

# **The 2022 Hawaii Inter-County Input-Output Study**



**July 2026**

**Research and Economic Analysis Division  
Department of Business, Economic Development and Tourism  
STATE OF HAWAII**

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## PREFACE

This report is the fifth update of the 2002 benchmark report of Hawaii inter-county input-output (I-O) study prepared by the Department of Business, Economic Development & Tourism (DBEDT). This update is based on both available and estimated 2022 data. The report was prepared at the Research and Economic Analysis Division (READ) of DBEDT by Dr. Oscar Carvallo Valencia, under the supervision of Dr. Joseph A. Roos, Economic Research Program Manager.

The report is available on the DBEDT Web site, <https://dbedt.hawaii.gov/>

## I. INTRODUCTION

This report presents the inter-county input-output (I-O) model for the State of Hawaii. The 2022 inter-county I-O model updates the 2017 inter-county I-O model by including the latest available county-level data on jobs, earnings, final demand, state taxes, components of value added, and outputs of a few industries.

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.<sup>1</sup>

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.

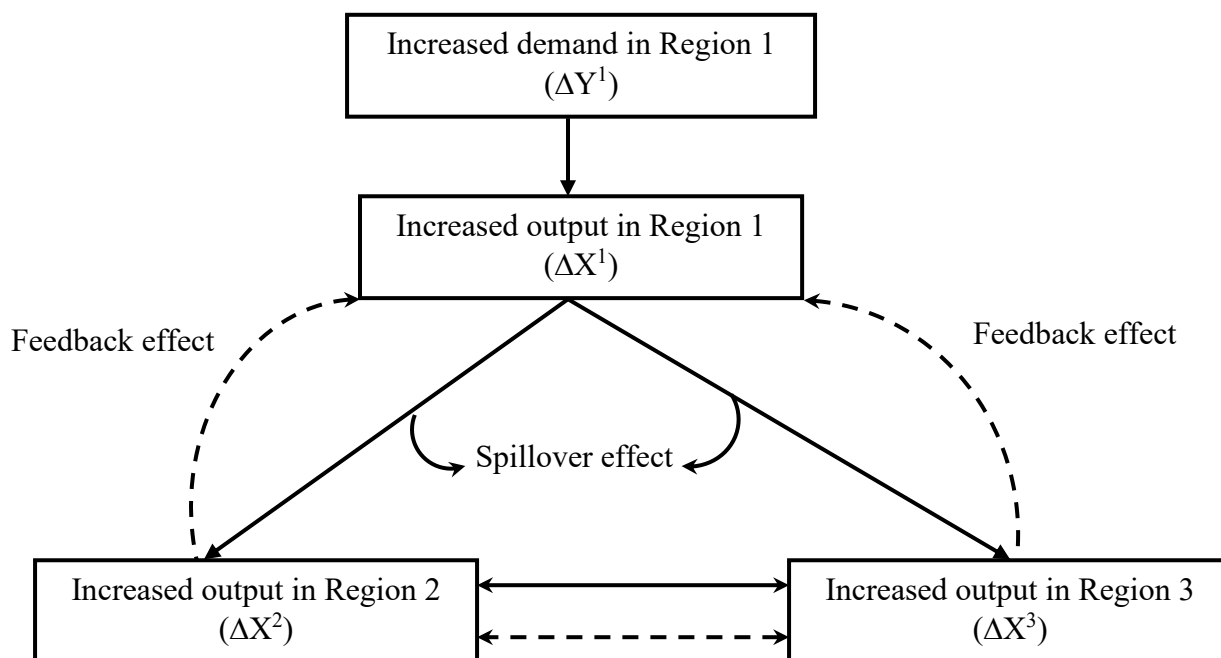
The inter-county I-O model presented in this report is an extension of the 2022 I-O model for the state, published by DBEDT in October 2025. The state I-O model provides detailed information on sales and purchases of goods and services among industries, final consumers (households, visitors, government, 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*.

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<sup>1</sup> Leading texts on input-output 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. 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 does 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-country 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 damage and losses by unscheduled events, such as earthquakes, flood, and other major natural disasters. 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 (2007), Patrick and Wang (2007), and Rey (1999).

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 an example. Mathematical details of constructing an inter-regional 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. The more detailed inter-county I-O model developed in this study is a 20-sector 4-county model. Although developing a 62 sector for Honolulu County (like the 2022 State I-O table) is feasible, data limitations made more detailed analysis of the neighbor islands counties impractical. The complete 20 sector 4-county transactions tables, direct requirements tables, and total requirements tables are available along with this report on 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 2022, Honolulu accounted for 71.4 percent of total output, 74.0 percent of total labor income, and 68.3 percent of total jobs in the State. Maui and Hawaii counties accounted for about 10–13 percent each and Kauai about 5-7.5 percent of the State total output, labor income and employment.

Except for agriculture for which Hawaii County had the largest shares of earnings, jobs and output, 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 77–82 percent of the State total. Honolulu also accounted for significant shares of total agricultural (including commercial fishery and agricultural and fishery services) output (30.1 percent), labor income (30.1 percent), and employment (26.7 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 44.5 percent of total output and labor income, and 31.4 percent of total jobs in agriculture in the State. Kauai accounted for 10.9 percent and Maui accounted for 14.4 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 2.7 percent of total output, 2.8 percent of total labor income, and 7.6 percent of total jobs in Hawaii County, compared to less than 1.1 percent of total output, labor income, and total jobs in Honolulu. The government is another sector in which counties differ significantly. The government sector accounted for 14.5 percent of total output, 32.1 percent of labor income, and 27.9 percent of total jobs in Honolulu, compared to 16–26 percent of total output, 12–39 percent of labor income, and 14–19 percent of total jobs in other three counties. More detailed industries’ contributions to total output are presented in Appendix Table A-1.

### ***Inter-Industry Purchases and Sales***

As can be seen in Tables 2 and 3 (Table 2. Inter-County Transactions Table (in \$million except number of jobs), 2022, tab T2\_5x5model, and Table 3. Inter-County Transactions Table (percent of total input), 2022, tab T3\_5x5model, in file 2022-County-I-O Inter\_Country.xls, at [2022 State Input-Output Study | Research & Economic Analysis](#)), Honolulu made a sizable portion of total sales to industries located in the other three counties. Except for some inputs to the service sector, the flows of industries’ inputs among Hawaii, Kauai and Maui counties were less significant.

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 and Maui. This is largely a function of local agricultural products used as inputs to food processing on the neighbor islands. When added, shares of both intermediate input and value added in total purchases of manufacturing were similarly lower in Honolulu, and Maui, mainly because of a higher share of imported inputs from outside Hawaii. 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-4 to A-7.

For some industries, Honolulu purchased sizable amounts of intermediate sales from other counties. For example, Honolulu purchases accounted for 31.1 percent of total intermediate sales of agriculture (Table 2, first row, \$61.4 million) and 26.1 percent of intermediate manufacturing sales in Hawaii County (Table 2, third row, \$42.0 million).

### ***Final Demand***

Table 4 summarizes total final demand provided by Hawaii producers (excluding imported final demand) and their major components by county. Of the \$117.6 billion total final demand provided by Hawaii producers in 2022, Honolulu accounted for 70.6 percent, Maui 13.4 percent, Hawaii County 10.5 percent, and Kauai 5.5 percent. Personal consumption expenditures (PCE) had the highest share in total final demand in all counties, especially in Honolulu. Visitor expenditures (VE) had the second highest share in total final demand in all neighbor island counties, especially in Maui and Kauai County. 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 13 percent vs. 1 – 5 percent), primarily because of the military bases on Oahu. While the share of out-of-state export in total final demand was higher in Honolulu compared with that of the neighbor island counties, the out-of-county but within-state export share was larger for neighbor island counties than for Honolulu.

Of the total \$53.9 billion PCE for the state in 2022 provided by local producers (i.e., excluding imported goods and services from out-of-state producers), Honolulu accounted for 75.3 percent, Maui 10.4 percent, Hawaii County 9.4 percent, and Kauai 4.9 percent. In 2022, of total visitor expenditures of \$19.4 billion provided by local producers, Honolulu accounted for 49.6 percent, Maui 26.5 percent, Hawaii County 14.1 percent, and Kauai 9.8 percent.

Industries' shares in total PCE and those for visitor expenditures, including imports from out-of-state producers are presented in Appendix Tables A-2 and A-, respectively. As shown in Appendix Table A-2, except for a considerably lower share of within-state imports, industries' shares in total PCE followed similar patterns 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, and government. Out-of-state imported goods and services made up about 14 percent of total PCE.

As can be seen in Appendix Table A-3, in terms of industries' proportions, visitor expenditure patterns followed less similar general trends across counties. The hotel sector accounted for the largest share of total visitor expenditures in all counties. The second largest sector was retail trade for Maui, Hawaii County, and Kauai counties, while it was transportation for Honolulu, which accounted for about 15.6 percent of total visitor expenditures. The retail trade 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, real estate and rentals, and transportation.

## **Multipliers**

Type I and Type II final demand multipliers for output, earnings<sup>2</sup> 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 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, 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.

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<sup>2</sup> 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 17 percent smaller than the sum of employee compensation and proprietors' income, which is traditionally known as labor income.

As can be seen in Table 5, the differences between the inter-county multipliers and the single-county multipliers are mostly 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.

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 1.41, meaning that every dollar increases in final demand in agriculture in Hawaii County would increase the total output in the State by \$1.41. Table 6 shows that, of the \$1.41 additional output, \$1.36 (96.9 percent) is output of Hawaii County, \$0.04 (2.9 percent) of Honolulu output, \$0.001 (0.1 percent) of Maui output, and \$0.001 (0.1 percent) of Kauai output. Note that Type I single-county output multiplier of agriculture in Hawaii County is 1.36, 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 almost identical to the state output multipliers for all sectors, except the government sector and the agriculture sector. 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 8–17. 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 mostly 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.

Across all counties, the more labor-intensive industries, such as arts and entertainment, agriculture, educational services, eating and drinking, business services, and other services have higher final demand job multipliers and more capital-intensive industries, such as utilities, other manufacturing, information, and real estate and rentals have lower final demand job multipliers.

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

The usefulness of the inter-county I-O model is illustrated below using an example. The example involves estimating the economic impacts of visitor spending in Maui County in 2024. In determining whether or not the use of a multiplier is relevant, the single most important factor is whether the economic activity brings in or losses money 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. Additional examples of applying the inter-county I-O model are available in the 1997, 2002, 2005, 2007, 2012, and 2017 Hawaii Inter-County Input-Output studies.

#### **Economic Impacts of Decreased Visitors Expenditures in Maui County in 2024**

Visitor expenditures decreased in Maui County in 2024. As shown in Table 18, for the whole year of 2024, total visitor expenditures by air for the state decreased \$134.1 million or -1.4 percent compared to the previous year. Maui experienced the largest decrease in visitor expenditures by air in 2024, decreased \$503.3 million or -8.5 percent, compared with the previous year.

Decreases in visitor expenditures have negative impacts on the economy. Using the I-O model, the direct, indirect, and induced impacts of decreased visitor expenditures on output, labor income (earnings), total jobs, wage and salary jobs, and state tax revenues can be estimated. 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 impacts of decreased visitor expenditures in Maui County in 2024 on output, labor income, and total jobs.<sup>3</sup> The economic impacts of decreased visitor expenditures in other counties can be estimated in a similar way.

To estimate the economic impacts of decreased visitor expenditures in Maui County in 2024, one has to go through three basic steps: (1) allocate the \$503.3 million decreased visitor spending in Maui County in 2024 to industries in each county that produced the goods and services purchased by Maui visitors, thereby generating a vector of decreased visitor spending by county and by industry,<sup>4</sup> (2) estimate the direct impacts on output, labor income, and total jobs in each industry and each county, and (3) multiply the vector of visitor spending generated in step (1) by the appropriate multipliers or the total requirements matrix to estimate the total economic negative impacts on output, earnings, and total jobs. Using the Type I multipliers, the total direct and indirect impacts can be estimated; using the Type II multipliers, the total direct, indirect, and induced impacts can be estimated. In this example, we apply the Type II multipliers to estimate the total economic impacts.

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<sup>3</sup> The impacts on state tax revenues and wage and salary jobs can be estimated similarly.

<sup>4</sup> 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 \$503.3 million decreased visitor expenditures in Maui County in 2024 should be allocated to individual industries in all counties in Hawaii and imports. We assume imports do not affect the output of Hawaii, so that only the impacts on Hawaii produced goods and services are analyzed.

Step (1) first allocates the \$503.3 million additional Maui County visitor expenditures to Maui County producers, other Hawaii producers (producers in Honolulu, Hawaii, and Kauai County), and out-of state imports. Based on the 2022 inter-county transaction table, about 78.7 percent of total (including Hawaii produced and imported goods and services) Maui County visitor expenditures were provided by Maui industries; about 14.9 percent of total Maui County visitor expenditures were provided by Hawaii industries of other counties; and about 6.4 percent of total Maui County visitor expenditures were imported from out-of-state producers. Based on the same percentages calculated from the 2022 inter-county transaction table, it is estimated that Maui County visitor expenditures provided by Maui producers, other Hawaii producers, and out-of-state imports decreased \$396.0 million, \$75.1 million, and \$32.2 million, respectively, in the 2024.<sup>5</sup>

To allocate the Maui visitor expenditure increases from each county's producers to the industries (sectors) of each county, the sector's shares of visitor expenditures in total county visitor expenditures must be estimated. Such shares were also estimated based on the 2024 inter-county transaction table. As shown in Table 19, the Maui hotel sector declined most of visitor spending in Maui, accounting for 43.8 percent of total visitor spending provided by Maui producers in 2024, followed by retail trade (18.2 percent), real estate and rentals (11.0 percent), eating and drinking (10.6 percent), and transportation (5.3 percent). Among the industries in other counties, transportation was the most effected sector, followed by manufacturing. The vector of direct visitor decreased spending is calculated by multiplying the total visitor expenditure decrease from each county's producer by the industry percentages provided in Table 19.

