direct and indirect effects. Relative to Type I multipliers, Type II multipliers are generally higher in Honolulu than in other counties. This is because higher labor income per unit of output in Honolulu produces higher induced effects.

A notable advantage of an inter-regional I-O model over a single-region model is its ability to estimate impacts of a demand change not only in a particular region where demand change has occurred, but also the impacts on other regions supplying inputs to that region. The Type I inter-county output multiplier of agriculture for Hawaii County is 1.43, meaning that every dollar increases in final demand in agriculture in Hawaii County would increase the total output in the State by \$1.43. Table 6 shows that, of the \$1.43 in additional output, \$1.28 (89.6 percent) is output of Hawaii County, \$0.14 (9.8 percent) of Honolulu output, and \$0.01 (0.4 percent) of Maui output. Note that Type I single-county output multiplier of agriculture in Hawaii County is 1.28, the same as that county's contribution to the output multiplier in the inter-county model. The same relationship would hold for other multipliers, as well as other industries.

Table 7 shows the relationships between multipliers obtained from the inter-county I-O table and the state I-O table for the 5-sector model. When the inter-county multipliers are weighted by counties' output shares, inter-county weighted output multipliers are virtually identical to the state output multipliers. Earnings and employment multipliers are also very close, although not identical, when they are weighed by earnings and employment shares of counties.

The various final-demand and direct-effect multipliers obtained from the 20-sector state, inter-county and single region county I-O models are presented in Tables 8-13. The multipliers for a more detailed inter-county I-O model (67 sectors for Honolulu and 20 sectors each for other counties) are presented in Tables 14-16. Important points from these tables are summarized below.

Both Type I and Type II output multipliers from the single region county models are not only smaller than those obtained from the inter-county model, but they are almost all smaller than those from the state I-O model, especially for Maui, Kauai and Hawaii counties. In many cases, this is also true for final demand earnings multipliers. Inter-county multipliers are usually somewhere in between the state and single county multipliers.

Final demand job multipliers for most of the industries are lower in Honolulu than in other counties in both inter-county and single region county I-O models. Across all counties, the more labor intensive industries, such as agriculture, business services, educational services, other services, and arts and entertainment have higher final demand job multipliers and more capital intensive industries, such as utilities, other manufacturing, information, real estate and rentals, and finance and insurance have lower final demand job multipliers.

Final demand state tax multipliers follow the pattern of final demand earning multipliers as state tax collections are largely functions of income.

III. EXAMPLES OF USING THE INTER-COUNTY I-O MODEL

The usefulness of the inter-county I-O model is illustrated below using two examples. One involves estimating the economic impacts of increased visitor spending in Maui County in 2005, while the other example demonstrates the use of the model to analyze the economic impacts of an Oahu rail transit project.³ In determining whether or not the use of a multiplier is relevant, the single more important factor is whether the economic activity brings in money not currently in the economy. Visitor expenditures are a particularly good example. For example, a rock concert attended only by residents would have virtually no feed back or multiplier effects, as it would substitute for other entertainment such as a movie and dinner out. But a rock concert which draws in a large number of fans from across the world may have a multiplier impact, but the import content (e.g. payment to the out-of-state performer) must be subtracted. A multiplier analysis may also be relevant if there is a shift from an activity which is highly import based to one which draws more on local resources.

Impacts of Increased Visitors Expenditures in Maui County in 2005

As shown in Table 17, total visitor expenditures for the state was \$11,904.0 million in 2005, a 9.6 percent or \$1,042.2 million increase from the previous year. Hawaii County experienced the most rapid growth in visitor expenditures in 2005, increasing 27.1 percent or \$355.0 million, followed by Maui County (11.7 percent or \$346.2 million), Honolulu County (5.3 percent or \$291.8 million), and Kauai County (4.4 percent or \$49.2 million). Due to differences in economic structures, the economic impacts of a given change in visitor expenditures would be different for each county. In this example, we estimate the economic impacts of increased visitor expenditures in Maui County in 2005. The economic impacts of increased visitor expenditures in other counties can be estimated in a similar way.

To estimate the economic impacts of increased visitor expenditures in Maui County in 2005, one has to go through two basic steps: (1) allocate the \$346.2 million increased visitor spending in Maui County in 2005 to industries in each county that produced the goods and services purchased by Maui visitors, thereby generating a vector of visitor spending by county and by industry,⁴ (2) multiply the vector of visitor spending generated in step (1) by the appropriate multipliers or the total requirements matrix to estimate the total economic impacts.

Step (1) is performed by multiplying the \$346.2 million expenditure by the industry percentages calculated from the Maui County visitor expenditure vector in the 2002 inter-county model.⁵ This allocation produces a vector of direct visitor spending, with \$262.1 million (or 75.7 percent) spent on

³ The purpose of these examples is just to illustrate the use of the inter-county I-O model and hence the results presented in this section should not be taken as true impacts of the transit project.

⁴ Since the visitor demand in Maui includes goods and services produced by industries in all counties in the State of Hawaii and out-of-state producers, the \$346.2 million increased visitor expenditures in Maui County in 2005 should be allocated to individual industries in all counties in Hawaii and imports. We assume imports do not affect the output of Hawaii, so only the impacts on Hawaii produced goods and services are analyzed.

⁵ Dividing each element in the Maui County visitor expenditure vector by its total produces a vector of industry and import shares. Multiplying each element in this share vector by \$346.2 million allocates the total visitor spending to industries on each county as well as imports.

goods and services produced by Maui County industries and \$18.5 million (or 5.4 percent) spent on imports from other Hawaii counties. Therefore, \$280.6 million (the sum of \$262.1 million and \$18.5 million) or about 81.1 percent of the \$346.2 million increased visitor expenditures for Maui in 2005 were produced by local producers statewide. The remaining \$65.6 million or 18.9 percent of increased Maui county visitor expenditures in 2005 was spent on imported goods and services from out-of-state producers. The vector of direct visitor spending reflects the direct impacts on output of Hawaii industries and excludes the goods and services imported from out-of-state producers. The industry shares of total visitor expenditures spent on goods and services produced in each county of Hawaii are provided in Table 18.

As shown in Table 18, the Maui hotel sector received most of visitor spending in Maui, accounting for 41.6 percent of total increased or direct visitor spending in 2005, followed by real estate and rentals (15.8 percent), eating and drinking (13.4 percent), retail trade (6.3 percent), and transportation (6.2 percent). Among the industries in other counties, transportation was the most dominant sector, followed by wholesale trade and manufacturing.

Step (2) computes the estimated impacts on total output by county and by industry and is performed by multiplying the visitor expenditures vector generated in Step (1) by the Type II inter-county total requirements table. This calculation can easily be performed by copying the total requirements matrix from the DBEDT Web site into a file where the visitor expenditure vector is stored as a row. The total output impacts by industry are then produced by multiplying each element in the visitor expenditure vector by the corresponding element in each industry row of the total requirements matrix. Total output impact estimates can also be calculated using the appropriate multiplier vector shown in Table 8. By stacking together four Type II inter-county multiplier columns into a 80 x 1 single vector corresponding to the county order in the visitor expenditure vector and multiplying the two vectors would also yield the same total impact estimate. However, the individual products do not represent the output in each industry, but the total output in the economy attributable to each industry's direct effect.

The direct income (or earnings) and total job impacts by industry can be computed by multiplying the direct output vector estimated in Step (1) by earnings-to-output and total job-to-output ratio vectors calculated from the transactions table of the 2002 inter-county I-O model. The sums of the resultant vectors are the total state direct earnings and jobs impacts.

The total earnings and total job impacts can be computed similarly to the total output impacts by county and by industry, as described above. In calculating the total earnings and total job impacts, however, the Type II total requirements matrix (also called output multipliers matrix) in estimating output impacts is replaced by the Type II earning multipliers matrix and the Type II total job multipliers matrix, respectively. The results of these operations are summarized in Table 19.

As can be seen in Table 19, the \$280.6 million additional visitor spending produced by Hawaii producers throughout the state in Maui County in 2005 is estimated to have generated total impacts of \$535.0 million in output, \$172.5 million in income, and 5,807 jobs in the state economy. About 78.6 percent of total output, 78.2 percent of total income, and 81.6 percent of total jobs generated from the increased visitor spending are estimated to remain in Maui County. Honolulu is expected to account for 19.3 percent of total output, 19.6 percent of income, and 15.5 percent of total job impacts. The Maui's shares in total impacts were smaller than its shares in direct impacts, suggesting some dependence of

Maui industries in meeting visitor demand on their counterparts from other counties, especially from Honolulu.

As can be seen in Table 20, with the exception of the real estate and rentals sector, the same sectors with the highest share in total direct impacts also have the highest shares in total output impacts, but their shares are considerably smaller. This is because some sectors with no direct visitor spending captured large indirect and induced effects, including finance and insurance, other manufacturing, utilities, professional and business services, and health services.

Economic Impacts of a Hypothetical Public Transit Project on Oahu

The inter-regional I-O approach has also been widely used in estimating the impacts of public transit projects (e.g., Southworth *et al.*, 2002; Meyer, Nelson and Peng, 1999; and Strathman and Dueker, 1987). Since we do not have enough information to estimate the impact of the newly commissioned Oahu rail transit system, we use a hypothetical example to illustrate the use of inter-county I-O model in estimating the impacts public transits or other public infrastructure projects. The example also involves numerous simplifying assumptions about the economy. The assumptions and results from this example should, therefore, not be used to determine the impacts of the proposed Oahu rail transit system.

Besides reducing traffic, the hypothetical transit project will have other impacts on the State economy. The transit project will have positive impacts from the construction work for the project, as well as negative impacts from reduced personal consumption expenditures if the project is funded by increasing taxes to the residents. The I-O approach can be used to estimate both positive and negative impacts of the project.

Using the inter-regional I-O approach to conduct impact analysis of a public transit project funded by increased taxes would normally involve the following steps: (1) determine the timing of the expenditures of the project and the sources and uses of funds in both the construction phase and the operations phase; (2) estimate the positive impact of the project due to new construction or other expenditures; (3) estimate the impact on other economic activities that may be generated by the project, and the negative impact of incidental costs such as increased traffic during the construction phase; (4) estimate the negative impact of the project due to reduced personal consumption from increased taxes or the reduction of other alternative construction projects; and (5) estimate the net impact of the project.

Not only does the timing of the construction cost and project revenue have to be estimated, but it is also important to examine the sources and uses of funds. The source of the funds can have an impact on the disposable income of residents. In general, if the project cost is financed by charging additional taxes on local residents, the reduced disposable income of the residents will negatively affect the economy. If the project is totally financed by federal or other outside funding, the impact on disposable income of the local residents is negligible and can be ignored. If the project funding replaces other government construction or spending projects, the net impact of the project should be determined by subtracting the positive impact of the replaced project(s) from the positive impact of the proposed project.

Examining the kinds of purchases made is also critical. Clearly, expenditures on local labor will have a different impact on the local economy than expenditures on non-local labor. Similarly purchases of local produced goods will have different impacts on the local economy than purchases of imported goods. In addition, to the extent possible, other costs or benefits of the project, such as increased traffic during the construction period or increased construction activity near the new terminals should be considered. Quantifying these indirect costs or benefits can be very challenging but they must be included for a complete analysis.

The positive impact of the project due to construction expenditures is affected by the nature of the investment. In this example, we assume the construction expenditure for the hypothetical project is state and local (S&L) government investment on Oahu, a component of final demand in the 2002 Hawaii inter-county I-O model. The positive economic impacts of the S&L investment on output, earnings, and jobs can be estimated using the respective final demand multipliers for the S&L government sector and the estimated construction spending.

However, the positive impact will be tempered by the reduced personal consumption of residents if the project is financed by charging additional taxes on local residents, for example a general excise and use tax (GET) surcharge. Additional taxes paid by residents reduce their ability to spend on goods and services. This lower level of spending will decrease personal consumption expenditures (PCE) on Oahu, a component of final demand in the inter-county I-O model. This decline in PCE on Oahu will have negative impacts on the State economy. To do the analysis we must first estimate the portion of the additional taxes paid by residents, as compared to taxes paid by visitors. Although additional taxes on visitors can reduce visitor spending and affect the competitiveness of the Hawaii tourism industry, we assume that due to the relatively small increase and the low rate of Hawaii's general excise tax as compared to other visitor destinations that there is no impact on visitor spending.

In order to compute the net impact of the entire construction project, we need to compare the positive impacts of construction investment with the negative impacts of reduced PCE due to the GET surcharge. All values in the analysis should be converted to present values to make the comparison overtime meaningful.

Estimated Project Construction Costs and Assumptions

In this example we assume that the hypothetical Oahu transit project will cost \$1 billion in 2007 constant dollars (excluding operation and maintenance costs) to build.⁶ In addition, we assume that construction work will start in 2010 and be completed in one year.

We also assume that 25 percent of the project cost will be used to buy imported goods and services from outside of Hawaii, including trains.⁷

⁶ In this example, all values are measured in constant 2007 dollars to facilitate comparison of values incurred at different time periods.

⁷ Note that this assumption is significantly higher than the share of imports in total state and local government investment obtained from the 2002 I-O table. According to the 2002 I-O table, only about 7.7 percent of total state and local government investment was imported.

In this example, we first assume that all costs of the hypothetical Oahu transit project will be funded by a 0.5 percent surcharge on Oahu's GET base subject to a 4 percent GET tax rate starting from January 2007. We also assume that the GET surcharge will end when enough money has been collected to finance the \$1 billion project cost. In addition, we assume that the unused tax revenue collected before the construction of the hypothetical project will earn interest; therefore, total tax revenues collected may be lower than the project cost due to interest revenue of unused funds. We then do another example where 25 percent of the funding for the project comes from federal sources.

To calculate the revenue from a 0.5 percent GET surcharge, we need to estimate the GET base subject to the surcharge. Based on data from Hawaii Department of Taxation⁸, Oahu's GET base subject to the 4 percent tax rate was \$39.2 billion in calendar year 2005. Since the GET surcharge is assumed to begin in January 2007 and may continue until enough revenue to finance this project is collected, we need to project the annual GET base on Oahu in 2007 and the following years.

Historically, the GET base has been increasing overtime. For example, between 2002 and 2005 Oahu's GET base (i.e., total sales subject to the 4 percent GET rate) increased at an annual rate of 7.7 percent. This increase is due to both real growth and inflation. The GET data from the Department of Taxation are in current dollars. Between 2002 and 2005, the inflation (Honolulu CPI-U) increased at 3.1 percent per year. Therefore, the real growth rate of Oahu's GET base was about 4.6 percent per year between 2002 and 2005. We assume (based on ten months of data) that the annual growth rate of Oahu's GET base at current dollars in 2006 will reach 13.1 percent. Accounting for the Honolulu inflation rate of 5.9 percent in 2006, the real growth rate of Oahu's GET base will be 7.2 percent in 2006. Oahu's GET base in current dollars is estimated to be \$44.4 billion in 2006.

The high real growth rate of GET base between 2002 and 2006 was largely due to relatively high growth in both real personal income and real visitor expenditure. We assume Oahu's GET base in current dollars will increase at the same rate of the projected personal income growth in future years. We also make various assumptions described below to determine the impact of the reduced spending levels because of the tax. Adjusting for the reduced levels of spending and including more than \$6 billion "unallocated" GET base in 2007, total revenue from the GET surcharge will be \$264.8 million in 2007. This revenue is assumed to increase at an annual real rate of 2 percent for all later years, same as the assumed real growth rate of the GET base, until enough revenue is collected to finance the project.

Since the surcharge will be collected from 2007 through most of 2010 and construction expenditures will occur in 2010, the balance will build and earn interest. In this example, we assume that the unused funds will earn a 5 percent interest annually. Similarly, when costs exceed revenues, loans will be used to cover the project cost.⁹ In calculating the interest on revenue or cost, we first calculated the annual

⁸ Source: Department of Tax, Monthly Tax Collection Reports for Calendar Year 2005 (posted on DOT Web site, <http://www.hawaii.gov/tax/monthly/2005cy-ge.pdf>).

⁹ The interest rate on the project loan is also assumed to be 5 percent per year. It should be noted that unused funds at the end of the previous year will earn 5 percent interest in the current year, while the unused revenue received during the current year will only earn 2.5 percent (half of the annual interest rate) interest in that year. Assuming that revenues are received evenly throughout the year is similar to assuming that revenue will be received in the middle of the year, so only half year's interest will be earned on the current year revenue from the surcharge.

revenue, annual cost, and unused funds or outstanding loans at the end of each year in current price. To convert a value from constant 2007 dollars to current dollars, we assume the inflation rate of 3.4 percent in 2008, 3.2 percent in 2009, and 3.0 percent in 2010 and thereafter. As shown in Table 21, the project will earn interest until 2010 from unused funds. In this example, we assume that the GET surcharge will be repealed when enough money has been collected to cover the total cost of the project. As shown in Table 21, based on the assumptions used in this example, the GET surcharge will be repealed before the end of 2010.

The Positive Impacts of the Construction Project

We can use the 2002 inter-county I-O model to estimate the positive economic impacts of the \$1 billion hypothetical state & local government investment.

First, we need to allocate the \$1 billion investment to Hawaii industries and out-of-state imports. Since we assumed that 25 percent of the project investment will be used to buy out-of-state imported goods and services, we only need to allocate the remaining \$750 million to Hawaii industries. Based on the industries' shares in Honolulu S&L government investment calculated from the 2002 inter-county I-O table, we can allocate the S&L government investment to individual industries. As shown in Table 22, the construction sector will receive 94.9 percent of total direct project investment, followed by wholesale trade (2.2 percent), retail trade (1.6 percent), transportation (0.7 percent), and professional services (0.6 percent).

After the S&L government investment is allocated to industries, the estimation of direct and total economic impacts can be done using the same methodology as used in estimating the impact of increased visitor spending in the previous example. As can be seen in Table 22, the direct impacts of the \$1 billion investment on the hypothetical Oahu transit system are estimated to be \$750.0 million additional output, \$307.1 million additional earnings, and 5,268 additional jobs. All direct impacts are limited to the City and County of Honolulu.

As shown in Table 23, the \$1 billion annual investment on the hypothetical transit project is expected to increase total state output by \$1,494.2 million, total earnings by \$564.8 million, and total jobs by 12,788 jobs. Unlike direct impacts, a small share of the total economic impact of the project will also be realized in other counties, with Honolulu accounting for about 97 percent of total output and total earnings, and about 96 percent of total jobs generated and the neighbor island counties accounting for 3-4 percent of the total economic impact. The direct and total economic impacts for the state by industry are provided in Table 24.

The Negative Impacts of the GET Surcharge

To estimate the negative impact of the hypothetical project on resident expenditures, we first estimate the negative impacts of the GET surcharge each year between 2007 and 2010. The total project impacts are the sums of the annual impacts between 2007 and 2010.

The negative economic impacts of the GET surcharge are mainly due to reduced personal consumption expenditures (PCE) on Honolulu through reduced income for spending. In reality, a small portion of the GET surcharge will be collected from neighbor island residents who do some of their

shopping on Oahu; and the GET surcharge should also directly affect the PCEs in the neighbor island counties. However, in this example, we assume only Honolulu's PCEs are directly affected by the GET surcharge to simplify the analysis. We also make another simplifying assumption that residents do not change their spending patterns to avoid paying the tax, including more internet purchases or more purchases from other counties. We also assume that visitors do not change their spending patterns due to the increased tax on Oahu.

To estimate the total annual economic impacts of the 2007 GET surcharge, we need to estimate the impact of the GET surcharge on Honolulu PCE first. As discussed before, total GET surcharge collection is estimated to be about \$265 million in 2007. In this example, we assume business firms will pass all the additional cost of the GET surcharge to consumers, therefore the surcharge will be paid by individual consumers.

Some of the \$265 million GET surcharge in 2007 will be paid by out-of-state visitors and do not affect Honolulu PCE. The GET surcharge paid by visitors includes the GET surcharge paid directly and the surcharge paid indirectly by them. The direct surcharge is relatively easy to estimate. Visitors spend mainly on lodging, food and beverage, shopping, transportation, and entertainment and recreation. Expenditures in these categories are all subject to the GET surcharge; therefore, in this example, we assume that all visitor expenditures on Oahu will be subject the GET surcharge. In 2006, visitor expenditures in the state were about \$11,994 million and Oahu accounted for about 49 percent of the total visitor expenditures. In 2007, total visitor expenditures in the state are expected to reach \$12,845 million. Assuming that visitors do not change their spending pattern and Oahu continues to account for 49 percent of expenditures, the GET surcharge directly collected from visitors will be about \$31.6 million or 11.9 percent of the total GET surcharge in 2007.

The indirect surcharge paid by visitors is more difficult to estimate. First, we need to estimate the total amount of GET surcharge paid by business firms in Oahu. The shares of intermediate demand in total demand are used to estimate the business share of GET. Based on the 2002 inter-county I-O table, 55.6 percent of service's GET and 52.0 percent of other rental's GET was paid by businesses. Accordingly, we assume that about half of other GET was paid by business. Based on this, as shown in Table 25 we estimated that 31.4 percent of total GET surcharge will be paid by business firms.

Second, we allocate the GET surcharge paid by business firms between residents and visitors. The ratio of visitor expenditures and total expenditures (including resident and visitor expenditures) in the state of Hawaii was estimated and used to allocate the business surcharge between residents and visitors. In 2005, total personal income in the state was \$43,953 million. Assuming that resident total consumption expenditures account for 85 percent of total personal income based on the 2002 inter-county I-O table, total resident consumption expenditures would be about \$37,360 million in 2005. Visitor expenditures in the state were about \$11,904 million in 2005. Therefore, the ratio between visitor expenditures and total expenditures was 24.2 percent. Allocating 24.2 percent of the GET surcharge paid by business firms to visitors, the GET surcharge indirectly paid by visitors in 2007 would be about 7.6 percent of total surcharge. Adding the GET surcharges paid by visitors directly and indirectly, 19.5 ($11.9+7.6=19.5$) percent or about \$51.7 million of the GET surcharge will be covered by visitors, and about \$213.1 million GET surcharge will be paid by Oahu residents in 2007.

PCE will not decrease by the full amount of the GET surcharge paid by Oahu residents. We assume that the impact of the GET surcharge is the same as a reduction in the disposable income of Oahu residents. When disposable income decreases, people will reduce both consumption and savings. The relationship between the GET surcharge and reduction in PCE is determined by estimating a marginal propensity to consume in Oahu.¹⁰ Based on a regression analysis, the Oahu marginal propensity to consume is estimated to be about 0.82.¹¹ This means that if the disposable income of the Oahu residents decreases by \$100 million, Oahu residents will reduce their consumption by \$82 million and reduce their savings by \$18 million. As shown in Table 26, the \$213.1 million GET surcharge being paid by Honolulu residents is expected to reduce Honolulu PCE by \$174.8 million in 2007.

Similar to the estimation of the positive economic impacts of the project investment, to determine the negative economic impacts of the \$174.8 million reduction in Honolulu PCE in 2007 we need to allocate the \$174.8 million Honolulu PCE reduction to the Hawaii industries and out-of-state imports. Based on the industries' shares in Honolulu PCE calculated from the 2002 inter-county I-O table, we can calculate the Honolulu PCE final demand vector. This vector is also the direct impact on output. As shown in Table 27, the \$174.8 million reduction in Honolulu PCE is expected to directly reduce total state output by about \$139.9 million (80.1 percent of reduced PCE) in 2007. Total state imports will be reduced by about \$34.8 million. The direct output impact is mainly on Honolulu (\$134.0 million or 95.7 percent). The neighbor island counties account for only 4.3 percent of the direct output reduction. In Honolulu, the direct output impact will primarily be on the real estate and rentals (\$29.9 million), health services (\$27.6 million), retail trade (\$19.0 million), finance and insurance (\$10.5 million), and other services (\$7.6 million).

The direct earnings and direct job impacts as well as the total economic impact of the reduction in PCE can be estimated using the same approach used in the estimation of the positive impacts of the project investment. The direct impacts on earnings and total jobs by county and by industry are provided in Table 28 and Table 29, respectively. The total economic impacts of the reduced PCE due to the GET surcharge are summarized in Table 30. The direct impact of the GET surcharge in 2007 are estimated to be \$139.9 million output reduction, \$47.9 million less earnings, and 1,494 fewer total jobs. Honolulu will account for about 95-96 percent of the direct impacts. The total economic impacts on the state economy are estimated to be \$268.8 million output reduction, \$91.2 million less earnings, and 2,775 reduced total jobs. Honolulu will account for about 93-94 percent of the total impacts. The direct and total economic impacts on the state by industry are provided in Table 31. The negative impacts of reduction in Honolulu PCE for subsequent years can be estimated in a similar fashion. The estimated annual negative economic impacts of the GET surcharge from 2007 to 2010 are provided in Table 32.

¹⁰ The marginal propensity to consume is defined as the additional consumption caused by \$1 increases in disposable income (or after tax income).

¹¹ The regression is based on the assumption that PCE is a linear function of disposable income ($C = C_0 + C_1(Y-T)$, where C is PCE, C_0 is autonomous consumption, C_1 is marginal propensity to consume, Y is income before tax, T is net tax paid, and Y-T is disposable income). The dependent variable in the regression is the average annual expenditures in Honolulu; the independent variable is the average money income after taxes in Honolulu. Regression data between 1980 and 2003 are from the Hawaii Data Book, various years.

The Net Economic Impacts of the Project Investment and the GET Surcharge

Combining the positive impact of construction and the negative impacts of the GET surcharge on PCE for the project, the net economic impact of the hypothetical Oahu transit project is expected to be about \$509.2 million in increased output, about \$230.5 million in additional earnings, and 2,617 job-years of additional jobs over the period between 2007 and 2010. The net increased output is slightly more than half of the billion dollars actually spent.

Although the net impacts on output and labor income calculated above are based on 2007 constant dollars, these values are actually measured in future values rather than present values. Since the positive impacts occur in 2010 (we assumed that construction will start and complete in 2010) and the negative impacts occur in different years starting in 2007, the impacts based on present value provide a better measurement of the net impacts. In this example, since all future values are already adjusted for inflation we used a discount rate of 3.5 percent to calculate the present value. As shown in Table 33, in present values, the net economic impacts of the hypothetical Oahu transit project are expected to be about \$406.5 million in increased output, and about \$190.0 million in additional earnings.

Estimated Impact if 25Percent of Project Covered with Federal Funds

Alternatively if we assume that federal funds will cover 25 percent of the construction cost in 2010, the GET surcharge will be repealed before the end of 2009. As shown in Table 32, with 25 percent federal funds the negative economic impact of the GET surcharge is expected to be lower, about \$733.0 million in reduced output, about \$248.7 million reduced earnings, and 7,569 job-years of reduced employment over the period between 2007 and 2009. Without federal funds, the GET surcharge is expected to reduce output by about \$985.0 million, reduce earnings by about \$334.2 million, and reduce employment by 10,171 job-years over the period between 2007 and 2010. As shown in Table 33, with federal funds the net economic impacts of the hypothetical Oahu transit project in present value are expected to be significantly higher, and total approximately \$636.6 million in increased output, and \$268.1 million in additional earnings.

