June 2019

Economic Impacts Attributable to FY 2018 Federal Grants and Payments to Seven Insular Areas

Final Report

Prepared for

Office of Insular Affairs
U.S. Department of the Interior
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Washington, DC 20240

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EXECUTIVE SUMMARY

The Office of Insular Affairs (OIA) carries out the Department of the Interior's responsibilities for U.S.-affiliated insular areas. These areas are the territories of American Samoa, Guam, the U.S. Virgin Islands, and the Commonwealth of the Northern Mariana Islands as well as the Freely Associated States (FAS)[1] of the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau.

The total budget of the OIA for fiscal year (FY) 2018 was $776.9 million. This figure includes $123.8 million for the Palau Compact Extension. Only $89.4 million of the Palau Compact Extension was spent in 2018; the balance is expected to be spent between 2019 and 2024. As a result, this report considers OIA's budget for FY 2018 to be $742.5 million ($776.9 million less the $34.5 million for the Palau Compact Extension not spent in 2018). These funds played an important role in the economies of each of these areas by providing financial and technical assistance to promote economic growth, education, and public health and the development of more efficient and effective government.

Generally, a lack of sophisticated economic data series for these insular areas deprived territorial and federal leaders of the type of thorough economic analysis that would help them make more informed policy decisions. For the FY 2018 analysis, input-output (I/O) data from the Bureau of Economic Analysis (BEA) are available for U.S. territories. For FAS, RTI International used the economic base analysis (EBA) approach employed in previous years' studies.

The following economic aggregates were calculated for each insular area:

- Total employment: the number of individuals employed, which typically consists of full-time and part-time employees but excludes subsistence agriculture and fishing
- Total employee compensation: payments made to all employees during the year, including salaries, wages, and other forms of compensation
- Gross domestic product (GDP): a measure of each area's economic output—typically defined as the value of all final goods and services made within the borders of the insular area in a particular year

Table ES-1 summarizes the results of this analysis.

[1] FAS are independent nations that were at one time governed by the United States and continue to maintain a close relationship with the United States through the Compact of Free Association, which makes them eligible to receive funds and assistance from U.S. federal agencies.

Table ES-1. Economic Impact Summary of OIA Grants and Payments (FY 2018)

	Total OIA Payments ($'000, 2018$)	Total OIA Employment Impact	National Employment Supported by OIA Payments (%)	Total OIA Employee Compensation Impact ($'000, 2018$)	National Employee Compen-sation Supported by OIA Payments (%)	Total OIA GDP Impact ($'000, 2018$)	National GDP Supported by OIA Payments (%)
American Samoa	$38,874	1,182	9%	$32,765	16%	$35,174	5%
Guam	$106,739	3,499	6%	$108,207	7%	$106,225	2%
Northern Mariana Islands	$17,331	791	3%	$17,375	3%	$16,569	1%
U.S. Virgin Islands	$264,531	6,727	17%	$281,697	20%	$265,090	7%
Micronesia	$112,072	7,260	46%	$69,093	51%	$240,311	70%
Marshall Islands	$80,202	4,795	43%	$50,440	41%	$134,798	64%
Palau[a]	$90,545	2,398	N/A	$38,758	N/A	$89,727	N/A
Total	$710,294	26,652		$598,335		$887,894	

[a] The total impacts for Palau represent only the direct impacts of OIA spending, including employment and employee compensation impacts calculated using ratios based on economic data. Because of the large increase in OIA spending in Palau in 2018, the relatively small size of Palau's economy, and the lack of 2018 national-level data capturing the effect of this spending in Palau, we were unable to calculate accurate multipliers for the impact of spending in Palau. See Section 8 for more detail.

Note: Total impacts are the sum of estimated direct, indirect, and induced impacts associated with OIA grants and payments. Approximately $32.2 million of a total $742.5 million was spent outside the seven insular areas that were the primary focus of this study.

Source: RTI estimates.

ES.1 FY 2018 OIA Payments to the Insular Areas

OIA's responsibilities are framed by the long-term security interests of the United States in the western Pacific and serious economic and fiscal problems affecting the U.S. territories and FAS. Although each insular area situation is unique, they share common challenges, including limited land and resources; small populations; limited local technical expertise; narrow economic bases; and exposure to natural disasters, such as hurricanes and typhoons. OIA strives to empower the local communities, foster economic development, promote sound management, and improve quality of life while respecting and preserving local cultures.

Per capita GDP for the insular areas averages less than $20,000, although there is great variability in income across areas (Table ES-2). In contrast, U.S. per capita GDP was

estimated to be approximately $61,390 in 2017, presented in 2018 dollars (World Bank, 2019a, 2019b).