Step (2) estimates the direct impacts on output, labor income, and total jobs in each industry and each county. The vector of direct visitor spending calculated in Step (1) reflects the direct impacts on output of Hawaii industries and excludes the goods and services imported from out-of-state producers. The direct output impact is provided in Table 20. The direct labor income 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 2022 inter-county I-O model. The sums of the resultant vectors are the total state direct earnings and jobs impacts. The direct labor income and total job impacts by industry are provided in Table 21 and Table 22, respectively.

Step (3) 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

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<sup>5</sup> Ideally, if the actual data of decreased visitor expenditures by industry and by county in 2024 were available, such data should have been used as the visitor expenditure vector. However, such data are not available; therefore, we must estimate the vector using the 2022 inter-county I-O table. 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 \$503.3 million allocates the total visitor spending to industries on each county as well as imports.

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 decline in the economy attributable to each industry's direct effect.

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 23.

As can be seen in Table 23, the \$503.3 million decreased visitor spending in Maui County produced by Hawaii producers throughout the state in 2024 is estimated to have decreased \$961.0 million output, \$316.4 million labor income, and 5,381 jobs in the state economy. About 57.9 percent of total output destruction, 52.8 percent of total labor income, and 56.3 percent of total jobs losses from the decreased visitor spending are generated in Maui County. Honolulu is expected to account for 35.0 percent of total output, 38.8 percent of labor income, and 36.3 percent of total job negative 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.

The direct and total impacts of increased Maui visitor expenditures in 2024 by industry are provided in Table 24. 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 or very small direct visitor spending captured large indirect and induced effects, including finance and insurance, other manufacturing, utilities, professional and business services, and health services.

## TABLES

**Table 1. Output, Income and Total Employment by Industry and by County - County Shares, 2022**

	Hawaii County		Honolulu County		Kauai County		Maui County		State Total	
	Value	%	Value	%	Value	%	Value	%	Value	%
Output (\$ mil.)										
Agriculture	448.1	44.5	303.6	30.1	110.2	10.9	145.2	14.4	1,007.2	100.0
Construction	1,500.6	12.2	8,369.6	68.0	737.2	6.0	1,700.8	13.8	12,308.2	100.0
Manufacturing	345.1	6.2	4,941.9	89.2	63.8	1.2	191.3	3.5	5,542.2	100.0
Services	12,775.3	10.7	83,143.9	69.6	7,172.1	6.0	16,326.2	13.7	119,417.5	100.0
Government	1,597.0	7.9	16,460.6	80.9	1,100.9	5.4	1,184.5	5.8	20,343.0	100.0
Total	16,666.1	10.5	113,219.7	71.4	9,184.3	5.8	19,548.0	12.3	158,618.1	100.0
Earnings (\$ mil.)										
Agriculture	166.5	44.5	112.8	30.1	41.0	10.9	54.0	14.4	374.2	100.0
Construction	567.1	12.2	3,163.0	68.0	278.6	6.0	642.7	13.8	4,651.4	100.0
Manufacturing	86.5	8.8	846.7	86.3	12.9	1.3	34.8	3.5	981.0	100.0
Services	3,780.0	10.6	25,292.1	71.2	2,079.5	5.9	4,351.3	12.3	35,502.9	100.0
Government	1,318.6	7.7	13,899.5	81.6	844.1	5.0	973.3	5.7	17,035.5	100.0
Total	5,918.7	10.1	43,314.1	74.0	3,256.1	5.6	6,056.0	10.3	58,545.0	100.0
Total jobs* (no.)										
Agriculture	6,978	31.4	5,926	26.7	4,518	20.4	4,773	21.5	22,196	100.0
Construction	8,347	15.8	29,544	55.9	5,991	11.3	8,964	17.0	52,846	100.0
Manufacturing	5,196	19.0	14,117	51.5	3,905	14.3	4,174	15.2	27,393	100.0
Services	54,122	11.6	324,010	69.2	30,505	6.5	59,864	12.8	468,500	100.0
Government	17,067	9.1	144,447	77.1	12,262	6.5	13,570	7.2	187,346	100.0
Total	91,709	12.1	518,044	68.3	57,182	7.5	91,345	12.0	758,280	100.0

\*Includes wage/salary and proprietors' jobs.

**Table 1a. Output, Income and Total Employment by Industry and by County - Sector Shares, 2022**

	Hawaii County		Honolulu County		Kauai County		Maui County		State Total	
	Value	%	Value	%	Value	%	Value	%	Value	%
Output (\$ mil.)										
Agriculture	448.1	2.7	303.6	0.3	110.2	1.2	145.2	0.7	1,007.2	0.6
Construction	1,500.6	9.0	8,369.6	7.4	737.2	8.0	1,700.8	8.7	12,308.2	7.8
Manufacturing	345.1	2.1	4,941.9	4.4	63.8	0.7	191.3	1.0	5,542.2	3.5
Services	12,775.3	76.7	83,143.9	73.4	7,172.1	78.1	16,326.2	83.5	119,417.5	75.3
Government	1,597.0	9.6	16,460.6	14.5	1,100.9	12.0	1,184.5	6.1	20,343.0	12.8
Total	16,666.1	100.0	113,219.7	100.0	9,184.3	100.0	19,548.0	100.0	158,618.1	100.0
Earnings (\$ mil.)										
Agriculture	166.5	2.8	112.8	0.3	41.0	1.3	54.0	0.9	374.2	0.6
Construction	567.1	9.6	3,163.0	7.3	278.6	8.6	642.7	10.6	4,651.4	7.9
Manufacturing	86.5	1.5	846.7	2.0	12.9	0.4	34.8	0.6	981.0	1.7
Services	3,780.0	63.9	25,292.1	58.4	2,079.5	63.9	4,351.3	71.9	35,502.9	60.6
Government	1,318.6	22.3	13,899.5	32.1	844.1	25.9	973.3	16.1	17,035.5	29.1
Total	5,918.7	100.0	43,314.1	100.0	3,256.1	100.0	6,056.0	100.0	58,545.0	100.0
Total jobs* (no.)										
Agriculture	6,978	7.6	5,926	1.1	4,518	7.9	4,773	5.2	22,196	2.9
Construction	8,347	9.1	29,544	5.7	5,991	10.5	8,964	9.8	52,846	7.0
Manufacturing	5,196	5.7	14,117	2.7	3,905	6.8	4,174	4.6	27,393	3.6
Services	54,122	59.0	324,010	62.5	30,505	53.3	59,864	65.5	468,500	61.8
Government	17,067	18.6	144,447	27.9	12,262	21.4	13,570	14.9	187,346	24.7
Total	91,709	100.0	518,044	100.0	57,182	100.0	91,345	100.0	758,280	100.0

**Table 2. Inter-County Transactions Table (in \$million except number of jobs), 2022 ( Tab T2\_5x5model, in file 2022-County-I-O Inter\_Country\_20Sectors.xls at [2022 State Input-Output Study | Research & Economic Analysis](#))**

**Table 3. Inter-County Transactions Table (percent of total input), 2022 ( Tab T3\_5x5model, in file 2022-County-I-O Inter\_Country.xls at [2022 State Input-Output Study | Research & Economic Analysis](#))**

**Table 4. Composition of Total Final Demand by County, 2022**

	Hawaii County	Honolulu County	Kauai County	Maui County	State Total
Total final demand (\$ million)	12,352.0	83,076.5	6,513.2	15,712.8	117,654.5
Components of final demand					
Personal consumption expenditures	5,242.5	41,947.6	2,735.6	5,788.9	55,714.5
Visitor expenditures	2,748.0	9,643.8	1,904.9	5,159.8	19,456.5
GPI and inventories change	841.9	6,677.7	312.2	759.8	8,591.5
State and local government	1,412.9	3,577.4	604.1	1,295.1	6,889.6
Federal government	570.5	10,155.0	153.7	108.8	10,987.9
Exports - within state	1,051.6	5,183.1	484.5	2,037.0	8,756.1
Exports - out of state	484.7	5,892.0	318.2	563.4	7,258.3

GPI = gross private investment

	Hawaii County	Honolulu County	Kauai County	Maui County	State Total
Total final demand (\$ million)	12,352.0	83,076.5	6,513.2	15,712.8	117,654.5
Share in county final demand (%)					
Personal consumption expenditures	42.4	50.5	42.0	36.8	47.4
Visitor expenditures	22.2	11.6	29.2	32.8	16.5
GPI and inventories change	6.8	8.0	4.8	4.8	7.3
State and local government	11.4	4.3	9.3	8.2	5.9
Federal government	4.6	12.2	2.4	0.7	9.3
Exports - within state	8.5	6.2	7.4	13.0	7.4
Exports - out of state	3.9	7.1	4.9	3.6	6.2

	Hawaii County	Honolulu County	Kauai County	Maui County	State Total
Total final demand (% in state total)	10.5	70.6	5.5	13.4	100.0
Share in state total (% of state total)					
Personal consumption expenditures	9.4	75.3	4.9	10.4	100.0
Visitor expenditures	14.1	49.6	9.8	26.5	100.0
GPI and inventories change	9.8	77.7	3.6	8.8	100.0
State and local government	20.5	51.9	8.8	18.8	100.0
Federal government	5.2	92.4	1.4	1.0	100.0
Exports - within state	12.0	59.2	5.5	23.3	100.0
Exports - out of state	6.7	81.2	4.4	7.8	100.0

**Table 5. Final Demand Output, Earnings and Total Job Multipliers in State, Inter-County, and County I-O Models, 2022**

	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	1.39	1.94	1.50	2.09	1.25	1.51	1.40	1.88	1.02	1.80
Inter-county model										
Hawaii	1.41	1.98	1.27	1.80	1.41	1.81	1.44	1.94	1.05	1.85
Honolulu	1.46	2.14	1.59	2.32	1.23	1.53	1.37	1.93	1.02	1.93
Kauai	1.12	1.57	1.38	1.90	1.83	2.33	1.58	2.09	1.02	1.68
Maui	1.41	1.99	1.29	1.84	1.21	1.48	1.47	1.97	1.04	1.85
County model										
Hawaii	1.36	1.70	1.24	1.55	1.12	1.29	1.27	1.53	1.04	1.52
Honolulu	1.44	1.96	1.51	2.04	1.19	1.40	1.35	1.76	1.02	1.71
Kauai	1.12	1.43	1.33	1.70	1.36	1.59	1.38	1.69	1.02	1.43
Maui	1.27	1.57	1.24	1.54	1.09	1.22	1.23	1.45	1.04	1.49
Earnings multiplier										
State model	0.43	0.59	0.46	0.63	0.21	0.28	0.37	0.50	0.60	0.82
Inter-county model										
Hawaii	0.43	0.60	0.40	0.55	0.30	0.42	0.37	0.52	0.60	0.82
Honolulu	0.45	0.65	0.49	0.70	0.20	0.28	0.37	0.53	0.61	0.87
Kauai	0.36	0.48	0.43	0.58	0.39	0.53	0.41	0.56	0.55	0.74
Maui	0.42	0.59	0.40	0.55	0.20	0.27	0.36	0.50	0.59	0.82
County model										
Hawaii	0.42	0.51	0.39	0.47	0.22	0.27	0.33	0.39	0.61	0.73
Honolulu	0.45	0.60	0.47	0.62	0.19	0.25	0.36	0.48	0.61	0.80
Kauai	0.35	0.45	0.41	0.53	0.25	0.32	0.35	0.45	0.55	0.45
Maui	0.39	0.47	0.39	0.47	0.17	0.20	0.29	0.35	0.59	0.72
Job multiplier										
State model	18.44	21.61	6.84	10.24	4.44	5.96	7.80	10.52	8.61	13.05
Inter-county model										
Hawaii	18.9	21.7	6.8	9.4	17.4	19.4	6.3	8.7	10.9	14.8
Honolulu	22.2	25.2	5.9	9.1	4.1	5.4	5.5	7.9	8.9	12.8
Kauai	42.3	44.6	10.0	12.6	65.3	67.7	7.0	9.6	11.3	14.7
Maui	35.2	37.8	6.4	8.9	22.8	24.0	5.7	7.9	11.6	15.3
County model										
Hawaii	19.0	21.0	5.6	7.4	5.7	6.8	7.6	9.2	8.7	11.6
Honolulu	18.46	21.39	6.91	9.95	3.88	5.10	7.55	9.91	8.76	12.70
Kauai	16.35	18.22	5.93	8.13	5.60	6.94	7.61	9.48	7.98	18.22
Maui	17.03	18.63	5.27	6.87	4.22	4.22	6.14	7.35	8.69	11.15