Table 1. Output, Income and Total Employment by Industry and by County - County Shares, 2002

| | Hawaii County | | Honolulu County | | Kauai County | | Maui County | | State Total | |
|---------------------------|----------------|-------------|-----------------|-------------|----------------|------------|----------------|-------------|-----------------|--------------|
| | Value | % | Value | % | Value | % | Value | % | Value | % |
| Output (\$ mil.) | | | | | | | | | | |
| Agriculture | 206.0 | 30.2 | 285.1 | 41.8 | 48.6 | 7.1 | 142.9 | 20.9 | 682.7 | 100.0 |
| Construction | 710.0 | 15.0 | 3,213.9 | 68.0 | 228.9 | 4.8 | 574.5 | 12.2 | 4,727.3 | 100.0 |
| Manufacturing | 204.2 | 5.5 | 3,142.6 | 85.0 | 53.9 | 1.5 | 296.0 | 8.0 | 3,696.7 | 100.0 |
| Services | 4,793.3 | 9.4 | 37,204.4 | 73.3 | 2,465.8 | 4.9 | 6,315.6 | 12.4 | 50,779.0 | 100.0 |
| Government | 649.2 | 6.0 | 9,318.2 | 86.8 | 259.0 | 2.4 | 506.7 | 4.7 | 10,733.1 | 100.0 |
| Total | 6,562.7 | 9.3 | 53,164.2 | 75.3 | 3,056.2 | 4.3 | 7,835.7 | 11.1 | 70,618.8 | 100.0 |
| Earnings (\$ mil.) | | | | | | | | | | |
| Agriculture | 79.0 | 27.1 | 128.3 | 44.0 | 17.8 | 6.1 | 66.4 | 22.8 | 291.5 | 100.0 |
| Construction | 269.3 | 14.2 | 1,321.2 | 69.5 | 84.9 | 4.5 | 225.7 | 11.9 | 1,901.0 | 100.0 |
| Manufacturing | 53.8 | 7.2 | 539.5 | 72.5 | 21.3 | 2.9 | 129.7 | 17.4 | 744.3 | 100.0 |
| Services | 1,515.5 | 9.1 | 12,590.6 | 75.3 | 734.6 | 4.4 | 1,882.6 | 11.3 | 16,723.3 | 100.0 |
| Government | 552.2 | 6.2 | 7,752.5 | 86.6 | 220.3 | 2.5 | 422.1 | 4.7 | 8,947.0 | 100.0 |
| Total | 2,469.7 | 8.6 | 22,332.2 | 78.1 | 1,078.9 | 3.8 | 2,726.4 | 9.5 | 28,607.1 | 100.0 |
| Total jobs* (no.) | | | | | | | | | | |
| Agriculture | 6,845 | 39.8 | 5,363 | 31.2 | 1,596 | 9.3 | 3,399 | 19.8 | 17,203 | 100.0 |
| Construction | 5,469 | 15.9 | 21,929 | 63.8 | 2,008 | 5.8 | 4,979 | 14.5 | 34,385 | 100.0 |
| Manufacturing | 1,988 | 10.7 | 13,639 | 73.5 | 615 | 3.3 | 2,306 | 12.4 | 18,548 | 100.0 |
| Services | 56,825 | 10.7 | 377,268 | 71.2 | 28,431 | 5.4 | 67,677 | 12.8 | 530,201 | 100.0 |
| Government | 12,680 | 7.5 | 142,563 | 83.9 | 4,881 | 2.9 | 9,719 | 5.7 | 169,843 | 100.0 |
| Total | 83,807 | 10.9 | 560,762 | 72.8 | 37,531 | 4.9 | 88,080 | 11.4 | 770,180 | 100.0 |

*Includes wage/salary and proprietors' jobs.

Table 1a. Output, Income and Total Employment by Industry and by County - Sector Shares, 2002

| | Hawaii County | | Honolulu County | | Kauai County | | Maui County | | State Total | |
|--------------------|---------------|-------|-----------------|-------|--------------|-------|-------------|-------|-------------|-------|
| | Value | % | Value | % | Value | % | Value | % | Value | % |
| Output (\$ mil.) | | | | | | | | | | |
| Agriculture | 206.0 | 3.1 | 285.1 | 0.5 | 48.6 | 1.6 | 142.9 | 1.8 | 682.7 | 1.0 |
| Construction | 710.0 | 10.8 | 3,213.9 | 6.0 | 228.9 | 7.5 | 574.5 | 7.3 | 4,727.3 | 6.7 |
| Manufacturing | 204.2 | 3.1 | 3,142.6 | 5.9 | 53.9 | 1.8 | 296.0 | 3.8 | 3,696.7 | 5.2 |
| Services | 4,793.3 | 73.0 | 37,204.4 | 70.0 | 2,465.8 | 80.7 | 6,315.6 | 80.6 | 50,779.0 | 71.9 |
| Government | 649.2 | 9.9 | 9,318.2 | 17.5 | 259.0 | 8.5 | 506.7 | 6.5 | 10,733.1 | 15.2 |
| Total | 6,562.7 | 100.0 | 53,164.2 | 100.0 | 3,056.2 | 100.0 | 7,835.7 | 100.0 | 70,618.8 | 100.0 |
| Earnings (\$ mil.) | | | | | | | | | | |
| Agriculture | 79.0 | 3.2 | 128.3 | 0.6 | 17.8 | 1.7 | 66.4 | 2.4 | 291.5 | 1.0 |
| Construction | 269.3 | 10.9 | 1,321.2 | 5.9 | 84.9 | 7.9 | 225.7 | 8.3 | 1,901.0 | 6.6 |
| Manufacturing | 53.8 | 2.2 | 539.5 | 2.4 | 21.3 | 2.0 | 129.7 | 4.8 | 744.3 | 2.6 |
| Services | 1,515.5 | 61.4 | 12,590.6 | 56.4 | 734.6 | 68.1 | 1,882.6 | 69.1 | 16,723.3 | 58.5 |
| Government | 552.2 | 22.4 | 7,752.5 | 34.7 | 220.3 | 20.4 | 422.1 | 15.5 | 8,947.0 | 31.3 |
| Total | 2,469.7 | 100.0 | 22,332.2 | 100.0 | 1,078.9 | 100.0 | 2,726.4 | 100.0 | 28,607.1 | 100.0 |
| Total jobs* (no.) | | | | | | | | | | |
| Agriculture | 6,845 | 8.2 | 5,363 | 1.0 | 1,596 | 4.3 | 3,399 | 3.9 | 17,203 | 2.2 |
| Construction | 5,469 | 6.5 | 21,929 | 3.9 | 2,008 | 5.4 | 4,979 | 5.7 | 34,385 | 4.5 |
| Manufacturing | 1,988 | 2.4 | 13,639 | 2.4 | 615 | 1.6 | 2,306 | 2.6 | 18,548 | 2.4 |
| Services | 56,825 | 67.8 | 377,268 | 67.3 | 28,431 | 75.8 | 67,677 | 76.8 | 530,201 | 68.8 |
| Government | 12,680 | 15.1 | 142,563 | 25.4 | 4,881 | 13.0 | 9,719 | 11.0 | 169,843 | 22.1 |
| Total | 83,807 | 100.0 | 560,762 | 100.0 | 37,531 | 100.0 | 88,080 | 100.0 | 770,180 | 100.0 |

Table 2. Inter-county Transactions Table (\$ million), 2002

| | | Hawaii County | | | | | Honolulu County | | | | |
|--------------------|-----------------|------------------|-------------------|--------------------|----------|-----------------|------------------|------------------|--------------------|----------|-----------------|
| | | Agri- culture | Const- ruction | Manufac- turing | Services | Govern- ment | Agri- culture | Const- ructon | Manufac- turing | Services | Govern- ment |
| Hawaii County | Agriculture | 23.1 | 1.0 | 12.3 | 8.0 | 0.2 | 0.5 | 0.0 | 29.8 | 6.2 | 0.0 |
| | Construction | 1.1 | 1.1 | 0.4 | 54.5 | 4.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Manufacturing | 1.0 | 3.4 | 2.8 | 14.8 | 0.3 | 0.6 | 4.6 | 5.6 | 34.0 | 0.9 |
| | Services | 18.7 | 111.4 | 23.0 | 873.3 | 26.7 | 0.4 | 14.5 | 4.5 | 63.1 | 3.5 |
| | Government | 1.2 | 0.8 | 0.5 | 35.5 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Honolulu County | Agriculture | 0.0 | 0.0 | 0.8 | 0.0 | 0.0 | 20.6 | 1.2 | 57.8 | 66.9 | 1.2 |
| | Construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 1.9 | 5.6 | 3.2 | 440.8 | 55.7 |
| | Manufacturing | 9.9 | 38.1 | 8.4 | 135.6 | 2.6 | 13.2 | 139.2 | 128.0 | 886.0 | 34.2 |
| | Services | 7.0 | 51.5 | 9.6 | 213.8 | 5.1 | 39.6 | 776.0 | 477.8 | 9,186.5 | 389.9 |
| | Government | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.5 | 5.1 | 11.6 | 370.3 | 15.4 |
| Kauai County | Agriculture | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.4 | 0.0 | 1.2 | 0.6 | 0.0 |
| | Construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Manufacturing | 0.1 | 0.5 | 0.1 | 1.9 | 0.0 | 0.1 | 0.9 | 0.8 | 5.3 | 0.2 |
| | Services | 0.2 | 1.2 | 0.3 | 7.2 | 0.3 | 0.2 | 3.8 | 2.8 | 46.3 | 2.5 |
| | Government | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Maui County | Agriculture | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 | 0.4 | 0.0 | 1.2 | 0.5 | 0.0 |
| | Construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Manufacturing | 0.4 | 1.6 | 0.5 | 6.0 | 0.1 | 0.4 | 3.7 | 3.3 | 22.1 | 0.9 |
| | Services | 0.2 | 1.3 | 0.4 | 8.7 | 0.4 | 0.4 | 6.6 | 5.2 | 78.1 | 4.7 |
| | Government | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Intermed. input | 63.1 | 212.0 | 60.2 | 1,359.5 | 41.3 | 80.2 | 961.3 | 732.8 | 11,206.6 | 509.2 |
| | Value added | 102.3 | 323.9 | 58.3 | 2,911.7 | 588.3 | 164.5 | 1,561.9 | 661.1 | 22,050.1 | 8,576.6 |
| | Income | 79.0 | 269.3 | 53.8 | 1,515.5 | 552.2 | 128.3 | 1,321.2 | 539.5 | 12,590.6 | 7,752.5 |
| | Others | 23.3 | 54.6 | 4.5 | 1,396.2 | 36.2 | 36.2 | 240.7 | 121.6 | 9,459.5 | 824.1 |
| | Imports | 40.6 | 174.2 | 85.7 | 522.1 | 19.6 | 40.4 | 690.7 | 1,748.7 | 3,947.6 | 232.4 |
| | Total input | 206.0 | 710.0 | 204.2 | 4,793.3 | 649.2 | 285.1 | 3,213.9 | 3,142.6 | 37,204.4 | 9,318.2 |
| | Total jobs | 6,845 | 5,469 | 1,988 | 56,825 | 12,680 | 5,363 | 21,929 | 13,639 | 377,268 | 142,563 |

Table 2. Inter-county Transactions Table (\$ million), 2002 - Contd.

| | | Kauai County | | | | | Maui County | | | | | Total | Total | Total |
|-----------------|-----------------|--------------|---------------|----------------|-----------|-------------|--------------|---------------|----------------|----------|-------------|------------------|--------------|----------------|
| | | Agri-culture | Const-ruktion | Manuf-acturing | Servi-ces | Govern-ment | Agri-culture | Const-ruktion | Manuf-acturing | Services | Govern-ment | intermed. demand | final demand | output (sales) |
| Hawaii County | Agriculture | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 3.1 | 2.1 | 0.0 | 86.5 | 119.6 | 206.0 |
| | Construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 61.7 | 648.3 | 710.0 |
| | Manufacturing | 0.0 | 0.1 | 1.4 | 2.0 | 0.0 | 0.2 | 1.2 | 0.3 | 6.6 | 0.1 | 80.0 | 124.3 | 204.2 |
| | Services | 0.0 | 0.1 | 0.2 | 3.1 | 0.1 | 0.2 | 2.0 | 0.5 | 15.9 | 0.3 | 1,161.4 | 3,631.9 | 4,793.3 |
| | Government | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 39.1 | 610.2 | 649.2 |
| Honolulu County | Agriculture | 0.0 | 0.0 | 0.6 | 0.9 | 0.0 | 0.0 | 0.0 | 11.6 | 2.3 | 0.0 | 164.0 | 121.1 | 285.1 |
| | Construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 507.3 | 2,706.6 | 3,213.9 |
| | Manufacturing | 1.7 | 11.1 | 0.7 | 53.8 | 0.7 | 5.3 | 34.2 | 7.1 | 175.3 | 2.4 | 1,687.6 | 1,455.0 | 3,142.6 |
| | Services | 1.5 | 14.9 | 1.1 | 73.1 | 1.3 | 3.9 | 39.8 | 9.9 | 281.0 | 4.5 | 11,587.8 | 25,616.6 | 37,204.4 |
| | Government | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 403.9 | 8,914.3 | 9,318.2 |
| Kauai County | Agriculture | 2.0 | 0.3 | 6.2 | 5.1 | 0.0 | 0.0 | 0.0 | 2.7 | 0.5 | 0.0 | 19.2 | 29.4 | 48.6 |
| | Construction | 0.7 | 0.7 | 0.1 | 45.1 | 2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 48.8 | 180.0 | 228.9 |
| | Manufacturing | 0.1 | 0.5 | 0.2 | 5.1 | 0.0 | 0.0 | 0.2 | 0.1 | 1.7 | 0.0 | 18.1 | 35.9 | 53.9 |
| | Services | 6.9 | 39.5 | 4.5 | 491.6 | 9.4 | 0.1 | 1.2 | 0.3 | 10.3 | 0.2 | 628.8 | 1,837.0 | 2,465.8 |
| | Government | 0.1 | 0.4 | 0.1 | 28.5 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 29.6 | 229.5 | 259.0 |
| Maui County | Agriculture | 0.0 | 0.0 | 0.7 | 0.5 | 0.0 | 12.5 | 0.7 | 34.7 | 14.3 | 0.1 | 66.3 | 76.6 | 142.9 |
| | Construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 | 1.5 | 0.4 | 105.2 | 4.9 | 113.6 | 460.9 | 574.5 |
| | Manufacturing | 0.0 | 0.3 | 0.0 | 1.7 | 0.0 | 0.6 | 3.1 | 2.6 | 36.4 | 0.2 | 83.9 | 212.1 | 296.0 |
| | Services | 0.0 | 0.4 | 0.1 | 4.2 | 0.1 | 14.4 | 87.8 | 25.9 | 1,184.7 | 18.3 | 1,441.9 | 4,873.7 | 6,315.6 |
| | Government | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.2 | 20.5 | 0.3 | 21.5 | 485.2 | 506.7 |
| | Intermed. input | 13.0 | 68.4 | 16.0 | 714.7 | 14.5 | 38.9 | 172.0 | 99.4 | 1,856.7 | 31.3 | 18,251.0 | 52,367.8 | 70,618.8 |
| | Value added | 24.1 | 101.9 | 22.7 | 1,467.3 | 236.5 | 88.1 | 267.3 | 133.8 | 3,678.9 | 455.5 | 43,474.8 | | |
| | Income | 17.8 | 84.9 | 21.3 | 734.6 | 220.3 | 66.4 | 225.7 | 129.7 | 1,882.6 | 422.1 | 28,607.1 | | |
| | Others | 6.3 | 17.0 | 1.4 | 732.7 | 16.2 | 21.7 | 41.7 | 4.0 | 1,796.3 | 33.5 | 14,867.7 | | |
| | Imports | 11.5 | 58.6 | 15.3 | 283.7 | 8.1 | 15.9 | 135.2 | 62.8 | 780.0 | 19.9 | 8,893.0 | 10,386.2 | 19,279.2 |
| | Total input | 48.6 | 228.9 | 53.9 | 2,465.8 | 259.0 | 142.9 | 574.5 | 296.0 | 6,315.6 | 506.7 | 70,618.8 | 62,754.0 | |
| | Total jobs | 1,596 | 2,008 | 615 | 28,431 | 4,881 | 3,399 | 4,979 | 2,306 | 67,677 | 9,719 | 770,180 | | |

Table 3. Inter-county Transactions Table (percent of total input), 2002

| | | Hawaii County | | | | | Honolulu County | | | | |
|--------------------|-----------------|------------------|-------------------|--------------------|----------|-----------------|------------------|------------------|--------------------|----------|-----------------|
| | | Agri- culture | Const- ruction | Manufac- turing | Services | Govern- ment | Agri- culture | Const- ructon | Manufac- turing | Services | Govern- ment |
| Hawaii County | Agriculture | 11.2 | 0.1 | 6.0 | 0.2 | 0.0 | 0.2 | 0.0 | 0.9 | 0.0 | 0.0 |
| | Construction | 0.6 | 0.2 | 0.2 | 1.1 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Manufacturing | 0.5 | 0.5 | 1.4 | 0.3 | 0.0 | 0.2 | 0.1 | 0.2 | 0.1 | 0.0 |
| | Services | 9.1 | 15.7 | 11.3 | 18.2 | 4.1 | 0.1 | 0.5 | 0.1 | 0.2 | 0.0 |
| | Government | 0.6 | 0.1 | 0.2 | 0.7 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Honolulu County | Agriculture | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 7.2 | 0.0 | 1.8 | 0.2 | 0.0 |
| | Construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 0.2 | 0.1 | 1.2 | 0.6 |
| | Manufacturing | 4.8 | 5.4 | 4.1 | 2.8 | 0.4 | 4.6 | 4.3 | 4.1 | 2.4 | 0.4 |
| | Services | 3.4 | 7.3 | 4.7 | 4.5 | 0.8 | 13.9 | 24.1 | 15.2 | 24.7 | 4.2 |
| | Government | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.2 | 0.4 | 1.0 | 0.2 |
| Kauai County | Agriculture | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Manufacturing | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Services | 0.1 | 0.2 | 0.2 | 0.2 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 |
| | Government | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Maui County | Agriculture | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Manufacturing | 0.2 | 0.2 | 0.2 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 |
| | Services | 0.1 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 |
| | Government | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Intermed. input | 30.6 | 29.9 | 29.5 | 28.4 | 6.4 | 28.1 | 29.9 | 23.3 | 30.1 | 5.5 |
| | Value added | 49.7 | 45.6 | 28.6 | 60.7 | 90.6 | 57.7 | 48.6 | 21.0 | 59.3 | 92.0 |
| | Income | 38.4 | 37.9 | 26.4 | 31.6 | 85.0 | 45.0 | 41.1 | 17.2 | 33.8 | 83.2 |
| | Others | 11.3 | 7.7 | 2.2 | 29.1 | 5.6 | 12.7 | 7.5 | 3.9 | 25.4 | 8.8 |
| | Imports | 19.7 | 24.5 | 42.0 | 10.9 | 3.0 | 14.2 | 21.5 | 55.6 | 10.6 | 2.5 |
| | Total input | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Table 3. Inter-county Transactions Table (percent of total input), 2002 - Contd.

| | | Kauai County | | | | | Maui County | | | | | Total | Total | Total |
|-----------------|-----------------|--------------|---------------|----------------|-----------|-------------|--------------|---------------|----------------|----------|-------------|------------------|--------------|----------------|
| | | Agri-culture | Const-ruktion | Manuf-acturing | Servi-ces | Govern-ment | Agri-culture | Const-ruktion | Manuf-acturing | Services | Govern-ment | intermed. demand | final demand | output (sales) |
| Hawaii County | Agriculture | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.3 |
| | Construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 1.0 | 1.0 |
| | Manufacturing | 0.0 | 0.1 | 2.7 | 0.1 | 0.0 | 0.1 | 0.2 | 0.1 | 0.1 | 0.0 | 0.1 | 0.2 | 0.3 |
| | Services | 0.0 | 0.0 | 0.3 | 0.1 | 0.1 | 0.1 | 0.3 | 0.2 | 0.3 | 0.1 | 1.6 | 5.8 | 6.8 |
| | Government | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 1.0 | 0.9 |
| Honolulu County | Agriculture | 0.0 | 0.0 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 3.9 | 0.0 | 0.0 | 0.2 | 0.2 | 0.4 |
| | Construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 4.3 | 4.6 |
| | Manufacturing | 3.5 | 4.9 | 1.2 | 2.2 | 0.3 | 3.7 | 5.9 | 2.4 | 2.8 | 0.5 | 2.4 | 2.3 | 4.5 |
| | Services | 3.1 | 6.5 | 2.0 | 3.0 | 0.5 | 2.7 | 6.9 | 3.3 | 4.4 | 0.9 | 16.4 | 40.8 | 52.7 |
| | Government | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 14.2 | 13.2 |
| Kauai County | Agriculture | 4.0 | 0.1 | 11.6 | 0.2 | 0.0 | 0.0 | 0.0 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| | Construction | 1.4 | 0.3 | 0.1 | 1.8 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.3 |
| | Manufacturing | 0.2 | 0.2 | 0.4 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 |
| | Services | 14.1 | 17.3 | 8.4 | 19.9 | 3.6 | 0.1 | 0.2 | 0.1 | 0.2 | 0.0 | 0.9 | 2.9 | 3.5 |
| | Government | 0.3 | 0.2 | 0.2 | 1.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.4 |
| Maui County | Agriculture | 0.0 | 0.0 | 1.3 | 0.0 | 0.0 | 8.7 | 0.1 | 11.7 | 0.2 | 0.0 | 0.1 | 0.1 | 0.2 |
| | Construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.1 | 0.3 | 0.1 | 1.7 | 1.0 | 0.2 | 0.7 | 0.8 |
| | Manufacturing | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.4 | 0.5 | 0.9 | 0.6 | 0.0 | 0.1 | 0.3 | 0.4 |
| | Services | 0.1 | 0.2 | 0.1 | 0.2 | 0.0 | 10.1 | 15.3 | 8.7 | 18.8 | 3.6 | 2.0 | 7.8 | 8.9 |
| | Government | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.3 | 0.1 | 0.0 | 0.8 | 0.7 |
| | Intermed. input | 26.7 | 29.9 | 29.6 | 29.0 | 5.6 | 27.3 | 29.9 | 33.6 | 29.4 | 6.2 | 25.8 | 83.4 | |
| | Value added | 49.5 | 44.5 | 42.0 | 59.5 | 91.3 | 61.6 | 46.5 | 45.2 | 58.3 | 89.9 | 61.6 | | |
| | Income | 36.6 | 37.1 | 39.4 | 29.8 | 85.0 | 46.4 | 39.3 | 43.8 | 29.8 | 83.3 | 40.5 | | |
| | Others | 12.9 | 7.4 | 2.5 | 29.7 | 6.3 | 15.2 | 7.3 | 1.4 | 28.4 | 6.6 | 21.1 | | |
| | Imports | 23.7 | 25.6 | 28.4 | 11.5 | 3.1 | 11.1 | 23.5 | 21.2 | 12.3 | 3.9 | 12.6 | 16.6 | |
| | Total input | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Table 4. Composition of Total Final Demand by County, 2002

| | Hawaii County | Honolulu County | Kauai County | Maui County | State Total |
|-----------------------------------|------------------|--------------------|-----------------|----------------|-------------|
| Total final demand (\$ million) | 5,134.2 | 38,813.5 | 2,311.7 | 6,108.5 | 52,367.8 |
| Components of final demand | | | | | |
| Personal consumption expenditures | 2,151.0 | 17,751.1 | 842.8 | 2,361.0 | 23,105.9 |
| Visitor expenditures | 1,062.4 | 5,269.7 | 740.6 | 1,976.1 | 9,048.7 |
| GPI and inventories change | 640.9 | 2,377.7 | 178.3 | 445.5 | 3,642.4 |
| State and local government | 633.8 | 4,176.7 | 244.5 | 535.5 | 5,590.5 |
| Federal government | 99.5 | 6,388.3 | 33.2 | 54.2 | 6,575.2 |
| Exports - within state | 373.0 | 1,037.4 | 189.5 | 460.3 | 2,060.2 |
| Exports - out of state | 173.6 | 1,812.7 | 82.8 | 275.9 | 2,344.9 |

GPI = gross private investment

| | Hawaii County | Honolulu County | Kauai County | Maui County | State Total |
|-----------------------------------|------------------|--------------------|-----------------|----------------|-------------|
| Total final demand (\$ million) | 5,134.2 | 38,813.5 | 2,311.7 | 6,108.5 | 52,367.8 |
| Share in county final demand (%) | | | | | |
| Personal consumption expenditures | 41.9 | 45.7 | 36.5 | 38.7 | 44.1 |
| Visitor expenditures | 20.7 | 13.6 | 32.0 | 32.3 | 17.3 |
| GPI and inventories change | 12.5 | 6.1 | 7.7 | 7.3 | 7.0 |
| State and local government | 12.3 | 10.8 | 10.6 | 8.8 | 10.7 |
| Federal government | 1.9 | 16.5 | 1.4 | 0.9 | 12.6 |
| Exports - within state | 7.3 | 2.7 | 8.2 | 7.5 | 3.9 |
| Exports - out of state | 3.4 | 4.7 | 3.6 | 4.5 | 4.5 |

| | Hawaii County | Honolulu County | Kauai County | Maui County | State Total |
|---|------------------|--------------------|-----------------|----------------|-------------|
| Total final demand (% in state total) | 9.8 | 74.1 | 4.4 | 11.7 | 100.0 |
| Share in state total (% of state total) | | | | | |
| Personal consumption expenditures | 9.3 | 76.8 | 3.6 | 10.2 | 100.0 |
| Visitor expenditures | 11.7 | 58.2 | 8.2 | 21.8 | 100.0 |
| GPI and inventories change | 17.6 | 65.3 | 4.9 | 12.2 | 100.0 |
| State and local government | 11.3 | 74.7 | 4.4 | 9.6 | 100.0 |
| Federal government | 1.5 | 97.2 | 0.5 | 0.8 | 100.0 |
| Exports - within state | 18.1 | 50.4 | 9.2 | 22.3 | 100.0 |
| Exports - out of state | 7.4 | 77.3 | 3.5 | 11.8 | 100.0 |