Table ES-2. Economic Characteristics by Insular Area

	Estimated Population (# in 2018)	Estimated Employment (#)	Estimated Employee Compensation ($'000, 2018$)	GDP ($'000, 2018$)	GDP per Capita (2018$)
American Samoa	55,641	13,692	$202,704	$649,486	$11,673
Guam	164,229	60,170	$1,593,261	$6,002,111	$36,547
Northern Mariana Islands	55,144	27,970	$607,870	$1,631,910	$29,594
U.S. Virgin Islands	107,268	38,454	$1,429,338	$3,949,162	$36,816
Micronesia	105,544	15,620	$134,542	$344,617	$3,265
Marshall Islands	53,127	11,066	$124,145	$209,085	$3,936
Palau[a]	21,729	11,832	$134,846	$296,879	$13,663
United States	325,147,121				$61,390

[a] We did not estimate multiplier effects for FY 2018 spending in Palau. Because of the large increase in OIA spending in Palau in 2018, the relatively small size of Palau's economy, and the lack of 2018 national-level data capturing the effect of this spending in Palau, we were unable to calculate accurate multipliers for the impact of spending in Palau. See Section 8 for more detail.

Sources: 2018 population and GDP estimates were obtained from the World Bank (2019a, 2019b). Data on estimated 2017 GDP and GDP per capita are presented in 2017 terms inflated to 2018 dollars. Data on estimated employment and employee compensation for the four U.S. territories are RTI estimates based on IMPLAN (2013). Data on estimated 2017 population, 2017 GDP, and 2017 GDP per capita for the three FAS were obtained from World Bank Indicators (2019a, 2019b). 2017 GDP per capita for the United States was from the World Bank (2019a, 2019b). RTI constructed estimated employment and employee compensation statistics for the three FAS based on data obtained from Pacific and Virgin Islands Training Initiatives (PITI-VITI) (2019b, 2019c, 2019d). The construction of this data for each insular area is explained in more detail in the full report.

For FY 2018, $620 million of OIA's $742 million budget was distributed directly to insular areas for technical assistance, grants, and payments to the insular areas. A large majority of this budget is considered mandatory, essential assistance to provide basic services or defined by law, while only a small percentage is considered discretionary (OIA, 2018, 2019a, 2019b). OIA payments fund health care, education, government operations, roads, and other types of social and physical infrastructure. From a budgetary standpoint, payments can be separated into three primary categories (Table ES-3):

- *Fiscal payments*, which are the return of taxes collected by the U.S. federal government to Guam and the U.S. Virgin Islands, as required by law
- *Assistance to territories*, which provides general technical assistance; finances education and health care operations; funds and maintains essential infrastructure;

and supports environmental initiatives, including Brown Tree Snake Control and the Coral Reef Initiative

- *Compact of Free Association*, which distributes annual payments to FAS per their treaties with the United States, and provides support to the U.S. western Pacific territories and Hawaii to offset the impact the Compact has on regional social infrastructure

Table ES-3. FY 2018 OIA Payments by Insular Area

	Assistance to Territories ($'000; 2018$)	Compact of Free Association—Current ($'000; 2018$)	Compact of Free Association—Permanent ($'000; 2018$)	Fiscal Payments ($'000; 2018$)	Total OIA Payments ($'000; 2018$)
American Samoa	$38,852	—	$22	—	$38,874
Guam	$14,785	—	$14,907	$77,047	$106,739
Northern Mariana Islands	$15,022	—	$2,309	—	$17,331
U.S. Virgin Islands	$10,505	—	—	$254,026	$264,531
Micronesia	$572	—	$111,500	—	$112,072
Marshall Islands	$2,704	$550	$76,948	—	$80,202
Palau[a]	$553	$89,992	—	—	$90,545
Other[b]	$16,877	$2,177	$13,123	—	$32,177

[a] The Budget Justification for FY 2020 lists total Compact of Free Association spending in Palau as $123,824 for Palau Compact Extension spending. This increase is a result of the newly signed "Compact Review Agreement." The agreement specified $65.25 million, $2 million, and $22.106 million that would be transferred to Palau in 2018. The remainder would be transferred to Palau between 2019 and 2024. In this report we only account for the $89.992 transferred to Palau in FY 2018. Funds transferred to Palau in FY 2019 or later will be accounted for in future versions of this report as the transfers occur. See Section 8 for more detail.

[b] This other category represents payments being spent outside the seven insular areas, such as Washington, DC; Hawaii; and others.

Source: RTI estimates based on detailed budget information provided by OIA (2018, 2019a, 2019b).

ES.2 Study Methodology

Total economic impacts are the sum of direct economic impacts and indirect/induced economic impacts resulting from recipient organizations' consumption of goods and services and household spending by organizations' employees. RTI reviewed employment, employee compensation, and activity trends for each insular area to estimate the direct impact of OIA payments.