**Table 6. Counties' Percentage Contributions to Output Multiplier in Inter-County I-O Model, 2022**

	Agriculture		Construction		Manufacturing		Services		Government	
	Multiplier	%	Multiplier	%	Multiplier	%	Multiplier	%	Multiplier	%
Type I										
Hawaii	1.41	100.0	1.27	100.0	1.41	100.0	1.44	100.0	1.05	100.0
Hawaii	1.36	96.9	1.24	97.6	1.12	79.7	1.27	88.7	1.05	99.6
Honolulu	0.04	2.9	0.03	2.2	0.25	17.6	0.15	10.6	0.00	0.4
Kauai	0.001	0.1	0.00	0.1	0.03	2.3	0.01	0.4	0.00	0.0
Maui	0.001	0.1	0.00	0.1	0.00	0.3	0.00	0.3	0.00	0.0
Honolulu	1.46	100.0	1.59	100.0	1.23	100.0	1.37	100.0	1.02	100.0
Hawaii	0.01	0.4	0.05	3.2	0.03	2.2	0.01	0.8	0.00	0.0
Honolulu	1.45	99.2	1.52	95.5	1.19	97.1	1.35	98.5	1.02	100.0
Kauai	0.00	0.2	0.01	0.5	0.01	0.4	0.01	0.4	0.00	0.0
Maui	0.00	0.2	0.01	0.8	0.00	0.3	0.00	0.3	0.00	0.0
Kauai	1.14	100.0	1.38	100.0	1.83	100.0	1.58	100.0	1.02	100.0
Hawaii	0.00	0.1	0.00	0.2	0.03	1.6	0.01	0.8	0.00	0.0
Honolulu	0.02	2.1	0.04	3.1	0.43	23.4	0.18	11.7	0.00	0.3
Kauai	1.12	97.8	1.33	96.6	1.36	74.6	1.38	87.3	1.02	99.7
Maui	0.00	0.0	0.00	0.1	0.01	0.3	0.00	0.2	0.00	0.0
Maui	1.41	100.0	1.29	100.0	1.21	100.0	1.47	100.0	1.04	100.0
Hawaii	0.01	0.4	0.00	0.2	0.01	1.1	0.01	1.0	0.00	0.0
Honolulu	0.11	7.8	0.04	3.3	0.10	8.3	0.22	14.6	0.01	0.6
Kauai	0.02	1.4	0.00	0.2	0.00	0.2	0.01	0.9	0.00	0.0
Maui	1.27	90.4	1.24	96.3	1.09	90.4	1.23	83.5	1.04	99.3
Type II										
Hawaii	1.98	100.0	1.80	100.0	1.81	100.0	1.94	100.0	1.85	100.0
Hawaii	1.71	86.1	1.56	86.5	1.31	71.9	1.54	79.5	1.53	83.0
Honolulu	0.25	12.4	0.22	12.0	0.44	24.5	0.36	18.7	0.28	15.0
Kauai	0.01	0.3	0.01	0.3	0.04	2.4	0.01	0.6	0.01	0.4
Maui	0.02	1.2	0.02	1.1	0.02	1.2	0.02	1.2	0.03	1.6
Honolulu	2.14	100.0	2.32	100.0	1.53	100.0	1.93	100.0	1.93	100.0
Hawaii	0.03	1.3	0.08	3.6	0.04	2.8	0.03	1.6	0.03	1.5
Honolulu	2.07	96.6	2.18	93.6	1.46	95.5	1.86	96.3	1.86	95.9
Kauai	0.01	0.6	0.02	0.8	0.01	0.7	0.01	0.7	0.01	0.6
Maui	0.03	1.5	0.05	2.0	0.02	1.1	0.03	1.5	0.04	2.0
Kauai	1.57	100.0	1.90	100.0	2.33	100.0	2.09	100.0	1.68	100.0
Hawaii	0.01	0.8	0.02	0.9	0.05	2.1	0.03	1.3	0.02	1.0
Honolulu	0.16	10.4	0.21	11.3	0.70	30.0	0.39	18.6	0.21	12.3
Kauai	1.38	87.8	1.65	86.8	1.56	66.8	1.65	78.9	1.44	85.3
Maui	0.02	1.0	0.02	1.0	0.03	1.1	0.02	1.1	0.02	1.4
Maui	1.99	100.0	1.84	100.0	1.48	100.0	1.97	100.0	1.85	100.0
Hawaii	0.02	1.1	0.02	1.0	0.02	1.6	0.03	1.6	0.02	1.2
Honolulu	0.36	17.9	0.26	14.2	0.23	15.2	0.46	23.1	0.32	17.0
Kauai	0.03	1.5	0.01	0.5	0.01	0.5	0.02	1.1	0.01	0.5
Maui	1.58	79.5	1.55	84.3	1.23	82.8	1.46	74.2	1.50	81.2

**Table 7. Type I State and Weighted Inter-County Multipliers, 2022**

	Agriculture	Construction	Manufacturing	Services	Government
Output					
State	1.39	1.50	1.25	1.40	1.02
Weighted inter-county	1.39	1.50	1.25	1.41	1.03
Earnings					
State	0.43	0.46	0.21	0.37	0.60
Weighted inter-county	0.43	0.46	0.21	0.37	0.60
Total jobs					
State	18.4	6.8	4.4	7.8	8.6
Weighted inter-county	28.0	6.6	18.2	5.7	9.4

**Table 8. Final Demand Output Multipliers for the State, Inter-County and County I-O Models, 2022**

	State model	Inter-county model 1/				County model 2/			
		Hawaii	Oahu	Kauai	Maui	Hawaii	Oahu	Kauai	Maui
Type I									
Agriculture	1.39	1.41	1.45	1.17	1.42	1.36	1.44	1.14	1.31
Mining and construction	1.50	1.27	1.59	1.42	1.30	1.26	1.51	1.38	1.27
Food processing	1.59	1.32	1.64	2.34	1.84	1.14	1.50	2.12	1.49
Other manufacturing	1.17	1.62	1.16	1.61	1.05	1.09	1.14	1.05	1.00
Transportation	1.40	1.43	1.40	1.71	1.27	1.23	1.39	1.52	1.06
Information	1.48	1.77	1.41	1.93	1.76	1.52	1.41	1.47	1.44
Utilities	1.54	1.39	1.55	1.88	1.55	1.35	1.54	1.78	1.47
Wholesale trade	1.31	1.37	1.27	1.96	1.43	1.24	1.25	1.59	1.17
Retail trade	1.28	1.33	1.23	1.48	1.47	1.29	1.22	1.42	1.35
Finance and insurance	1.60	1.51	1.58	2.03	1.56	1.38	1.55	1.79	1.25
Real estate and rentals	1.32	1.44	1.22	1.75	1.56	1.40	1.20	1.66	1.47
Professional services	1.54	1.75	1.47	1.85	1.96	1.38	1.45	1.45	1.34
Business services	1.30	1.38	1.29	1.42	1.21	1.22	1.28	1.20	1.07
Educational services	1.12	1.16	1.09	1.50	1.16	1.16	1.09	1.45	1.14
Health services	1.40	1.13	1.48	1.18	1.17	1.12	1.42	1.12	1.08
Arts and entertainment	1.07	1.08	1.07	1.13	1.04	1.07	1.06	1.10	1.03
Hotels	1.59	1.62	1.58	1.46	1.61	1.03	1.52	1.02	1.02
Eating and drinking	1.51	1.86	1.48	1.62	1.35	1.46	1.45	1.22	1.06
Other services	1.22	1.26	1.20	1.25	1.30	1.24	1.19	1.23	1.26
Government	1.02	1.05	1.02	1.03	1.04	1.05	1.02	1.02	1.04
Type II									
Agriculture	1.92	1.95	2.02	1.78	2.02	1.71	1.94	1.47	1.62
Mining and construction	2.08	1.75	2.22	2.14	1.87	1.57	2.04	1.77	1.58
Food processing	2.11	1.71	2.20	3.19	2.44	1.35	1.94	2.55	1.75
Other manufacturing	1.38	2.01	1.37	2.07	1.24	1.21	1.32	1.17	1.10
Transportation	1.90	1.92	1.91	2.49	1.76	1.50	1.84	1.90	1.28
Information	1.80	2.21	1.71	2.52	2.20	1.74	1.67	1.71	1.61
Utilities	1.84	1.64	1.85	2.45	1.89	1.51	1.80	2.07	1.64
Wholesale trade	1.76	1.84	1.71	2.82	1.98	1.52	1.63	1.99	1.42
Retail trade	1.70	1.74	1.65	2.11	2.00	1.55	1.58	1.76	1.62
Finance and insurance	2.05	1.91	2.02	2.74	2.03	1.61	1.94	2.13	1.45
Real estate and rentals	1.58	1.75	1.44	2.27	1.94	1.60	1.40	1.93	1.67
Professional services	2.22	2.50	2.14	2.87	2.89	1.78	2.04	1.94	1.73
Business services	2.09	2.20	2.07	2.53	2.07	1.71	1.98	1.77	1.53
Educational services	1.59	1.65	1.56	2.32	1.72	1.47	1.50	1.90	1.45
Health services	2.00	1.62	2.11	1.88	1.76	1.43	1.95	1.50	1.40
Arts and entertainment	1.82	1.85	1.82	2.19	1.90	1.57	1.71	1.69	1.51
Hotels	2.09	2.14	2.10	2.02	2.18	1.22	1.95	1.24	1.20
Eating and drinking	2.12	2.59	2.08	2.45	1.99	1.84	1.98	1.59	1.35
Other services	1.74	1.79	1.71	1.97	1.91	1.57	1.65	1.61	1.59
Government	1.77	1.80	1.77	1.97	1.91	1.54	1.69	1.54	1.52

**Table 9. Final Demand Earnings Multipliers for the State, Inter-County and County Models, 2022**

	State model	Inter-county model 1/				County model 2/			
		Hawaii	Oahu	Kauai	Maui	Hawaii	Oahu	Kauai	Maui
Type I									
Agriculture	0.43	0.43	0.46	0.36	0.41	0.42	0.46	0.35	0.38
Mining and	0.47	0.38	0.51	0.42	0.39	0.38	0.49	0.41	0.38
Food processing	0.42	0.31	0.45	0.52	0.42	0.26	0.40	0.45	0.32
Other	0.17	0.31	0.17	0.32	0.13	0.14	0.16	0.13	0.12
Transportation	0.40	0.40	0.41	0.47	0.35	0.33	0.41	0.41	0.28
Information	0.26	0.35	0.24	0.38	0.31	0.27	0.24	0.25	0.22
Utilities	0.24	0.20	0.24	0.34	0.23	0.19	0.24	0.31	0.21
Wholesale trade	0.37	0.38	0.36	0.53	0.39	0.34	0.35	0.42	0.31
Retail trade	0.34	0.33	0.33	0.37	0.37	0.32	0.33	0.36	0.33
Finance and	0.36	0.32	0.36	0.43	0.33	0.28	0.35	0.37	0.24
Real estate and	0.21	0.25	0.18	0.31	0.26	0.24	0.17	0.29	0.24
Professional	0.55	0.60	0.54	0.63	0.66	0.49	0.53	0.52	0.48
Business services	0.63	0.66	0.63	0.67	0.60	0.60	0.63	0.60	0.56
Educational	0.38	0.38	0.37	0.48	0.39	0.38	0.37	0.47	0.38
Health services	0.48	0.39	0.51	0.41	0.41	0.38	0.49	0.40	0.38
Arts and	0.60	0.61	0.60	0.62	0.59	0.61	0.60	0.62	0.59
Hotels	0.41	0.42	0.41	0.36	0.42	0.24	0.40	0.23	0.23
Eating and	0.49	0.58	0.49	0.52	0.45	0.46	0.48	0.40	0.36
Other services	0.42	0.42	0.42	0.42	0.42	0.41	0.42	0.41	0.41
Government	0.60	0.60	0.61	0.55	0.59	0.60	0.61	0.55	0.59
Type II									
Agriculture	0.58	0.58	0.62	0.55	0.58	0.52	0.60	0.45	0.46
Mining and	0.63	0.51	0.68	0.65	0.55	0.47	0.63	0.53	0.46
Food processing	0.56	0.42	0.60	0.78	0.59	0.32	0.52	0.58	0.38
Other	0.23	0.41	0.22	0.45	0.19	0.18	0.21	0.17	0.15
Transportation	0.54	0.53	0.55	0.71	0.49	0.41	0.53	0.52	0.33
Information	0.34	0.46	0.32	0.56	0.44	0.33	0.31	0.32	0.26
Utilities	0.32	0.27	0.32	0.51	0.33	0.23	0.31	0.39	0.25
Wholesale trade	0.49	0.50	0.48	0.79	0.55	0.41	0.46	0.53	0.38
Retail trade	0.45	0.45	0.45	0.57	0.52	0.39	0.43	0.45	0.40
Finance and	0.48	0.43	0.48	0.65	0.47	0.35	0.46	0.47	0.30
Real estate and	0.28	0.33	0.24	0.47	0.37	0.29	0.23	0.37	0.29
Professional	0.74	0.81	0.72	0.94	0.92	0.61	0.70	0.66	0.58
Business services	0.85	0.88	0.85	1.01	0.85	0.74	0.82	0.76	0.68
Educational	0.51	0.51	0.50	0.74	0.55	0.47	0.49	0.60	0.46
Health services	0.65	0.52	0.68	0.63	0.58	0.47	0.64	0.51	0.47
Arts and	0.81	0.82	0.81	0.96	0.84	0.75	0.78	0.79	0.72
Hotels	0.55	0.56	0.56	0.53	0.58	0.29	0.52	0.30	0.28
Eating and	0.66	0.78	0.65	0.77	0.63	0.57	0.63	0.51	0.44
Other services	0.56	0.56	0.56	0.64	0.60	0.51	0.54	0.52	0.49
Government	0.81	0.81	0.81	0.84	0.85	0.74	0.79	0.70	0.72