Table 5. Final Demand Output, Earnings and Total Job Multipliers in State, Inter-county, and County I-O Models

| | Agriculture | | Construction | | Manufacturing | | Services | | Government | |
|---------------------|-------------|---------|--------------|---------|---------------|---------|----------|---------|------------|---------|
| | Type I | Type II | Type I | Type II | Type I | Type II | Type I | Type II | Type I | Type II |
| Output multipliers | | | | | | | | | | |
| State model | 1.40 | 2.02 | 1.42 | 1.99 | 1.34 | 1.67 | 1.42 | 1.93 | 1.08 | 1.87 |
| Inter-county model | | | | | | | | | | |
| Hawaii | 1.43 | 1.99 | 1.41 | 1.94 | 1.41 | 1.83 | 1.39 | 1.87 | 1.09 | 1.96 |
| Honolulu | 1.39 | 2.07 | 1.42 | 2.00 | 1.33 | 1.62 | 1.42 | 1.95 | 1.08 | 1.86 |
| Kauai | 1.37 | 1.83 | 1.42 | 1.94 | 1.41 | 1.97 | 1.40 | 1.85 | 1.08 | 1.92 |
| Maui | 1.38 | 2.00 | 1.42 | 1.96 | 1.47 | 2.08 | 1.41 | 1.87 | 1.09 | 1.93 |
| County model | | | | | | | | | | |
| Hawaii | 1.28 | 1.65 | 1.21 | 1.54 | 1.24 | 1.50 | 1.26 | 1.57 | 1.06 | 1.68 |
| Honolulu | 1.37 | 1.99 | 1.40 | 1.94 | 1.30 | 1.56 | 1.41 | 1.89 | 1.07 | 1.80 |
| Kauai | 1.26 | 1.57 | 1.23 | 1.57 | 1.26 | 1.63 | 1.30 | 1.60 | 1.06 | 1.67 |
| Maui | 1.26 | 1.69 | 1.21 | 1.55 | 1.27 | 1.67 | 1.27 | 1.57 | 1.06 | 1.67 |
| Earnings multiplier | | | | | | | | | | |
| State model | 0.50 | 0.68 | 0.46 | 0.62 | 0.27 | 0.36 | 0.41 | 0.56 | 0.64 | 0.87 |
| Inter-county model | | | | | | | | | | |
| Hawaii | 0.47 | 0.63 | 0.43 | 0.59 | 0.35 | 0.47 | 0.39 | 0.53 | 0.72 | 0.96 |
| Honolulu | 0.54 | 0.74 | 0.47 | 0.64 | 0.23 | 0.32 | 0.42 | 0.58 | 0.63 | 0.86 |
| Kauai | 0.39 | 0.51 | 0.44 | 0.58 | 0.46 | 0.61 | 0.37 | 0.50 | 0.70 | 0.94 |
| Maui | 0.51 | 0.68 | 0.45 | 0.59 | 0.51 | 0.68 | 0.37 | 0.50 | 0.70 | 0.93 |
| County model | | | | | | | | | | |
| Hawaii | 0.43 | 0.54 | 0.38 | 0.48 | 0.30 | 0.38 | 0.36 | 0.45 | 0.71 | 0.89 |
| Honolulu | 0.54 | 0.72 | 0.46 | 0.62 | 0.23 | 0.30 | 0.42 | 0.56 | 0.62 | 0.84 |
| Kauai | 0.36 | 0.44 | 0.39 | 0.48 | 0.42 | 0.52 | 0.35 | 0.43 | 0.70 | 0.87 |
| Maui | 0.48 | 0.60 | 0.39 | 0.49 | 0.45 | 0.56 | 0.34 | 0.42 | 0.69 | 0.86 |
| Job multiplier | | | | | | | | | | |
| State model | 30.3 | 36.8 | 11.4 | 17.3 | 9.2 | 12.6 | 14.7 | 20.0 | 16.6 | 24.8 |
| Inter-county model | | | | | | | | | | |
| Hawaii | 40.4 | 46.8 | 12.0 | 17.9 | 15.6 | 20.3 | 16.1 | 21.5 | 20.5 | 30.4 |
| Honolulu | 23.3 | 30.1 | 10.8 | 16.8 | 7.9 | 10.8 | 14.3 | 19.7 | 16.0 | 24.0 |
| Kauai | 37.6 | 42.8 | 13.1 | 18.9 | 18.8 | 24.9 | 16.0 | 21.0 | 19.7 | 29.1 |
| Maui | 28.8 | 35.3 | 12.7 | 18.4 | 15.0 | 21.5 | 14.9 | 19.7 | 20.0 | 28.9 |
| County model | | | | | | | | | | |
| Hawaii | 39.2 | 43.7 | 10.2 | 14.2 | 14.0 | 17.2 | 15.0 | 18.7 | 20.3 | 27.7 |
| Honolulu | 22.9 | 29.2 | 10.6 | 16.0 | 7.3 | 9.9 | 14.1 | 19.0 | 16.0 | 23.3 |
| Kauai | 36.7 | 40.3 | 11.5 | 15.5 | 17.0 | 21.3 | 15.1 | 18.6 | 19.5 | 26.6 |
| Maui | 27.8 | 32.4 | 10.9 | 14.7 | 12.4 | 16.7 | 13.7 | 16.9 | 19.8 | 26.4 |

Table 6. Counties' Percentage Contributions to Output Multiplier in Inter-county I-O Model

| | Agriculture | | Construction | | Manufacturing | | Services | | Government | |
|----------|-------------|-------|--------------|-------|---------------|-------|------------|-------|------------|-------|
| | Multiplier | % | Multiplier | % | Multiplier | % | Multiplier | % | Multiplier | % |
| Type I | | | | | | | | | | |
| Hawaii | 1.43 | 100.0 | 1.49 | 100.0 | 1.49 | 100.0 | 1.37 | 100.0 | 1.05 | 100.0 |
| Hawaii | 1.28 | 89.6 | 1.26 | 84.6 | 1.30 | 87.2 | 1.25 | 91.2 | 1.04 | 99.0 |
| Honolulu | 0.14 | 9.8 | 0.22 | 14.8 | 0.17 | 11.4 | 0.11 | 8.0 | 0.02 | 1.9 |
| Kauai | 0.00 | 0.2 | 0.00 | 0.0 | 0.01 | 0.7 | 0.00 | 0.0 | 0.00 | 0.0 |
| Maui | 0.01 | 0.4 | 0.01 | 0.7 | 0.01 | 0.7 | 0.00 | 0.0 | 0.00 | 0.0 |
| Honolulu | 1.40 | 100.0 | 1.43 | 100.0 | 1.29 | 100.0 | 1.39 | 100.0 | 1.04 | 100.0 |
| Hawaii | 0.01 | 0.7 | 0.01 | 0.7 | 0.02 | 1.6 | 0.01 | 0.7 | 0.00 | 0.0 |
| Honolulu | 1.38 | 98.6 | 1.41 | 98.6 | 1.26 | 97.7 | 1.38 | 99.3 | 1.04 | 100.0 |
| Kauai | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 |
| Maui | 0.01 | 0.7 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 |
| Kauai | 1.57 | 100.0 | 1.54 | 100.0 | 1.93 | 100.0 | 1.37 | 100.0 | 1.06 | 100.0 |
| Hawaii | 0.00 | 0.0 | 0.00 | 0.0 | 0.02 | 1.0 | 0.00 | 0.0 | 0.00 | 0.0 |
| Honolulu | 0.20 | 12.7 | 0.23 | 14.9 | 0.21 | 10.9 | 0.09 | 6.6 | 0.01 | 0.9 |
| Kauai | 1.36 | 86.6 | 1.30 | 84.4 | 1.64 | 85.0 | 1.27 | 92.7 | 1.05 | 99.1 |
| Maui | 0.01 | 0.6 | 0.01 | 0.6 | 0.05 | 2.6 | 0.00 | 0.0 | 0.00 | 0.0 |
| Maui | 1.46 | 100.0 | 1.44 | 100.0 | 1.71 | 100.0 | 1.35 | 100.0 | 1.07 | 100.0 |
| Hawaii | 0.01 | 0.7 | 0.01 | 0.7 | 0.04 | 2.3 | 0.01 | 0.7 | 0.00 | 0.0 |
| Honolulu | 0.17 | 11.6 | 0.22 | 15.3 | 0.28 | 16.4 | 0.12 | 8.9 | 0.03 | 2.8 |
| Kauai | 0.00 | 0.0 | 0.00 | 0.0 | 0.02 | 1.2 | 0.00 | 0.0 | 0.00 | 0.0 |
| Maui | 1.28 | 87.7 | 1.20 | 83.3 | 1.37 | 80.1 | 1.22 | 90.4 | 1.05 | 98.1 |
| Type II | | | | | | | | | | |
| Hawaii | 1.92 | 100.0 | 1.98 | 100.0 | 1.83 | 100.0 | 1.81 | 100.0 | 1.82 | 100.0 |
| Hawaii | 1.60 | 83.3 | 1.57 | 79.3 | 1.51 | 82.5 | 1.54 | 85.1 | 1.59 | 87.4 |
| Honolulu | 0.30 | 15.6 | 0.39 | 19.7 | 0.29 | 15.8 | 0.25 | 13.8 | 0.21 | 11.5 |
| Kauai | 0.01 | 0.5 | 0.01 | 0.5 | 0.01 | 0.5 | 0.01 | 0.6 | 0.01 | 0.5 |
| Maui | 0.01 | 0.5 | 0.02 | 1.0 | 0.02 | 1.1 | 0.01 | 0.6 | 0.01 | 0.5 |
| Honolulu | 2.02 | 100.0 | 2.04 | 100.0 | 1.54 | 100.0 | 1.88 | 100.0 | 1.84 | 100.0 |
| Hawaii | 0.02 | 1.0 | 0.02 | 1.0 | 0.03 | 1.9 | 0.01 | 0.5 | 0.01 | 0.5 |
| Honolulu | 1.97 | 97.5 | 1.99 | 97.5 | 1.50 | 97.4 | 1.84 | 97.9 | 1.81 | 98.4 |
| Kauai | 0.01 | 0.5 | 0.01 | 0.5 | 0.00 | 0.0 | 0.01 | 0.5 | 0.01 | 0.5 |
| Maui | 0.02 | 1.0 | 0.02 | 1.0 | 0.01 | 0.6 | 0.01 | 0.5 | 0.01 | 0.5 |
| Kauai | 2.07 | 100.0 | 2.02 | 100.0 | 2.38 | 100.0 | 1.86 | 100.0 | 1.80 | 100.0 |
| Hawaii | 0.01 | 0.5 | 0.01 | 0.5 | 0.03 | 1.3 | 0.01 | 0.5 | 0.01 | 0.6 |
| Honolulu | 0.37 | 17.9 | 0.40 | 19.8 | 0.37 | 15.5 | 0.24 | 12.9 | 0.21 | 11.7 |
| Kauai | 1.68 | 81.2 | 1.59 | 78.7 | 1.90 | 79.8 | 1.60 | 86.0 | 1.57 | 87.2 |
| Maui | 0.02 | 1.0 | 0.02 | 1.0 | 0.08 | 3.4 | 0.01 | 0.5 | 0.01 | 0.6 |
| Maui | 2.01 | 100.0 | 1.94 | 100.0 | 2.17 | 100.0 | 1.79 | 100.0 | 1.81 | 100.0 |
| Hawaii | 0.02 | 1.0 | 0.02 | 1.0 | 0.05 | 2.3 | 0.02 | 1.1 | 0.01 | 0.6 |
| Honolulu | 0.33 | 16.4 | 0.38 | 19.6 | 0.45 | 20.7 | 0.25 | 14.0 | 0.21 | 11.6 |
| Kauai | 0.01 | 0.5 | 0.01 | 0.5 | 0.03 | 1.4 | 0.01 | 0.6 | 0.01 | 0.6 |
| Maui | 1.65 | 82.1 | 1.53 | 78.9 | 1.64 | 75.6 | 1.52 | 84.9 | 1.58 | 87.3 |

Table 7. Type I State and Weighted Inter-county Multipliers

| | Agriculture | Construction | Manufacturing | Services | Government |
|-----------------------|-------------|--------------|---------------|----------|------------|
| Output | | | | | |
| State | 1.40 | 1.42 | 1.34 | 1.42 | 1.08 |
| Weighted inter-county | 1.40 | 1.42 | 1.34 | 1.42 | 1.08 |
| Earnings | | | | | |
| State | 0.50 | 0.46 | 0.27 | 0.41 | 0.64 |
| Weighted inter-county | 0.50 | 0.46 | 0.30 | 0.41 | 0.64 |
| Total jobs | | | | | |
| State | 30.3 | 11.4 | 9.2 | 14.7 | 16.6 |
| Weighted inter-county | 32.5 | 11.4 | 9.9 | 14.7 | 16.7 |

Table 8. Final Demand Output Multipliers for the State, Inter-county and County I-O Models

| | State model | Inter-county model | | | | County model | | | |
|-------------------------|-------------|--------------------|------|-------|------|--------------|------|-------|------|
| | | Hawaii | Oahu | Kauai | Maui | Hawaii | Oahu | Kauai | Maui |
| Type I | | | | | | | | | |
| Agriculture | 1.39 | 1.42 | 1.39 | 1.37 | 1.37 | 1.27 | 1.37 | 1.25 | 1.25 |
| Mining and construction | 1.41 | 1.40 | 1.41 | 1.41 | 1.41 | 1.21 | 1.39 | 1.23 | 1.20 |
| Food processing | 1.60 | 1.60 | 1.60 | 1.59 | 1.59 | 1.38 | 1.51 | 1.43 | 1.36 |
| Other manufacturing | 1.25 | 1.28 | 1.24 | 1.24 | 1.25 | 1.14 | 1.23 | 1.09 | 1.12 |
| Transportation | 1.52 | 1.46 | 1.53 | 1.49 | 1.47 | 1.22 | 1.51 | 1.31 | 1.22 |
| Information | 1.32 | 1.35 | 1.32 | 1.30 | 1.36 | 1.24 | 1.31 | 1.24 | 1.26 |
| Utilities | 1.43 | 1.41 | 1.43 | 1.42 | 1.42 | 1.09 | 1.41 | 1.12 | 1.10 |
| Wholesale trade | 1.28 | 1.27 | 1.28 | 1.28 | 1.28 | 1.17 | 1.27 | 1.19 | 1.17 |
| Retail trade | 1.36 | 1.37 | 1.35 | 1.37 | 1.37 | 1.27 | 1.34 | 1.30 | 1.27 |
| Finance and insurance | 1.48 | 1.42 | 1.49 | 1.45 | 1.44 | 1.24 | 1.48 | 1.31 | 1.26 |
| Real estate and rentals | 1.42 | 1.39 | 1.43 | 1.41 | 1.42 | 1.28 | 1.42 | 1.31 | 1.28 |
| Professional services | 1.41 | 1.43 | 1.41 | 1.44 | 1.46 | 1.27 | 1.39 | 1.31 | 1.30 |
| Business services | 1.37 | 1.33 | 1.38 | 1.32 | 1.37 | 1.21 | 1.37 | 1.24 | 1.24 |
| Educational services | 1.47 | 1.44 | 1.48 | 1.42 | 1.46 | 1.31 | 1.46 | 1.30 | 1.34 |
| Health services | 1.40 | 1.37 | 1.40 | 1.40 | 1.38 | 1.24 | 1.39 | 1.31 | 1.25 |
| Arts and entertainment | 1.27 | 1.27 | 1.27 | 1.27 | 1.27 | 1.19 | 1.26 | 1.21 | 1.19 |
| Hotels | 1.40 | 1.39 | 1.40 | 1.39 | 1.42 | 1.27 | 1.39 | 1.31 | 1.30 |
| Eating and drinking | 1.51 | 1.50 | 1.51 | 1.49 | 1.50 | 1.28 | 1.48 | 1.34 | 1.31 |
| Other services | 1.46 | 1.40 | 1.46 | 1.44 | 1.45 | 1.28 | 1.45 | 1.34 | 1.31 |
| Government | 1.08 | 1.09 | 1.08 | 1.08 | 1.09 | 1.06 | 1.07 | 1.06 | 1.06 |
| Type II | | | | | | | | | |
| Agriculture | 2.00 | 1.97 | 2.05 | 1.81 | 1.96 | 1.63 | 1.97 | 1.55 | 1.66 |
| Mining and construction | 1.98 | 1.93 | 2.00 | 1.93 | 1.94 | 1.54 | 1.93 | 1.57 | 1.55 |
| Food processing | 2.04 | 2.04 | 2.04 | 2.02 | 2.05 | 1.63 | 1.88 | 1.70 | 1.62 |
| Other manufacturing | 1.54 | 1.69 | 1.50 | 1.91 | 2.09 | 1.40 | 1.47 | 1.54 | 1.71 |
| Transportation | 2.04 | 2.04 | 2.04 | 2.02 | 1.98 | 1.58 | 1.98 | 1.65 | 1.54 |
| Information | 1.79 | 1.86 | 1.82 | 1.66 | 1.63 | 1.58 | 1.77 | 1.48 | 1.43 |
| Utilities | 1.72 | 1.71 | 1.72 | 1.69 | 1.69 | 1.25 | 1.67 | 1.27 | 1.25 |
| Wholesale trade | 1.78 | 1.81 | 1.79 | 1.67 | 1.76 | 1.53 | 1.74 | 1.45 | 1.50 |
| Retail trade | 1.88 | 1.83 | 1.88 | 1.90 | 1.87 | 1.58 | 1.84 | 1.66 | 1.61 |
| Finance and insurance | 1.95 | 1.95 | 1.96 | 1.93 | 1.86 | 1.57 | 1.91 | 1.61 | 1.52 |
| Real estate and rentals | 1.65 | 1.64 | 1.66 | 1.64 | 1.61 | 1.43 | 1.63 | 1.46 | 1.39 |
| Professional services | 2.12 | 2.04 | 2.15 | 1.94 | 2.05 | 1.67 | 2.08 | 1.63 | 1.68 |
| Business services | 2.12 | 1.98 | 2.15 | 2.09 | 1.94 | 1.65 | 2.08 | 1.77 | 1.63 |
| Educational services | 2.21 | 2.14 | 2.24 | 2.19 | 2.04 | 1.79 | 2.17 | 1.81 | 1.73 |
| Health services | 2.09 | 2.01 | 2.13 | 2.03 | 1.98 | 1.66 | 2.05 | 1.74 | 1.65 |
| Arts and entertainment | 1.97 | 1.97 | 1.98 | 1.93 | 1.92 | 1.67 | 1.92 | 1.67 | 1.65 |
| Hotels | 1.97 | 1.91 | 1.99 | 1.84 | 1.95 | 1.62 | 1.94 | 1.62 | 1.66 |
| Eating and drinking | 2.05 | 2.01 | 2.07 | 1.99 | 2.01 | 1.59 | 1.98 | 1.66 | 1.64 |
| Other services | 2.08 | 2.03 | 2.10 | 2.06 | 2.00 | 1.69 | 2.04 | 1.76 | 1.67 |
| Government | 1.86 | 1.94 | 1.85 | 1.92 | 1.91 | 1.67 | 1.79 | 1.65 | 1.65 |

Note: Output multiplier shows the total dollar change in output in all row industries that results from a \$1 change in final demand in the corresponding row industry.

Table 9. Final Demand Earnings Multipliers for the State, Inter-county and County Models

| | State model | Inter-county model | | | | County model | | | |
|-------------------------|-------------|--------------------|------|-------|------|--------------|------|-------|------|
| | | Hawaii | Oahu | Kauai | Maui | Hawaii | Oahu | Kauai | Maui |
| Type I | | | | | | | | | |
| Agriculture | 0.49 | 0.46 | 0.53 | 0.37 | 0.50 | 0.42 | 0.53 | 0.34 | 0.47 |
| Mining and construction | 0.47 | 0.44 | 0.48 | 0.44 | 0.46 | 0.39 | 0.47 | 0.39 | 0.40 |
| Food processing | 0.36 | 0.37 | 0.35 | 0.36 | 0.39 | 0.30 | 0.32 | 0.31 | 0.31 |
| Other manufacturing | 0.24 | 0.34 | 0.21 | 0.57 | 0.72 | 0.30 | 0.21 | 0.53 | 0.69 |
| Transportation | 0.42 | 0.48 | 0.41 | 0.45 | 0.43 | 0.42 | 0.41 | 0.40 | 0.37 |
| Information | 0.38 | 0.42 | 0.40 | 0.30 | 0.24 | 0.39 | 0.40 | 0.28 | 0.21 |
| Utilities | 0.24 | 0.25 | 0.23 | 0.23 | 0.23 | 0.18 | 0.23 | 0.17 | 0.17 |
| Wholesale trade | 0.41 | 0.45 | 0.41 | 0.33 | 0.41 | 0.42 | 0.40 | 0.30 | 0.38 |
| Retail trade | 0.42 | 0.38 | 0.43 | 0.45 | 0.43 | 0.36 | 0.43 | 0.43 | 0.40 |
| Finance and insurance | 0.38 | 0.44 | 0.38 | 0.40 | 0.36 | 0.39 | 0.38 | 0.36 | 0.31 |
| Real estate and rentals | 0.18 | 0.21 | 0.18 | 0.20 | 0.16 | 0.17 | 0.18 | 0.17 | 0.13 |
| Professional services | 0.58 | 0.51 | 0.60 | 0.42 | 0.50 | 0.46 | 0.59 | 0.39 | 0.45 |
| Business services | 0.61 | 0.55 | 0.63 | 0.65 | 0.49 | 0.51 | 0.62 | 0.62 | 0.45 |
| Educational services | 0.60 | 0.59 | 0.62 | 0.65 | 0.49 | 0.55 | 0.61 | 0.61 | 0.46 |
| Health services | 0.57 | 0.53 | 0.58 | 0.53 | 0.52 | 0.49 | 0.58 | 0.50 | 0.48 |
| Arts and entertainment | 0.57 | 0.58 | 0.57 | 0.55 | 0.56 | 0.56 | 0.57 | 0.53 | 0.53 |
| Hotels | 0.46 | 0.44 | 0.48 | 0.38 | 0.45 | 0.40 | 0.47 | 0.36 | 0.42 |
| Eating and drinking | 0.44 | 0.43 | 0.45 | 0.42 | 0.43 | 0.37 | 0.44 | 0.38 | 0.38 |
| Other services | 0.51 | 0.53 | 0.51 | 0.52 | 0.47 | 0.49 | 0.51 | 0.49 | 0.43 |
| Government | 0.64 | 0.72 | 0.63 | 0.71 | 0.70 | 0.71 | 0.63 | 0.70 | 0.69 |
| Type II | | | | | | | | | |
| Agriculture | 0.67 | 0.61 | 0.73 | 0.49 | 0.65 | 0.52 | 0.71 | 0.42 | 0.57 |
| Mining and construction | 0.63 | 0.59 | 0.65 | 0.58 | 0.59 | 0.48 | 0.63 | 0.48 | 0.48 |
| Food processing | 0.49 | 0.49 | 0.48 | 0.48 | 0.50 | 0.37 | 0.43 | 0.38 | 0.37 |
| Other manufacturing | 0.32 | 0.46 | 0.28 | 0.75 | 0.94 | 0.38 | 0.27 | 0.65 | 0.83 |
| Transportation | 0.57 | 0.64 | 0.56 | 0.59 | 0.56 | 0.52 | 0.54 | 0.49 | 0.45 |
| Information | 0.51 | 0.57 | 0.55 | 0.40 | 0.31 | 0.48 | 0.54 | 0.34 | 0.25 |
| Utilities | 0.32 | 0.33 | 0.32 | 0.31 | 0.30 | 0.23 | 0.30 | 0.21 | 0.21 |
| Wholesale trade | 0.55 | 0.60 | 0.55 | 0.43 | 0.53 | 0.52 | 0.54 | 0.37 | 0.45 |
| Retail trade | 0.57 | 0.51 | 0.59 | 0.59 | 0.56 | 0.44 | 0.57 | 0.52 | 0.48 |
| Finance and insurance | 0.52 | 0.59 | 0.52 | 0.53 | 0.47 | 0.48 | 0.51 | 0.44 | 0.37 |
| Real estate and rentals | 0.25 | 0.28 | 0.25 | 0.26 | 0.22 | 0.21 | 0.24 | 0.21 | 0.15 |
| Professional services | 0.78 | 0.68 | 0.81 | 0.56 | 0.65 | 0.57 | 0.79 | 0.47 | 0.55 |
| Business services | 0.82 | 0.73 | 0.85 | 0.85 | 0.64 | 0.63 | 0.83 | 0.76 | 0.54 |
| Educational services | 0.82 | 0.79 | 0.84 | 0.85 | 0.64 | 0.68 | 0.82 | 0.74 | 0.55 |
| Health services | 0.77 | 0.71 | 0.80 | 0.70 | 0.67 | 0.60 | 0.77 | 0.62 | 0.57 |
| Arts and entertainment | 0.77 | 0.78 | 0.78 | 0.72 | 0.72 | 0.69 | 0.76 | 0.65 | 0.64 |
| Hotels | 0.62 | 0.59 | 0.65 | 0.50 | 0.59 | 0.50 | 0.64 | 0.44 | 0.50 |
| Eating and drinking | 0.60 | 0.57 | 0.61 | 0.55 | 0.56 | 0.45 | 0.59 | 0.46 | 0.46 |
| Other services | 0.69 | 0.71 | 0.70 | 0.68 | 0.61 | 0.60 | 0.68 | 0.60 | 0.51 |
| Government | 0.86 | 0.96 | 0.86 | 0.93 | 0.91 | 0.88 | 0.84 | 0.85 | 0.83 |

Note: Final demand earnings multiplier shows the total change in earnings received by households from all row industries that results from a \$1 change in final demand in the corresponding row industry.

Table 10. Final Demand Total Job Multipliers for the State, Inter-county and County Models

| | State model | Inter-county model | | | | County model | | | |
|-------------------------|-------------|--------------------|------|-------|------|--------------|------|-------|------|
| | | Hawaii | Oahu | Kauai | Maui | Hawaii | Oahu | Kauai | Maui |
| Type I | | | | | | | | | |
| Agriculture | 29.8 | 39.9 | 22.8 | 36.8 | 28.2 | 38.9 | 22.4 | 36.0 | 27.4 |
| Mining and construction | 11.3 | 12.1 | 10.8 | 13.3 | 13.0 | 10.5 | 10.6 | 11.8 | 11.2 |
| Food processing | 16.2 | 20.8 | 14.8 | 23.5 | 16.7 | 18.4 | 12.5 | 21.4 | 13.1 |
| Other manufacturing | 6.7 | 12.4 | 6.0 | 14.7 | 12.5 | 11.3 | 5.9 | 13.1 | 11.5 |
| Transportation | 12.3 | 15.8 | 11.5 | 16.9 | 15.0 | 14.1 | 11.2 | 15.7 | 13.3 |
| Information | 9.4 | 13.0 | 9.7 | 9.1 | 7.1 | 11.9 | 9.6 | 8.5 | 6.2 |
| Utilities | 5.0 | 5.2 | 4.9 | 5.4 | 4.9 | 3.4 | 4.6 | 3.7 | 3.2 |
| Wholesale trade | 11.7 | 15.9 | 11.1 | 14.8 | 15.3 | 15.0 | 10.9 | 14.0 | 14.3 |
| Retail trade | 19.2 | 19.1 | 19.1 | 21.3 | 18.9 | 18.2 | 19.0 | 20.7 | 18.1 |
| Finance and insurance | 10.4 | 14.8 | 9.9 | 16.3 | 12.5 | 13.3 | 9.8 | 15.1 | 11.0 |
| Real estate and rentals | 7.1 | 8.4 | 6.8 | 8.0 | 8.1 | 7.5 | 6.7 | 7.2 | 7.0 |
| Professional services | 15.7 | 20.2 | 14.8 | 20.3 | 20.2 | 18.8 | 14.6 | 19.1 | 18.7 |
| Business services | 22.8 | 31.3 | 22.0 | 28.3 | 22.3 | 30.2 | 21.8 | 27.5 | 21.1 |
| Educational services | 25.2 | 30.6 | 24.8 | 26.2 | 25.8 | 29.5 | 24.6 | 24.7 | 24.7 |
| Health services | 16.7 | 18.0 | 16.5 | 20.0 | 16.1 | 16.8 | 16.3 | 19.2 | 14.9 |
| Arts and entertainment | 30.2 | 30.7 | 32.8 | 25.9 | 25.3 | 29.9 | 32.7 | 25.3 | 24.6 |
| Hotels | 13.9 | 14.5 | 13.7 | 12.8 | 14.3 | 13.4 | 13.5 | 12.1 | 13.2 |
| Eating and drinking | 24.7 | 25.6 | 25.0 | 26.5 | 22.2 | 23.7 | 24.5 | 25.1 | 20.4 |
| Other services | 23.8 | 31.7 | 22.7 | 32.6 | 23.2 | 30.6 | 22.5 | 31.8 | 22.0 |
| Government | 16.6 | 20.4 | 16.0 | 19.7 | 20.0 | 20.2 | 16.0 | 19.5 | 19.8 |
| Type II | | | | | | | | | |
| Agriculture | 36.0 | 46.0 | 29.6 | 41.7 | 34.1 | 43.1 | 28.7 | 39.3 | 31.4 |
| Mining and construction | 17.3 | 17.9 | 29.6 | 19.0 | 18.3 | 14.3 | 16.1 | 15.6 | 14.6 |
| Food processing | 20.9 | 25.7 | 29.6 | 28.2 | 21.3 | 21.4 | 16.3 | 24.4 | 15.7 |
| Other manufacturing | 9.8 | 16.9 | 29.6 | 22.1 | 20.9 | 14.3 | 8.3 | 18.2 | 17.3 |
| Transportation | 17.7 | 22.2 | 29.6 | 22.7 | 20.1 | 18.2 | 16.0 | 19.5 | 16.4 |
| Information | 14.2 | 18.6 | 29.6 | 13.0 | 9.9 | 15.8 | 14.3 | 11.2 | 7.9 |
| Utilities | 8.1 | 8.5 | 29.6 | 8.4 | 7.7 | 5.2 | 7.3 | 5.4 | 4.6 |
| Wholesale trade | 16.9 | 21.9 | 29.6 | 19.1 | 20.1 | 19.1 | 15.7 | 16.9 | 17.5 |
| Retail trade | 24.6 | 24.2 | 29.6 | 27.1 | 24.0 | 21.7 | 24.0 | 24.8 | 21.5 |
| Finance and insurance | 15.3 | 20.7 | 29.6 | 21.5 | 16.7 | 17.2 | 14.2 | 18.5 | 13.6 |
| Real estate and rentals | 9.5 | 11.1 | 29.6 | 10.6 | 10.0 | 9.2 | 8.8 | 8.9 | 8.0 |
| Professional services | 23.0 | 27.0 | 29.6 | 25.9 | 26.1 | 23.3 | 21.6 | 22.8 | 22.5 |
| Business services | 30.6 | 38.5 | 29.6 | 36.7 | 28.1 | 35.2 | 29.1 | 33.5 | 25.0 |
| Educational services | 32.9 | 38.5 | 29.6 | 34.6 | 31.5 | 34.9 | 31.8 | 30.5 | 28.6 |
| Health services | 24.0 | 25.0 | 29.6 | 26.9 | 22.2 | 21.6 | 23.1 | 24.0 | 19.0 |
| Arts and entertainment | 37.4 | 38.4 | 29.6 | 33.0 | 31.8 | 35.4 | 39.4 | 30.3 | 29.1 |
| Hotels | 19.7 | 20.3 | 29.6 | 17.8 | 19.6 | 17.4 | 19.1 | 15.6 | 16.7 |
| Eating and drinking | 30.3 | 31.3 | 29.6 | 32.0 | 27.3 | 27.3 | 29.6 | 28.7 | 23.6 |
| Other services | 30.3 | 38.7 | 29.6 | 39.4 | 28.7 | 35.4 | 28.5 | 36.5 | 25.6 |
| Government | 24.7 | 29.9 | 29.6 | 28.8 | 28.2 | 27.2 | 23.3 | 26.2 | 25.6 |

Note: Final-demand total job multiplier shows the total change in number of total jobs (wage and salary and proprietors' jobs) in all row industries that results from a \$1 million change in final demand in the corresponding row industry.