In 2012, economic data for the U.S. territories—American Samoa, Guam, Northern Mariana Islands, and the U.S. Virgin Islands—became available. This was an indirect result of OIA funding given to the BEA to develop more robust economic data for the U.S. territories.

Unlike the EBA model, an I/O modeling framework allows specific multipliers to be calculated for each industry. Although the EBA performed can use more recent data, it often relies on a mix of various sources. Using the I/O analysis to estimate the economic impacts of OIA payments produces more accurate results because data come from a single data source.

For FAS—Micronesia, Marshall Islands, and the Republic of Palau—indirect/induced impacts were estimated using EBA. The reasoning underlying EBA is that an individual region's economic activity is derived from its "base" or "primary" sectors, which are defined as those sectors whose revenue is received primarily from outside the region. Base sectors often include manufacturing, mining, agriculture, and fisheries that produce goods for export and activities that are funded by the U.S. federal government and aid organizations. EBA is best applied to small, relatively specialized regions whose economies rely to a larger extent on exports (Wang and vom Hofe, 2007). Consequently, this methodological approach is well suited to studying the economies of the FAS.

RTI also conducted a supplemental analysis of the economic impact of OIA spending on Washington DC, and Hawaii.

ES.3 Economic Impact Results

RTI estimated the direct, indirect/induced, and total economic impacts of OIA payments on each insular area in terms of employment, employee compensation, and GDP. Estimates of local employment supported by OIA payments are presented in Table ES-4.

Table ES-4. Estimated Employment Impact of OIA Payments (FY 2018)

	Direct Employment Impact (#)	Indirect/Induced Employment Impact (#)	Total Employment Impact (#)	National Employment Supported by OIA Payments (%)
American Samoa	1,058	124	1,182	9%
Guam	3,363	136	3,499	6%
Northern Mariana Islands	664	127	791	3%
U.S. Virgin Islands	6,085	643	6,727	17%
Micronesia	2,351	4,909	7,260	46%
Marshall Islands	1,981	2,814	4,795	43%
Palau[a]	2,398	N/A	N/A	N/A

[a] We did not estimate multiplier effects for FY 2018 spending in Palau. Because of the large increase in OIA spending in Palau in 2018, the relatively small size of Palau's economy, and the lack of 2018 national-level data capturing the effect of this spending in Palau, we were unable to calculate accurate multipliers for the impact of spending in Palau. See Section 8 for more detail.

Source: RTI estimates for the four U.S. territories are based on IMPLAN (2013). Estimates for the three FAS were based on PITI-VITI (2019b, 2019c, 2019d).

In the cases of the Marshall Islands and Micronesia, a significant portion of national employment is directly and indirectly supported by OIA payments. Approximately 46% of total recorded employment in Micronesia was either directly or indirectly supported by OIA payments. These data do not include subsistence agriculture or fishing.

Estimates of the amount of employee compensation supported by OIA payments are presented in Table ES-5. In the cases of the Marshall Islands and Micronesia, a significant portion of national employee compensation is directly and indirectly supported by OIA payments. For example, approximately 51% of total estimated recorded employee compensation in the Federated States of Micronesia is either directly or indirectly supported by OIA payments.

Table ES-5. Estimated Employee Compensation Impact of OIA Payments (FY 2018)

	Direct Employee Compensation Impact ($'000, 2018$)	Indirect/Induced Employee Compensation Impact ($'000, 2018$)	Total Employee Compensation Impact ($'000, 2018$)	National Employee Compensation Supported by OIA Payments (%)
American Samoa	$30,534	$2,230	$32,765	16%
Guam	$105,231	$2,976	$108,207	7%
Northern Mariana Islands	$15,331	$2,044	$17,375	3%
U.S. Virgin Islands	$261,898	$19,799	$281,697	20%
Micronesia	$25,618	$43,475	$69,093	51%
Marshall Islands	$24,090	$26,349	$50,440	41%
Palau[a]	$38,758	N/A	N/A	N/A

[a] We did not estimate multiplier effects for FY 2018 spending in Palau. Because of the large increase in OIA spending in Palau in 2018, the relatively small size of Palau's economy, and the lack of 2018 national-level data capturing the effect of this spending in Palau, we were unable to calculate accurate multipliers for the impact of spending in Palau. See Section 8 for more detail.

Source: RTI estimates for the four U.S. territories are based on IMPLAN (2013). Estimates for the three FAS were based on PITI-VITI (2019b, 2019c, 2019d).

Estimates of the amount of GDP supported by OIA payments are presented in Table ES-6. Based on RTI's analysis of the economics of each insular area, we determined that for every $1.00 of GDP directly supported by OIA payments, approximately $0.35 of GDP was supported elsewhere in the insular economy, on average. As a result, a significant portion of national employee compensation is directly and indirectly supported by OIA payments. For example, approximately 64% of total GDP in the Marshall Islands is either directly or indirectly supported by OIA payments.