**Table 10. Final Demand Total Job Multipliers for the State, Inter-County and County Models, 2022**

	State	Inter-county model 1/				County model 2/			
	model	Hawaii	Oahu	Kauai	Maui	Hawaii	Oahu	Kauai	Maui
Type I									
Agriculture	8.6	19.1	18.5	16.6	17.6	18.8	18.4	16.4	16.7
Mining and construction	4.8	5.4	7.5	6.1	5.1	5.4	7.0	5.9	4.9
Food processing	9.0	8.4	11.5	12.1	10.3	7.1	9.9	10.7	7.7
Other manufacturing	2.2	6.0	3.1	5.9	2.4	2.8	3.0	2.4	2.2
Transportation	5.1	7.6	7.6	9.0	6.6	6.5	7.5	7.8	5.2
Information	3.1	7.1	4.1	7.3	5.4	5.7	4.1	4.8	3.6
Utilities	2.5	2.8	3.4	5.7	3.1	2.6	3.4	5.1	2.7
Wholesale trade	4.7	6.7	6.0	9.6	6.6	6.0	5.8	7.4	5.1
Retail trade	6.6	9.5	9.1	10.1	9.7	9.3	9.1	9.8	9.0
Finance and insurance	4.0	7.3	7.4	9.4	6.9	6.6	7.3	8.1	5.2
Real estate and rentals	1.7	6.4	3.4	6.7	5.0	6.3	3.3	6.2	4.5
Professional services	4.8	9.9	8.3	10.4	10.4	8.0	8.2	8.3	7.1
Business services	9.1	13.1	12.2	13.0	11.7	12.2	12.2	11.8	10.9
Educational services	12.4	17.7	17.3	19.6	17.6	17.7	17.3	19.4	17.4
Health services	7.7	7.8	10.0	8.2	8.2	7.7	9.6	7.9	7.7
Arts and entertainment	8.7	16.5	16.2	16.8	16.0	16.5	16.1	16.7	16.0
Hotels	5.2	6.6	6.6	5.6	6.6	3.4	6.2	3.3	3.2
Eating and drinking	10.1	14.6	11.7	12.4	10.8	12.4	11.5	10.2	9.2
Other services	9.3	20.7	20.3	20.4	20.3	20.5	20.3	20.3	20.0
Government	8.5	8.7	8.7	7.9	8.5	8.9	8.8	8.0	8.6
Type II									
Agriculture	10.7	22.3	21.8	20.2	21.0	21.0	21.3	18.3	18.4
Mining and construction	7.1	8.3	11.1	10.4	8.4	7.3	10.1	8.1	6.6
Food processing	11.0	10.7	14.7	17.2	13.8	8.5	12.4	13.1	9.1
Other manufacturing	3.0	8.3	4.3	8.5	3.6	3.6	4.0	3.1	2.7
Transportation	7.1	10.5	10.5	13.7	9.5	8.2	10.0	10.0	6.4
Information	4.4	9.7	5.8	10.8	7.9	7.1	5.6	6.2	4.6
Utilities	3.7	4.2	5.2	9.0	5.1	3.5	4.9	6.8	3.6
Wholesale trade	6.5	9.5	8.5	14.7	9.8	7.7	8.0	9.7	6.4
Retail trade	8.2	12.0	11.5	13.9	12.8	10.9	11.2	11.7	10.5
Finance and insurance	5.8	9.6	9.9	13.7	9.6	8.0	9.5	10.1	6.3
Real estate and rentals	2.8	8.3	4.6	9.9	7.2	7.5	4.4	7.8	5.5
Professional services	7.5	14.4	12.1	16.5	15.8	10.5	11.5	11.1	9.2
Business services	12.3	18.0	16.7	19.6	16.7	15.3	16.2	15.0	13.4
Educational services	14.3	20.6	20.0	24.5	20.8	19.6	19.7	21.9	19.1
Health services	10.1	10.6	13.6	12.5	11.6	9.6	12.7	10.1	9.4
Arts and entertainment	11.7	21.1	20.4	23.2	21.0	19.6	19.8	20.0	18.6
Hotels	7.3	9.7	9.5	9.0	9.9	4.6	8.7	4.5	4.2
Eating and drinking	12.5	18.9	15.1	17.4	14.5	14.8	14.5	12.3	10.8
Other services	11.4	23.8	23.2	24.7	23.8	22.7	22.9	22.5	21.8
Government	11.4	13.1	12.9	13.6	13.5	12.0	12.6	11.0	11.3

**Table 11. Final Demand State Tax Multipliers for the State, Inter-County and County Models, 2022**

	State	Inter-county model 1/				County model 2/			
	model	Hawaii	Oahu	Kauai	Maui	Hawaii	Oahu	Kauai	Maui
Type I									
Agriculture	0.0500	0.0471	0.0574	0.0392	0.0550	0.0446	0.0266	0.0375	0.0474
Mining and construction	0.0993	0.0777	0.1085	0.0853	0.0808	0.0767	0.0328	0.0828	0.0789
Food processing	0.0622	0.0441	0.0662	0.0987	0.0740	0.0343	0.0301	0.0863	0.0552
Other manufacturing	0.0278	0.0544	0.0271	0.0544	0.0207	0.0223	0.0126	0.0199	0.0176
Transportation	0.0603	0.0611	0.0607	0.0745	0.0531	0.0505	0.0305	0.0635	0.0409
Information	0.0633	0.0829	0.0591	0.0869	0.0796	0.0676	0.0174	0.0601	0.0600
Utilities	0.0828	0.0785	0.0815	0.1040	0.0892	0.0762	0.0179	0.0978	0.0841
Wholesale trade	0.0710	0.0748	0.0688	0.1077	0.0792	0.0662	0.0255	0.0833	0.0618
Retail trade	0.2022	0.2027	0.2002	0.2104	0.2129	0.2002	0.0224	0.2068	0.2050
Finance and insurance	0.0938	0.0853	0.0931	0.1139	0.0901	0.0776	0.0259	0.0991	0.0712
Real estate and rentals	0.0637	0.0683	0.0576	0.0847	0.0802	0.0662	0.0115	0.0793	0.0750
Professional services	0.0928	0.1051	0.0892	0.1062	0.1198	0.0816	0.0369	0.0822	0.0799
Business services	0.0881	0.0923	0.0875	0.0938	0.0824	0.0821	0.0453	0.0804	0.0739
Educational services	0.0666	0.0681	0.0655	0.0852	0.0683	0.0676	0.0295	0.0825	0.0672
Health services	0.0794	0.0610	0.0848	0.0637	0.0632	0.0601	0.0353	0.0611	0.0592
Arts and entertainment	0.0682	0.0692	0.0682	0.0715	0.0667	0.0686	0.0362	0.0702	0.0660
Hotels	0.1425	0.1432	0.1430	0.1346	0.1440	0.1086	0.0246	0.1080	0.1076
Eating and drinking	0.0800	0.0947	0.0787	0.0864	0.0720	0.0711	0.0310	0.0626	0.0547
Other services	0.0561	0.0576	0.0549	0.0559	0.0617	0.0561	0.0266	0.0542	0.0589
Government	0.0630	0.0637	0.0633	0.0578	0.0629	0.0634	0.0530	0.0576	0.0626
Type II									
Agriculture	0.0824	0.0805	0.0923	0.0757	0.0908	0.0661	0.0368	0.0574	0.0656
Mining and construction	0.1348	0.1071	0.1471	0.1284	0.1147	0.0960	0.0436	0.1062	0.0970
Food processing	0.0936	0.0681	0.1001	0.1499	0.1098	0.0475	0.0389	0.1120	0.0704
Other manufacturing	0.0407	0.0783	0.0397	0.0820	0.0322	0.0296	0.0161	0.0272	0.0233
Transportation	0.0909	0.0914	0.0918	0.1210	0.0830	0.0674	0.0395	0.0865	0.0541
Information	0.0826	0.1094	0.0771	0.1224	0.1058	0.0814	0.0226	0.0743	0.0704
Utilities	0.1008	0.0937	0.0999	0.1378	0.1093	0.0857	0.0232	0.1153	0.0941
Wholesale trade	0.0986	0.1037	0.0959	0.1590	0.1124	0.0834	0.0333	0.1071	0.0767
Retail trade	0.2277	0.2283	0.2255	0.2482	0.2448	0.2166	0.0298	0.2270	0.2209
Finance and insurance	0.1209	0.1098	0.1201	0.1565	0.1183	0.0921	0.0337	0.1198	0.0830
Real estate and rentals	0.0793	0.0872	0.0711	0.1160	0.1030	0.0783	0.0154	0.0956	0.0863
Professional services	0.1346	0.1511	0.1299	0.1675	0.1754	0.1067	0.0487	0.1114	0.1027
Business services	0.1360	0.1426	0.1353	0.1602	0.1345	0.1129	0.0593	0.1144	0.1006
Educational services	0.0953	0.0975	0.0938	0.1341	0.1022	0.0870	0.0377	0.1090	0.0854
Health services	0.1158	0.0908	0.1233	0.1055	0.0990	0.0797	0.0461	0.0836	0.0777
Arts and entertainment	0.1137	0.1160	0.1136	0.1352	0.1185	0.0995	0.0494	0.1052	0.0943
Hotels	0.1734	0.1751	0.1744	0.1683	0.1786	0.1206	0.0333	0.1212	0.1186
Eating and drinking	0.1172	0.1390	0.1156	0.1363	0.1100	0.0947	0.0417	0.0853	0.0720
Other services	0.0875	0.0896	0.0864	0.0984	0.0983	0.0770	0.0358	0.0774	0.0784
Government	0.1085	0.1097	0.1092	0.1141	0.1150	0.0940	0.0664	0.0888	0.0909

**Table 12. Final Demand State Individual Income Tax Multipliers, 2022**

	State model	Inter-county model 1/				County model 2/			
		Hawaii	Oahu	Kauai	Maui	Hawaii	Oahu	Kauai	Maui
Type I									
Agriculture	0.0244	0.0245	0.0269	0.0198	0.0233	0.0235	0.0266	0.0192	0.0211
Mining and construction	0.0318	0.0256	0.0345	0.0287	0.0260	0.0252	0.0328	0.0278	0.0253
Food processing	0.0307	0.0237	0.0328	0.0381	0.0311	0.0201	0.0301	0.0336	0.0241
Other manufacturing	0.0132	0.0229	0.0129	0.0243	0.0106	0.0112	0.0126	0.0104	0.0096
Transportation	0.0303	0.0292	0.0308	0.0349	0.0259	0.0243	0.0305	0.0299	0.0204
Information	0.0187	0.0246	0.0175	0.0275	0.0224	0.0194	0.0174	0.0182	0.0157
Utilities	0.0179	0.0149	0.0181	0.0251	0.0173	0.0141	0.0179	0.0229	0.0155
Wholesale trade	0.0265	0.0271	0.0259	0.0381	0.0280	0.0243	0.0255	0.0303	0.0225
Retail trade	0.0228	0.0221	0.0226	0.0252	0.0248	0.0213	0.0224	0.0240	0.0220
Finance and insurance	0.0264	0.0236	0.0263	0.0322	0.0246	0.0210	0.0259	0.0272	0.0183
Real estate and rentals	0.0138	0.0163	0.0117	0.0215	0.0178	0.0155	0.0115	0.0196	0.0160
Professional services	0.0383	0.0414	0.0373	0.0438	0.0456	0.0338	0.0369	0.0358	0.0328
Business services	0.0456	0.0469	0.0454	0.0479	0.0431	0.0432	0.0453	0.0431	0.0400
Educational services	0.0300	0.0302	0.0296	0.0375	0.0305	0.0300	0.0295	0.0364	0.0301
Health services	0.0348	0.0283	0.0366	0.0302	0.0300	0.0279	0.0353	0.0289	0.0280
Arts and entertainment	0.0367	0.0371	0.0367	0.0381	0.0360	0.0369	0.0362	0.0377	0.0358
Hotels	0.0255	0.0259	0.0258	0.0220	0.0259	0.0130	0.0246	0.0128	0.0126
Eating and drinking	0.0318	0.0376	0.0314	0.0335	0.0284	0.0294	0.0310	0.0253	0.0224
Other services	0.0265	0.0265	0.0266	0.0267	0.0268	0.0260	0.0266	0.0261	0.0257
Government	0.0526	0.0523	0.0530	0.0481	0.0518	0.0523	0.0530	0.0481	0.0517
Type II									
Agriculture	0.0350	0.0352	0.0383	0.0342	0.0361	0.0306	0.0368	0.0265	0.0271
Mining and construction	0.0434	0.0350	0.0471	0.0457	0.0381	0.0316	0.0436	0.0363	0.0312
Food processing	0.0410	0.0314	0.0439	0.0581	0.0438	0.0245	0.0389	0.0430	0.0291
Other manufacturing	0.0174	0.0309	0.0171	0.0342	0.0147	0.0137	0.0161	0.0130	0.0115
Transportation	0.0403	0.0390	0.0410	0.0530	0.0365	0.0299	0.0395	0.0383	0.0248
Information	0.0250	0.0332	0.0234	0.0409	0.0316	0.0240	0.0226	0.0234	0.0192
Utilities	0.0237	0.0198	0.0241	0.0383	0.0245	0.0173	0.0232	0.0293	0.0188
Wholesale trade	0.0355	0.0364	0.0348	0.0578	0.0398	0.0300	0.0333	0.0390	0.0274
Retail trade	0.0311	0.0304	0.0309	0.0402	0.0362	0.0267	0.0298	0.0313	0.0273
Finance and insurance	0.0353	0.0315	0.0352	0.0487	0.0346	0.0258	0.0337	0.0347	0.0222
Real estate and rentals	0.0189	0.0224	0.0161	0.0338	0.0260	0.0195	0.0154	0.0255	0.0197
Professional services	0.0519	0.0563	0.0506	0.0676	0.0652	0.0422	0.0487	0.0465	0.0404
Business services	0.0612	0.0632	0.0610	0.0740	0.0618	0.0534	0.0593	0.0555	0.0488
Educational services	0.0394	0.0396	0.0388	0.0568	0.0427	0.0365	0.0377	0.0461	0.0361
Health services	0.0467	0.0379	0.0492	0.0467	0.0428	0.0344	0.0461	0.0371	0.0341
Arts and entertainment	0.0516	0.0522	0.0516	0.0634	0.0547	0.0472	0.0494	0.0504	0.0451
Hotels	0.0356	0.0363	0.0361	0.0347	0.0380	0.0170	0.0333	0.0176	0.0163
Eating and drinking	0.0440	0.0519	0.0435	0.0528	0.0419	0.0372	0.0417	0.0336	0.0281
Other services	0.0368	0.0368	0.0369	0.0436	0.0399	0.0329	0.0358	0.0346	0.0322
Government	0.0675	0.0672	0.0679	0.0705	0.0705	0.0624	0.0664	0.0595	0.0611