Table 11. Final Demand State Tax Multipliers for the State, Inter-county and County Models

| | State model | Inter-county model | | | | County model | | | |
|-------------------------|-------------|--------------------|------|-------|------|--------------|------|-------|------|
| | | Hawaii | Oahu | Kauai | Maui | Hawaii | Oahu | Kauai | Maui |
| Type I | | | | | | | | | |
| Agriculture | 0.04 | 0.04 | 0.05 | 0.04 | 0.04 | 0.03 | 0.05 | 0.03 | 0.03 |
| Mining and construction | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.06 | 0.07 | 0.05 | 0.05 |
| Food processing | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.02 | 0.04 | 0.02 | 0.02 |
| Other manufacturing | 0.02 | 0.03 | 0.02 | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 |
| Transportation | 0.05 | 0.06 | 0.05 | 0.06 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 |
| Information | 0.06 | 0.08 | 0.05 | 0.06 | 0.05 | 0.07 | 0.05 | 0.05 | 0.05 |
| Utilities | 0.07 | 0.06 | 0.08 | 0.05 | 0.05 | 0.06 | 0.08 | 0.04 | 0.04 |
| Wholesale trade | 0.17 | 0.13 | 0.17 | 0.14 | 0.16 | 0.12 | 0.17 | 0.13 | 0.15 |
| Retail trade | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.17 | 0.18 | 0.17 | 0.17 |
| Finance and insurance | 0.06 | 0.03 | 0.06 | 0.03 | 0.03 | 0.03 | 0.06 | 0.03 | 0.03 |
| Real estate and rentals | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 | 0.05 | 0.04 | 0.04 |
| Professional services | 0.07 | 0.07 | 0.08 | 0.07 | 0.07 | 0.06 | 0.07 | 0.06 | 0.07 |
| Business services | 0.08 | 0.07 | 0.08 | 0.07 | 0.07 | 0.07 | 0.08 | 0.07 | 0.07 |
| Educational services | 0.08 | 0.07 | 0.08 | 0.07 | 0.07 | 0.07 | 0.08 | 0.07 | 0.07 |
| Health services | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.05 | 0.06 | 0.05 | 0.05 |
| Arts and entertainment | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 | 0.05 | 0.05 | 0.04 |
| Hotels | 0.10 | 0.07 | 0.14 | 0.08 | 0.08 | 0.07 | 0.14 | 0.07 | 0.08 |
| Eating and drinking | 0.06 | 0.06 | 0.07 | 0.06 | 0.06 | 0.05 | 0.07 | 0.05 | 0.05 |
| Other services | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.05 | 0.06 | 0.05 | 0.05 |
| Government | 0.04 | 0.03 | 0.04 | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | 0.03 |
| Type II | | | | | | | | | |
| Agriculture | 0.08 | 0.07 | 0.08 | 0.06 | 0.07 | 0.05 | 0.08 | 0.05 | 0.05 |
| Mining and construction | 0.10 | 0.10 | 0.10 | 0.09 | 0.10 | 0.07 | 0.10 | 0.07 | 0.07 |
| Food processing | 0.06 | 0.06 | 0.07 | 0.05 | 0.06 | 0.04 | 0.06 | 0.04 | 0.04 |
| Other manufacturing | 0.04 | 0.05 | 0.04 | 0.06 | 0.07 | 0.04 | 0.04 | 0.04 | 0.05 |
| Transportation | 0.08 | 0.09 | 0.08 | 0.09 | 0.08 | 0.07 | 0.07 | 0.07 | 0.06 |
| Information | 0.08 | 0.11 | 0.08 | 0.08 | 0.07 | 0.09 | 0.08 | 0.07 | 0.06 |
| Utilities | 0.09 | 0.08 | 0.09 | 0.06 | 0.06 | 0.06 | 0.09 | 0.05 | 0.05 |
| Wholesale trade | 0.19 | 0.16 | 0.20 | 0.16 | 0.19 | 0.14 | 0.20 | 0.15 | 0.17 |
| Retail trade | 0.21 | 0.20 | 0.21 | 0.21 | 0.20 | 0.19 | 0.21 | 0.19 | 0.19 |
| Finance and insurance | 0.09 | 0.07 | 0.09 | 0.06 | 0.06 | 0.05 | 0.09 | 0.04 | 0.04 |
| Real estate and rentals | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.05 | 0.06 | 0.05 | 0.05 |
| Professional services | 0.11 | 0.11 | 0.12 | 0.10 | 0.11 | 0.09 | 0.11 | 0.08 | 0.09 |
| Business services | 0.12 | 0.11 | 0.12 | 0.11 | 0.10 | 0.09 | 0.12 | 0.09 | 0.09 |
| Educational services | 0.12 | 0.11 | 0.12 | 0.11 | 0.10 | 0.09 | 0.12 | 0.09 | 0.09 |
| Health services | 0.10 | 0.09 | 0.10 | 0.09 | 0.09 | 0.08 | 0.10 | 0.07 | 0.08 |
| Arts and entertainment | 0.09 | 0.09 | 0.09 | 0.08 | 0.08 | 0.07 | 0.09 | 0.07 | 0.07 |
| Hotels | 0.14 | 0.10 | 0.17 | 0.10 | 0.11 | 0.09 | 0.17 | 0.09 | 0.09 |
| Eating and drinking | 0.10 | 0.09 | 0.10 | 0.09 | 0.09 | 0.07 | 0.09 | 0.07 | 0.07 |
| Other services | 0.10 | 0.10 | 0.10 | 0.09 | 0.09 | 0.08 | 0.09 | 0.07 | 0.07 |
| Government | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.07 | 0.08 | 0.06 | 0.06 |

Note: Final-demand state tax multiplier shows the total change in state tax revenues (excludes county and federal taxes and includes income taxes on earnings) from households and all row industries that results from a \$1 change in final demand in the corresponding row industry.

Table 12. Direct Effect Earnings Multipliers for the State, Inter-county and County Models

| | State model | Inter-county model | | | | County model | | | |
|-------------------------|-------------|--------------------|------|-------|------|--------------|------|-------|------|
| | | Hawaii | Oahu | Kauai | Maui | Hawaii | Oahu | Kauai | Maui |
| Type I | | | | | | | | | |
| Agriculture | 1.29 | 1.34 | 1.27 | 1.30 | 1.25 | 1.24 | 1.25 | 1.20 | 1.18 |
| Mining and construction | 1.36 | 1.37 | 1.36 | 1.35 | 1.35 | 1.19 | 1.35 | 1.20 | 1.18 |
| Food processing | 2.18 | 1.99 | 2.24 | 1.94 | 2.07 | 1.63 | 2.05 | 1.68 | 1.67 |
| Other manufacturing | 1.43 | 1.29 | 1.53 | 1.13 | 1.10 | 1.16 | 1.51 | 1.06 | 1.06 |
| Transportation | 1.68 | 1.42 | 1.72 | 1.52 | 1.45 | 1.24 | 1.70 | 1.37 | 1.25 |
| Information | 1.36 | 1.36 | 1.33 | 1.39 | 1.63 | 1.25 | 1.32 | 1.30 | 1.42 |
| Utilities | 1.79 | 1.61 | 1.82 | 1.75 | 1.72 | 1.19 | 1.76 | 1.32 | 1.28 |
| Wholesale trade | 1.28 | 1.22 | 1.29 | 1.34 | 1.23 | 1.14 | 1.28 | 1.23 | 1.14 |
| Retail trade | 1.27 | 1.31 | 1.27 | 1.23 | 1.23 | 1.21 | 1.26 | 1.18 | 1.16 |
| Finance and insurance | 1.55 | 1.40 | 1.58 | 1.47 | 1.47 | 1.23 | 1.56 | 1.32 | 1.26 |
| Real estate and rentals | 2.70 | 2.21 | 2.85 | 2.25 | 3.11 | 1.87 | 2.80 | 1.96 | 2.43 |
| Professional services | 1.26 | 1.33 | 1.25 | 1.39 | 1.33 | 1.20 | 1.24 | 1.26 | 1.20 |
| Business services | 1.24 | 1.22 | 1.24 | 1.16 | 1.27 | 1.14 | 1.23 | 1.12 | 1.17 |
| Educational services | 1.25 | 1.25 | 1.26 | 1.22 | 1.29 | 1.17 | 1.25 | 1.14 | 1.20 |
| Health services | 1.27 | 1.25 | 1.28 | 1.25 | 1.24 | 1.16 | 1.27 | 1.19 | 1.15 |
| Arts and entertainment | 1.17 | 1.16 | 1.18 | 1.17 | 1.15 | 1.11 | 1.17 | 1.13 | 1.11 |
| Hotels | 1.38 | 1.36 | 1.37 | 1.37 | 1.35 | 1.24 | 1.36 | 1.29 | 1.24 |
| Eating and drinking | 1.46 | 1.45 | 1.47 | 1.41 | 1.44 | 1.25 | 1.43 | 1.27 | 1.26 |
| Other services | 1.33 | 1.25 | 1.35 | 1.29 | 1.32 | 1.17 | 1.34 | 1.22 | 1.21 |
| Government | 1.04 | 1.04 | 1.04 | 1.03 | 1.04 | 1.03 | 1.04 | 1.02 | 1.02 |
| Type II | | | | | | | | | |
| Agriculture | 1.74 | 1.80 | 1.73 | 1.72 | 1.63 | 1.53 | 1.67 | 1.47 | 1.42 |
| Mining and construction | 1.84 | 1.83 | 1.86 | 1.78 | 1.76 | 1.47 | 1.80 | 1.47 | 1.43 |
| Food processing | 2.95 | 2.66 | 3.06 | 2.57 | 2.71 | 2.01 | 2.75 | 2.05 | 2.01 |
| Other manufacturing | 1.94 | 1.73 | 2.09 | 1.49 | 1.43 | 1.43 | 2.02 | 1.29 | 1.27 |
| Transportation | 2.27 | 1.90 | 2.35 | 2.00 | 1.89 | 1.53 | 2.27 | 1.67 | 1.51 |
| Information | 1.84 | 1.82 | 1.82 | 1.84 | 2.12 | 1.54 | 1.77 | 1.58 | 1.71 |
| Utilities | 2.43 | 2.16 | 2.49 | 2.32 | 2.26 | 1.47 | 2.36 | 1.60 | 1.54 |
| Wholesale trade | 1.73 | 1.64 | 1.76 | 1.76 | 1.61 | 1.40 | 1.72 | 1.50 | 1.38 |
| Retail trade | 1.71 | 1.75 | 1.73 | 1.62 | 1.61 | 1.50 | 1.69 | 1.44 | 1.39 |
| Finance and insurance | 2.10 | 1.87 | 2.15 | 1.94 | 1.92 | 1.52 | 2.09 | 1.61 | 1.52 |
| Real estate and rentals | 3.66 | 2.97 | 3.89 | 2.98 | 4.08 | 2.30 | 3.75 | 2.39 | 2.93 |
| Professional services | 1.70 | 1.78 | 1.71 | 1.84 | 1.73 | 1.48 | 1.66 | 1.54 | 1.44 |
| Business services | 1.67 | 1.63 | 1.69 | 1.53 | 1.65 | 1.40 | 1.65 | 1.36 | 1.40 |
| Educational services | 1.70 | 1.67 | 1.72 | 1.61 | 1.67 | 1.44 | 1.68 | 1.39 | 1.44 |
| Health services | 1.71 | 1.67 | 1.74 | 1.66 | 1.61 | 1.43 | 1.70 | 1.46 | 1.38 |
| Arts and entertainment | 1.59 | 1.55 | 1.61 | 1.55 | 1.50 | 1.37 | 1.57 | 1.38 | 1.33 |
| Hotels | 1.87 | 1.82 | 1.87 | 1.81 | 1.75 | 1.54 | 1.82 | 1.58 | 1.49 |
| Eating and drinking | 1.97 | 1.94 | 2.00 | 1.87 | 1.87 | 1.54 | 1.92 | 1.55 | 1.52 |
| Other services | 1.80 | 1.68 | 1.84 | 1.70 | 1.72 | 1.44 | 1.79 | 1.49 | 1.45 |
| Government | 1.40 | 1.38 | 1.42 | 1.36 | 1.34 | 1.26 | 1.39 | 1.25 | 1.23 |

Note: Direct-effect earnings multiplier shows the total change in earnings received by households from all row industries that results from a \$1 change in earnings received by households directly from the corresponding row industry.

Table 13. Direct Effect Total Job Multipliers for the State, Inter-county and County Models

| | State model | Inter-county model | | | | County model | | | |
|-------------------------|-------------|--------------------|------|-------|------|--------------|------|-------|------|
| | | Hawaii | Oahu | Kauai | Maui | Hawaii | Oahu | Kauai | Maui |
| Type I | | | | | | | | | |
| Agriculture | 1.18 | 1.20 | 1.21 | 1.12 | 1.19 | 1.17 | 1.19 | 1.10 | 1.15 |
| Mining and construction | 1.56 | 1.57 | 1.58 | 1.51 | 1.50 | 1.36 | 1.55 | 1.35 | 1.30 |
| Food processing | 2.30 | 2.02 | 2.22 | 2.14 | 2.57 | 1.78 | 1.88 | 1.95 | 2.02 |
| Other manufacturing | 1.57 | 1.33 | 1.63 | 1.25 | 1.25 | 1.21 | 1.60 | 1.11 | 1.15 |
| Transportation | 1.78 | 1.47 | 1.86 | 1.45 | 1.43 | 1.30 | 1.82 | 1.34 | 1.27 |
| Information | 1.50 | 1.49 | 1.45 | 1.55 | 1.90 | 1.37 | 1.43 | 1.44 | 1.65 |
| Utilities | 2.57 | 2.28 | 2.64 | 2.42 | 2.37 | 1.48 | 2.51 | 1.67 | 1.53 |
| Wholesale trade | 1.34 | 1.26 | 1.36 | 1.29 | 1.24 | 1.18 | 1.35 | 1.21 | 1.16 |
| Retail trade | 1.19 | 1.23 | 1.18 | 1.17 | 1.20 | 1.17 | 1.18 | 1.14 | 1.15 |
| Finance and insurance | 1.65 | 1.43 | 1.68 | 1.43 | 1.48 | 1.29 | 1.65 | 1.32 | 1.31 |
| Real estate and rentals | 2.29 | 2.31 | 2.36 | 2.34 | 2.18 | 2.05 | 2.32 | 2.11 | 1.88 |
| Professional services | 1.32 | 1.31 | 1.33 | 1.30 | 1.30 | 1.21 | 1.31 | 1.23 | 1.20 |
| Business services | 1.20 | 1.14 | 1.21 | 1.15 | 1.21 | 1.10 | 1.20 | 1.12 | 1.14 |
| Educational services | 1.20 | 1.18 | 1.20 | 1.21 | 1.19 | 1.13 | 1.19 | 1.14 | 1.14 |
| Health services | 1.33 | 1.30 | 1.34 | 1.27 | 1.30 | 1.21 | 1.32 | 1.22 | 1.21 |
| Arts and entertainment | 1.11 | 1.12 | 1.11 | 1.14 | 1.13 | 1.09 | 1.10 | 1.12 | 1.10 |
| Hotels | 1.43 | 1.45 | 1.42 | 1.44 | 1.43 | 1.34 | 1.41 | 1.37 | 1.32 |
| Eating and drinking | 1.25 | 1.26 | 1.24 | 1.24 | 1.30 | 1.16 | 1.21 | 1.18 | 1.19 |
| Other services | 1.21 | 1.15 | 1.23 | 1.16 | 1.23 | 1.11 | 1.22 | 1.13 | 1.16 |
| Government | 1.05 | 1.05 | 1.05 | 1.04 | 1.04 | 1.04 | 1.04 | 1.03 | 1.03 |
| Type II | | | | | | | | | |
| Agriculture | 1.43 | 1.38 | 1.57 | 1.27 | 1.43 | 1.30 | 1.52 | 1.20 | 1.32 |
| Mining and construction | 2.38 | 2.33 | 2.48 | 2.17 | 2.12 | 1.85 | 2.36 | 1.78 | 1.69 |
| Food processing | 2.96 | 2.48 | 2.90 | 2.57 | 3.28 | 2.07 | 2.45 | 2.23 | 2.43 |
| Other manufacturing | 2.28 | 1.82 | 2.36 | 1.87 | 2.09 | 1.53 | 2.25 | 1.54 | 1.74 |
| Transportation | 2.56 | 2.05 | 2.72 | 1.95 | 1.91 | 1.69 | 2.59 | 1.68 | 1.57 |
| Information | 2.26 | 2.13 | 2.22 | 2.22 | 2.65 | 1.81 | 2.14 | 1.90 | 2.11 |
| Utilities | 4.11 | 3.70 | 4.26 | 3.77 | 3.68 | 2.27 | 3.95 | 2.42 | 2.22 |
| Wholesale trade | 1.94 | 1.73 | 2.00 | 1.66 | 1.63 | 1.51 | 1.93 | 1.47 | 1.42 |
| Retail trade | 1.52 | 1.56 | 1.52 | 1.49 | 1.52 | 1.40 | 1.49 | 1.37 | 1.37 |
| Finance and insurance | 2.42 | 2.00 | 2.51 | 1.89 | 1.98 | 1.66 | 2.41 | 1.63 | 1.61 |
| Real estate and rentals | 3.04 | 3.05 | 3.17 | 3.09 | 2.71 | 2.52 | 3.05 | 2.60 | 2.17 |
| Professional services | 1.95 | 1.74 | 2.01 | 1.66 | 1.68 | 1.51 | 1.94 | 1.46 | 1.45 |
| Business services | 1.61 | 1.40 | 1.64 | 1.49 | 1.52 | 1.28 | 1.60 | 1.36 | 1.35 |
| Educational services | 1.56 | 1.48 | 1.58 | 1.60 | 1.46 | 1.34 | 1.54 | 1.41 | 1.32 |
| Health services | 1.90 | 1.80 | 1.94 | 1.71 | 1.79 | 1.55 | 1.87 | 1.53 | 1.53 |
| Arts and entertainment | 1.38 | 1.40 | 1.35 | 1.46 | 1.42 | 1.29 | 1.33 | 1.34 | 1.30 |
| Hotels | 2.03 | 2.03 | 2.06 | 2.00 | 1.97 | 1.73 | 1.99 | 1.75 | 1.68 |
| Eating and drinking | 1.53 | 1.53 | 1.52 | 1.49 | 1.60 | 1.34 | 1.47 | 1.34 | 1.38 |
| Other services | 1.54 | 1.40 | 1.59 | 1.40 | 1.52 | 1.28 | 1.55 | 1.29 | 1.35 |
| Government | 1.56 | 1.53 | 1.57 | 1.53 | 1.47 | 1.39 | 1.53 | 1.39 | 1.34 |

Note: Direct-effect total job multiplier shows the total change in number of jobs (wage and salary plus proprietors' jobs) in all row industries that results from a change of one job in the corresponding row industry.

Table 14. Detailed Inter-County Final-Demand Output and Earnings Multipliers for Honolulu

| Industry | Final-demand multipliers | | | |
|---|--------------------------|---------|--------------------|---------|
| | Output (dollars) | | Earnings (dollars) | |
| | Type I | Type II | Type I | Type II |
| 1 Sugarcane | NA | NA | NA | NA |
| 2 Vegetables | 1.45 | 2.05 | 0.49 | 0.66 |
| 3 Macadamia nuts, coffee, and other fruits | 1.15 | 1.92 | 0.62 | 0.85 |
| 4 Pineapples | 1.31 | 1.98 | 0.54 | 0.73 |
| 5 Flowers and nursery products | 1.40 | 2.06 | 0.53 | 0.72 |
| 6 Other crops | 1.20 | 1.67 | 0.38 | 0.53 |
| 7 Animal production | 1.58 | 2.15 | 0.46 | 0.63 |
| 8 Aquaculture | 1.30 | 2.20 | 0.73 | 0.99 |
| 9 Commercial fishing | 1.55 | 2.29 | 0.60 | 0.82 |
| 10 Forestry & logging | 1.47 | 2.35 | 0.71 | 0.97 |
| 11 Support activities for agriculture | 1.33 | 2.03 | 0.56 | 0.77 |
| 12 Mining | 1.44 | 2.07 | 0.51 | 0.70 |
| 13 Single family construction | 1.39 | 1.83 | 0.35 | 0.48 |
| 14 Construction of other buildings | 1.42 | 1.97 | 0.44 | 0.60 |
| 15 Heavy and civil engineering construction | 1.44 | 2.45 | 0.82 | 1.12 |
| 16 Maintenance & repairs | 1.40 | 2.02 | 0.50 | 0.68 |
| 17 Food processing | 1.61 | 2.05 | 0.36 | 0.49 |
| 18 Beverage manufacturing | 1.56 | 1.95 | 0.32 | 0.43 |
| 19 Apparel and textile manufacturing | 1.37 | 1.87 | 0.41 | 0.56 |
| 20 Petroleum manufacturing | 1.11 | 1.19 | 0.06 | 0.09 |
| 21 Other manufacturing | 1.35 | 1.80 | 0.36 | 0.50 |
| 22 Air transportation | 1.57 | 2.04 | 0.38 | 0.52 |
| 23 Water transportation | 1.71 | 2.17 | 0.37 | 0.51 |
| 24 Truck and rail transportation | 1.37 | 1.96 | 0.48 | 0.66 |
| 25 Transit and ground passenger transportation | 1.49 | 2.00 | 0.41 | 0.56 |
| 26 Scenic and support activities for transportation | 1.22 | 1.92 | 0.56 | 0.77 |
| 27 Couriers and messengers | 1.20 | 1.73 | 0.43 | 0.58 |
| 28 Warehousing and storage | 1.41 | 2.06 | 0.53 | 0.72 |
| 29 Publishing (include Internet) | 1.21 | 1.92 | 0.58 | 0.79 |
| 30 Motion picture and sound recording industries | 1.19 | 1.64 | 0.36 | 0.49 |
| 31 Broadcasting (Radio, TV, Cable) | 1.25 | 2.04 | 0.64 | 0.87 |
| 32 Telecommunications | 1.37 | 1.77 | 0.32 | 0.44 |
| 33 Internet providers, web, and data processing | 1.40 | 2.02 | 0.50 | 0.69 |
| 34 Other information services | 1.46 | 2.00 | 0.43 | 0.59 |
| 35 Utilities | 1.41 | 1.66 | 0.21 | 0.28 |
| 36 Wholesale trade | 1.28 | 1.79 | 0.41 | 0.56 |
| 37 Retail trade | 1.35 | 1.90 | 0.44 | 0.60 |
| 38 Credit intermediation and related activities | 1.37 | 1.79 | 0.34 | 0.46 |
| 39 Insurance carriers and related activities | 1.70 | 2.25 | 0.45 | 0.61 |
| 40 Other finance and insurance | 1.36 | 2.07 | 0.57 | 0.78 |
| 41 Owner-occupied dwellings | 1.38 | 1.54 | 0.12 | 0.17 |
| 42 Real estate | 1.45 | 1.74 | 0.23 | 0.31 |
| 43 Rental & leasing | 1.56 | 1.93 | 0.30 | 0.41 |

Table 14. Detailed Inter-County Final-Demand Output and Earnings Multipliers for Honolulu - Contd.

| Industry | Final-demand multipliers | | | |
|--|--------------------------|---------|-----------------------|---------|
| | Output (dollars) | | Earnings (dollars) | |
| | Type I | Type II | Type I | Type II |
| 44 Legal services | 1.22 | 2.00 | 0.63 | 0.86 |
| 45 Architectural and engineering services | 1.37 | 2.14 | 0.62 | 0.85 |
| 46 Computer systems design services | 1.53 | 2.31 | 0.63 | 0.85 |
| 47 R&D in the physical, engineering, & life sciences | 1.37 | 1.92 | 0.45 | 0.61 |
| 48 Other professional services | 1.51 | 2.27 | 0.61 | 0.83 |
| 49 Management of companies and enterprises | 1.42 | 2.22 | 0.64 | 0.87 |
| 50 Travel arrangement and reservation services | 1.49 | 2.21 | 0.58 | 0.79 |
| 51 Administrative and support services | 1.29 | 2.13 | 0.67 | 0.92 |
| 52 Waste management and remediation services | 1.50 | 2.02 | 0.42 | 0.58 |
| 53 Colleges, universities, and professional schools | 1.47 | 2.24 | 0.62 | 0.84 |
| 54 Other educational services | 1.48 | 2.26 | 0.63 | 0.87 |
| 55 Ambulatory health care services | 1.17 | 2.02 | 0.68 | 0.93 |
| 56 Hospitals | 1.64 | 2.26 | 0.50 | 0.68 |
| 57 Nursing and residential care facilities | 1.37 | 2.07 | 0.57 | 0.77 |
| 58 Social assistance | 1.33 | 2.11 | 0.63 | 0.86 |
| 59 Arts and entertainment | 1.27 | 1.98 | 0.58 | 0.78 |
| 60 Accommodation | 1.40 | 2.00 | 0.48 | 0.66 |
| 61 Eating and drinking | 1.52 | 2.08 | 0.45 | 0.62 |
| 62 Repair and maintenance | 1.40 | 2.02 | 0.50 | 0.68 |
| 63 Personal and laundry services | 1.54 | 2.20 | 0.53 | 0.73 |
| 64 Organizations | 1.45 | 2.10 | 0.53 | 0.72 |
| 65 Federal government military | 1.00 | 1.71 | 0.57 | 0.78 |
| 66 Federal government: civilian | 1.25 | 2.08 | 0.67 | 0.92 |
| 67 State and local government | 1.14 | 2.00 | 0.69 | 0.95 |
| PCE - Hawaii | 1.11 | 1.48 | 0.31 | 0.42 |
| PCE - Honolulu | 1.13 | 1.54 | 0.33 | 0.45 |
| PCE - Kauai | 1.12 | 1.48 | 0.30 | 0.40 |
| PCE - Maui | 1.12 | 1.45 | 0.28 | 0.37 |
| VE - Hawaii | 1.16 | 1.58 | 0.34 | 0.46 |
| VE - Honolulu | 1.26 | 1.70 | 0.36 | 0.49 |
| VE - Kauai | 1.15 | 1.52 | 0.31 | 0.42 |
| VE - Maui | 1.15 | 1.55 | 0.33 | 0.44 |
| State and local government consumption | 1.11 | 1.89 | 0.64 | 0.86 |
| Federal military consumption | 0.96 | 1.60 | 0.51 | 0.70 |
| Federal civilian consumption | 1.21 | 2.00 | 0.64 | 0.87 |