Table ES-6. Estimated GDP Impact of OIA Payments (FY 2018)

	Direct GDP Impact ($'000, 2018$)	Indirect/ Induced GDP Impact ($'000, 2018$)	Total GDP Impact ($'000, 2018$)	Percentage of National GDP Supported by OIA Payments (%)
American Samoa	$35,069	$106	$35,174	5%
Guam	$106,051	$174	$106,225	2%
Northern Mariana Islands	$16,498	$71	$16,569	1%
U.S. Virgin Islands	$263,368	$1,722	$265,090	7%
Micronesia	$84,112	$156,198	$240,311	70%
Marshall Islands	$61,272	$73,526	$134,798	64%
Palau	$89,727	N/A	N/A	N/A

Source: RTI estimates for the four U.S. territories are based on IMPLAN (2013). Estimates for the three FAS were based on PITI-VITI (2019b, 2019c, 2019d).

In addition to the analysis of the seven insular areas, RTI also conducted a supplemental analysis of the economic impact of OIA operations in Washington, DC, and Hawaii. RTI estimated that approximately $10.3 million of OIA's operating budget was spent in Washington, DC, and nearly $18 million in Hawaii for OIA operations and to offset the impact Compact provisions have on Hawaii's social infrastructure. To estimate the economic impacts, RTI used IMPLAN modeling software to construct I/O models of each region. Using these models, RTI estimated that OIA's operations and payments in Washington D.C. would directly support 49 jobs, approximately $8.6 million of employee compensation, and $10.3 million in GDP. In Hawaii, OIA spending in FY 2018 is estimated to directly support 139 employees, $11.0 million of employee compensation and $12.6 million in GDP.

1. INTRODUCTION

The Office of Insular Affairs (OIA) contracted with RTI International to estimate the economic impacts of federal payments and grants from fiscal year (FY) 2018 to U.S.-affiliated insular areas. These areas are the U.S. territories of American Samoa, Guam, the Commonwealth of the Northern Mariana Islands (CNMI), and the U.S. Virgin Islands (USVI), as well as the freely associated states (FAS) of the Republic of the Marshall Islands (RMI), the Federated States of Micronesia (FSM), and the Republic of Palau.

Out of its budget of $742 million, OIA distributed approximately $620 million in technical assistance, grants, and payments directly to the insular areas during FY 2018. These payments play an important role in each area's economy, supporting local jobs and providing employee compensation in regions. The economic characteristics of these areas are displayed in Table 1-1.

Table 1-1. Economic Characteristics by Insular Area

	Estimated Population (2017 #)	Estimated Employment (#)	Estimated Employee Compensation ($'000, 2018$)2018	GDP ($'000, 2018)	GDP per Capita (2018$)
American Samoa	55,641	13,692	202,704	649,486	11,673
Guam	164,229	60,170	1,593,261	6,002,111	36,547
Northern Mariana Islands	55,144	27,970	607,870	1,631,910	29,594
U.S. Virgin Islands	107,268	38,454	1,429,338	3,949,162	36,816
Micronesia	105,544	15,620	134,542	344,617	3,265
Marshall Islands	53,127	11,066	124,145	209,085	3,936
Palau	21,729	11,832	134,846	296,879	13,663
United States	325,147,121				61,390

Sources: 2017 population and gross domestic product (GDP) estimates were obtained from the World Bank (2019a, 2019b). Data on estimated 2017 GDP and GDP per capita are presented in 2017 terms inflated to 2018 dollars. Data on estimated employment and employee compensation for the four U.S. territories are RTI estimates based on IMPLAN (2013). Data on estimated 2017 population, 2017 GDP, and GDP per capita for the three FAS were obtained from World Bank Indicators (2019a, 2019b). 2017 GDP per capita for the United States was from the World Bank (2019a, 2019b). RTI constructed estimated employment and employee compensation statistics for the three FAS based on data obtained from Pacific and Virgin Islands Training Initiatives (PITI-VITI) (2019b, 2019c, 2019d).

Because the insular areas are not included in many U.S. statistical surveys of economic activity, critical data on local economic activity are often not captured. To some degree, this changed through OIA funding of the Bureau of Economic Analysis (BEA) to develop better economic data for U.S. territories under the Statistical Improvement Project. The BEA

provides benchmark input-output (I/O) data for the United States. The benchmark accounts show how industries interact at the detailed level; specifically, they show how more than 500 industrial sectors provide input to, and use output from, each other to produce GDP.[1] These data are now available for U.S. territories, and they were used for this report.

In this study, RTI estimated direct economic impacts and multipliers for estimating total economic impact, which includes indirect and induced impacts, for each of the seven insular area's economies. Analysis results were designed to be integrated into a larger report that estimates the economic benefits of lands and other resources managed by the Department of the Interior (DOI), thus enabling OIA to report on its economic impacts in the same manner as other Department offices and bureaus (DOI, 2013).