**Table 13. Final Demand State GET Multipliers, 2022**

	State model	Inter-county model 1/				County model 2/			
		Hawaii	Oahu	Kauai	Maui	Hawaii	Oahu	Kauai	Maui
<b>Type I</b>									
Agriculture	0.0128	0.0106	0.0169	0.0078	0.0161	0.0098	0.0165	0.0072	0.0125
Mining and construction	0.0515	0.0394	0.0570	0.0406	0.0403	0.0391	0.0535	0.0398	0.0397
Food processing	0.0143	0.0083	0.0155	0.0249	0.0186	0.0047	0.0137	0.0206	0.0119
Other manufacturing	0.0043	0.0137	0.0040	0.0145	0.0019	0.0027	0.0036	0.0017	0.0010
Transportation	0.0149	0.0163	0.0148	0.0196	0.0137	0.0129	0.0144	0.0163	0.0098
Information	0.0190	0.0280	0.0173	0.0254	0.0259	0.0225	0.0172	0.0161	0.0189
Utilities	0.0081	0.0060	0.0084	0.0133	0.0081	0.0053	0.0081	0.0113	0.0064
Wholesale trade	0.0307	0.0337	0.0296	0.0438	0.0351	0.0304	0.0292	0.0344	0.0283
Retail trade	0.1662	0.1676	0.1650	0.1690	0.1707	0.1667	0.1648	0.1679	0.1682
Finance and insurance	0.0093	0.0094	0.0091	0.0118	0.0097	0.0076	0.0087	0.0083	0.0055
Real estate and rentals	0.0336	0.0350	0.0319	0.0363	0.0403	0.0343	0.0315	0.0347	0.0387
Professional services	0.0341	0.0389	0.0329	0.0369	0.0433	0.0309	0.0325	0.0290	0.0295
Business services	0.0288	0.0306	0.0286	0.0303	0.0269	0.0269	0.0285	0.0252	0.0238
Educational services	0.0251	0.0262	0.0247	0.0308	0.0257	0.0261	0.0246	0.0300	0.0253
Health services	0.0287	0.0226	0.0306	0.0235	0.0234	0.0223	0.0294	0.0228	0.0221
Arts and entertainment	0.0223	0.0228	0.0222	0.0236	0.0219	0.0226	0.0221	0.0232	0.0217
Hotels	0.0317	0.0317	0.0321	0.0293	0.0320	0.0212	0.0309	0.0210	0.0210
Eating and drinking	0.0313	0.0353	0.0310	0.0331	0.0286	0.0274	0.0306	0.0252	0.0229
Other services	0.0176	0.0189	0.0171	0.0172	0.0191	0.0184	0.0170	0.0166	0.0182
Government	0.0004	0.0011	0.0004	0.0004	0.0006	0.0010	0.0004	0.0003	0.0005
<b>Type II</b>									
Agriculture	0.0269	0.0255	0.0321	0.0210	0.0303	0.0196	0.0302	0.0150	0.0202
Mining and construction	0.0669	0.0525	0.0738	0.0562	0.0538	0.0479	0.0680	0.0490	0.0473
Food processing	0.0279	0.0189	0.0303	0.0437	0.0331	0.0107	0.0257	0.0307	0.0183
Other manufacturing	0.0098	0.0240	0.0095	0.0255	0.0065	0.0060	0.0084	0.0045	0.0034
Transportation	0.0281	0.0297	0.0283	0.0367	0.0258	0.0206	0.0266	0.0253	0.0153
Information	0.0274	0.0397	0.0252	0.0389	0.0366	0.0288	0.0242	0.0216	0.0233
Utilities	0.0159	0.0128	0.0164	0.0256	0.0161	0.0096	0.0152	0.0181	0.0106
Wholesale trade	0.0427	0.0464	0.0414	0.0629	0.0485	0.0382	0.0396	0.0437	0.0346
Retail trade	0.1772	0.1789	0.1761	0.1827	0.1835	0.1742	0.1747	0.1758	0.1748
Finance and insurance	0.0210	0.0203	0.0209	0.0275	0.0211	0.0142	0.0192	0.0164	0.0104
Real estate and rentals	0.0404	0.0434	0.0377	0.0477	0.0494	0.0398	0.0368	0.0411	0.0435
Professional services	0.0522	0.0593	0.0506	0.0596	0.0659	0.0424	0.0484	0.0404	0.0392
Business services	0.0496	0.0530	0.0495	0.0546	0.0478	0.0409	0.0473	0.0385	0.0350
Educational services	0.0376	0.0393	0.0371	0.0485	0.0391	0.0349	0.0357	0.0404	0.0330
Health services	0.0445	0.0358	0.0473	0.0387	0.0376	0.0312	0.0440	0.0316	0.0299
Arts and entertainment	0.0420	0.0436	0.0421	0.0465	0.0425	0.0367	0.0399	0.0369	0.0336
Hotels	0.0450	0.0457	0.0458	0.0422	0.0461	0.0267	0.0427	0.0262	0.0256
Eating and drinking	0.0474	0.0549	0.0471	0.0518	0.0440	0.0381	0.0449	0.0341	0.0302
Other services	0.0312	0.0331	0.0308	0.0325	0.0337	0.0280	0.0294	0.0257	0.0264
Government	0.0201	0.0216	0.0204	0.0207	0.0213	0.0150	0.0184	0.0126	0.0125

**Table 14. Final Demand State TAT Multipliers, 2022**

	State model	Inter-county model 1/				County model 2/			
		Hawaii	Oahu	Kauai	Maui	Hawaii	Oahu	Kauai	Maui
Type I									
Agriculture	0.00077	0.00035	0.00125	0.00022	0.00162	0.00014	0.00119	0.00007	0.00102
Mining and construction	0.00235	0.00124	0.00271	0.00092	0.00235	0.00116	0.00221	0.00070	0.00216
Food processing	0.00379	0.00118	0.00465	0.00187	0.00330	0.00018	0.00421	0.00070	0.00164
Other manufacturing	0.00116	0.00246	0.00113	0.00134	0.00060	0.00026	0.00105	0.00004	0.00001
Transportation	0.00085	0.00070	0.00087	0.00075	0.00075	0.00036	0.00082	0.00022	0.00015
Information	0.00206	0.00381	0.00164	0.00294	0.00421	0.00253	0.00161	0.00063	0.00260
Utilities	0.00225	0.00166	0.00191	0.00175	0.00481	0.00139	0.00185	0.00119	0.00426
Wholesale trade	0.00250	0.00201	0.00244	0.00335	0.00307	0.00110	0.00236	0.00078	0.00123
Retail trade	0.00171	0.00132	0.00166	0.00091	0.00329	0.00110	0.00161	0.00056	0.00245
Finance and insurance	0.00466	0.00196	0.00513	0.00222	0.00398	0.00120	0.00502	0.00079	0.00212
Real estate and rentals	0.00154	0.00196	0.00061	0.00134	0.00495	0.00178	0.00056	0.00084	0.00440
Professional services	0.00590	0.00772	0.00543	0.00424	0.01097	0.00414	0.00529	0.00114	0.00495
Business services	0.00157	0.00155	0.00162	0.00104	0.00113	0.00081	0.00158	0.00019	0.00051
Educational services	0.00058	0.00024	0.00064	0.00035	0.00043	0.00019	0.00059	0.00013	0.00030
Health services	0.00289	0.00017	0.00375	0.00003	0.00004	0.00011	0.00271	0.00000	0.00000
Arts and entertainment	0.00023	0.00046	0.00014	0.00027	0.00026	0.00039	0.00013	0.00012	0.00019
Hotels	0.06952	0.06937	0.06940	0.06908	0.06979	0.06668	0.06904	0.06656	0.06664
Eating and drinking	0.00276	0.00358	0.00264	0.00282	0.00228	0.00119	0.00255	0.00035	0.00051
Other services	0.00171	0.00176	0.00156	0.00072	0.00300	0.00163	0.00155	0.00057	0.00272
Government	0.00013	0.00016	0.00011	0.00004	0.00032	0.00014	0.00011	0.00003	0.00029
Type II									
Agriculture	0.00194	0.00145	0.00252	0.00114	0.00297	0.00056	0.00188	0.00019	0.00177
Mining and construction	0.00363	0.00221	0.00411	0.00201	0.00364	0.00154	0.00294	0.00085	0.00291
Food processing	0.00492	0.00197	0.00587	0.00320	0.00464	0.00044	0.00481	0.00086	0.00226
Other manufacturing	0.00162	0.00326	0.00159	0.00219	0.00104	0.00041	0.00129	0.00009	0.00024
Transportation	0.00196	0.00170	0.00200	0.00197	0.00188	0.00070	0.00143	0.00037	0.00069
Information	0.00276	0.00469	0.00230	0.00394	0.00519	0.00281	0.00197	0.00071	0.00303
Utilities	0.00290	0.00216	0.00257	0.00262	0.00557	0.00158	0.00220	0.00129	0.00467
Wholesale trade	0.00349	0.00296	0.00343	0.00472	0.00432	0.00144	0.00288	0.00093	0.00184
Retail trade	0.00264	0.00215	0.00258	0.00187	0.00449	0.00143	0.00211	0.00069	0.00311
Finance and insurance	0.00564	0.00277	0.00611	0.00335	0.00504	0.00149	0.00555	0.00091	0.00260
Real estate and rentals	0.00210	0.00258	0.00110	0.00214	0.00581	0.00202	0.00082	0.00094	0.00487
Professional services	0.00742	0.00925	0.00692	0.00587	0.01305	0.00464	0.00609	0.00132	0.00589
Business services	0.00330	0.00321	0.00336	0.00275	0.00311	0.00143	0.00253	0.00040	0.00161
Educational services	0.00162	0.00120	0.00167	0.00158	0.00171	0.00058	0.00115	0.00030	0.00106
Health services	0.00421	0.00115	0.00515	0.00109	0.00139	0.00050	0.00344	0.00014	0.00076
Arts and entertainment	0.00187	0.00199	0.00180	0.00186	0.00223	0.00101	0.00102	0.00034	0.00135
Hotels	0.07064	0.07045	0.07054	0.07003	0.07107	0.06692	0.06963	0.06664	0.06710
Eating and drinking	0.00411	0.00506	0.00399	0.00417	0.00371	0.00166	0.00327	0.00049	0.00122
Other services	0.00284	0.00281	0.00271	0.00179	0.00439	0.00204	0.00217	0.00071	0.00352
Government	0.00177	0.00167	0.00178	0.00145	0.00229	0.00075	0.00102	0.00022	0.00146