Table 15. Detailed Inter-county Final Demand Total Job and State Tax Multipliers for Honolulu

| Industry | Final-demand multipliers | | | |
|---|----------------------------|---------|------------------------|---------|
| | Employment (total jobs) | | State Tax (dollars) | |
| | Type I | Type II | Type I | Type II |
| 1 Sugarcane | NA | NA | NA | NA |
| 2 Vegetables | 17.6 | 23.8 | 0.04 | 0.08 |
| 3 Macadamia nuts, coffee, and other fruits | 37.6 | 45.5 | 0.03 | 0.08 |
| 4 Pineapples | 24.6 | 31.4 | 0.04 | 0.08 |
| 5 Flowers and nursery products | 26.7 | 33.4 | 0.05 | 0.08 |
| 6 Other crops | 14.4 | 19.3 | 0.03 | 0.06 |
| 7 Animal production | 17.7 | 23.6 | 0.04 | 0.08 |
| 8 Aquaculture | 13.7 | 23.0 | 0.03 | 0.08 |
| 9 Commercial fishing | 34.4 | 42.1 | 0.05 | 0.10 |
| 10 Forestry & logging | 9.5 | 18.6 | 0.05 | 0.10 |
| 11 Support activities for agriculture | 17.9 | 25.1 | 0.07 | 0.11 |
| 12 Mining | 11.0 | 17.5 | 0.06 | 0.09 |
| 13 Single family construction | 9.6 | 14.1 | 0.07 | 0.10 |
| 14 Construction of other buildings | 10.9 | 16.5 | 0.07 | 0.10 |
| 15 Heavy and civil engineering construction | 15.1 | 25.5 | 0.06 | 0.12 |
| 16 Maintenance & repairs | 10.2 | 16.5 | 0.08 | 0.11 |
| 17 Food processing | 14.5 | 19.0 | 0.04 | 0.07 |
| 18 Beverage manufacturing | 8.7 | 12.8 | 0.05 | 0.07 |
| 19 Apparel and textile manufacturing | 21.3 | 26.5 | 0.04 | 0.07 |
| 20 Petroleum manufacturing | 1.2 | 2.0 | 0.01 | 0.01 |
| 21 Other manufacturing | 10.2 | 14.8 | 0.04 | 0.06 |
| 22 Air transportation | 9.4 | 14.2 | 0.04 | 0.07 |
| 23 Water transportation | 9.5 | 14.3 | 0.06 | 0.08 |
| 24 Truck and rail transportation | 14.7 | 20.9 | 0.08 | 0.12 |
| 25 Transit and ground passenger transportation | 32.6 | 37.8 | 0.08 | 0.10 |
| 26 Scenic and support activities for transportation | 13.5 | 20.7 | 0.07 | 0.11 |
| 27 Couriers and messengers | 15.4 | 20.8 | 0.04 | 0.07 |
| 28 Warehousing and storage | 17.3 | 24.0 | 0.07 | 0.11 |
| 29 Publishing (include Internet) | 11.1 | 18.4 | 0.07 | 0.11 |
| 30 Motion picture and sound recording industries | 19.8 | 24.3 | 0.06 | 0.08 |
| 31 Broadcasting (Radio, TV, Cable) | 14.1 | 22.2 | 0.08 | 0.12 |
| 32 Telecommunications | 7.2 | 11.3 | 0.05 | 0.07 |
| 33 Internet providers, web, and data processing | 12.8 | 19.2 | 0.07 | 0.11 |
| 34 Other information services | 18.4 | 23.9 | 0.08 | 0.10 |
| 35 Utilities | 3.8 | 6.5 | 0.07 | 0.09 |
| 36 Wholesale trade | 11.3 | 16.5 | 0.17 | 0.20 |
| 37 Retail trade | 19.4 | 24.9 | 0.18 | 0.21 |
| 38 Credit intermediation and related activities | 7.9 | 12.2 | 0.04 | 0.07 |
| 39 Insurance carriers and related activities | 12.3 | 18.0 | 0.10 | 0.13 |
| 40 Other finance and insurance | 21.1 | 28.4 | 0.06 | 0.09 |
| 41 Owner-occupied dwellings | 3.7 | 5.3 | 0.02 | 0.03 |
| 42 Real estate | 8.6 | 11.5 | 0.06 | 0.07 |
| 43 Rental & leasing | 11.0 | 14.8 | 0.20 | 0.22 |

Table 15. Detailed Inter-county Final Demand Total Job and State Tax Multipliers for Honolulu - Contd.

| Industry | Final-demand multipliers | | | |
|--|----------------------------|---------|------------------------|---------|
| | Employment (total jobs) | | State Tax (dollars) | |
| | Type I | Type II | Type I | Type II |
| 44 Legal services | 13.1 | 21.1 | 0.07 | 0.11 |
| 45 Architectural and engineering services | 13.8 | 21.7 | 0.08 | 0.12 |
| 46 Computer systems design services | 15.7 | 23.6 | 0.09 | 0.13 |
| 47 R&D in the physical, engineering, & life sciences | 10.4 | 16.1 | 0.05 | 0.08 |
| 48 Other professional services | 19.3 | 27.1 | 0.08 | 0.12 |
| 49 Management of companies and enterprises | 12.0 | 20.1 | 0.08 | 0.13 |
| 50 Travel arrangement and reservation services | 20.7 | 28.1 | 0.08 | 0.12 |
| 51 Administrative and support services | 31.8 | 40.3 | 0.08 | 0.13 |
| 52 Waste management and remediation services | 11.0 | 16.3 | 0.08 | 0.11 |
| 53 Colleges, universities, and professional schools | 23.1 | 30.9 | 0.08 | 0.12 |
| 54 Other educational services | 26.0 | 34.1 | 0.08 | 0.13 |
| 55 Ambulatory health care services | 14.8 | 23.5 | 0.07 | 0.12 |
| 56 Hospitals | 13.8 | 20.1 | 0.06 | 0.09 |
| 57 Nursing and residential care facilities | 22.4 | 29.6 | 0.04 | 0.08 |
| 58 Social assistance | 32.3 | 40.3 | 0.05 | 0.09 |
| 59 Arts and entertainment | 32.9 | 40.2 | 0.05 | 0.09 |
| 60 Accommodation | 13.9 | 20.1 | 0.14 | 0.17 |
| 61 Eating and drinking | 25.1 | 30.8 | 0.07 | 0.10 |
| 62 Repair and maintenance | 21.4 | 27.8 | 0.08 | 0.11 |
| 63 Personal and laundry services | 30.4 | 37.2 | 0.08 | 0.12 |
| 64 Organizations | 18.6 | 25.3 | 0.04 | 0.08 |
| 65 Federal government military | 13.0 | 20.3 | 0.03 | 0.07 |
| 66 Federal government: civilian | 15.9 | 24.5 | 0.04 | 0.09 |
| 67 State and local government | 20.2 | 29.1 | 0.04 | 0.09 |
| PCE - Hawaii | 12.4 | 16.5 | 0.06 | 0.08 |
| PCE - Honolulu | 11.6 | 15.8 | 0.06 | 0.08 |
| PCE - Kauai | 12.4 | 16.2 | 0.06 | 0.08 |
| PCE - Maui | 11.2 | 14.5 | 0.06 | 0.08 |
| VE - Hawaii | 13.6 | 18.1 | 0.06 | 0.08 |
| VE - Honolulu | 12.6 | 17.2 | 0.08 | 0.10 |
| VE - Kauai | 12.8 | 16.9 | 0.06 | 0.08 |
| VE - Maui | 12.8 | 16.8 | 0.06 | 0.08 |
| State and local government consumption | 18.6 | 26.7 | 0.04 | 0.08 |
| Federal military consumption | 12.0 | 18.5 | 0.03 | 0.07 |
| Federal civilian consumption | 15.9 | 24.1 | 0.04 | 0.09 |

Table 16. Detailed Inter-county Direct Effect Earnings and Total Job Multipliers for Honolulu

| Industry | Direct-effect multipliers | | | |
|---|---------------------------|---------|----------------------------|---------|
| | Earnings (dollars) | | Employment (total jobs) | |
| | Type I | Type II | Type I | Type II |
| 1 Sugarcane | NA | NA | NA | NA |
| 2 Vegetables | 1.38 | 1.88 | 1.32 | 1.78 |
| 3 Macadamia nuts, coffee, and other fruits | 1.08 | 1.47 | 1.04 | 1.26 |
| 4 Pineapples | 1.21 | 1.65 | 1.14 | 1.46 |
| 5 Flowers and nursery products | 1.31 | 1.78 | 1.20 | 1.50 |
| 6 Other crops | 1.18 | 1.62 | 1.17 | 1.57 |
| 7 Animal production | 1.58 | 2.15 | 1.51 | 2.02 |
| 8 Aquaculture | 1.14 | 1.55 | 1.29 | 2.16 |
| 9 Commercial fishing | 1.35 | 1.85 | 1.21 | 1.48 |
| 10 Forestry & logging | 1.39 | 1.90 | 1.99 | 3.91 |
| 11 Support activities for agriculture | 1.21 | 1.66 | 1.23 | 1.72 |
| 12 Mining | 1.34 | 1.82 | 1.44 | 2.29 |
| 13 Single family construction | 1.54 | 2.10 | 1.76 | 2.59 |
| 14 Construction of other buildings | 1.46 | 2.00 | 1.62 | 2.46 |
| 15 Heavy and civil engineering construction | 1.23 | 1.68 | 1.42 | 2.40 |
| 16 Maintenance & repairs | 1.35 | 1.84 | 1.70 | 2.76 |
| 17 Food processing | 2.26 | 3.08 | 2.18 | 2.86 |
| 18 Beverage manufacturing | 2.17 | 2.96 | 2.57 | 3.76 |
| 19 Apparel and textile manufacturing | 1.39 | 1.89 | 1.24 | 1.55 |
| 20 Petroleum manufacturing | 1.82 | 2.48 | 3.62 | 6.06 |
| 21 Other manufacturing | 1.48 | 2.02 | 1.56 | 2.27 |
| 22 Air transportation | 1.89 | 2.57 | 2.29 | 3.47 |
| 23 Water transportation | 4.43 | 6.04 | 7.22 | 10.83 |
| 24 Truck and rail transportation | 1.31 | 1.79 | 1.32 | 1.86 |
| 25 Transit and ground passenger transportation | 1.61 | 2.20 | 1.18 | 1.37 |
| 26 Scenic and support activities for transportation | 1.15 | 1.57 | 1.20 | 1.84 |
| 27 Couriers and messengers | 1.19 | 1.62 | 1.16 | 1.57 |
| 28 Warehousing and storage | 1.35 | 1.84 | 1.32 | 1.83 |
| 29 Publishing (include Internet) | 1.15 | 1.57 | 1.27 | 2.12 |
| 30 Motion picture and sound recording industries | 1.20 | 1.64 | 1.13 | 1.39 |
| 31 Broadcasting (Radio, TV, Cable) | 1.14 | 1.56 | 1.27 | 1.99 |
| 32 Telecommunications | 1.50 | 2.05 | 1.78 | 2.79 |
| 33 Internet providers, web, and data processing | 1.37 | 1.87 | 1.60 | 2.40 |
| 34 Other information services | 1.61 | 2.20 | 1.57 | 2.04 |
| 35 Utilities | 1.62 | 2.21 | 2.09 | 3.53 |
| 36 Wholesale trade | 1.30 | 1.78 | 1.39 | 2.03 |
| 37 Retail trade | 1.29 | 1.76 | 1.20 | 1.54 |
| 38 Credit intermediation and related activities | 1.61 | 2.19 | 2.04 | 3.15 |
| 39 Insurance carriers and related activities | 1.82 | 2.49 | 1.92 | 2.81 |
| 40 Other finance and insurance | 1.26 | 1.72 | 1.21 | 1.62 |
| 41 Owner-occupied dwellings | NA | NA | NA | NA |
| 42 Real estate | 2.19 | 2.99 | 1.83 | 2.45 |
| 43 Rental & leasing | 2.26 | 3.09 | 1.96 | 2.64 |

Table 16. Detailed Inter-county Direct Effect Earnings and Total Job Multipliers for Honolulu - Contd.

| Industry | Direct-effect multipliers | | | |
|--|---------------------------|---------|----------------------------|---------|
| | Earnings (dollars) | | Employment (total jobs) | |
| | Type I | Type II | Type I | Type II |
| 44 Legal services | 1.12 | 1.52 | 1.18 | 1.90 |
| 45 Architectural and engineering services | 1.21 | 1.66 | 1.32 | 2.08 |
| 46 Computer systems design services | 1.33 | 1.82 | 1.47 | 2.22 |
| 47 R&D in the physical, engineering, & life sciences | 1.35 | 1.84 | 1.48 | 2.30 |
| 48 Other professional services | 1.36 | 1.85 | 1.37 | 1.91 |
| 49 Management of companies and enterprises | 1.26 | 1.72 | 1.44 | 2.43 |
| 50 Travel arrangement and reservation services | 1.38 | 1.89 | 1.31 | 1.77 |
| 51 Administrative and support services | 1.17 | 1.59 | 1.12 | 1.42 |
| 52 Waste management and remediation services | 1.59 | 2.18 | 1.80 | 2.68 |
| 53 Colleges, universities, and professional schools | 1.26 | 1.71 | 1.22 | 1.64 |
| 54 Other educational services | 1.30 | 1.78 | 1.23 | 1.61 |
| 55 Ambulatory health care services | 1.10 | 1.50 | 1.15 | 1.83 |
| 56 Hospitals | 1.73 | 2.36 | 1.97 | 2.87 |
| 57 Nursing and residential care facilities | 1.22 | 1.67 | 1.20 | 1.59 |
| 58 Social assistance | 1.21 | 1.65 | 1.12 | 1.40 |
| 59 Arts and entertainment | 1.18 | 1.61 | 1.11 | 1.36 |
| 60 Accommodation | 1.38 | 1.88 | 1.45 | 2.09 |
| 61 Eating and drinking | 1.48 | 2.02 | 1.24 | 1.52 |
| 62 Repair and maintenance | 1.30 | 1.78 | 1.20 | 1.56 |
| 63 Personal and laundry services | 1.44 | 1.96 | 1.20 | 1.47 |
| 64 Organizations | 1.36 | 1.85 | 1.33 | 1.81 |
| 65 Federal government military | 1.00 | 1.36 | 1.00 | 1.56 |
| 66 Federal government: civilian | 1.13 | 1.54 | 1.17 | 1.80 |
| 67 State and local government | 1.06 | 1.45 | 1.06 | 1.53 |

Table 17. Total Visitor Expenditures by County: 2005 vs. 2004 (\$ million)

| | 2005 | 2004 | Change | (%) Change |
|------------------|----------|----------|--------|------------|
| State total | 11,904.0 | 10,861.8 | 1042.2 | 9.6 |
| Honolulu County | 5,770.0 | 5,478.2 | 291.8 | 5.3 |
| Maui County | 3,305.4 | 2,959.2 | 346.2 | 11.7 |
| Hawaii County | 1,667.0 | 1,312.0 | 355.0 | 27.1 |
| Kauai County | 1,161.6 | 1,112.4 | 49.2 | 4.4 |
| County share (%) | | | | |
| Honolulu County | 48.5 | 50.4 | 28.0 | |
| Maui County | 27.8 | 27.2 | 33.2 | |
| Hawaii County | 14.0 | 12.1 | 34.1 | |
| Kauai County | 9.8 | 10.2 | 4.7 | |

Source: DBEDT Annual Visitor Research Report 2005.

Table 18. Direct Spending of Increased Visitor Expenditures in Maui County in 2005

| | Hawaii County | Honolulu County | Kauai County | Maui County | State Total |
|------------------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Total direct spending (\$ million) | 1.4 | 16.5 | 0.6 | 262.1 | 280.6 |
| Sector's shares (%) | | | | | |
| Agriculture | 21.9 | 1.0 | 4.5 | 0.0 | 0.2 |
| Mining and construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Food processing | 39.8 | 3.9 | 11.3 | 0.1 | 0.5 |
| Other manufacturing | 2.5 | 7.8 | 1.1 | 0.0 | 0.5 |
| Transportation | 34.9 | 79.2 | 81.0 | 6.2 | 10.8 |
| Information | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 |
| Utilities | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Wholesale trade | 0.9 | 8.1 | 2.1 | 0.5 | 1.0 |
| Retail trade | 0.0 | 0.0 | 0.0 | 6.3 | 5.9 |
| Finance and insurance | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Real estate and rentals | 0.0 | 0.0 | 0.0 | 15.8 | 14.8 |
| Professional services | 0.0 | 0.0 | 0.0 | 1.2 | 1.1 |
| Business services | 0.0 | 0.0 | 0.0 | 4.0 | 3.7 |
| Educational services | 0.0 | 0.0 | 0.0 | 1.3 | 1.2 |
| Health services | 0.0 | 0.0 | 0.0 | 1.4 | 1.3 |
| Arts and entertainment | 0.0 | 0.0 | 0.0 | 5.8 | 5.4 |
| Hotels | 0.0 | 0.0 | 0.0 | 41.6 | 38.9 |
| Eating and drinking | 0.0 | 0.0 | 0.0 | 13.4 | 12.6 |
| Other services | 0.0 | 0.0 | 0.0 | 1.3 | 1.2 |
| Government | 0.0 | 0.0 | 0.0 | 0.8 | 0.7 |

Table 19. Economic Impacts of Increased Visitor Expenditures in Maui County in 2005

| | Visitor expenditures (\$ million) | Output (\$ million) | | Earnings (\$ million) | | Total jobs (no.) | |
|------------------|--------------------------------------|------------------------|-------|--------------------------|-------|---------------------|-------|
| | | Direct | Total | Direct | Total | Direct | Total |
| State total | 280.6 | 280.6 | 535.0 | 95.0 | 172.5 | 3,236 | 5,807 |
| Hawaii County | 1.4 | 1.4 | 7.4 | 0.5 | 2.5 | 22 | 112 |
| Honolulu County | 16.5 | 16.5 | 103.1 | 4.7 | 33.8 | 104 | 903 |
| Kauai County | 0.6 | 0.6 | 3.7 | 0.2 | 1.3 | 8 | 51 |
| Maui County | 262.1 | 262.1 | 420.8 | 89.6 | 134.9 | 3,103 | 4,740 |
| County share (%) | | | | | | | |
| Hawaii County | 0.5 | 0.5 | 1.4 | 0.5 | 1.5 | 0.7 | 1.9 |
| Honolulu County | 5.9 | 5.9 | 19.3 | 5.0 | 19.6 | 3.2 | 15.5 |
| Kauai County | 0.2 | 0.2 | 0.7 | 0.2 | 0.7 | 0.2 | 0.9 |
| Maui County | 93.4 | 93.4 | 78.6 | 94.3 | 78.2 | 95.9 | 81.6 |

Table 20. Impacts of Increased Visitor Expenditures in Maui County in 2005 by Industry

| | Output (\$ million) | | Income (\$ million) | | Total jobs (no.) | |
|-------------------------|---------------------|-------|---------------------|-------|------------------|-------|
| | Direct | Total | Direct | Total | Direct | Total |
| Total | 280.6 | 535.0 | 95.0 | 172.5 | 3,236 | 5,807 |
| Agriculture | 0.6 | 4.1 | 0.2 | 1.8 | 16 | 104 |
| Mining and construction | 0.0 | 8.6 | 0.0 | 3.4 | 0 | 73 |
| Food processing | 1.4 | 5.6 | 0.3 | 1.2 | 12 | 41 |
| Other manufacturing | 1.4 | 18.3 | 0.3 | 3.8 | 6 | 78 |
| Transportation | 30.4 | 39.9 | 10.0 | 13.1 | 263 | 342 |
| Information | 0.5 | 15.4 | 0.1 | 3.2 | 2 | 66 |
| Utilities | 0.0 | 10.9 | 0.0 | 1.8 | 0 | 23 |
| Wholesale trade | 2.7 | 14.4 | 1.0 | 5.3 | 28 | 139 |
| Retail trade | 16.6 | 37.5 | 6.6 | 14.9 | 261 | 592 |
| Finance and insurance | 0.0 | 14.9 | 0.0 | 4.3 | 0 | 103 |
| Real estate and rentals | 41.4 | 93.1 | 2.4 | 5.6 | 153 | 338 |
| Professional services | 3.1 | 18.9 | 1.3 | 8.6 | 48 | 263 |
| Business services | 10.5 | 30.4 | 4.6 | 14.1 | 194 | 565 |
| Educational services | 3.5 | 5.4 | 1.5 | 2.5 | 75 | 117 |
| Health services | 3.7 | 20.5 | 1.7 | 9.8 | 46 | 254 |
| Arts and entertainment | 15.1 | 17.5 | 7.9 | 9.2 | 340 | 395 |
| Hotels | 109.1 | 112.6 | 42.0 | 43.3 | 1,087 | 1,121 |
| Eating and drinking | 35.2 | 43.6 | 12.0 | 14.9 | 603 | 756 |
| Other services | 3.3 | 17.2 | 1.3 | 6.7 | 63 | 327 |
| Government | 2.1 | 6.1 | 1.8 | 5.1 | 40 | 111 |
| Sector's shares (%) | | | | | | |
| Agriculture | 0.2 | 0.8 | 0.2 | 1.0 | 0.5 | 1.8 |
| Mining and construction | 0.0 | 1.6 | 0.0 | 2.0 | 0.0 | 1.2 |
| Food processing | 0.5 | 1.1 | 0.3 | 0.7 | 0.4 | 0.7 |
| Other manufacturing | 0.5 | 3.4 | 0.3 | 2.2 | 0.2 | 1.3 |
| Transportation | 10.8 | 7.5 | 10.6 | 7.6 | 8.1 | 5.9 |
| Information | 0.2 | 2.9 | 0.1 | 1.8 | 0.1 | 1.1 |
| Utilities | 0.0 | 2.0 | 0.0 | 1.1 | 0.0 | 0.4 |
| Wholesale trade | 1.0 | 2.7 | 1.1 | 3.1 | 0.9 | 2.4 |
| Retail trade | 5.9 | 7.0 | 7.0 | 8.6 | 8.1 | 10.2 |
| Finance and insurance | 0.0 | 2.8 | 0.0 | 2.5 | 0.0 | 1.8 |
| Real estate and rentals | 14.8 | 17.4 | 2.6 | 3.2 | 4.7 | 5.8 |
| Professional services | 1.1 | 3.5 | 1.4 | 5.0 | 1.5 | 4.5 |
| Business services | 3.7 | 5.7 | 4.8 | 8.2 | 6.0 | 9.7 |
| Educational services | 1.2 | 1.0 | 1.5 | 1.4 | 2.3 | 2.0 |
| Health services | 1.3 | 3.8 | 1.8 | 5.7 | 1.4 | 4.4 |
| Arts and entertainment | 5.4 | 3.3 | 8.4 | 5.3 | 10.5 | 6.8 |
| Hotels | 38.9 | 21.0 | 44.2 | 25.1 | 33.6 | 19.3 |
| Eating and drinking | 12.6 | 8.2 | 12.6 | 8.6 | 18.6 | 13.0 |
| Other services | 1.2 | 3.2 | 1.3 | 3.9 | 1.9 | 5.6 |
| Government | 0.7 | 1.1 | 1.8 | 3.0 | 1.2 | 1.9 |

Note: sector totals are totals for all four counties.