1.1 FY 2018 OIA Payments to Insular Areas

In FY 2018, OIA's total budget was $742 million, of which $620 million was spent directly in the insular areas to provide assistance, grants, and compacts to the insular areas during the fiscal year. In this report, all assistance, grants, and compacts are referred to collectively as "payments," the majority of which are considered mandatory (OIA, 2019b). OIA payments fund health care, education, government operations, roads, and other types of social and physical infrastructure. From a budgetary standpoint, payments can be separated into three primary categories:

- *Fiscal payments*, which are the return of taxes collected by the U.S. federal government to Guam and the USVI, as required by law
- *Assistance to territories*, which provides general technical assistance; finances education and health care operations; funds and maintains essential infrastructure; and supports environmental initiatives, including Brown Tree Snake Control and the Coral Reef Initiative
- *Compact of Free Association*, which distributes annual payments to FAS per their treaties with the United States, and provides support to the U.S. western Pacific territories and Hawaii to offset the impact the Compact has on regional social infrastructure

For the purposes of this analysis, RTI received detailed budget information from OIA, which was then used to estimate expenditures in each insular area related to OIA payments (Table 1-2). Although this determination was typically straightforward, in some cases determining where spending would be directed was not possible using readily available information.

[1] These accounts provide detailed information on the flows of the goods and services that make up the production processes of industries. See http://www.bea.gov.

Table 1-2. FY 2018 OIA Payments by Insular Area

	Assistance to Territories ($'000, 2018$)	Compact of Free Association—Current ($'000, 2018$)	Compact of Free Association—Permanent ($'000, 2018$)	Fiscal Payments ($'000, 2018$)	Total OIA Payments ($'000, 2018$)
American Samoa	$38,852	—	$22	—	$38,874
Guam	$14,785	—	$14,907	$77,047	$106,739
Northern Mariana Islands	$15,022	—	$2,309	—	$17,331
U.S. Virgin Islands	$10,505	—	—	$254,026	$264,531
Micronesia	$572	—	$111,500	—	$112,072
Marshall Islands	$2,704	$550	$76,948	—	$80,202
Palau[a]	$553	$88,992	—	—	$90,545
Other[b]	$16,877	$2,177	$13,123	—	$32,177
Total	$99,870	$92,719	$218,809	$331,073	$742,471

[a] The Budget Justification for FY 2020 lists total Compact of Free Association spending in Palau as $123,824 for Palau Compact Extension spending. This increase is a result of the newly signed "Compact Review Agreement." The agreement specified $65.25 million, $2 million, and $22.106 million that would be transferred to Palau in 2018. The remainder would be transferred to Palau between 2019 and 2024. In this report we only account from the $89.992 transferred to Palau in FY 2018. Funds transferred to Palau in FY 2019 or later will be accounted for in future versions of this report as the transfers occur.

[b] This other category represents payments being spent outside the seven insular areas, such as Washington, DC; Hawaii; and others.

Sources: RTI estimates based on detailed budget information provided by OIA (2018, 2019a, 2019b).

1.2 Study Objectives

The objectives of this study were to

- estimate the direct economic impacts of OIA payments and indirect/induced multipliers and impacts relevant for OIA grant and payment categories for each insular area;
- review FY 2018 grants and payments and determine affected economic sectors for the American Samoa Operations Grant, Brown Tree Snake Control, Compact of Free Association (permanent and current), Coral Reef Initiative, covenant grants, maintenance assistance fund, return of federal taxes to U.S. Virgin Islands and Guam, and technical assistance;
- model the direct and indirect/induced economic impacts of FY 2018 grants and payments for each insular area and for each payment category; and
- prepare a final report that summarizes the assumptions and provides tabular data on economic impacts.

1.3 Overview of Study Methodology

In 2012, I/O data for the U.S. territories—American Samoa, Guam, CNMI, and the USVI—became available following the Statistical Improvement Project. In contrast to the EBA approach used for all insular areas in previous reports, an I/O modeling framework allows more specific multipliers to be calculated for each industry.[2] I/O models use multipliers to simulate how employment or income generated in one industry can generate additional jobs, income, and output in other industries and for the region's economy as a whole. This allows for greater precision relative to using the economic base multiplier for all sectors. We used the IMPLAN software tool to construct the I/O models.

Although the economic impacts of government spending for the U.S. territories are estimated using I/O models, no I/O data were available for the three FAS—FSM, Marshall Islands, and the Republic of Palau. Thus, RTI developed multipliers for the FAS using EBA.[3]

The reasoning underlying EBA is that an individual region's economic activity is derived from its "base" or "primary" sectors, which are defined as those sectors whose revenue is received primarily from outside the region—base sectors typically include manufacturing firms, mines, and farms that produce goods for export and activities that are funded by the federal government (Klosterman, 1990). As a result, EBA is best applied to small, relatively specialized regions whose economies rely to a larger extent on exports (Wang and vom Hofe, 2007). Consequently, this methodological approach is well suited to studying the economies of the insular areas.