**Table 15. Final Demand Other State Taxes Multipliers, 2022**

	State model	Inter-county model 1/				County model 2/			
		Hawaii	Oahu	Kauai	Maui	Hawaii	Oahu	Kauai	Maui
Type I									
Agriculture	0.0121	0.0117	0.0124	0.0114	0.0141	0.0112	0.0123	0.0110	0.0128
Mining and construction	0.0136	0.0115	0.0143	0.0151	0.0122	0.0113	0.0134	0.0145	0.0118
Food processing	0.0134	0.0109	0.0132	0.0338	0.0210	0.0093	0.0119	0.0314	0.0176
Other manufacturing	0.0092	0.0153	0.0090	0.0143	0.0075	0.0081	0.0087	0.0078	0.0070
Transportation	0.0143	0.0150	0.0142	0.0193	0.0127	0.0130	0.0140	0.0170	0.0106
Information	0.0236	0.0266	0.0226	0.0311	0.0271	0.0232	0.0226	0.0252	0.0228
Utilities	0.0546	0.0559	0.0531	0.0639	0.0590	0.0554	0.0529	0.0625	0.0579
Wholesale trade	0.0114	0.0121	0.0108	0.0225	0.0130	0.0105	0.0105	0.0178	0.0097
Retail trade	0.0115	0.0117	0.0108	0.0152	0.0141	0.0112	0.0107	0.0144	0.0124
Finance and insurance	0.0534	0.0504	0.0525	0.0677	0.0518	0.0478	0.0521	0.0628	0.0453
Real estate and rentals	0.0148	0.0151	0.0134	0.0256	0.0171	0.0146	0.0132	0.0242	0.0160
Professional services	0.0145	0.0171	0.0136	0.0212	0.0200	0.0127	0.0133	0.0162	0.0126
Business services	0.0121	0.0132	0.0118	0.0146	0.0112	0.0113	0.0118	0.0119	0.0096
Educational services	0.0109	0.0114	0.0105	0.0166	0.0117	0.0113	0.0105	0.0160	0.0114
Health services	0.0130	0.0100	0.0139	0.0099	0.0099	0.0098	0.0132	0.0094	0.0090
Arts and entertainment	0.0089	0.0089	0.0091	0.0095	0.0085	0.0087	0.0088	0.0092	0.0084
Hotels	0.0158	0.0162	0.0156	0.0142	0.0164	0.0076	0.0144	0.0076	0.0074
Eating and drinking	0.0142	0.0182	0.0136	0.0169	0.0126	0.0132	0.0133	0.0117	0.0089
Other services	0.0102	0.0104	0.0097	0.0112	0.0128	0.0101	0.0096	0.0108	0.0122
Government	0.0099	0.0101	0.0099	0.0092	0.0102	0.0100	0.0099	0.0092	0.0101
Type II									
Agriculture	0.0186	0.0183	0.0194	0.0193	0.0214	0.0153	0.0185	0.0157	0.0166
Mining and construction	0.0209	0.0174	0.0220	0.0244	0.0192	0.0150	0.0200	0.0200	0.0155
Food processing	0.0198	0.0158	0.0200	0.0449	0.0283	0.0119	0.0173	0.0375	0.0207
Other manufacturing	0.0118	0.0202	0.0116	0.0201	0.0099	0.0095	0.0109	0.0096	0.0082
Transportation	0.0205	0.0210	0.0205	0.0293	0.0188	0.0162	0.0196	0.0225	0.0133
Information	0.0275	0.0319	0.0263	0.0386	0.0324	0.0258	0.0258	0.0285	0.0249
Utilities	0.0583	0.0589	0.0567	0.0712	0.0631	0.0572	0.0562	0.0666	0.0600
Wholesale trade	0.0170	0.0179	0.0163	0.0336	0.0198	0.0138	0.0153	0.0235	0.0128
Retail trade	0.0167	0.0168	0.0159	0.0234	0.0206	0.0143	0.0152	0.0192	0.0157
Finance and insurance	0.0589	0.0553	0.0579	0.0768	0.0576	0.0506	0.0569	0.0677	0.0478
Real estate and rentals	0.0180	0.0189	0.0161	0.0324	0.0218	0.0169	0.0156	0.0280	0.0183
Professional services	0.0230	0.0263	0.0217	0.0345	0.0313	0.0175	0.0206	0.0232	0.0173
Business services	0.0219	0.0233	0.0214	0.0289	0.0219	0.0172	0.0203	0.0200	0.0151
Educational services	0.0167	0.0173	0.0162	0.0272	0.0186	0.0150	0.0155	0.0222	0.0152
Health services	0.0204	0.0160	0.0216	0.0190	0.0172	0.0136	0.0199	0.0147	0.0129
Arts and entertainment	0.0182	0.0182	0.0182	0.0234	0.0191	0.0146	0.0169	0.0175	0.0142
Hotels	0.0221	0.0226	0.0219	0.0214	0.0234	0.0099	0.0198	0.0107	0.0097
Eating and drinking	0.0218	0.0271	0.0210	0.0276	0.0204	0.0177	0.0198	0.0171	0.0124
Other services	0.0166	0.0168	0.0160	0.0205	0.0203	0.0141	0.0153	0.0163	0.0162
Government	0.0191	0.0193	0.0191	0.0215	0.0209	0.0159	0.0181	0.0166	0.0160

**Table 16. Direct Effect Earnings Multipliers for the State, Inter-County and County Models, 2022**

	State model	Inter-county model 1/				County model 2/			
		Hawaii	Oahu	Kauai	Maui	Hawaii	Oahu	Kauai	Maui
Type I									
Agriculture	1.34	1.36	1.44	1.12	1.29	1.31	1.43	1.10	1.18
Mining and construction	1.43	1.17	1.55	1.29	1.18	1.15	1.48	1.26	1.15
Food processing	1.82	1.37	1.95	2.26	1.85	1.13	1.75	1.98	1.38
Other manufacturing	1.43	2.56	1.40	2.67	1.12	1.21	1.35	1.09	1.00
Transportation	1.56	1.52	1.58	1.81	1.35	1.27	1.56	1.56	1.06
Information	2.02	2.72	1.89	3.01	2.45	2.14	1.87	1.97	1.71
Utilities	2.29	1.91	2.33	3.25	2.24	1.80	2.30	2.96	2.00
Wholesale trade	1.33	1.37	1.30	1.93	1.42	1.23	1.28	1.53	1.13
Retail trade	1.30	1.28	1.28	1.44	1.42	1.23	1.27	1.37	1.27
Finance and insurance	1.87	1.67	1.87	2.27	1.74	1.49	1.84	1.91	1.28
Real estate and rentals	1.82	2.17	1.57	2.75	2.31	2.08	1.54	2.52	2.08
Professional services	1.38	1.49	1.34	1.56	1.64	1.23	1.33	1.28	1.18
Business services	1.18	1.22	1.18	1.24	1.12	1.12	1.17	1.11	1.03
Educational services	1.10	1.11	1.08	1.39	1.12	1.10	1.08	1.35	1.10
Health services	1.35	1.09	1.43	1.16	1.16	1.08	1.37	1.12	1.08
Arts and entertainment	1.04	1.05	1.04	1.08	1.02	1.05	1.03	1.07	1.02
Hotels	1.81	1.83	1.83	1.60	1.84	1.04	1.75	1.03	1.01
Eating and drinking	1.42	1.66	1.40	1.49	1.28	1.33	1.38	1.16	1.04
Other services	1.18	1.18	1.18	1.18	1.19	1.16	1.18	1.16	1.15
Government	1.01	1.03	1.01	1.01	1.02	1.02	1.01	1.01	1.01
Type II									
Agriculture	1.80	1.82	1.93	1.72	1.83	1.62	1.87	1.40	1.44
Mining and construction	1.92	1.57	2.08	1.97	1.68	1.42	1.93	1.60	1.40
Food processing	2.44	1.83	2.62	3.41	2.59	1.39	2.29	2.52	1.68
Other manufacturing	1.91	3.48	1.88	3.79	1.59	1.49	1.76	1.39	1.22
Transportation	2.09	2.04	2.12	2.73	1.90	1.56	2.04	1.98	1.29
Information	2.71	3.66	2.53	4.41	3.43	2.64	2.44	2.51	2.08
Utilities	3.08	2.56	3.12	4.93	3.17	2.22	3.00	3.77	2.43
Wholesale trade	1.79	1.84	1.75	2.89	2.00	1.51	1.67	1.95	1.38
Retail trade	1.74	1.71	1.72	2.19	2.01	1.52	1.66	1.74	1.54
Finance and insurance	2.51	2.25	2.51	3.41	2.44	1.83	2.40	2.43	1.56
Real estate and rentals	2.44	2.91	2.10	4.17	3.28	2.57	2.01	3.21	2.54
Professional services	1.85	2.01	1.80	2.34	2.30	1.51	1.73	1.63	1.44
Business services	1.58	1.64	1.58	1.87	1.58	1.38	1.53	1.42	1.26
Educational services	1.47	1.49	1.45	2.13	1.59	1.36	1.41	1.72	1.34
Health services	1.82	1.47	1.92	1.77	1.64	1.33	1.79	1.42	1.32
Arts and entertainment	1.40	1.41	1.40	1.65	1.46	1.29	1.34	1.36	1.24
Hotels	2.43	2.47	2.46	2.35	2.56	1.28	2.28	1.31	1.24
Eating and drinking	1.90	2.23	1.88	2.22	1.81	1.64	1.81	1.47	1.26
Other services	1.58	1.59	1.58	1.81	1.69	1.43	1.54	1.48	1.40
Government	1.36	1.38	1.36	1.55	1.45	1.26	1.32	1.29	1.23

**Table 17. Direct Effect Total Job Multipliers for the State, Inter-County and County Models, 2022**

	State model	Inter-county model 1/				County model 2/			
		Hawaii	Oahu	Kauai	Maui	Hawaii	Oahu	Kauai	Maui
Type I									
Agriculture	1.18	1.22	1.19	1.06	1.13	1.21	1.18	1.05	1.07
Mining and construction	1.68	1.34	1.86	1.50	1.26	1.32	1.74	1.44	1.22
Food processing	1.71	1.33	1.83	1.92	1.64	1.13	1.57	1.70	1.22
Other manufacturing	1.46	2.75	1.42	2.70	1.13	1.31	1.37	1.11	1.00
Transportation	1.53	1.55	1.54	1.84	1.34	1.32	1.52	1.59	1.06
Information	2.29	3.61	2.09	3.69	2.73	2.90	2.07	2.43	1.83
Utilities	3.64	2.96	3.70	6.07	3.37	2.75	3.63	5.47	2.89
Wholesale trade	1.39	1.53	1.35	2.18	1.50	1.36	1.32	1.69	1.15
Retail trade	1.19	1.22	1.17	1.30	1.25	1.19	1.16	1.26	1.16
Finance and insurance	1.77	1.72	1.75	2.23	1.64	1.56	1.72	1.91	1.23
Real estate and rentals	1.90	2.94	1.53	3.07	2.26	2.86	1.50	2.85	2.05
Professional services	1.47	1.70	1.41	1.77	1.79	1.37	1.39	1.42	1.22
Business services	1.17	1.24	1.16	1.23	1.10	1.15	1.16	1.12	1.03
Educational services	1.04	1.05	1.03	1.17	1.04	1.05	1.03	1.15	1.04
Health services	1.34	1.09	1.41	1.16	1.15	1.08	1.36	1.12	1.08
Arts and entertainment	1.03	1.05	1.03	1.06	1.02	1.04	1.02	1.06	1.01
Hotels	2.05	2.09	2.08	1.78	2.07	1.07	1.96	1.04	1.02
Eating and drinking	1.32	1.62	1.30	1.38	1.20	1.37	1.28	1.13	1.02
Other services	1.06	1.08	1.06	1.07	1.06	1.07	1.06	1.06	1.05
Government	1.02	1.03	1.01	1.02	1.02	1.03	1.01	1.02	1.02
Type II									
Agriculture	1.37	1.43	1.40	1.30	1.35	1.35	1.37	1.17	1.18
Mining and construction	2.50	2.04	2.74	2.57	2.07	1.80	2.49	1.99	1.63
Food processing	2.18	1.70	2.34	2.74	2.19	1.35	1.98	2.09	1.45
Other manufacturing	2.02	3.81	1.97	3.94	1.64	1.66	1.83	1.43	1.25
Transportation	2.11	2.15	2.13	2.78	1.93	1.66	2.05	2.04	1.31
Information	3.21	4.89	2.94	5.46	4.00	3.61	2.82	3.11	2.32
Utilities	5.46	4.55	5.54	9.72	5.45	3.79	5.24	7.26	3.88
Wholesale trade	1.98	2.16	1.93	3.34	2.22	1.75	1.83	2.21	1.46
Retail trade	1.49	1.54	1.48	1.79	1.65	1.41	1.43	1.51	1.35
Finance and insurance	2.38	2.28	2.35	3.24	2.28	1.91	2.25	2.38	1.49
Real estate and rentals	2.57	3.78	2.11	4.51	3.27	3.42	2.00	3.56	2.53
Professional services	2.14	2.46	2.06	2.82	2.70	1.80	1.97	1.89	1.58
Business services	1.60	1.70	1.58	1.86	1.58	1.45	1.53	1.42	1.27
Educational services	1.20	1.22	1.19	1.46	1.24	1.17	1.17	1.30	1.14
Health services	1.82	1.50	1.91	1.76	1.64	1.36	1.79	1.42	1.32
Arts and entertainment	1.30	1.34	1.30	1.47	1.33	1.24	1.26	1.27	1.18
Hotels	2.97	3.05	3.01	2.83	3.12	1.46	2.75	1.44	1.34
Eating and drinking	1.71	2.09	1.68	1.93	1.61	1.64	1.61	1.37	1.20
Other services	1.22	1.24	1.21	1.29	1.24	1.18	1.20	1.18	1.14
Government	1.52	1.57	1.51	1.75	1.62	1.39	1.45	1.39	1.33

**Table 18. Total Visitor Expenditures by Air by County: 2023-2024 (\$ million)**

	2024	2023	Change	(%) Change
State total	20,488.7	20,662.8	-174.1	-0.8
Honolulu County	8,944.9	8,890.9	54.0	0.6
Maui County	5,446.8	5,950.1	-503.3	-8.5
Hawaii County	3,223.7	3,029.0	194.8	6.4
Kauai County	2,873.3	2,792.8	80.5	2.9
County share (%)				
Honolulu County	43.7	43.0	-31.0	
Maui County	26.6	28.8	289.1	
Hawaii County	15.7	14.7	-111.9	
Kauai County	14.0	13.5	-46.2	