Table 21. Projected Revenue and Cost of a Hypothetical Oahu Project

Assumption 1: without Federal Funds

| Year | In Constant 2007 \$ million | | | | |
|--------------|-----------------------------|---------------|---------------|----------------|-------------------------|
| | Revenue | | | Cost Total | Interest Revenue (Cost) |
| | GET Surcharge | Federal Funds | Total Revenue | | |
| 2007 | 264.8 | | 264.8 | | 6.6 |
| 2008 | 270.1 | | 270.1 | | 19.9 |
| 2009 | 275.5 | | 275.5 | | 33.7 |
| 2010 | 160.1 | 0.0 | 160.1 | 1,000.0 | 20.0 |
| Total | 970.5 | 0.0 | 970.5 | 1,000.0 | 80.1 |

| Year | In Current \$ million | | | | Honolulu CPI-U Growth Rate (%) |
|--------------|-----------------------|----------------|--------------|------------------|--------------------------------|
| | Revenue Total | Cost Total | Unused Funds | Interest Revenue | |
| 2007 | 264.8 | 0.0 | 271.4 | 6.6 | 4.0 |
| 2008 | 279.3 | 0.0 | 571.3 | 20.6 | 3.4 |
| 2009 | 294.0 | 0.0 | 901.1 | 35.9 | 3.2 |
| 2010 | 176.0 | 1,099.1 | 0.0 | 22.0 | 3.0 |
| Total | 1,014.0 | 1,099.1 | | 85.1 | |

Assumption 2: with 25 Percent Federal Funds

| Year | In Constant 2007 \$ million | | | | |
|--------------|-----------------------------|---------------|---------------|----------------|-------------------------|
| | Revenue | | | Cost Total | Interest Revenue (Cost) |
| | GET Surcharge | Federal Funds | Total Revenue | | |
| 2007 | 264.8 | | 264.8 | | 6.6 |
| 2008 | 270.1 | | 270.1 | | 19.9 |
| 2009 | 187.3 | | 187.3 | | 31.4 |
| 2010 | | 250.0 | 250.0 | 1,000.0 | 17.9 |
| Total | 722.2 | 250.0 | 972.2 | 1,000.0 | 75.8 |

| Year | In Current \$ million | | | | Honolulu CPI-U Growth Rate (%) |
|--------------|-----------------------|----------------|--------------|------------------|--------------------------------|
| | Revenue Total | Cost Total | Unused Funds | Interest Revenue | |
| 2007 | 264.8 | 0.0 | 271.4 | 6.6 | 4.0 |
| 2008 | 279.3 | 0.0 | 571.3 | 20.6 | 3.4 |
| 2009 | 199.9 | 0.0 | 804.7 | 33.6 | 3.2 |
| 2010 | 274.8 | 1,099.1 | 0.0 | 19.6 | 3.0 |
| Total | 1,018.7 | 1,099.1 | | 80.4 | |

Table 22. Direct Impacts of \$1 Billion Investment in a Hypothetical Oahu Project

| | Annual Investment (\$ million) | Industry Share (%) | Direct Impacts on Hawaii | | |
|-------------------------|--------------------------------------|--------------------------|--------------------------|--------------------------|---------------------|
| | | | Output (\$ million) | Earnings (\$ million) | No of total jobs |
| Hawaii produced | 750.0 | 100.0 | 750.0 | 307.1 | 5,268 |
| By sector | | | | | |
| Agriculture | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Mining and construction | 711.6 | 94.9 | 711.6 | 292.5 | 4,855 |
| Food processing | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Other manufacturing | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Transportation | 5.2 | 0.7 | 5.2 | 1.5 | 32 |
| Information | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Utilities | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Wholesale trade | 16.6 | 2.2 | 16.6 | 6.0 | 135 |
| Retail trade | 12.1 | 1.6 | 12.1 | 4.7 | 194 |
| Finance and insurance | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Real estate and rentals | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Professional services | 4.6 | 0.6 | 4.6 | 2.4 | 51 |
| Business services | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Educational services | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Health services | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Arts and entertainment | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Hotels | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Eating and drinking | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Other services | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Government | 0.0 | 0.0 | 0.0 | 0.0 | 0 |
| Imports | 250.0 | | | | |
| Total | 1,000.0 | | 750.0 | 307.1 | 5,268 |

Table 23. Economic Impacts of \$1 Billion Investment in a Hypothetical Oahu Project

| | Output (\$ million) | | Earnings (\$ million) | | Total job | |
|------------------|---------------------|---------|-----------------------|-------|-----------|--------|
| | Direct | Total | Direct | Total | Direct | Total |
| State total | 750.0 | 1,494.2 | 307.1 | 564.8 | 5,268 | 12,788 |
| Hawaii County | 0.0 | 17.7 | 0.0 | 6.0 | 0 | 238 |
| Honolulu County | 750.0 | 1,452.4 | 307.1 | 550.1 | 5,268 | 12,267 |
| Kauai County | 0.0 | 7.0 | 0.0 | 2.4 | 0 | 91 |
| Maui County | 0.0 | 17.1 | 0.0 | 6.3 | 0 | 192 |
| County share (%) | | | | | | |
| Hawaii County | 0.0 | 1.2 | 0.0 | 1.1 | 0.0 | 1.9 |
| Honolulu County | 100.0 | 97.2 | 100.0 | 97.4 | 100.0 | 95.9 |
| Kauai County | 0.0 | 0.5 | 0.0 | 0.4 | 0.0 | 0.7 |
| Maui County | 0.0 | 1.1 | 0.0 | 1.1 | 0.0 | 1.5 |

Table 24. Economic Impacts of \$1 Billion Investment in a Hypothetical Oahu Project by Industry

| | Output (\$ million) | | Earnings (\$ million) | | Total jobs (no.) | |
|-------------------------|---------------------|---------|-----------------------|-------|------------------|--------|
| | Direct | Total | Direct | Total | Direct | Total |
| Total | 750.0 | 1,494.2 | 307.1 | 564.8 | 5,268 | 12,788 |
| Agriculture | 0.0 | 4.6 | 0.0 | 2.0 | 0 | 105 |
| Mining and construction | 711.6 | 720.0 | 292.5 | 296.0 | 4,855 | 4,913 |
| Food processing | 0.0 | 6.9 | 0.0 | 1.4 | 0 | 49 |
| Other manufacturing | 0.0 | 53.4 | 0.0 | 9.9 | 0 | 217 |
| Transportation | 5.2 | 32.8 | 1.5 | 9.7 | 32 | 209 |
| Information | 0.0 | 29.2 | 0.0 | 10.3 | 0 | 194 |
| Utilities | 0.0 | 15.6 | 0.0 | 2.6 | 0 | 29 |
| Wholesale trade | 16.6 | 71.8 | 6.0 | 26.0 | 135 | 591 |
| Retail trade | 12.1 | 99.3 | 4.7 | 38.3 | 194 | 1,601 |
| Finance and insurance | 0.0 | 52.5 | 0.0 | 15.0 | 0 | 314 |
| Real estate and rentals | 0.0 | 126.9 | 0.0 | 9.0 | 0 | 370 |
| Professional services | 4.6 | 83.2 | 2.4 | 43.9 | 51 | 942 |
| Business services | 0.0 | 44.0 | 0.0 | 25.0 | 0 | 814 |
| Educational services | 0.0 | 9.1 | 0.0 | 4.9 | 0 | 187 |
| Health services | 0.0 | 62.4 | 0.0 | 32.3 | 0 | 772 |
| Arts and entertainment | 0.0 | 4.4 | 0.0 | 2.3 | 0 | 128 |
| Hotels | 0.0 | 10.0 | 0.0 | 3.7 | 0 | 98 |
| Eating and drinking | 0.0 | 23.4 | 0.0 | 8.1 | 0 | 472 |
| Other services | 0.0 | 30.3 | 0.0 | 12.7 | 0 | 564 |
| Government | 0.0 | 14.2 | 0.0 | 11.8 | 0 | 219 |
| Share by sector (%) | | | | | | |
| Agriculture | 0.0 | 0.3 | 0.0 | 0.4 | 0.0 | 0.8 |
| Mining and construction | 94.9 | 48.2 | 95.3 | 52.4 | 92.2 | 38.4 |
| Food processing | 0.0 | 0.5 | 0.0 | 0.2 | 0.0 | 0.4 |
| Other manufacturing | 0.0 | 3.6 | 0.0 | 1.8 | 0.0 | 1.7 |
| Transportation | 0.7 | 2.2 | 0.5 | 1.7 | 0.6 | 1.6 |
| Information | 0.0 | 2.0 | 0.0 | 1.8 | 0.0 | 1.5 |
| Utilities | 0.0 | 1.0 | 0.0 | 0.5 | 0.0 | 0.2 |
| Wholesale trade | 2.2 | 4.8 | 1.9 | 4.6 | 2.6 | 4.6 |
| Retail trade | 1.6 | 6.6 | 1.5 | 6.8 | 3.7 | 12.5 |
| Finance and insurance | 0.0 | 3.5 | 0.0 | 2.7 | 0.0 | 2.5 |
| Real estate and rentals | 0.0 | 8.5 | 0.0 | 1.6 | 0.0 | 2.9 |
| Professional services | 0.6 | 5.6 | 0.8 | 7.8 | 1.0 | 7.4 |
| Business services | 0.0 | 2.9 | 0.0 | 4.4 | 0.0 | 6.4 |
| Educational services | 0.0 | 0.6 | 0.0 | 0.9 | 0.0 | 1.5 |
| Health services | 0.0 | 4.2 | 0.0 | 5.7 | 0.0 | 6.0 |
| Arts and entertainment | 0.0 | 0.3 | 0.0 | 0.4 | 0.0 | 1.0 |
| Hotels | 0.0 | 0.7 | 0.0 | 0.7 | 0.0 | 0.8 |
| Eating and drinking | 0.0 | 1.6 | 0.0 | 1.4 | 0.0 | 3.7 |
| Other services | 0.0 | 2.0 | 0.0 | 2.2 | 0.0 | 4.4 |
| Government | 0.0 | 1.0 | 0.0 | 2.1 | 0.0 | 1.7 |

Table 25. Estimation of GET Base on Oahu Paid Indirectly by Visitors

| | GET Base Oahu 2005 (\$ million) | Share in Total 4% (%) | Share of GET Paid by Business (%) | GET Base Paid by Business (%) |
|---|---------------------------------------|-----------------------------|---|-------------------------------------|
| Retailing | 18,022.8 | 45.9 | 0.0 | 0.0 |
| Services | 7,307.8 | 18.6 | 55.5 | 10.3 |
| Contracting | 4,376.9 | 11.2 | 100.0 | 11.2 |
| All Other Rentals | 4,139.5 | 10.5 | 52.0 | 5.5 |
| Hotel Rentals | 1,943.7 | 5.0 | 0.0 | 0.0 |
| Others (4%) | 3,454.9 | 8.8 | 50.0 | 4.4 |
| Total (4%) | 39,245.6 | 100.0 | | 31.4 |
| Share of Visitor Expenditures in Total Expenditures | | | | 24.2 |
| GET Base Paid Indirectly by Visitors | | | | 7.6 |

Source: Department of Taxation and DBEDT

Table 26. The Impact of GET Surcharge on Honolulu PCE

Assumption 1: without Federal Funds

| Year | Total GET Surcharge (\$ million) | Surcharge from Visitors (%) | Surcharge from Residents (\$ million) | Marginal Propensity to Consume | Reduction in Honolulu PCE (\$ million) |
|-------|--|-----------------------------------|---|--------------------------------------|--|
| 2007 | 264.8 | 19.5 | 213.1 | 0.82 | 174.8 |
| 2008 | 270.1 | 19.5 | 217.4 | 0.82 | 178.2 |
| 2009 | 275.5 | 19.5 | 221.7 | 0.82 | 181.8 |
| 2010 | 160.1 | 19.5 | 128.9 | 0.82 | 105.7 |
| Total | 970.5 | | 781.1 | | 640.5 |

Assumption 2: with 25 Percent Federal Funds

| Year | Total GET Surcharge (\$ million) | Surcharge from Visitors (%) | Surcharge from Residents (\$ million) | Marginal Propensity to Consume | Reduction in Honolulu PCE (\$ million) |
|-------|--|-----------------------------------|---|--------------------------------------|--|
| 2007 | 264.8 | 19.5 | 213.1 | 0.82 | 174.8 |
| 2008 | 270.1 | 19.5 | 217.4 | 0.82 | 178.2 |
| 2009 | 187.3 | 19.5 | 150.8 | 0.82 | 123.6 |
| 2010 | 0.0 | 19.5 | 0.0 | 0.82 | 0.0 |
| Total | 722.2 | | 581.2 | | 476.6 |

**Table 27. Direct Impact on Output of \$175 Million Honolulu PCE Reduction
Due to a \$265 Million Surcharge (\$ million)**

| | Hawaii County | Honolulu County | Kauai County | Maui County | State Total |
|----------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Total direct output impact | 2.2 | 134.0 | 1.0 | 2.8 | 139.9 |
| Direct impact by sector | | | | | |
| Agriculture | 0.2 | 0.4 | 0.1 | 0.1 | 0.7 |
| Mining and construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Food processing | 0.2 | 1.7 | 0.0 | 0.2 | 2.1 |
| Other manufacturing | 0.0 | 2.1 | 0.0 | 0.0 | 2.1 |
| Transportation | 0.1 | 4.3 | 0.1 | 0.1 | 4.5 |
| Information | 0.0 | 4.4 | 0.0 | 0.0 | 4.4 |
| Utilities | 0.0 | 2.2 | 0.0 | 0.0 | 2.2 |
| Wholesale trade | 0.0 | 5.1 | 0.0 | 0.1 | 5.3 |
| Retail trade | 0.2 | 19.0 | 0.0 | 0.1 | 19.4 |
| Finance and insurance | 0.0 | 10.5 | 0.0 | 0.0 | 10.6 |
| Real estate and rentals | 0.1 | 29.9 | 0.1 | 0.1 | 30.2 |
| Professional services | 0.0 | 2.7 | 0.0 | 0.0 | 2.7 |
| Business services | 0.0 | 1.2 | 0.0 | 0.0 | 1.2 |
| Educational services | 0.0 | 3.4 | 0.0 | 0.0 | 3.4 |
| Health services | 0.1 | 27.6 | 0.0 | 0.0 | 27.7 |
| Arts and entertainment | 0.0 | 1.6 | 0.0 | 0.0 | 1.7 |
| Hotels | 1.2 | 0.1 | 0.6 | 1.8 | 3.7 |
| Eating and drinking | 0.0 | 6.9 | 0.0 | 0.1 | 7.0 |
| Other services | 0.0 | 7.6 | 0.0 | 0.0 | 7.6 |
| Government | 0.0 | 3.3 | 0.0 | 0.0 | 3.3 |

**Table 28. Direct Impact on Earnings of \$175 Million Honolulu PCE Reduction
Due to a \$265 Million Surcharge (\$ million)**

| | Hawaii County | Honolulu County | Kauai County | Maui County | State Total |
|------------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Total direct earnings impact | 0.8 | 45.8 | 0.3 | 1.0 | 47.9 |
| Direct impact by sector | | | | | |
| Agriculture | 0.1 | 0.2 | 0.0 | 0.1 | 0.3 |
| Mining and construction | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Food processing | 0.0 | 0.3 | 0.0 | 0.0 | 0.4 |
| Other manufacturing | 0.0 | 0.3 | 0.0 | 0.0 | 0.4 |
| Transportation | 0.0 | 1.3 | 0.0 | 0.0 | 1.3 |
| Information | 0.0 | 1.6 | 0.0 | 0.0 | 1.6 |
| Utilities | 0.0 | 0.4 | 0.0 | 0.0 | 0.4 |
| Wholesale trade | 0.0 | 1.9 | 0.0 | 0.0 | 1.9 |
| Retail trade | 0.1 | 7.3 | 0.0 | 0.1 | 7.5 |
| Finance and insurance | 0.0 | 3.0 | 0.0 | 0.0 | 3.0 |
| Real estate and rentals | 0.0 | 2.1 | 0.0 | 0.0 | 2.1 |
| Professional services | 0.0 | 1.4 | 0.0 | 0.0 | 1.4 |
| Business services | 0.0 | 0.7 | 0.0 | 0.0 | 0.7 |
| Educational services | 0.0 | 1.8 | 0.0 | 0.0 | 1.9 |
| Health services | 0.0 | 14.3 | 0.0 | 0.0 | 14.4 |
| Arts and entertainment | 0.0 | 0.9 | 0.0 | 0.0 | 0.9 |
| Hotels | 0.4 | 0.0 | 0.2 | 0.7 | 1.3 |
| Eating and drinking | 0.0 | 2.4 | 0.0 | 0.0 | 2.4 |
| Other services | 0.0 | 3.2 | 0.0 | 0.0 | 3.2 |
| Government | 0.0 | 2.7 | 0.0 | 0.0 | 2.7 |

**Table 29. Direct Impact on Total Jobs of \$175 Million Honolulu PCE Reduction
Due to a \$265 Million Surcharge (\$ million)**

| | Hawaii County | Honolulu County | Kauai County | Maui County | State Total |
|-------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Direct job impact | 27 | 1,423 | 12 | 31 | 1,494 |
| Direct impact by sector | | | | | |
| Agriculture | 5 | 7 | 3 | 3 | 18 |
| Mining and construction | 0 | 0 | 0 | 0 | 0 |
| Food processing | 2 | 12 | 0 | 1 | 15 |
| Other manufacturing | 0 | 8 | 0 | 0 | 8 |
| Transportation | 1 | 27 | 1 | 1 | 29 |
| Information | 0 | 29 | 0 | 0 | 29 |
| Utilities | 0 | 4 | 0 | 0 | 4 |
| Wholesale trade | 1 | 42 | 0 | 1 | 44 |
| Retail trade | 3 | 306 | 1 | 2 | 312 |
| Finance and insurance | 0 | 62 | 0 | 0 | 63 |
| Real estate and rentals | 0 | 86 | 0 | 0 | 87 |
| Professional services | 0 | 30 | 0 | 0 | 30 |
| Business services | 0 | 23 | 0 | 0 | 23 |
| Educational services | 0 | 70 | 0 | 0 | 70 |
| Health services | 1 | 340 | 0 | 1 | 342 |
| Arts and entertainment | 1 | 48 | 0 | 1 | 50 |
| Hotels | 12 | 1 | 5 | 18 | 36 |
| Eating and drinking | 1 | 139 | 1 | 1 | 142 |
| Other services | 1 | 140 | 0 | 1 | 141 |
| Government | 0 | 50 | 0 | 0 | 50 |

**Table 30. Estimated Economic Impacts of \$175 Million Honolulu PCE Reduction
Due to a \$265 Million GET Surcharge**

| | Output (\$ million) | | Earnings (\$ million) | | Total jobs (no.) | |
|------------------|---------------------|-------|-----------------------|-------|------------------|-------|
| | Direct | Total | Direct | Total | Direct | Total |
| State total | 139.9 | 268.8 | 47.9 | 91.2 | 1,494 | 2,775 |
| Hawaii County | 2.2 | 6.0 | 0.8 | 2.0 | 27 | 82 |
| Honolulu County | 134.0 | 252.7 | 45.8 | 85.7 | 1,423 | 2,578 |
| Kauai County | 1.0 | 2.8 | 0.3 | 0.9 | 12 | 35 |
| Maui County | 2.8 | 7.3 | 1.0 | 2.5 | 31 | 80 |
| County share (%) | | | | | | |
| Hawaii County | 1.5 | 2.2 | 1.6 | 2.2 | 1.8 | 2.9 |
| Honolulu County | 95.7 | 94.0 | 95.6 | 94.0 | 95.3 | 92.9 |
| Kauai County | 0.7 | 1.0 | 0.7 | 1.0 | 0.8 | 1.3 |
| Maui County | 2.0 | 2.7 | 2.2 | 2.8 | 2.1 | 2.9 |

Table 31. Estimated Economic Impacts of \$175 Million Honolulu PCE Reduction by Industry

| | Output (\$ million) | | Earnings (\$ million) | | Total jobs (no.) | |
|-------------------------|---------------------|-------|-----------------------|-------|------------------|-------|
| | Direct | Total | Direct | Total | Direct | Total |
| Total | 139.9 | 268.8 | 47.9 | 91.2 | 1,494 | 2,775 |
| Agriculture | 0.7 | 2.3 | 0.3 | 1.0 | 18 | 54 |
| Mining and construction | 0.0 | 3.0 | 0.0 | 1.2 | 0 | 21 |
| Food processing | 2.1 | 3.9 | 0.4 | 0.8 | 15 | 28 |
| Other manufacturing | 2.1 | 7.9 | 0.4 | 1.4 | 8 | 32 |
| Transportation | 4.5 | 8.4 | 1.3 | 2.5 | 29 | 54 |
| Information | 4.4 | 10.8 | 1.6 | 3.8 | 29 | 72 |
| Utilities | 2.2 | 6.1 | 0.4 | 1.0 | 4 | 11 |
| Wholesale trade | 5.3 | 10.6 | 1.9 | 3.8 | 44 | 88 |
| Retail trade | 19.4 | 28.9 | 7.5 | 11.2 | 312 | 466 |
| Finance and insurance | 10.6 | 23.0 | 3.0 | 6.6 | 63 | 138 |
| Real estate and rentals | 30.2 | 57.5 | 2.1 | 4.1 | 87 | 168 |
| Professional services | 2.7 | 11.1 | 1.4 | 5.8 | 30 | 126 |
| Business services | 1.2 | 12.8 | 0.7 | 7.2 | 23 | 236 |
| Educational services | 3.4 | 5.1 | 1.9 | 2.8 | 70 | 106 |
| Health services | 27.7 | 38.1 | 14.4 | 19.7 | 342 | 470 |
| Arts and entertainment | 1.7 | 2.5 | 0.9 | 1.3 | 50 | 72 |
| Hotels | 3.7 | 5.4 | 1.3 | 2.0 | 36 | 53 |
| Eating and drinking | 7.0 | 11.1 | 2.4 | 3.8 | 142 | 224 |
| Other services | 7.6 | 13.9 | 3.2 | 5.8 | 141 | 259 |
| Government | 3.3 | 6.3 | 2.7 | 5.3 | 50 | 98 |
| Sector's share (%) | | | | | | |
| Agriculture | 0.5 | 0.9 | 0.7 | 1.1 | 1.2 | 1.9 |
| Mining and construction | 0.0 | 1.1 | 0.0 | 1.3 | 0.0 | 0.7 |
| Food processing | 1.5 | 1.5 | 0.9 | 0.9 | 1.0 | 1.0 |
| Other manufacturing | 1.5 | 2.9 | 0.8 | 1.6 | 0.6 | 1.1 |
| Transportation | 3.2 | 3.1 | 2.8 | 2.7 | 1.9 | 1.9 |
| Information | 3.1 | 4.0 | 3.2 | 4.2 | 2.0 | 2.6 |
| Utilities | 1.6 | 2.3 | 0.7 | 1.1 | 0.3 | 0.4 |
| Wholesale trade | 3.8 | 3.9 | 4.0 | 4.2 | 2.9 | 3.2 |
| Retail trade | 13.8 | 10.8 | 15.6 | 12.2 | 20.9 | 16.8 |
| Finance and insurance | 7.6 | 8.6 | 6.3 | 7.2 | 4.2 | 5.0 |
| Real estate and rentals | 21.6 | 21.4 | 4.4 | 4.5 | 5.9 | 6.0 |
| Professional services | 1.9 | 4.1 | 3.0 | 6.4 | 2.0 | 4.5 |
| Business services | 0.9 | 4.7 | 1.5 | 7.9 | 1.5 | 8.5 |
| Educational services | 2.4 | 1.9 | 3.9 | 3.1 | 4.7 | 3.8 |
| Health services | 19.8 | 14.2 | 30.0 | 21.6 | 22.9 | 16.9 |
| Arts and entertainment | 1.2 | 0.9 | 1.9 | 1.4 | 3.3 | 2.6 |
| Hotels | 2.6 | 2.0 | 2.8 | 2.2 | 2.4 | 1.9 |
| Eating and drinking | 5.0 | 4.1 | 5.1 | 4.2 | 9.5 | 8.1 |
| Other services | 5.5 | 5.2 | 6.7 | 6.4 | 9.5 | 9.4 |
| Government | 2.4 | 2.4 | 5.7 | 5.8 | 3.4 | 3.5 |

Note: Impacts by industry are totals for four counties.

Table 32. Total Economic Impacts of the GET Surcharge in a Hypothetical Oahu Project

Assumption 1: without Federal Funds

| Year | Reduction in Honolulu PCE (\$ million) | Total Impacts (Reduction) | | |
|------------------------|--|---------------------------|-----------------------|------------|
| | | Output (\$ million) | Earnings (\$ million) | Total Jobs |
| 2007 | 174.8 | 268.8 | 91.2 | 2,775 |
| 2008 | 178.2 | 274.1 | 93.0 | 2,831 |
| 2009 | 181.8 | 279.6 | 94.9 | 2,887 |
| 2010 | 105.7 | 162.5 | 55.1 | 1,678 |
| Total negative impacts | 640.5 | 985.0 | 334.2 | 10,171 |
| Total positive impacts | | 1,494.2 | 564.8 | 12,788 |
| Net impacts | | 509.2 | 230.5 | 2,617 |

Assumption 2: with 25 Percent Federal Funds

| Year | Reduction in Honolulu PCE (\$ million) | Total Impacts (Reduction) | | |
|------------------------|--|---------------------------|-----------------------|------------|
| | | Output (\$ million) | Earnings (\$ million) | Total Jobs |
| 2007 | 174.8 | 268.8 | 91.2 | 2,775 |
| 2008 | 178.2 | 274.1 | 93.0 | 2,831 |
| 2009 | 123.6 | 190.1 | 64.5 | 1,963 |
| 2010 | 0.0 | 0.0 | 0.0 | 0 |
| Total negative impacts | 476.6 | 733.0 | 248.7 | 7,569 |
| Total positive impacts | | 1,494.2 | 564.8 | 12,788 |
| Net impacts | | 761.2 | 316.0 | 5,219 |

Table 33. Net Economic Impacts of a Hypothetical Oahu Project in Present Value

Assumption 1: without Federal Funds

| Year | Present Value Factor | Impacts on Output | | | Impacts on Earnings | | |
|-------|----------------------|-------------------|--------------------|-------------|---------------------|--------------------|-------------|
| | | GET Surcharge | Project Investment | Net Impacts | GET Surcharge | Project Investment | Net Impacts |
| 2007 | 1.00 | -268.8 | | -268.8 | -91.2 | | -91.2 |
| 2008 | 0.97 | -264.9 | | -264.9 | -89.9 | | -89.9 |
| 2009 | 0.93 | -261.0 | | -261.0 | -88.6 | | -88.6 |
| 2010 | 0.90 | -146.6 | 1,347.7 | 1,201.1 | -49.7 | 509.4 | 459.7 |
| Total | | -941.2 | 1,347.7 | 406.5 | -319.4 | 509.4 | 190.0 |

Assumption 2: with 25 Percent Federal Funds

| Year | Present Value Factor | Impacts on Output | | | Impacts on Earnings | | |
|-------|----------------------|-------------------|--------------------|-------------|---------------------|--------------------|-------------|
| | | GET Surcharge | Project Investment | Net Impacts | GET Surcharge | Project Investment | Net Impacts |
| 2007 | 1.00 | -268.8 | | -268.8 | -91.2 | | -91.2 |
| 2008 | 0.97 | -264.9 | | -264.9 | -89.9 | | -89.9 |
| 2009 | 0.93 | -177.5 | | -177.5 | -60.2 | | -60.2 |
| 2010 | 0.90 | 0.0 | 1,347.7 | 1,347.7 | 0.0 | 509.4 | 509.4 |
| Total | | -711.1 | 1,347.7 | 636.6 | -241.3 | 509.4 | 268.1 |

APPENDIX A

MATHEMATICAL FRAMEWORK FOR THE INTER-COUNTY I-O MODEL

The flow of inter-industry sales in the inter-regional transaction table can be expressed as a system of $n \times l$ equations, representing the distribution of each industry's total output (sales) in each of l regions to n industries and m final demand sectors in that region as well as other regions in the economy as¹²

$$X_i^r = \sum_{s=1}^l \sum_{j=1}^n Z_{ij}^{rs} + \sum_{s=1}^l \sum_{k=1}^m Y_{ik}^{rs} \quad (\text{A.1})$$

where

$r, s = 1, 2, \dots, l$ row and column regions;

$i, j = 1, 2, \dots, n$ selling and purchasing sectors;

$k = 1, 2, \dots, m$ final demand sectors;

$X_i^r =$ total output (sales) of the i th industry in the r th region, including the total inter-industry sales (the first term in the equation) and total final sales (the second term in the equation);

$Z_{ij}^{rs} =$ i th industry's inter-industry sales from row region r to the j th industry in column region s ; and

$Y_{ik}^{rs} =$ i th industry's final sales from region r to the k th final demand sector in region s .¹³

Similarly, the flow of inter-industry purchases can be expressed as a system of another set of $n \times l$ equations, showing the distribution of industry j 's total input (purchases) from n industries and l regions and imports, and payments to p final payments sectors as follows:

$$X_j^s = \sum_{r=1}^l \sum_{i=1}^n Z_{ji}^{sr} + M_j^s + \sum_{q=1}^p W_{qj}^s \quad (\text{A.2})$$

where

$r, s = 1, 2, \dots, l$ regions;

$i, j = 1, 2, \dots, n$ industries;

$q = 1, 2, \dots, p$ final payment sectors;

$X_j^s =$ total input (purchases) of the j th industry in column region s , including the total inter-industry purchases (the first term in the equation), imports as production inputs to industries (the second term in the equation) and total final payments (the third term in the equation);

$Z_{ji}^{sr} =$ inter-industry purchases by j th industry in region s from the i th industry in region r ;

$M_j^s =$ imports of r th region's industry j as intermediate input; and

¹² Most of the mathematical expressions presented are adopted from Miller and Blair (1985) with some modifications.

¹³ Only personal consumption expenditures (PCE) and visitor expenditure components of industry's final demand have been allocated to each of the four counties in this study, given the lack of information to do the same for other final demand.

$W_{qj}^s =$ j th industry's payments to the q th final payment sector in region s .¹⁴

Continuing with the above notations, a matrix of inter-industry flows of goods and services within region r may be represented as

$$Z^{rr} = [Z_{ij}^{rr}]_{n \times n} \quad (\text{A.3})$$

where Z_{ij}^{rr} shows i th sector's sales of goods and services in region r to the j th sector in that region.