Estimating the economic impact of federal funds on economic aggregates like regional employment is typically accomplished using a simple mathematical representation of a region's economy, such as

$$\Delta Y = s*\Delta X \quad (1.1)$$

where

ΔY is the change in total employment,

[2] The IMPLAN data for each U.S. territory is based on data calculated by the BEA for the territories in 2009.

[3] Other researchers have used I/O models for Hawaii to model economic impacts for U.S. insular territories; however, RTI does not recommend this approach because it assumes that the economic structure of the insular area is the same as that for Hawaii (see Pike [2007]). The model is also static and does not adjust for sectoral responses to materially significant shocks. Another alternative, but one that requires extensive data collection, would be the same as that employed in a 2008 analysis performed for the Department of Commerce and American Samoa (see ASDC [2008]). This latter method is resource intensive but may narrow the confidence interval surrounding economic multipliers.

ΔX is the change in base-sector employment (direct impact), and

s is total employment/base-sector employment (the base employment multiplier).

This model represents how an increase in base-sector employment will generate a larger increase in the region's total employment because of the ripple effect as new base-sector employees spend money on locally produced goods and services. This ripple effect is quantified by the "s" term, called the "base employment multiplier," which is typically estimated by taking the ratio of total employment to base-sector employment.

Using this core approach as a starting point for modeling the economy of each FAS, RTI estimated economic impacts in a short time period using available economic data. First, RTI computed an estimate of direct impacts for each of the grant and payment categories. This entailed combining these data with existing information on employment and income associated with government spending and other economic activities. Direct impacts are usually computed using ratios of employment or income created per dollar of government funding that have been derived from historical data. Direct total value-added impacts were calculated for American Samoa, Guam, CNMI, USVI, Hawaii, and the District of Columbia by multiplying OIA payments to these countries by IMPLAN total value-added direct effects. Second, to estimate the combined indirect and induced impact, RTI calculated multipliers for employment, income, and GDP by examining the economic structure and activities of each FAS.

To obtain more accurate measures of the direct employment impact of OIA payments, one must obtain an understanding of who receives these payments and what they are being spent on. For example, OIA payments used to fund a construction project will have different employment impacts than OIA payments used to fund education. Therefore, the first question asked when creating a more refined analysis is how OIA payments should be classified or treated as direct impacts. For the purposes of this study, OIA payments can be classified in six different ways:

- Education: payments associated with training or education inside the relevant insular area
- Construction: payments associated with building new or maintaining existing structures
- Government: payments associated with general government operations or general technical assistance
- Health care: payments associated with providing medical and other health care services
- Private: this classification is used only for payments to the Prior Service Benefits program. Beneficiaries receive this money in appreciation for their service during

World War II, and it generates an economic impact when recipients spend it on goods and services. Because data are not available on the spending behavior of these beneficiaries, precise output and employee compensation-to-employee ratios were difficult to obtain. Therefore, RTI typically used ratios that represented averages for the private nonagricultural sector and assumed 100% of beneficiary funds were spent locally.

- Wholesale: payments associated with purchasing goods or equipment from local wholesalers (companies involved in the resale, sale without transformation, of new and used goods to retailers; to industrial, commercial, institutional, or professional users; or to other wholesalers). This treatment assumes that the goods or equipment themselves were not manufactured in the insular area.

In addition to improving our classification of OIA payments, this study sought to refine economic impact estimates in a second way. Generally, only standard industries (agriculture, mining, manufacturing, and federal government) were assumed to be part of the economic base. However, many insular areas attract a number of tourists, which also contributes to the economic base. Similarly, government operations that are funded from external sources should also be included in measures of economic base employment and employee compensation.

1.4 Methodological Limitations

Although I/O and EBA have several advantages that make them the most reasonable methodological approaches, several limitations are associated with them that one must keep in mind when interpreting analysis results.

First, the quality of economic base multipliers relies heavily on the quality of the data being used. Most developing areas have a substantial informal sector composed of subsistence agriculture and fishing, domestic aids, street vendors, producers of clothing and handicrafts, and other workers whose occupation and income often go unreported.

Although accurate data on the size and makeup of the informal sector are difficult to gather, the informal sector in developing island areas was assumed to make up a significant percentage of official employment and income statistics. In a study of 110 countries, Schneider (2002) found that the informal sector made up 41% of official gross national income in developing countries and 38% in transition countries. Lal and Raj (2006) compiled data on the informal sector in developing island nations (data on the insular areas were not included) and found that self-employment as a percentage of total nonagricultural employment averaged 35% for the six islands for which these data were available. Data on the informal sector in the Pacific Island areas may be particularly difficult to obtain because, as a result of the rural nature of these areas, most informal workers operate from homes rather than working as street vendors, transportation providers, or other typically urban occupations (Duncan and Voigt-Graf, 2008).