Source: Department of Business, Economic Development and Tourism

**Table 19. Direct Spending of Decreased Visitor Expenditures in Maui County in 2024**

	Hawaii County	Honolulu County	Kauai County	Maui County	State Total
Total direct spending (\$ million)	-2.0	-67.2	-5.9	-396.0	-471.1
Sector's shares (% in county total)					
Agriculture	17.2	0.3	0.6	0.0	0.1
Mining and construction	0.0	0.0	0.0	0.0	0.0
Food processing	15.9	0.7	0.3	0.0	0.2
Other manufacturing	1.5	2.2	0.2	0.0	0.3
Transportation	64.3	84.0	31.9	5.3	17.1
Information	0.0	0.0	0.0	0.3	0.2
Utilities	0.0	0.0	0.0	0.0	0.0
Wholesale trade	1.1	2.0	0.2	0.3	0.6
Retail trade	0.0	0.0	0.0	18.2	15.3
Finance and insurance	0.0	0.0	0.0	0.0	0.0
Real estate and rentals	0.0	0.0	0.0	11.0	9.2
Professional services	0.0	0.0	0.0	0.9	0.7
Business services	0.0	0.0	0.0	2.5	2.1
Educational services	0.0	0.0	0.0	1.2	1.0
Health services	0.0	0.0	0.0	1.3	1.1
Arts and entertainment	0.0	0.0	0.0	4.0	3.4
Hotels	0.0	0.0	0.0	43.8	36.8
Eating and drinking	0.0	10.9	0.0	10.6	10.5
Other services	0.0	0.0	0.0	0.6	0.5
Government	0.0	0.0	66.8	0.0	0.8

**Table 20. Direct Output Impact of Decreased Visitor Expenditures in Maui County in 2024**

	Hawaii County	Honolulu County	Kauai County	Maui County	State Total
Total direct impact (\$M)	-2.0	-67.2	-5.9	-396.0	-471.1
Direct impact by industry (\$M)					
Agriculture	-0.3	-0.2	0.0	-0.1	-0.6
Mining and construction	0.0	0.0	0.0	0.0	0.0
Food processing	-0.3	-0.4	0.0	0.0	-0.8
Other manufacturing	0.0	-1.5	0.0	-0.1	-1.6
Transportation	-1.3	-56.4	-1.9	-21.0	-80.6
Information	0.0	0.0	0.0	-1.2	-1.2
Utilities	0.0	0.0	0.0	0.0	0.0
Wholesale trade	0.0	-1.3	0.0	-1.3	-2.6
Retail trade	0.0	0.0	0.0	-71.9	-71.9
Finance and insurance	0.0	0.0	0.0	0.0	0.0
Real estate and rentals	0.0	0.0	0.0	-43.5	-43.5
Professional services	0.0	0.0	0.0	-3.5	-3.5
Business services	0.0	0.0	0.0	-9.7	-9.7
Educational services	0.0	0.0	0.0	-4.8	-4.8
Health services	0.0	0.0	0.0	-5.2	-5.2
Arts and entertainment	0.0	0.0	0.0	-16.0	-16.0
Hotels	0.0	0.0	0.0	-173.5	-173.5
Eating and drinking	0.0	-7.3	0.0	-41.9	-49.2
Other services	0.0	0.0	0.0	-2.4	-2.4
Government	0.0	0.0	-4.0	0.0	-4.0

**Table 21. Direct Labor Income Impact of Decreased Visitor Expenditures in Maui County in 2024**

	Hawaii County	Honolulu County	Kauai County	Maui County	State Total
Total direct labor income (\$M)	-0.6	-18.1	-1.9	-112.7	-133.3
Direct impact by industry					
Agriculture	-0.1	-0.1	0.0	0.0	-0.2
Mining and construction	0.0	0.0	0.0	0.0	0.0
Food processing	-0.1	-0.1	0.0	0.0	-0.2
Other manufacturing	0.0	-0.2	0.0	0.0	-0.2
Transportation	-0.4	-15.1	-0.4	-4.6	-20.5
Information	0.0	0.0	0.0	-0.2	-0.2
Utilities	0.0	0.0	0.0	0.0	0.0
Wholesale trade	0.0	-0.4	0.0	-0.4	-0.8
Retail trade	0.0	0.0	0.0	-21.3	-21.3
Finance and insurance	0.0	0.0	0.0	0.0	0.0
Real estate and rentals	0.0	0.0	0.0	-2.3	-2.3
Professional services	0.0	0.0	0.0	-1.5	-1.5
Business services	0.0	0.0	0.0	-6.3	-6.3
Educational services	0.0	0.0	0.0	-3.3	-3.3
Health services	0.0	0.0	0.0	-2.1	-2.1
Arts and entertainment	0.0	0.0	0.0	-8.4	-8.4
Hotels	0.0	0.0	0.0	-40.1	-40.1
Eating and drinking	0.0	-2.2	0.0	-20.7	-22.8
Other services	0.0	0.0	0.0	-1.6	-1.6
Government	0.0	0.0	-1.5	0.0	-1.5

**Table 22. Direct Employment Impact of Decreased Visitor Expenditures in Maui County in 2024**

	Hawaii County	Honolulu County	Kauai County	Maui County	State Total
Total direct jobs (no.)	-16	-323	-28	-2,528	-2,894
Direct impact by industry					
Agriculture	-6	-2	0	-1	-10
Mining and construction	0	0	0	0	0
Food processing	-1	-3	0	0	-5
Other manufacturing	0	-3	0	-1	-4
Transportation	-7	-240	-8	-107	-362
Information	0	0	0	-2	-2
Utilities	0	0	0	0	0
Wholesale trade	0	-5	0	-7	-13
Retail trade	0	0	0	-601	-601
Finance and insurance	0	0	0	0	0
Real estate and rentals	0	0	0	-67	-67
Professional services	0	0	0	-39	-39
Business services	0	0	0	-173	-173
Educational services	0	0	0	-90	-90
Health services	0	0	0	-35	-35
Arts and entertainment	0	0	0	-263	-263
Hotels	0	0	0	-627	-627
Eating and drinking	0	-69	0	-474	-543
Other services	0	0	0	-39	-39
Government	0	0	-19	0	-19

**Table 23. Economic Impacts of Decreased Visitor Expenditures in Maui County in 2024**

	Visitor expenditures (\$ million)	Output (\$ million)		Earnings (\$ million)		Total jobs (no.)	
		Direct	Total	Direct	Total	Direct	Total
State total	-471.1	-471.1	-961.0	-133.3	-316.4	-2,894	-5,381
Hawaii County	-2.0	-2.0	-18.8	-0.6	-6.2	-16	-127
Honolulu County	-67.2	-67.2	-345.1	-18.1	-122.6	-323	-1,955
Kauai County	-5.9	-5.9	-40.3	-1.9	-20.6	-28	-268
Maui County	-396.0	-396.0	-556.8	-112.7	-167.0	-2,528	-3,031
County share (%)							
Hawaii County	0.4	0.4	2.0	0.4	2.0	0.5	2.4
Honolulu County	14.3	14.3	35.9	13.6	38.8	11.1	36.3
Kauai County	1.3	1.3	4.2	1.5	6.5	1.0	5.0
Maui County	84.1	84.1	57.9	84.5	52.8	87.3	56.3

**Table 24. Impacts of Decreased Visitor Expenditures in Maui County in 2024 by Industry**

	Output (\$ million)		Income (\$ million)		Total jobs (no.)	
	Direct	Total	Direct	Total	Direct	Total
Total	-471.1	-961.0	-133.3	-316.4	-2,894	-5,381
Agriculture	-0.6	-2.3	-0.2	-0.9	-10	-36
Mining and construction	0.0	-18.9	0.0	-7.1	0	-77
Food processing	-0.8	-3.4	-0.2	-1.0	-5	-21
Other manufacturing	-1.6	-9.6	-0.2	-1.4	-4	-21
Transportation	-80.6	-106.0	-20.5	-34.1	-362	-520
Information	-1.2	-20.0	-0.2	-3.3	-2	-40
Utilities	0.0	-27.5	0.0	-4.0	0	-26
Wholesale trade	-2.6	-17.2	-0.8	-5.5	-13	-76
Retail trade	-71.9	-92.9	-21.3	-28.9	-601	-723
Finance and insurance	0.0	-27.1	0.0	-6.1	0	-114
Real estate and rentals	-43.5	-144.1	-2.3	-17.2	-67	-316
Professional services	-3.5	-35.0	-1.5	-15.7	-39	-205
Business services	-9.7	-47.8	-6.3	-30.0	-173	-504
Educational services	-4.8	-8.2	-3.3	-3.2	-90	-138
Health services	-5.2	-38.8	-2.1	-16.4	-35	-275
Arts and entertainment	-16.0	-18.3	-8.4	-11.9	-263	-288
Hotels	-173.5	-201.7	-40.1	-50.1	-627	-638
Eating and drinking	-49.2	-73.5	-22.8	-28.1	-543	-662
Other services	-2.4	-12.4	-1.6	-5.4	-39	-237
Government	-4.0	-56.4	-1.5	-46.0	-19	-465
Sector's shares (%)						
Agriculture	0.1	0.2	0.2	0.3	0.4	0.7
Mining and construction	0.0	2.0	0.0	2.3	0.0	1.4
Food processing	0.2	0.3	0.2	0.3	0.2	0.4
Other manufacturing	0.3	1.0	0.2	0.4	0.1	0.4
Transportation	17.1	11.0	15.4	10.8	12.5	9.7
Information	0.2	2.1	0.1	1.0	0.1	0.7
Utilities	0.0	2.9	0.0	1.3	0.0	0.5
Wholesale trade	0.6	1.8	0.6	1.8	0.4	1.4
Retail trade	15.3	9.7	15.9	9.1	20.8	13.4
Finance and insurance	0.0	2.8	0.0	1.9	0.0	2.1
Real estate and rentals	9.2	15.0	1.7	5.4	2.3	5.9
Professional services	0.7	3.6	1.1	5.0	1.4	3.8
Business services	2.1	5.0	4.7	9.5	6.0	9.4
Educational services	1.0	0.9	2.4	1.0	3.1	2.6
Health services	1.1	4.0	1.5	5.2	1.2	5.1
Arts and entertainment	3.4	1.9	6.3	3.8	9.1	5.4
Hotels	36.8	21.0	30.1	15.8	21.7	11.9
Eating and drinking	10.5	7.6	17.1	8.9	18.8	12.3
Other services	0.5	1.3	1.2	1.7	1.3	4.4
Government	0.8	5.9	1.1	14.5	0.7	8.6

Note: sector totals are totals for all four counties.

## 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 as<sup>6</sup>

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

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  $s$ .<sup>7</sup>

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

---

<sup>6</sup> Most of the mathematical expressions presented are adopted from Miller and Blair (1985) with some modifications.

<sup>7</sup> 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  $s$ .<sup>8</sup>

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  $r \neq s$ ) is<sup>9</sup>

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

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 62-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 62 x 62 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.

<sup>8</sup> Conceptually, one could also regionalize final payments components, but it is not done so in this study due to data limitations.

<sup>9</sup> 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,  $\alpha_r$  denotes the proportion of total inter-industry purchases from within the region and  $\alpha_s$  denotes the proportions supplied from other regions.

Like information on inter-regional flows of goods and services, information on proportions ( $\alpha$ 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

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

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

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

representing a set of  $l$  matrix equations

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

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 as<sup>10</sup>

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

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

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<sup>10</sup> 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 2022 I-O table were reported in a more aggregate format and therefore were disaggregated using the detailed Economic Modeling Specialists, Inc. (EMSI) jobs data.

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. Although developing a 62 sector for Honolulu County (like the 2022 State I-O table) is feasible, data limitations made more detailed analysis of the neighbor islands counties impractical. 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 2022 inter-county I-O table was the 2022 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 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 (some 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 2022 Economic Census.

#### Agriculture, Aquaculture, and Commercial Fishing

The output for the agriculture and aquaculture sectors was based on the values of Census of 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.

### **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 2022 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 employment in mining and construction related activities by county.

### **Manufacturing**

Manufacturing outputs at the state level were mostly based on the 2022 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 2022 Hawaii Foreign Trade Zone (FTZ) Annual Report. At the county level, outputs for Honolulu were based on either the 2022 Economic Census or the FTZ Annual Report 2022. 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 employment.

### **Transportation**

Output of all transportation sectors for counties was obtained by allocating total output of transportation sectors in the 2022 state I-O table using respective transportation jobs by county. The definition of air and water transportation output and its estimation procedure can be found in the 2022 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 2022 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 2022 state I-O table. Trade margins are described in the 2022 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 2022 state I-O table using respective jobs by county. The definition of finance and insurance output and estimation procedures are provided in the 2022 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 2022 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 Housing Policy Study for Hawaii. Real estate output and rental & leasing outputs by county were computed based on the 2022 Economic Census.

## **Services**

### ***Business Services***

In the 2022 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 jobs by county. For the remaining three industries in this sector, county level outputs were based on the Economic Census.

### ***Educational Services***

In the 2022 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 2022 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 jobs from EMSI data.