Similarly, the matrix of inter-industry flows of goods and services between regions r and s (for $r \neq s$) is¹⁵

$$Z^{rs} = [Z_{ij}^{rs}]_{n \times n} \quad (\text{A.4})$$

where Z_{ij}^{rs} represents the i th sector's sales of goods and services in region r to the j th sector in region s .

With these notations, the complete inter-regional inter-industry transactions table for an n -sector, l -region economy can be represented as

$$Z = \begin{bmatrix} Z^{11} & Z^{12} & \dots & Z^{1l} \\ Z^{21} & Z^{22} & \dots & Z^{2l} \\ \vdots & \vdots & \vdots & \vdots \\ Z^{l1} & Z^{l2} & \dots & Z^{ll} \end{bmatrix}_{nl \times nl} \quad (\text{A.5})$$

The diagonal matrices are intra-regional inter-industry flows (i.e., within regions) and off-diagonal matrices are inter-regional flows of goods and services (i.e., between regions). Specifying Z would require detailed data on shipments (flows) of goods and services across sectors and between regions. When such data are not available, various mathematical approaches are employed to estimate inter-regional commodity and service flows.

In this study, given the lack of detailed information on intra- and inter-county flows of goods and services across industries, elements in Z are estimated using the direct-requirements or technology matrix (usually denoted as matrix ' A ') from the 131-sector state I-O model and industry outputs (sales) for counties. This is done in two stages.

- i) Derive the preliminary estimates of diagonal elements of matrix Z as

$$\hat{Z}^{rr} = A \cdot X^r \quad (\text{A.6})$$

where \hat{Z}^{rr} is the preliminary estimate of Z^{rr} , A is the technical coefficients matrix for the state I-O model, and X^r is a diagonal matrix with its diagonal elements being industry outputs for region r . The resultant 131 x 131 industry matrix for each county was then aggregated to a 20 x 20 industry matrix. This procedure was repeated four times for each of the four counties. The resulting matrices account for all Hawaii intermediate inputs purchased in each county regardless of which county they came from.

¹⁴ Conceptually, one could also regionalize final payments components, but it is not done so in this study due to data limitations.

¹⁵ In the literature this is also referred to as inter-regional trade flow.

ii) \hat{Z}^{rr} was adjusted to account for inter-county trade flows of goods and services as

$$\begin{aligned} Z^{rr} &= \hat{Z}^{rr} \cdot \alpha_r \\ Z^{sr} &= \hat{Z}^{sr} \cdot \alpha_s \\ \alpha_r + \sum_{r \neq s=1}^l \alpha_s &= I \text{ for all } i \end{aligned} \tag{A.7}$$

where the first expression shows the intra- and inter-industry input purchases within the region, second expression denotes the region r 's inter-industry purchases from other regions, α_r denotes the proportion of total inter-industry purchases from within the region and α_s denotes the proportions supplied from other regions.

Like information on inter-regional flows of goods and services, information on proportions (α s) of total regional inter-industry purchases supplied by different regions was not readily available. These proportions for manufacturing and agricultural sectors were based on inter-island waterborne commerce data obtained from the US Army Corps of Engineers and data on plane and ship arrivals of various agricultural products from neighbor islands to Honolulu market obtained from the State of Hawaii Department of Agriculture (DOA). Hawaii's inputs to certain industries, such as agriculture, construction, utilities, arts/entertainment, other services and government enterprises were assumed to come mostly from the purchasing county. For financial, professional and business service sectors, Oahu was assumed to supply some intermediate inputs to other three counties. For other manufacturing and hotel sectors, Oahu was assumed to supply most of the intermediate inputs to other counties.

The next step is to derive the inter-regional direct requirements table. In the case of an inter-regional I-O model, each column of the direct requirements table contains purchases within the region (a_{ij}^{rr}) and purchases from other regions (a_{ij}^{rs} where $r \neq s$). a_{ij}^{rr} represents the purchase of column sector j in region r from the i th sector in that region to produce a dollar of sector j 's output in region r . a_{ij}^{rs} represents the purchase of column sector j in region r from the i th sector in other regions ($r \neq s$) to produce a dollar of sector j 's output in region r . These coefficients are derived by dividing each column entry of the inter-regional transactions table, Z_{ij}^{rr} and Z_{ij}^{rs} ($r \neq s$) by the corresponding column total, X_j^s as

$$a_{ij}^{rr} = Z_{ij}^{rr} / X_j^s \quad a_{ij}^{rs} = Z_{ij}^{rs} / X_j^s \tag{A.8}$$

Using equation (A.8), the system of inter-industry equations (A.1) can be rewritten as

$$X_i^r = \sum_{s=1}^l \sum_{j=1}^n a_{ij}^{rs} X_j^s + \sum_{s=1}^l \sum_{k=1}^m Y_{ik}^{rs} \tag{A.9}$$

The sets of matrices showing the direct requirement coefficients among industries within the region is represented as

$$A^{rr} = [a_{ij}^{rr}]_{n \times n} \tag{A.10}$$

Similarly the set of matrices showing the direct requirement coefficients among industries between regions r and s ($r \neq s$) is represented as

$$A^{rs} = [a_{ij}^{rs}]_{n \times n} \quad (\text{A.11})$$

For a l -region model, the complete direct coefficient matrix will be

$$A = \begin{bmatrix} A^{11} & A^{12} & \dots & A^{1l} \\ A^{21} & A^{22} & \dots & A^{2l} \\ \vdots & \vdots & \vdots & \vdots \\ A^{l1} & A^{l2} & \dots & A^{ll} \end{bmatrix}_{nl \times nl} \quad (\text{A.12})$$

For notational convenience, let us combine the various final demand sectors to form one aggregate final demand sector ($Y^r = \sum_{s=1}^l \sum_{k=1}^m Y_{ik}^{rs}$). Also let $X^r = [X^1 \ X^2 \ \dots \ X^l]$ and $Y^r = [Y^1 \ Y^2 \ \dots \ Y^l]$ be the vectors of industry outputs and final demand sectors, respectively, where X^l is an $n \times 1$ vector of outputs and Y^l is a $n \times 1$ vector of final demand in region l . With these notations, the system of equations (A.9) can be written in a compact form as

$$X = AX + Y \quad (\text{A.13})$$

where X represents a $nl \times 1$ vector of industry total outputs, A represents an $nl \times nl$ matrix of direct requirements coefficients (also known as the technology matrix), and Y is an $nl \times 1$ vector of total final demand.

The expression of the inter-industry equations (A.13) can be rewritten as

$$X(I - A) = Y \quad (\text{A.14})$$

representing a set of l matrix equations

$$\begin{aligned} (I - A^{11})X^1 & - A^{12}X^2 - \dots & - A^{1l}X^l & = Y^1 \\ - A^{21}X^1 + (I - A^{22})X^2 & - \dots & - A^{2l}X^l & = Y^2 \\ \vdots & \vdots & \vdots & \vdots \\ - A^{l1}X^1 & - A^{l2}X^2 - \dots + (I - A^{ll})X^l & & = Y^l \end{aligned} \quad (\text{A.15})$$

where I is an identity matrix, which has ones on its diagonal and zeros elsewhere.

Thus, the vector of total industry outputs can be solved as:

$$X = (I - A)^{-1}Y = BY \quad (\text{A.16})$$

where $(I - A)^{-1} = B$ is the total requirements table, or Leontief inverse matrix. B is also referred to as the final-demand output multiplier table.

If the household sector is exogenous, the Type I final-demand output multiplier for the j th sector in region s (O_s^j) can be obtained by summing down the j th column of the Leontief matrix as

$$O_s^j = \sum_{r=1}^l \sum_{i=1}^n b_{ij}^{rs} \quad (\text{A.17})$$

where b_{ij}^{rs} are the elements of the final-demand output multiplier table, representing the change in output of sector i in region r due to a dollar change in final demand of sector j in region s .

A direct earnings coefficient (earnings to output ratio) matrix for region r (L^r) is represented as¹⁶

$$L^r = \begin{bmatrix} L_1^r & 0 & \cdots & 0 \\ 0 & L_2^r & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & L_n^r \end{bmatrix} \quad (\text{A.18})$$

where L_i^r represents the earnings to output ratio for sector i in region r . Then, the complete earnings to output coefficient matrix may be written as

$$L = \begin{bmatrix} L^1 & 0 & \cdots & 0 \\ 0 & L^2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & L^l \end{bmatrix} \quad (\text{A.19})$$

The final-demand earnings multiplier matrix (C) is obtained using the direct earnings coefficient matrix and the total requirements or Leontief matrix as

$$C = L \cdot B \quad (\text{A.20})$$

The Type I final-demand earnings multiplier for sector j in region s ($I_j^s(FD)$) is computed as:

$$I_j^s(FD) = \sum_{r=1}^l \sum_{i=1}^n c_{ij}^{rs} \quad (\text{A.21})$$

The Type I direct-effect earnings multiplier for sector j in region s ($I_j^s(DE)$) is derived as:

$$I_j^s(DE) = I_j^s(FD) / L_j^s \quad (\text{A.22})$$

A matrix of employment to output ratios or direct employment coefficients for region r (E^r) can be represented as

$$E^r = \begin{bmatrix} e_1^r & 0 & \cdots & 0 \\ 0 & e_2^r & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & e_n^r \end{bmatrix} \quad (\text{A.23})$$

where e_i^r represents the employment to output ratio for sector i in region r . Then, the complete direct employments coefficients matrix can be written as

¹⁶ See footnote 3.

$$E = \begin{bmatrix} E^1 & 0 & \dots & 0 \\ 0 & E^2 & 0 & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & E^l \end{bmatrix} \quad (\text{A.24})$$

The final-demand employment multiplier matrix (D) is derived using the direct employment coefficients matrix (E) and total requirements or Leontief matrix (B) as

$$D = E \cdot B \quad (\text{A.25})$$

The Type I final-demand employment multiplier for sector j in region s ($E_j^s(FD)$) is computed as

$$E_j^s(FD) = \sum_{r=1}^l \sum_{i=1}^n d_{ij}^{rs} \quad (\text{A.26})$$

The Type I direct-effect employment multiplier for sector j in region s ($E_j^s(DE)$) is derived as:

$$E_j^s(DE) = E_j^s(FD) / e_j^s \quad (\text{A.27})$$

Type II multipliers are obtained in exactly the same fashion as Type I multipliers except that households in each county are treated as an additional industry (i.e., as both suppliers of labor inputs to industries and purchasers of industries' outputs) to account for the effects of changes in household earnings and expenditures. Mathematically, this is done by adding both a household row and a household column to the inter-regional direct requirements matrix (A) in equation (A.13). Entries in the household row are the earnings to output ratios, and entries in the household column are industries' shares of total personal consumption expenditures, multiplied by the ratio of personal income less taxes and savings to personal income in order to account for the dampening effects of taxes and savings on expenditures. In computing output and employment multipliers, the entries in the household row of the resulting total requirements table are not included in the summation. Each entry in the household row of the total requirements matrix also happens to be the type II final-demand earnings multiplier of the column industry corresponding to the entry.

APPENDIX B

INDUSTRY CLASSIFICATION, DATA SOURCES, AND ESTIMATION PROCEDURE

Industry Classification

As in the state I-O model, the North American Industry Classification System (NAICS) was adopted in classifying industry sectors for the inter-county I-O model. However, several data sources used in the 2002 I-O table were reported in a more aggregate format and therefore were disaggregated using the detailed Hawaii's Department of Labor and Industrial Relations (DLIR) ES-202 jobs and income data. Similarly, proprietors' jobs and income were disaggregated using the 2002 nonemployer statistics from the Economic Census.

Two different detailed levels are provided in this study. In the less detailed level, industries in the inter-county model were aggregated to 20 sectors as in the condensed version of the state I-O model. In the more detailed level, industries in Honolulu were aggregated to 67 sectors as in the detailed version of the state I-O model, while industries in other counties were aggregated to 20 sectors as in the less detailed version of the inter-county model. A more detailed table would be difficult to build using the inter-regional accounting framework due to lack of data for the neighbor island counties and the geometric increase in the number of sectors. For example, an inter-regional inter-industry transactions table for a 20-sector 4-county model will have a total of 80 rows and 80 columns.

Output

The main data source for industries' outputs for the 2002 inter-county I-O table was the 2002 Economic Census (EC) of Hawaii's industries. The Economic Censuses disclose output estimates for most of the industries included in the inter-county I-O table. Following the 2002 U.S. national I-O table, industry's output is generally measured as follows:

$$\begin{aligned} \text{Output} &= \text{Revenue of for-profit establishments} \\ &+ \text{Expenses of non-profit establishments*} \\ &- \text{Cost of merchandise resales*} \\ &+ \text{Adjustment for underreporting*} \\ &+ \text{Changes in inventory*} \\ &+ \text{Sales taxes*} \\ &+ \text{Employee tips*} \end{aligned}$$

* If applicable (every industry may only have some of the components).

The above definition applies to most of the manufacturing and service industries. However, as described below, there are several industries for which output measures and sources were different from the 2002 Economic Census.

Agriculture, Aquaculture, and Commercial Fishing

The output for the agriculture (crops and livestock) and aquaculture sectors was based on the values of agricultural and aquacultural sales published in the Hawaii Department of Agriculture Statistics of Hawaii Agriculture, with adjustments made for changes in inventories and inter-farm sales

based on information obtained from the Bureau of Economic Analysis (BEA). The total state output of commercial fishing was based on information from the National Marine Fisheries Services (NMFS) Web site and it was allocated to counties based on counties' shares in nonemployer receipts from the 2002 Economic Census.

Forestry & Logging and Support Activities for Agriculture

The forestry & logging and support activities for agriculture are not covered in either the Statistics for Hawaii's Agriculture or the Economic Census. Thus, their outputs were estimated by applying the value added to output ratios for these sectors obtained from Statistics of Hawaii Agriculture to their corresponding valued added obtained from the Bureau of Economic Analysis (BEA).

Mining and Construction

Construction output equals the net revenue of construction (total value of construction less subcontracting) plus the value of architectural and engineering services involved in the construction activity. Mining and construction outputs in the state I-O came from the 2002 Economic Census of mining and construction, respectively. Mining and construction outputs for counties were estimated by allocating mining and construction outputs in the state I-O table using wage and salary employment in mining and construction related activities by county.

Manufacturing

Manufacturing outputs at the state level were mostly based on the 2002 Economic Census of manufacturing except for the output of petroleum processing, which was not disclosed in the Economic Census. Petroleum processing output was estimated based on the information contained in the 2002 Hawaii Foreign Trade Zone (FTZ) Annual Report. At the county level, outputs for Honolulu were based on either the 2002 Economic Census or the FTZ Annual Report 2002. For other counties, the Economic Census does not disclose detailed manufacturing sales by county. Therefore, manufacturing outputs for other counties were estimated by allocating the difference between Honolulu output and state total output for these industries in the state I-O table based on other counties shares in wage and salary income.

Transportation

Output of all transportation sectors for counties was obtained by allocating total output of transportation sectors in the 2002 state I-O table using respective transportation wage and salary income by county. The definition of air and water transportation output and its estimation procedure can be found in the 2002 benchmark I-O report for the state.

Utilities

Output of electricity and gas production by county was obtained from the Hawaii Data Book.

Trade

Output of wholesale and retail trade services was estimated based on wholesale and retail gross sales by county from the 2002 Economic Census and appropriate wholesale and retail margins. Because of the lack of information, the margins for counties were assumed to be the same as those for the 2002 state I-O table. Trade margins are described in the 2002 state I-O report.

Finance and Insurance

Output of finance and insurance industries for counties was obtained by allocating the finance and insurance output in the 2002 state I-O table using respective wage and salary income or job by county. The definition of finance and insurance output and estimation procedures are provided in the 2002 state I-O report.

Real Estate and Rental

Real estate and rental output was defined as the revenue of all rental activity in the state (regardless of which industry earned the revenue), plus the revenue of real estate brokers and agents, plus the imputed rental value of buildings owned by non-profit establishments serving individuals, plus the imputed value of new home sales by the construction industry. In the 2002 state I-O table, this sector includes three industries: (1) owner-occupied dwellings, (2) real estate, and (3) rental & leasing and others. Owner-occupied housing output was computed as the revenue that would be generated if all of the owner-occupied housing units were rented. This was estimated based on the number of owner-occupied housing units and average rent paid to comparable rental units by county. This information was obtained from the 2002 Housing Policy Study for Hawaii. Real estate output and rental & leasing outputs by county were computed based on the 2002 Economic Census.

Services

Business Services

In the 2002 state I-O table, the business services sector includes four industries: (1) management of companies and enterprises, (2) travel arrangement and reservation services, (3) administrative and support services, and (4) waste management and remediation services. The county level output of the management of companies and enterprises industry was obtained by allocating the state output of this industry using respective wage and salary income or job by county. For the remaining three industries in this sector, county level outputs were based on the Economic Census.

Educational Services

In the 2002 state I-O table, the educational services sector includes two industries: (1) colleges, universities, and professional schools, and (2) other educational services. Output of the total educational services sector by county was estimated based on the 2002 Economic Census and adjusted by the BEA/EC job ratios. The allocation of total educational services output to the two industries included was based on wage and salary income from ES202 data from the State of Hawaii Department of Labor and Industrial Relations (DLIR).

Hospitals

Hospitals output was based on their expenses instead of their revenues, since they are considered non-profit institutions serving individuals. Government-run hospitals were included in the Economic Census, but were removed from the output estimate, since the hospitals industry by I-O definition includes private hospitals only. Government hospitals are part of government expenditures in final demand.

Accommodation and Food Services

Accommodation and food services outputs for counties were estimated based on the 2002 Economic Census, plus estimated tips.

Government and Government Enterprises

In the 2002 state I-O table, the government sector includes three sub-sectors: (1) Federal government military, (2) Federal government civilian, and (3) state and local government. The outputs of government enterprises were combined with the outputs of the general government sub-sectors. State and local government enterprises' output was estimated in terms of three categories, namely water and sewer, public transit, and other government enterprises (airports, harbors, housing, parking, etc.). There are two federal government enterprises, namely postal service and others (e.g., military exchanges, commissaries, restaurants, and hotels). Government enterprise output was defined as operating revenue, except for military exchanges and commissaries for which output was defined as their operating margins. Output of the government sector for counties was obtained by allocating the government sector output in the 2002 state I-O table using respective value added by county.

Value Added

Value added is the income side of the Hawaii gross domestic product (GDP)¹⁷ account. For the 2002 I-O table, value added was divided into four components: (1) compensation of employees (COE), (2) proprietors' income, (3) taxes on production and imports less subsidies (TOPI), and (4) other capital costs. The main data source for the components of value added was the Bureau of Economic Analysis (BEA).

The BEA provided the following three components of GDP data at the state level (64 industries by NAICS): (1) COE, (2) TOPI, and (3) gross operating surplus (including proprietor's income and other capital costs). Please note that since BEA revised the GDP data, the state GDP data applied in the 2002 inter-county I-O model are different from the GDP data used in the 2002 state I-O model. The BEA GDP data can be used to determine the control total at the state level for the following two components: (1) COE, and (2) TOPI. The gross operating surplus (GOS) needs to be separated between proprietor's income and other capital costs.

In its personal income data, BEA also provides the earnings by place of work data for the state (SA05N) and by county (CA05N) and COE data for the state (SA06N) and by county (CA06N). Earnings by place of work = Compensation of employees + Proprietors' income. Therefore, COE and proprietors' income by industry for the state and by county can be calculated using BEA personal income data.

Other capital costs by industry for the state were calculated by subtracting the proprietors' income from the GOS. Please note that the BEA GDP data contains less detailed industry level data than the BEA income data. While the BEA GDP data can be grouped into 20 sectors similar to the 2-digit NAICS code, it is not detailed enough to generate the more detailed 67-sector industry level data

¹⁷ Formerly called gross state product (GSP).

applied in the 2002 state I-O table. The BEA income data, however, is more detailed and can be grouped into the required 67 sectors.

Compensation of Employees

Compensation of employees consists of wage and salary disbursements plus supplements to wages and salaries. The supplements to wages and salaries include employer contributions for employee pension and insurance funds, and employer contributions for government social insurance. In the 2002 inter-county I-O table, county level COE data by detailed industries (67 sectors) were obtained from BEA's estimate of COE by county (CA06N).

Proprietors' Income

In its personal income data, BEA also provides the county level earnings by place of work by industry (CA05N). The county level proprietors' income was determined by subtracting the county level COE from the county level total earnings by place of work.

Taxes on Production and Imports less Subsidies

Taxes on production and imports less subsidies (TOPI) consist of tax liabilities, such as general sales and property taxes that are chargeable to business expense in the calculation of profit-type incomes. Also included are special assessments. TOPI is the sum of business taxes and fees paid to the federal, state, and local governments. Components of TOPI include general excise taxes (GET), transient accommodations taxes (TAT), fuel taxes, property taxes, customs duties, and certain types of non-tax fees. Subsidies consist of the monetary grants paid by government agencies to private business or to government enterprises at another level of government. The county level TOPI data in the 2002 inter-county I-O table were estimated by allocating the state total TOPI to counties using counties' shares in total earnings.

Other Capital Costs

Other capital costs consist of several components, including corporate profits, consumption of fixed capital (i.e., depreciation), net interest paid, net rental income of individuals, and business transfers. Other capital costs for the state were computed by subtracting proprietors' income from gross operating surplus. Since information on other capital costs by industry and by county was not available, total other capital costs for the state was allocated to counties using counties share in outputs.

Final Demand

Final demand reflects the expenditure side of the state GDP account. It consists of personal consumption expenditures, visitor's expenditures, gross private investment, change in inventories, state and local government consumption and investment, federal government consumption and investment, and exports.

Personal Consumption Expenditures (PCEs)

The PCEs for counties were estimated based on income, population, retail sales and industry outputs by county. The process involved several iterations. The total PCE of each industry in each county was broken down to four components, representing the spending on that industry's final goods and services by households in each of the four counties. Exports to other counties and spending by Hawaii residents from other counties were included in PCEs. As in the state I-O model, PCEs were estimated in producers' prices with trade and transportation margins being assigned to relevant trade and transportation sectors.

Visitor Expenditures

Visitor expenditures for counties were computed based on total visitor days and total retail sales by county. Like PCEs, total expenditures by visitors on each industry's goods and services were broken down to four components, showing visitors' spending on that industry's goods and services in each of the four counties. Visitor expenditures were also valued at producers' prices with trade and distribution margins being assigned to relevant distribution sectors.

Gross Private Investment

Gross private investment consists of private sector spending on construction and producers' durable equipment (PDE). The value of private construction was estimated as total value of new construction (excluding repairs and maintenance construction) minus the value of government construction. The construction portion of private investment was obtained in estimating the construction output by county. The PDE portion was estimated by allocating total private spending on PDE in the 2002 state I-O table to counties using counties' shares in industry outputs.

Changes in Inventories

Changes in inventories by county were computed by allocating total changes in inventories in the 2002 state I-O table using industry outputs by county.

State and Local Government Consumption and Investment

State and local government consumption consists of compensation of employees, consumption of fixed capital, and operating expenses. Employee compensation was based on ES202 income and BEA wages and salaries and other labor income, adjusted to account for state and local government enterprises. Information on consumption of fixed capital by county was not available. Total fixed capital in the 2002 state I-O table, estimated based on BEA, was allocated to counties based on compensation of state and local government employees by county. Similarly, information on detailed government operating expenses by industry was not available for counties. Thus, the total operating expenses of state and local government (excluding operating expenses of the various government enterprises) in the 2002 state I-O table, estimated based on the special DAGS report and Census of Governments, was allocated to counties using industry outputs by county.

State and local government investment consists of the value of new state and local government construction and spending on durable equipment. The value of state and local government construction by county was estimated based on county financial reports and supplemental detail to the state financial reports, with adjustments made to conform to the state I-O model. The spending on durable equipment in the 2002 state I-O table was allocated to counties using industry outputs.

Federal Government Investment and Consumption: Military

Federal government military expenditures include investment and consumption expenditures. Investment comprises new construction spending and spending on producers' durable equipment. Construction spending was based on federal defense procurement data by county, while spending on durable equipment was estimated by allocating the total federal military durable spending in the 2002 state I-O table using industry outputs by county. Federal military consumption consists of purchases of goods and services from various industries, compensation of federal employees and consumption of fixed capital. Federal purchases of goods and services by industry were based on federal military procurement data by county and employees' compensation and capital consumption was obtained by adding the compensation of federal military employees and other capital costs of the federal military.

Federal Government Investment and Consumption: Civilian

Federal civilian investment and consumption were computed in the same way as the federal military investment and consumption, except for that it involved federal civilian procurement data and compensation of federal civilian employees and other nonmilitary capital costs of federal government.

Exports

Given the lack of data on industries' exports by county, exports were estimated by allocating total exports in the 2002 state I-O table to counties based on industry outputs by county.

Imports

Imports consist of out-of-state purchases of services and commodities by industries as inputs to production and by final users for consumption and investment. The value of total industries' imports was computed as a residual between total final demand and total value added, and allocated to industries in balancing the inter-regional inter-industry transactions table. The value of imports for each final demand sector was estimated as that sector's total expenditures on final goods and services at producers' prices less total final sales of goods and services to that sector by local industries. Given the lack of information, industries' imports by county were estimated by allocating total industries' imports in the 2002 state I-O table using counties' shares in industries' outputs. Allocation of imports of goods and services by final demand sectors was done based on counties' total expenditures on each final demand.

Employment

Total employment, wage and salary employment, and proprietors' employment numbers are mainly based on BEA employment data by industry and by county. The county level total employment at less detailed industry level (20 sectors) was obtained from the BEA's total employment data by county at 2-digit NAICS level (CA25N). The county level total employment at less detailed industry level was allocated to more detailed industry level (20 sectors for the neighbor island counties and 67 sectors for Honolulu) based on shares in wage and salary jobs. Since the state level total employment at more detailed industry level (67 sectors) can be calculated based on BEA SA25N data, adjustments were made such that the county total at detailed industry level equals the state total jobs at detailed industry level. The county level wage and salary jobs at detailed industry level (67 sectors)

were estimated based on BEA CA27N data. The proprietors' jobs were determined by the difference between total jobs and wage and salary jobs.

In addition, the State of Hawaii Department of Labor and Industrial Relations (DLIR) maintains a detailed data set (ES202) that provides tabulations of the 2002 number of reporting units, average annual employment, and total wages by industry and by county. For the industries in the 2002 I-O table that were not consistent with the 3-digit NAICS, the 2002 ES202 data were used to allocate the BEA data to the 2002 I-O industries.

APPENDIX C

INTER-COUNTY INTER-INDUSTRY TRANSACTIONS TABLE AND BALANCING PROCEDURE

Inter-county Inter-industry Transactions Table

An inter-industry transactions table in an inter-regional context depicts the flow of goods and services across industries both within region and between regions. This information is not readily available, especially the flow of services. Here, an attempt was made to derive an inter-county transactions table using the existing state inter-industry table and limited information on inter-industry flows of goods and services between counties.

Inter-island water-borne commerce data obtained from the U.S. Army Corps of Engineers provide information on tonnages received by and shipped out from each county for major commodity types. However, the available data do not contain information on the various port-to-port movements due to disclosure restrictions. In order to better estimate the flow of commodities between counties, such data on bilateral flows by port would be necessary for each commodity type. Moreover, the values of the shipments are not reported. However, looking at total tonnages received in and shipped out of each county by commodity type provided some insights into the flows of commodities between counties. Besides water-borne commerce, data on plane and ship arrivals of various agricultural products to Honolulu from neighbor islands were obtained from the Hawaii State Department of Agriculture (DOA). These data provided a basis for determining proportions of industries' commodity inputs supplied by various industries in different counties. There are significant flows of services between counties, but very little or no information exists on flows of services. Because of the lack of data to estimate the inter-county transactions table directly, as in other inter-regional I-O studies, an indirect approach is used to derive the inter-county transactions table.