Because of the size of the informal sector in the insular areas, much of the data used in this analysis likely underestimate employment, labor income, and GDP. Subsistence agriculture often makes up a substantial portion of unreported employment. A 1996 survey in Palau estimated the value of the primarily agricultural informal sector at $5 million, or twice the size of the recorded agricultural sector in that year. Most of these goods, however, are consumed by the household and traded informally and do not reach the market (Food and Agriculture Organization, 2006).

Second, with EBA, the division between base and nonbase sectors is often unclear. In this analysis, RTI used standard assumptions for identifying which sectors are considered base and nonbase. However, companies within these sectors are often engaged in satisfying both local and external demand. For example, local manufacturers may produce products that are exported and also consumed by local residents. This concern can often be minimized by using techniques for better estimating the portions of each sector that are truly base and nonbase (for example, surveys can be used to collect this information directly from local businesses); however, given the time and data constraints, these techniques were not feasible for this analysis.

Third, EBA in particular focuses exclusively on external demand. Therefore, supply constraints are assumed to not be binding, and nondemand factors that may contribute to regional growth are ignored (such as capital accumulation or productivity improvements). Because supply-side considerations are typically most important for long-term growth, EBA is best suited for short-term analyses.

1.5 Data Limitations

For the FY 2018 analysis, we were able to better estimate GDP base multipliers for each insular area using newly available I/O data for U.S. territories. This higher level of analysis was possible because of new estimates of GDP released by the BEA in 2018. Up-to-date employment, employee compensation, and GDP data were available for the FAS through new reports released in 2019 by PITI-VITI. These reports helped better estimate aspects of the base economy.[4]

When possible, we incorporated new economic data into the FY 2018 EBA model to update the output-to-employee and employee compensation-to-employee ratios, as well as the base multipliers. These data are essential to determining the direct and indirect impacts of OIA payments, and we believed these inclusions would better describe the significance of funding given the changing economies of the insular areas. Incorporating these new data sets did, however, cause some of the data to come from differing years. For example, to achieve updated employee compensation-to-employee ratios for the U.S. territories, we

[4] Employment and employee compensation data for FSM have been updated with data from 2017 reports released by PITI-VITI.

used newly released data from the 2016 County Business Patterns (released by the U.S. Census in 2019). However, these data sets lacked information about sales in each sector, and output-to-employee ratios could not be determined. RTI had to rely on the 2012 Economic Census for these ratios. During periods of decline and recovery, output-to-employee tends to increase (BEA, 2019; Bureau of Labor Statistics [BLS], 1986). The data from the Census also often exclude information about agricultural and public-sector employment, which leads to even more agglomeration of sources and assumptions to complete the employment statistics.

For the FAS, economic data rely on studies that are funded by the OIA through the PITI-VITI educational program. Although we were able to update employment data and employment compensation-to-employee ratios for each of these areas, data on output were unavailable. Therefore, we had to assume that the output-to-employee ratio for these three areas was comparable to that of American Samoa or in the case of Micronesia, the CNMI. These were chosen as the best U.S. territory comparison because they were the most similar to the FAS in terms of GDP per capita and other economic measures. This assumption is also likely an overestimate of the FAS's true output-to-employee ratio because the FAS has a higher GDP per capita. The use of American Samoa and CNMI data as a proxy will likely underestimate the impacts of OIA spending because more jobs will be supported by each dollar of OIA spending.

1.6 Report Organization

A separate report section detailing the payments, economic multipliers, and economic impacts was prepared for each insular area (Sections 2 through 8). In addition, a section for Washington, DC, and Hawaii was prepared (Section 9), because OIA locates significant operations in these regions. Section 10 summarizes economic impact data for all FY 2018 payments.

2. AMERICAN SAMOA

2.1 FY 2018 OIA Payments Summary

American Samoa faces a number of obstacles to economic development, including limited land and resources, a small population, limited local technical expertise, a narrow economic base, and vulnerability to natural disasters. The average GDP per capita for American Samoa in 2017 was $11,673 (in 2018 U.S. dollars) compared with approximately $61,390 in the United States (World Bank, 2019a, 2019b).

OIA strives to foster economic development, promote sound management, and improve quality of life in American Samoa. OIA payments to American Samoa in FY 2018 totaled $38.9 million and were primarily directed toward the government and construction sectors with additional support for education and health care (Table 2-1).

The largest block of OIA payments came in the form of Assistance to Territories funding, the largest proportion of which is operations grants that total $23.0 million. These grants are used to fund basic Samoan government operations and to support the American Samoa High Court (the highest court in American Samoa excluding the U.S. Supreme Court) and the operation of the LBJ Hospital.