### ***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 2022 Economic Census, plus estimated tips.

### ***Government and Government Enterprises***

In the 2022 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 2022 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) account. For the 2022 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 (TOPILS), 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: (1) COE, (2) TOPILS, and (3) gross operating surplus (including proprietor's income and other capital costs). 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) TOPILS. 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 62-sector industry level data applied in the 2022 state I-O table. The BEA income data, however, is more detailed and can be grouped into the required 62 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 2022 inter-county I-O table, county level COE data by detailed industries (62 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 (TOPILS) 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. TOPILS is the sum of business taxes and fees paid to the federal, state, and local governments. Components of TOPILS 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 TOPILS data in the 2022 inter-county I-O table were estimated by allocating the state total TOPILS 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 2022 outputs.

### **Final Demand**

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

### ***Personal Consumption Expenditures***

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 2022 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 2022 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 EMSI jobs 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 2022 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 2022 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 2022 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 2022 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 2022 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 2022 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 based on shares in wage and salary jobs. Since the state level total employment at more detailed industry level 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 were estimated based on BEA CA27N data. The proprietors' jobs were determined by the difference between total jobs and wage and salary jobs.

For the industries in the 2022 I-O table that were not consistent with the 3-digit NAICS, the EMSI data were used to allocate the BEA data to the 2022 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 62 by 62 inter-industry table was estimated using the detailed direct requirements matrix from the 2022 state I-O table and 62 industry outputs for that county. These 62 industries were then aggregated to 20 sectors for the counties. 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

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

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  $W_{qj}^{rs}$  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, 2022**

	Hawaii County	Honolulu County	Kauai County	Maui County	State total
Total output (\$ million)	16,666.1	113,219.7	9,184.3	19,548.0	158,618.1
Sector share (%)					
Agriculture	2.7	0.3	1.2	0.7	0.6
Mining and construction	9.0	7.4	8.0	8.7	7.8
Food processing	1.4	0.6	0.2	0.2	0.6
Other manufacturing	0.7	3.7	0.4	0.8	2.8
Transportation	4.1	6.2	4.2	5.0	5.7
Information	2.0	4.0	1.4	2.8	3.5
Utilities	3.1	2.6	2.5	3.3	2.7
Wholesale trade	2.1	3.6	1.7	1.9	3.1
Retail trade	9.2	6.3	7.1	7.5	6.8
Finance and insurance	3.0	6.0	8.7	2.1	5.3
Real estate and rentals	18.2	13.3	17.9	23.3	15.3
Professional services	4.2	6.3	3.7	2.1	5.4
Business services	3.4	3.8	4.5	2.6	3.7
Educational services	0.7	0.8	0.6	0.5	0.8
Health services	8.0	7.9	6.4	6.2	7.6
Arts and entertainment	1.3	0.7	1.3	1.4	0.9
Hotels	9.0	5.5	10.8	17.8	7.7
Eating and drinking	4.0	4.8	5.4	4.9	4.7
Other services	4.3	1.7	2.0	2.1	2.0
Government	9.6	14.5	12.0	6.1	12.8

**Table A-2. Personal Consumption Expenditures (PCE) Shares by Sector and by County, 2022**

	Hawaii County	Honolulu County	Kauai County	Maui County	State total
Total PCE (\$ million)	8,095.2	51,954.5	4,085.0	8,885.9	73,020.6
Sector share (%)					
Agriculture	0.32	0.07	0.24	0.15	0.12
Mining and construction	0.00	0.43	0.00	0.00	0.31
Food processing	0.01	0.30	0.00	0.01	0.22
Other manufacturing	0.29	2.40	0.15	0.01	1.75
Transportation	0.59	2.03	0.60	0.87	1.65
Information	3.22	4.75	0.85	1.40	3.96
Utilities	2.10	2.12	1.97	2.14	2.11
Wholesale trade	0.98	3.35	1.34	1.52	2.75
Retail trade	6.38	6.87	5.62	3.32	6.31
Finance and insurance	2.46	4.44	3.75	2.39	3.93
Real estate and rentals	17.77	20.39	19.97	25.17	20.65
Professional services	2.22	2.37	2.25	0.64	2.13
Business services	1.17	1.19	1.12	1.24	1.19
Educational services	0.47	0.96	0.00	0.07	0.74
Health services	12.30	15.57	10.62	9.62	14.21
Arts and entertainment	0.28	0.50	0.10	0.40	0.44
Hotels	0.44	0.00	0.04	0.69	0.14
Eating and drinking	3.12	3.68	1.43	3.37	3.46
Other services	1.61	2.50	1.34	3.04	2.40
Government	9.01	6.81	15.58	9.11	7.83
Imports -within state	20.94	5.29	19.57	19.96	9.61
Imports -out of state	14.30	13.97	13.46	14.89	14.09

**Table A-3. Visitor Expenditures (VE) Shares by Sector and by County, 2022**

	Hawaii County	Honolulu County	Kauai County	Maui County	State total
Total VE (\$ million)	3,259.3	10,363.3	2,464.5	6,558.1	22,645.3
Sector share (%)					
Agriculture	0.07	0.04	0.02	0.01	0.03
Mining and construction	0.00	0.00	0.00	0.00	0.00
Food processing	0.06	0.09	0.00	0.01	0.05
Other manufacturing	0.08	0.30	0.00	0.02	0.15
Transportation	7.14	15.68	2.13	4.17	9.64
Information	0.10	0.10	0.10	0.23	0.14
Utilities	0.00	0.00	0.00	0.00	0.00
Wholesale trade	0.65	0.64	0.37	0.25	0.50
Retail trade	14.27	14.27	14.29	14.28	14.28
Finance and insurance	0.00	0.00	0.00	0.00	0.00
Real estate and rentals	8.64	8.64	8.65	8.64	8.64
Professional services	0.70	0.70	0.70	0.70	0.70
Business services	1.93	1.93	1.93	1.93	1.93
Educational services	0.95	0.95	0.95	0.95	0.95
Health services	1.04	1.04	1.04	1.04	1.04
Arts and entertainment	3.17	3.17	3.18	3.17	3.17
Hotels	34.09	34.09	33.83	34.48	34.18
Eating and drinking	9.78	9.78	9.85	8.33	9.37
Other services	0.86	0.86	0.24	0.47	0.68
Government	0.79	0.79	0.00	0.00	0.47
Imports -within state	9.29	0.54	16.30	14.92	7.68
Imports -out of state	6.40	6.40	6.40	6.40	6.40

**Table A-4. Total Intermediate Demand as a Percent of Total Output by Sector and by County, 2022**

	Hawaii County	Honolulu County	Kauai County	Maui County	State total
Agriculture	44.0	23.2	11.8	2.0	28.2
Mining and construction	4.7	27.8	12.7	3.0	20.6
Food processing	69.4	25.7	17.5	2.1	34.3
Other manufacturing	0.8	19.2	28.8	3.1	18.3
Transportation	40.3	32.9	46.9	24.4	33.1
Information	17.1	25.5	71.0	22.1	25.7
Utilities	50.7	44.0	51.5	59.9	47.6
Wholesale trade	21.4	31.7	29.2	16.7	29.8
Retail trade	12.3	15.9	2.3	10.6	13.8
Finance and insurance	41.1	35.7	80.0	22.8	39.5
Real estate and rentals	34.6	17.3	31.3	27.4	22.3
Professional services	36.4	49.0	41.5	73.2	48.8
Business services	64.8	78.0	63.0	49.0	73.2
Educational services	16.0	22.8	55.0	17.5	23.2
Health services	10.8	4.2	18.4	9.6	6.1
Arts and entertainment	5.0	11.1	4.9	1.9	7.8
Hotels	18.6	42.4	6.3	15.9	29.0
Eating and drinking	9.4	41.2	33.4	2.5	32.9
Other services	75.8	9.4	56.2	10.5	26.9
Government	5.8	12.1	6.7	14.1	11.4

**Table A-5. Total Intermediate Input as a Percent of Total Output by Sector and by County, 2022**

	Hawaii County	Honolulu County	Kauai County	Maui County	State total
Agriculture	28.7	33.0	9.5	28.1	27.8
Mining and construction	18.9	42.8	24.2	19.7	35.6
Food processing	22.0	46.6	78.0	56.1	42.2
Other manufacturing	43.2	11.5	46.3	3.5	12.4
Transportation	31.2	31.1	45.4	20.0	30.5
Information	54.1	29.9	59.0	50.4	34.1
Utilities	26.9	41.7	52.1	36.1	39.6
Wholesale trade	26.0	19.3	59.5	29.4	21.8
Retail trade	22.7	17.0	28.4	31.1	20.4
Finance and insurance	34.9	39.4	57.1	37.3	40.7
Real estate and rentals	31.8	14.3	43.9	37.3	22.8
Professional services	51.8	33.3	53.2	65.6	37.2
Business services	26.7	21.2	28.7	14.4	21.7
Educational services	11.6	6.6	32.2	10.6	8.5
Health services	8.9	34.5	14.0	13.8	28.6
Arts and entertainment	5.9	5.5	8.1	2.6	5.2
Hotels	43.1	41.6	31.6	42.9	41.4
Eating and drinking	61.8	34.1	40.9	24.7	35.8
Other services	18.3	14.1	15.1	19.7	15.8
Government	3.7	1.5	1.6	2.9	1.8

**Table A-6. Total Labor Income as a Percent of Total Output by Sector and by County, 2022**

	Hawaii County	Honolulu County	Kauai County	Maui County	State total
Agriculture	35.7	38.0	26.6	35.4	35.4
Mining and construction	29.2	38.8	28.7	29.6	35.8
Food processing	16.3	33.1	36.9	36.9	29.6
Other manufacturing	33.3	13.0	40.4	32.4	14.5
Transportation	30.6	26.8	21.1	21.9	26.4
Information	23.0	13.9	16.4	14.8	14.6
Utilities	16.1	12.9	14.7	11.2	13.1
Wholesale trade	30.7	28.3	29.2	31.3	28.7
Retail trade	26.8	30.3	27.4	29.6	29.5
Finance and insurance	17.7	21.5	4.0	16.1	19.4
Real estate and rentals	4.4	9.3	4.8	5.2	7.6
Professional services	26.7	36.5	22.8	43.3	35.5
Business services	50.1	63.5	37.7	64.7	60.4
Educational services	72.1	66.8	19.6	68.4	65.3
Health services	36.8	46.6	33.8	39.3	44.2
Arts and entertainment	42.7	51.4	47.8	52.9	50.0
Hotels	24.3	19.8	27.3	23.1	21.9
Eating and drinking	34.4	29.4	32.0	49.4	32.5
Other services	32.9	81.6	55.6	68.0	67.6
Government	69.9	78.9	38.2	73.2	75.7

**Table A-7. Total Value Added as a Percent of Total Output by Sector and by County, 2022**

	Hawaii County	Honolulu County	Kauai County	Maui County	State total
Agriculture	46.9	44.3	80.3	25.1	46.6
Mining and construction	37.3	47.5	28.7	36.7	43.7
Food processing	22.3	44.4	50.5	50.0	39.8
Other manufacturing	38.7	28.9	78.4	71.2	31.0
Transportation	65.7	52.7	35.5	59.9	53.7
Information	46.6	35.9	39.9	23.1	35.4
Utilities	43.4	43.6	39.1	33.7	41.9
Wholesale trade	61.5	56.9	38.0	61.1	57.0
Retail trade	48.0	54.2	48.6	53.3	52.9
Finance and insurance	29.9	40.4	8.6	32.5	36.4
Real estate and rentals	68.1	84.1	58.3	51.2	74.2
Professional services	32.1	43.7	29.2	54.2	42.6
Business services	63.9	72.8	54.2	82.7	71.4
Educational services	79.1	81.2	39.4	82.5	79.2
Health services	36.7	53.0	36.1	41.3	49.2
Arts and entertainment	64.7	77.9	60.7	75.7	73.9
Hotels	45.8	37.5	51.6	43.6	41.4
Eating and drinking	35.6	39.8	34.9	58.6	41.5
Other services	30.5	75.2	52.7	63.5	62.5
Government	82.5	91.0	44.9	86.2	87.5

**Table A-8. Total Jobs Per \$ Million of Total Output by Sector and by County, 2022**

	Hawaii County	Honolulu County	Kauai County	Maui County	State total
Agriculture	19.1	12.4	9.7	17.0	15.7
Mining and construction	4.2	4.0	4.1	3.6	4.0
Food processing	4.1	7.7	12.1	11.1	7.1
Other manufacturing	11.7	2.0	14.5	8.5	2.5
Transportation	5.9	4.3	4.2	5.1	4.5
Information	2.6	2.0	2.2	1.5	2.0
Utilities	1.1	0.9	1.1	0.9	1.0
Wholesale trade	6.1	4.1	5.9	5.6	4.4
Retail trade	7.9	8.5	8.0	8.4	8.4
Finance and insurance	4.9	3.6	1.2	4.8	3.5
Real estate and rentals	1.9	1.9	1.6	1.5	1.8
Professional services	6.6	5.0	6.0	11.1	5.4
Business services	14.8	12.0	9.2	17.8	12.6
Educational services	20.9	16.9	6.3	19.0	16.9
Health services	7.0	6.9	5.6	6.8	6.8
Arts and entertainment	14.5	18.1	16.1	16.5	17.0
Hotels	4.5	3.1	4.8	3.6	3.6
Eating and drinking	11.1	9.3	10.1	11.3	9.8
Other services	8.7	18.0	14.6	16.4	15.5
Government	9.1	9.2	4.9	8.8	8.9