As outlined in the mathematical section, the inter-county inter-industry transactions table was derived in two stages. First, for each county, a 67 by 67 inter-industry table was estimated using the detailed direct requirements matrix from the 2002 state I-O table and 67 industry outputs for that county. These 67 industries were then aggregated to 20 sectors for the neighbor island counties (Honolulu remained 67 industries in the more detailed version of the 2002 inter-county I-O table). Each column of the resultant matrix represented the total inputs supplied by each of the row industries to produce the total column sector's output in each county. If all inputs were supplied from industries within a particular county, the resultant table would serve as the inter-industry transactions table for a single region I-O model for that county. However, when industries purchase inputs not only from industries within the county, but also from those in other counties, the resultant inter-industry table needs to be adjusted. This adjustment was done during the second stage. Total input purchases from a particular row industry were allocated to that industry in each of the four counties. The allocation of industries' total commodity inputs to different counties was done based on waterborne commerce data and DOA data on arrival of agricultural produce to Honolulu from outer islands. The allocation of services was based on a judgment of the proportions of services supplied within the county and those supplied by other counties depending upon the types of industries. Inter-industry supplies of inputs from certain industries, such as construction, real estate and rentals, utilities, arts/entertainment, other services and government enterprises were assumed to be mostly local.

Balancing Procedure

By definition, total output (sales) should equal total input (purchases) for each industry in each county. Because of the lack of information on inter-county inter-industry transactions, industries' sales (row totals) usually do not initially add up to their total purchases (column totals). Therefore, row and column elements of the transactions table need to be adjusted using a balancing procedure such that the row and the column corresponding to a particular industry add up to the same value. The inter-county model needs an additional adjustment such that relevant cells in the inter-county transactions table add up to the corresponding cell in the state I-O table.

One of the most popular techniques in balancing an I-O transactions table is the bi-proportional balancing procedure, which is also known as the RAS procedure. Traditionally, RAS is used to balance the direct requirements table. This study uses a modified tri-proportional RAS procedure to balance the inter-industry portion of the transactions table. None of the final demand and final payment sectors is changed in the balancing process.

Using equation (A.1), the control total for intermediate sales of sector i in region r (U_i^r) is calculated as

$$U_i^r = \sum_{s=1}^l \sum_{j=1}^n Z_{ij}^{rs} = X_i^r - \sum_{s=1}^l \sum_{k=1}^m Y_{ik}^{rs} \quad (C.1)$$

and the control total for inter-industry input (including intermediate import (M_j^s)) for sector j in region s (V_j^s) is calculated from equation (A.2) as

$$V_j^s = \sum_{r=1}^l \sum_{i=1}^n Z_{ji}^{sr} + M_j^s = X_j^s - \sum_{q=1}^p W_{qj}^s \quad (C.2)$$

where X_i^r is total sales or output for industry i in region r , X_j^s is total purchases or input for industry j in region s , Z_{ij}^{rs} is i th industry's inter-industry sales from row region r to the j th industry in column region s ; Y_{ik}^{rs} is i th industry's final sales from region r to the k th final demand sector in region s ; Z_{ji}^{sr} is inter-industry purchases by j th industry in region s from the i th industry in region r ; M_j^s is imports of s th region's industry j as intermediate input; and W_{qj}^s is j th industry's payments to the q th final payment sector in region s

The import row for intermediate use is represented as follows:

$$\sum_{s=1}^l \sum_{j=1}^n M_j^s = M \quad (C.3)$$

where M is the control total for intermediate imports computed based on relations between the value added and expenditure sides of the GDP account (i.e. total final demand less total value added gives total imports for intermediate use).

Initially none of the last three conditions hold. Thus, entries in each row and column need to be adjusted so that each row and each column add up to their corresponding control totals. The fourth balancing condition is that, for consistency, the sum of j th industry's purchases from i th industry in all

regions should add up to j th industry's purchases from i th industry in the state I-O model. Mathematically it can be expressed as

$$\sum_{s=1}^l \sum_{r=1}^l Z_{ij}^{rs} = \sum_{r=1}^l \sum_{s=1}^l Z_{ji}^{sr} = Z_{ij} \quad (\text{C.4})$$

Although, necessary for the construction of an I-O model, the last four equations (equations C.1 – C.4) are unlikely to be met by initial estimates. Thus, Z_{ij}^{rs} s and M_j^s need to be adjusted until each of the four equations is satisfied simultaneously. The balancing procedure was implemented using specifically designed macros in Microsoft Excel.

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APPENDIX TABLES

Table A-1. Output Shares by Sector and by County

| | Hawaii County | Honolulu County | Kauai County | Maui County | State total |
|---------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Total output (\$ million) | 6,562.7 | 53,164.2 | 3,056.2 | 7,835.7 | 70,618.8 |
| Sector share (%) | | | | | |
| Agriculture | 3.1 | 0.5 | 1.6 | 1.8 | 1.0 |
| Mining and construction | 10.8 | 6.0 | 7.5 | 7.3 | 6.7 |
| Food processing | 1.3 | 1.3 | 0.9 | 2.4 | 1.4 |
| Other manufacturing | 1.8 | 4.6 | 0.9 | 1.4 | 3.8 |
| Transportation | 3.2 | 6.1 | 4.2 | 3.8 | 5.5 |
| Information | 1.4 | 3.0 | 2.7 | 3.9 | 2.9 |
| Utilities | 3.0 | 1.7 | 3.0 | 2.5 | 2.0 |
| Wholesale trade | 2.2 | 3.7 | 1.8 | 1.7 | 3.3 |
| Retail trade | 10.0 | 6.6 | 8.5 | 8.8 | 7.3 |
| Finance and insurance | 2.4 | 6.4 | 2.2 | 2.1 | 5.4 |
| Real estate and rentals | 18.4 | 13.9 | 22.0 | 19.1 | 15.2 |
| Professional services | 3.2 | 5.2 | 3.2 | 2.7 | 4.7 |
| Business services | 2.6 | 4.4 | 3.5 | 3.8 | 4.1 |
| Educational services | 0.6 | 1.2 | 0.4 | 0.6 | 1.0 |
| Health services | 7.9 | 7.3 | 5.8 | 5.5 | 7.1 |
| Arts and entertainment | 1.5 | 0.8 | 1.9 | 2.3 | 1.1 |
| Hotels | 10.6 | 3.0 | 13.9 | 14.4 | 5.4 |
| Eating and drinking | 3.5 | 3.5 | 4.9 | 5.7 | 3.8 |
| Other services | 2.7 | 3.2 | 2.7 | 3.8 | 3.2 |
| Government | 9.9 | 17.5 | 8.5 | 6.5 | 15.2 |

Table A-2. Earnings Shares by Sector and by County

| | Hawaii County | Honolulu County | Kauai County | Maui County | State total |
|-----------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Total earnings (\$ million) | 2,469.7 | 22,332.2 | 1,078.9 | 2,726.4 | 28,607.1 |
| Sector share (%) | | | | | |
| Agriculture | 3.2 | 0.6 | 1.7 | 2.4 | 1.0 |
| Mining and construction | 10.9 | 5.9 | 7.9 | 8.3 | 6.6 |
| Food processing | 0.8 | 0.6 | 0.6 | 1.6 | 0.7 |
| Other manufacturing | 1.4 | 1.8 | 1.4 | 3.2 | 1.9 |
| Transportation | 3.4 | 4.3 | 4.1 | 3.9 | 4.1 |
| Information | 1.3 | 2.5 | 2.0 | 1.9 | 2.3 |
| Utilities | 1.5 | 0.7 | 1.4 | 1.2 | 0.8 |
| Wholesale trade | 2.4 | 3.2 | 1.4 | 1.9 | 2.9 |
| Retail trade | 8.9 | 6.1 | 10.0 | 10.1 | 6.9 |
| Finance and insurance | 2.3 | 4.3 | 1.9 | 1.8 | 3.8 |
| Real estate and rentals | 4.8 | 2.3 | 5.8 | 3.2 | 2.8 |
| Professional services | 3.6 | 6.6 | 3.0 | 3.2 | 5.9 |
| Business services | 3.4 | 6.0 | 6.2 | 4.7 | 5.6 |
| Educational services | 0.9 | 1.5 | 0.7 | 0.8 | 1.4 |
| Health services | 9.9 | 9.0 | 8.3 | 7.3 | 8.9 |
| Arts and entertainment | 2.3 | 1.0 | 2.7 | 3.4 | 1.4 |
| Hotels | 10.2 | 2.8 | 12.8 | 15.9 | 5.1 |
| Eating and drinking | 3.1 | 2.9 | 4.6 | 5.5 | 3.2 |
| Other services | 3.2 | 3.2 | 3.3 | 4.1 | 3.3 |
| Government | 22.4 | 34.7 | 20.4 | 15.5 | 31.3 |

Table A-3. Value Added Shares by Sector and by County

| | Hawaii County | Honolulu County | Kauai County | Maui County | State total |
|--------------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Total value added (\$ million) | 3,984.6 | 33,014.3 | 1,852.3 | 4,623.7 | 43,474.8 |
| Sector share (%) | | | | | |
| Agriculture | 2.6 | 0.5 | 1.3 | 1.9 | 0.9 |
| Mining and construction | 8.1 | 4.7 | 5.5 | 5.8 | 5.2 |
| Food processing | 0.6 | 0.5 | 0.4 | 1.1 | 0.6 |
| Other manufacturing | 0.9 | 1.5 | 0.8 | 1.8 | 1.4 |
| Transportation | 2.7 | 3.8 | 3.3 | 3.1 | 3.6 |
| Information | 1.4 | 2.9 | 2.2 | 2.7 | 2.7 |
| Utilities | 3.0 | 1.6 | 2.8 | 2.4 | 1.8 |
| Wholesale trade | 2.7 | 4.0 | 1.5 | 2.1 | 3.6 |
| Retail trade | 9.2 | 6.8 | 9.5 | 9.7 | 7.4 |
| Finance and insurance | 2.4 | 5.6 | 2.3 | 2.2 | 4.8 |
| Real estate and rentals | 20.9 | 14.8 | 24.0 | 20.1 | 16.3 |
| Professional services | 2.5 | 5.1 | 2.3 | 2.2 | 4.4 |
| Business services | 2.6 | 4.7 | 4.2 | 3.5 | 4.4 |
| Educational services | 0.6 | 1.2 | 0.5 | 0.5 | 1.0 |
| Health services | 7.5 | 7.0 | 5.6 | 5.3 | 6.8 |
| Arts and entertainment | 1.9 | 0.9 | 2.2 | 2.8 | 1.3 |
| Hotels | 10.6 | 3.1 | 12.9 | 15.5 | 5.6 |
| Eating and drinking | 2.6 | 2.7 | 3.7 | 4.5 | 2.9 |
| Other services | 2.3 | 2.6 | 2.3 | 3.0 | 2.6 |
| Government | 14.8 | 26.0 | 12.8 | 9.9 | 22.7 |

Table A-4. Total Job Shares by Sector and by County

| | Hawaii County | Honolulu County | Kauai County | Maui County | State total |
|-------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Total jobs | 83,807 | 560,762 | 37,531 | 88,080 | 770,180 |
| Sector share (%) | | | | | |
| Agriculture | 8.2 | 1.0 | 4.3 | 3.9 | 2.2 |
| Mining and construction | 6.5 | 3.9 | 5.4 | 5.7 | 4.5 |
| Food processing | 1.0 | 0.8 | 0.8 | 1.4 | 0.9 |
| Other manufacturing | 1.3 | 1.6 | 0.9 | 1.3 | 1.5 |
| Transportation | 2.7 | 3.6 | 3.9 | 3.5 | 3.5 |
| Information | 1.0 | 1.9 | 1.3 | 1.3 | 1.7 |
| Utilities | 0.5 | 0.3 | 0.5 | 0.5 | 0.4 |
| Wholesale trade | 2.2 | 2.9 | 1.6 | 1.9 | 2.6 |
| Retail trade | 12.1 | 10.1 | 12.6 | 12.3 | 10.7 |
| Finance and insurance | 1.9 | 3.6 | 2.0 | 1.6 | 3.1 |
| Real estate and rentals | 5.2 | 3.8 | 6.1 | 6.3 | 4.4 |
| Professional services | 3.9 | 5.5 | 4.1 | 3.7 | 5.1 |
| Business services | 5.6 | 7.6 | 7.0 | 6.3 | 7.2 |
| Educational services | 1.2 | 2.3 | 0.8 | 1.2 | 2.0 |
| Health services | 8.6 | 8.5 | 7.5 | 6.1 | 8.2 |
| Arts and entertainment | 3.2 | 2.2 | 3.4 | 4.5 | 2.6 |
| Hotels | 8.3 | 2.7 | 10.1 | 12.8 | 4.8 |
| Eating and drinking | 5.5 | 6.7 | 8.6 | 8.6 | 6.9 |
| Other services | 5.8 | 5.5 | 6.2 | 6.3 | 5.7 |
| Government | 15.1 | 25.4 | 13.0 | 11.0 | 22.1 |

Table A-5. Personal Consumption Expenditures (PCE) Shares by Sector and by County

| | Hawaii County | Honolulu County | Kauai County | Maui County | State total |
|-------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Total PCE (\$ million) | 3,133.8 | 23,155.5 | 1,258.6 | 3,389.7 | 30,937.6 |
| Sector share (%) | | | | | |
| Agriculture | 0.33 | 0.21 | 0.05 | 0.18 | 0.22 |
| Mining and construction | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Food processing | 0.06 | 1.00 | 0.02 | 0.09 | 0.76 |
| Other manufacturing | 0.01 | 1.19 | 0.01 | 0.02 | 0.89 |
| Transportation | 0.82 | 2.46 | 0.72 | 0.85 | 2.05 |
| Information | 1.14 | 2.49 | 2.04 | 4.53 | 2.56 |
| Utilities | 2.56 | 1.26 | 2.60 | 2.05 | 1.53 |
| Wholesale trade | 1.38 | 2.94 | 1.43 | 1.43 | 2.55 |
| Retail trade | 13.04 | 10.86 | 11.36 | 11.59 | 11.18 |
| Finance and insurance | 3.00 | 6.03 | 2.33 | 2.37 | 5.17 |
| Real estate and rentals | 22.09 | 17.13 | 25.40 | 24.59 | 18.79 |
| Professional services | 0.88 | 1.53 | 0.33 | 0.39 | 1.29 |
| Business services | 0.54 | 0.71 | 0.51 | 0.23 | 0.63 |
| Educational services | 0.58 | 1.93 | 0.13 | 0.50 | 1.56 |
| Health services | 15.72 | 15.79 | 12.77 | 11.68 | 15.21 |
| Arts and entertainment | 1.23 | 0.92 | 1.14 | 1.47 | 1.02 |
| Hotels | 0.09 | 0.06 | 0.09 | 0.17 | 0.08 |
| Eating and drinking | 2.62 | 3.94 | 2.69 | 3.28 | 3.68 |
| Other services | 1.44 | 4.33 | 2.26 | 3.50 | 3.86 |
| Government | 1.11 | 1.89 | 1.08 | 0.73 | 1.65 |
| Imports -within state | 11.43 | 3.41 | 13.10 | 10.42 | 5.38 |
| Imports -out of state | 19.93 | 19.93 | 19.93 | 19.93 | 19.93 |

Table A-6. Visitor Expenditures (VE) Shares by Sector and by County

| | Hawaii County | Honolulu County | Kauai County | Maui County | State total |
|-------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Total VE (\$ million) | 1,411.0 | 6,199.4 | 1,003.0 | 2,610.3 | 11,223.7 |
| Sector share (%) | | | | | |
| Agriculture | 0.08 | 0.04 | 0.01 | 0.02 | 0.03 |
| Mining and construction | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Food processing | 0.15 | 0.13 | 0.02 | 0.04 | 0.10 |
| Other manufacturing | 0.01 | 0.27 | 0.00 | 0.01 | 0.15 |
| Transportation | 6.15 | 25.42 | 4.59 | 4.72 | 16.32 |
| Information | 0.12 | 0.10 | 0.13 | 0.14 | 0.11 |
| Utilities | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wholesale trade | 0.39 | 0.55 | 0.42 | 0.39 | 0.48 |
| Retail trade | 4.39 | 3.49 | 4.72 | 4.79 | 4.01 |
| Finance and insurance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Real estate and rentals | 11.23 | 13.55 | 12.63 | 11.96 | 12.81 |
| Professional services | 0.82 | 0.65 | 0.88 | 0.90 | 0.75 |
| Business services | 1.60 | 2.10 | 0.99 | 3.04 | 2.16 |
| Educational services | 0.92 | 0.79 | 0.98 | 1.00 | 0.87 |
| Health services | 0.99 | 0.79 | 1.06 | 1.08 | 0.91 |
| Arts and entertainment | 3.71 | 2.44 | 3.90 | 4.37 | 3.18 |
| Hotels | 35.34 | 23.51 | 32.67 | 31.50 | 27.67 |
| Eating and drinking | 7.95 | 10.05 | 9.28 | 10.17 | 9.75 |
| Other services | 0.88 | 0.69 | 0.94 | 0.96 | 0.80 |
| Government | 0.56 | 0.44 | 0.60 | 0.61 | 0.51 |
| Imports -within state | 7.35 | 1.23 | 7.51 | 5.35 | 3.52 |
| Imports -out of state | 17.35 | 13.77 | 18.65 | 18.94 | 15.86 |

Table A-7. Total Intermediate Demand as a Percent of Total Output by Sector and by County

| | Hawaii County | Honolulu County | Kauai County | Maui County | State total |
|-------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Agriculture | 42.0 | 57.5 | 39.6 | 46.4 | 49.2 |
| Mining and construction | 8.7 | 15.8 | 21.3 | 19.8 | 15.5 |
| Food processing | 28.7 | 25.2 | 21.9 | 16.2 | 23.7 |
| Other manufacturing | 46.6 | 61.6 | 45.0 | 48.9 | 60.3 |
| Transportation | 19.9 | 17.7 | 21.8 | 22.8 | 18.3 |
| Information | 58.3 | 51.3 | 60.2 | 43.8 | 50.9 |
| Utilities | 50.1 | 54.5 | 57.3 | 56.0 | 54.3 |
| Wholesale trade | 44.0 | 45.4 | 32.6 | 33.6 | 44.4 |
| Retail trade | 14.2 | 15.2 | 10.8 | 13.5 | 14.6 |
| Finance and insurance | 33.0 | 43.7 | 38.5 | 34.1 | 42.8 |
| Real estate and rentals | 27.6 | 31.5 | 30.4 | 21.8 | 29.7 |
| Professional services | 67.8 | 55.4 | 76.2 | 73.9 | 58.0 |
| Business services | 76.3 | 80.7 | 80.0 | 69.8 | 79.3 |
| Educational services | 10.9 | 15.2 | 10.4 | 8.2 | 14.4 |
| Health services | 0.5 | 0.7 | 1.7 | 0.6 | 0.7 |
| Arts and entertainment | 3.3 | 6.0 | 3.0 | 3.6 | 4.8 |
| Hotels | 2.5 | 2.6 | 0.5 | 4.1 | 2.8 |
| Eating and drinking | 11.5 | 15.4 | 11.4 | 11.4 | 14.2 |
| Other services | 57.2 | 32.4 | 46.7 | 46.3 | 36.7 |
| Government | 6.0 | 4.3 | 11.4 | 4.3 | 4.6 |

Table A-8. Total Intermediate Input as a Percent of Total Output by Sector and by County

| | Hawaii County | Honolulu County | Kauai County | Maui County | State total |
|-------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Agriculture | 30.6 | 28.1 | 26.7 | 27.3 | 28.6 |
| Mining and construction | 29.9 | 29.9 | 29.9 | 29.9 | 29.9 |
| Food processing | 42.7 | 42.8 | 42.7 | 42.8 | 42.8 |
| Other manufacturing | 20.0 | 17.9 | 16.7 | 18.1 | 18.0 |
| Transportation | 34.9 | 39.8 | 36.4 | 35.2 | 39.1 |
| Information | 25.8 | 23.3 | 22.3 | 25.7 | 23.7 |
| Utilities | 32.3 | 33.3 | 32.2 | 32.3 | 32.9 |
| Wholesale trade | 20.0 | 20.6 | 20.5 | 20.2 | 20.5 |
| Retail trade | 27.0 | 25.3 | 26.7 | 26.4 | 25.7 |
| Finance and insurance | 29.5 | 33.9 | 32.2 | 30.5 | 33.6 |
| Real estate and rentals | 28.4 | 30.2 | 29.3 | 29.7 | 29.9 |
| Professional services | 31.0 | 29.2 | 31.6 | 32.9 | 29.6 |
| Business services | 23.7 | 27.3 | 23.2 | 26.4 | 26.8 |
| Educational services | 31.8 | 34.0 | 31.0 | 33.2 | 33.7 |
| Health services | 27.1 | 29.0 | 29.0 | 27.1 | 28.7 |
| Arts and entertainment | 19.6 | 19.6 | 20.0 | 19.3 | 19.5 |
| Hotels | 28.2 | 28.7 | 28.1 | 29.9 | 28.9 |
| Eating and drinking | 35.4 | 36.2 | 35.2 | 35.8 | 36.0 |
| Other services | 29.1 | 33.3 | 32.0 | 32.5 | 32.8 |
| Government | 6.4 | 5.5 | 5.6 | 6.2 | 5.6 |

Table A-9. Total Labor Income as a Percent of Total Output by Sector and by County

| | Hawaii County | Honolulu County | Kauai County | Maui County | State total |
|-------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Agriculture | 38.4 | 45.0 | 36.6 | 46.4 | 42.7 |
| Mining and construction | 37.9 | 41.1 | 37.1 | 39.3 | 40.2 |
| Food processing | 23.1 | 19.7 | 23.3 | 23.2 | 20.8 |
| Other manufacturing | 28.7 | 16.5 | 55.4 | 78.5 | 19.9 |
| Transportation | 40.1 | 29.2 | 34.7 | 35.9 | 30.4 |
| Information | 35.3 | 35.6 | 25.4 | 17.2 | 32.5 |
| Utilities | 19.5 | 16.2 | 16.8 | 16.9 | 16.8 |
| Wholesale trade | 41.9 | 36.1 | 27.5 | 39.2 | 36.5 |
| Retail trade | 33.7 | 38.7 | 41.4 | 39.9 | 38.3 |
| Finance and insurance | 36.6 | 28.6 | 30.6 | 28.6 | 29.0 |
| Real estate and rentals | 9.8 | 7.0 | 9.4 | 5.9 | 7.3 |
| Professional services | 42.3 | 53.2 | 32.7 | 41.4 | 51.2 |
| Business services | 50.0 | 57.1 | 62.7 | 43.3 | 55.5 |
| Educational services | 55.2 | 54.6 | 58.2 | 42.3 | 53.8 |
| Health services | 47.2 | 51.9 | 50.3 | 46.2 | 50.8 |
| Arts and entertainment | 56.5 | 52.9 | 51.2 | 52.5 | 53.2 |
| Hotels | 36.3 | 39.6 | 32.4 | 38.5 | 37.9 |
| Eating and drinking | 33.6 | 34.6 | 32.9 | 34.1 | 34.3 |
| Other services | 45.4 | 41.9 | 43.3 | 38.1 | 41.7 |
| Government | 85.0 | 83.2 | 85.0 | 83.3 | 83.4 |

Table A-10. Total Value Added as a Percent of Total Output by Sector and by County

| | Hawaii County | Honolulu County | Kauai County | Maui County | State total |
|-------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Agriculture | 49.7 | 57.7 | 49.5 | 61.6 | 55.5 |
| Mining and construction | 45.6 | 48.6 | 44.5 | 46.5 | 47.7 |
| Food processing | 28.3 | 24.8 | 28.5 | 28.4 | 25.9 |
| Other manufacturing | 28.7 | 20.0 | 55.3 | 73.4 | 22.9 |
| Transportation | 52.4 | 39.0 | 47.9 | 48.4 | 40.7 |
| Information | 59.2 | 60.3 | 48.2 | 40.6 | 56.9 |
| Utilities | 61.0 | 55.9 | 56.7 | 57.0 | 56.8 |
| Wholesale trade | 75.5 | 66.5 | 53.1 | 71.3 | 67.0 |
| Retail trade | 56.2 | 63.2 | 67.1 | 64.9 | 62.7 |
| Finance and insurance | 62.7 | 54.8 | 64.4 | 59.5 | 55.5 |
| Real estate and rentals | 68.9 | 66.3 | 66.1 | 62.2 | 66.0 |
| Professional services | 46.7 | 60.1 | 43.4 | 49.0 | 58.0 |
| Business services | 60.5 | 66.9 | 73.8 | 54.6 | 65.5 |
| Educational services | 61.4 | 60.7 | 64.7 | 47.6 | 60.0 |
| Health services | 57.7 | 59.8 | 57.9 | 56.5 | 59.2 |
| Arts and entertainment | 77.0 | 72.9 | 70.9 | 72.5 | 73.2 |
| Hotels | 60.9 | 64.9 | 56.1 | 63.6 | 62.8 |
| Eating and drinking | 46.3 | 47.4 | 45.5 | 46.9 | 47.2 |
| Other services | 53.2 | 51.4 | 52.4 | 47.9 | 51.1 |
| Government | 90.6 | 92.0 | 91.3 | 89.9 | 91.8 |

Table A-11. Total Jobs Per \$Million of Total Output by Sector and by County

| | Hawaii County | Honolulu County | Kauai County | Maui County | State total |
|-------------------------|------------------|--------------------|-----------------|----------------|----------------|
| Agriculture | 33.2 | 18.8 | 32.8 | 23.8 | 25.2 |
| Mining and construction | 7.7 | 6.8 | 8.8 | 8.7 | 7.3 |
| Food processing | 10.3 | 6.7 | 11.0 | 6.5 | 7.1 |
| Other manufacturing | 9.3 | 3.7 | 11.8 | 10.0 | 4.3 |
| Transportation | 10.8 | 6.2 | 11.6 | 10.5 | 6.9 |
| Information | 8.7 | 6.7 | 5.9 | 3.7 | 6.3 |
| Utilities | 2.3 | 1.8 | 2.2 | 2.1 | 2.0 |
| Wholesale trade | 12.7 | 8.1 | 11.5 | 12.3 | 8.7 |
| Retail trade | 15.6 | 16.1 | 18.2 | 15.7 | 16.1 |
| Finance and insurance | 10.3 | 5.9 | 11.4 | 8.5 | 6.3 |
| Real estate and rentals | 3.6 | 2.9 | 3.4 | 3.7 | 3.1 |
| Professional services | 15.5 | 11.1 | 15.6 | 15.5 | 11.8 |
| Business services | 27.5 | 18.2 | 24.6 | 18.5 | 19.0 |
| Educational services | 26.1 | 20.6 | 21.6 | 21.6 | 21.0 |
| Health services | 13.9 | 12.3 | 15.7 | 12.3 | 12.6 |
| Arts and entertainment | 27.4 | 29.7 | 22.6 | 22.5 | 27.1 |
| Hotels | 10.0 | 9.6 | 8.9 | 10.0 | 9.7 |
| Eating and drinking | 20.4 | 20.2 | 21.4 | 17.1 | 19.8 |
| Other services | 27.6 | 18.5 | 28.2 | 18.9 | 19.6 |
| Government | 19.5 | 15.3 | 18.8 | 19.2 | 15.8 |