Other Assistance to Territories funding, totaling $12.1 million, was used to fund economic development programs, judicial training, and other initiatives such as the Compact Impact Discretionary, which provides funding to offset impacts to the educational systems from immigration of FAS citizens.

In addition to funding received from OIA's Assistance to Territories, American Samoa received $22,000 through the Compact of Free Association Compact Impact Grant, which offsets costs incurred by American Samoan health, educational, and social systems from in-migration of FAS residents. American Samoa allocated its FY 2018 appropriated Compact impact payments toward training materials and equipment for the education of college nursing students.

RTI estimates that all spending associated with American Samoa was initiated within American Samoa.

Table 2-1. OIA Payments and Estimated Spending within American Samoa (FY 2018)

Appropriation	Spending ($'000; 2018$)	Economic Impact Treatment
Compact of Free Association		
Compact impact	$22	Education
Assistance to Territories		
American Samoa operations grant—Basic operations	$12,725	Government
American Samoa operations grant—LBJ hospital operations	$8,053	Health care
American Samoa operations grant—High court	$1,384	Government
American Samoa operations grant—ASCC operations	$840	Government
Subtotal	$23,002	
General technical assistance—Direct grants	$2,291	Government
Empowering Insular Communities		
Wholesale purchases (est.)	$459	Wholesale
Installations (est.)	$459	Construction
Capacity building (est.)	$459	Government
Subtotal	$1,376	
American Samoa construction	$10,321	Construction
Maintenance assistance	$1,032	Government
Coral Reef Initiative	$567	Government
Office of Insular Affairs	$261	Government
Compact Impact Discretionary	$2	Education
Subtotal, Other Assistance to Territories	$12,183	
Total, Assistance to Territories	$38,852	
Total Spending Inside American Samoa	$38,874	

Source: RTI estimates based on OIA (2018, 2019a, 2019b).

2.2 Economic Impacts of OIA Payments Using Input-Output Analysis

To determine the direct impacts of OIA payments in American Samoa, we applied each payment from Table 2-1 to a corresponding IMPLAN sector code. Direct impacts were estimated using output and employee compensation-to-employee ratios within the IMPLAN modeling system. The direct employment, employee compensation, and output inputs are reported in Table 2-2. We estimated that the $38.9 million spent in American Samoa directly supported 1,182 jobs and $32.8 million in employee compensation.

Table 2-2. American Samoa: Direct Economic Impacts of OIA Payments Using I/O Analysis (FY 2018)

Industry	IMPLAN Code	FY 2018 Payments ($'000, 2018$)	Output-to-Employee Ratio ($/employee)	Employee Compen-sation-to-Employee Ratio ($/employee)	Direct Employ-ment Impact (#)	Direct Employee Compen-sation Impact ($'000, 2018$)	Direct Effects	Direct Value-Added Change ($'000, 2018$)
State and local government, noneducation	437	$18,719	$32,265	$32,265	580	$18,719	1.00	$18,719
State and local government, education	438	$864	$23,573	$23,573	37	$864	1.00	$864
Hospitals	397	$8,053	$38,547	$28,997	209	$6,057	0.88	$7,092
Wholesale trade business	319	$459	$1,094,329	$16,754	0	$7	0.66	$304
Maintenance and repair construction of nonresidential structures	39	$10,780	$46,454	$21,059	232	$4,887	0.75	$8,090
Total		$38,874			1,058	$30,534		$35,069

[a] According to IMPLAN documentation, "Effects represent the Total Value Added and various Value Added subset dollars per $1,000,000 of production in the Industry" (IMPLAN, 2013).

Source: RTI estimates based on IMPLAN (2013).

These direct impacts were multiplied by Type II Social Accounting Matrix multipliers to estimate the total impact of OIA payments on the region's economy. These multipliers estimate the indirect and induced effects that occur throughout the local supply chain and as employees spend their wages. The relevant multipliers that were estimated for this analysis are reported in Table 2-3. Note the OIA payments from 2018 are treated as the output inputs.

Table 2-3. American Samoa: Selected IMPLAN Multipliers by Industry

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Value-Added Multiplier
State and local government, noneducation	437	1.12	1.07	1.003
State and local government, education	438	1.09	1.07	1.003
Hospitals	397	1.12	1.07	1.003
Wholesale trade business	319	1.90	1.89	1.002
Maintenance and repair construction of nonresidential structures	39	1.11	1.10	1.002

Source: RTI estimates based on IMPLAN (2013).

The indirect and induced impacts of OIA payments are estimated to be an additional 124 jobs and $2.2 million in employee compensation. Therefore, the total economic impact of OIA payments to American Samoa is 1,182 jobs, $32.8 million in employee compensation, and $35.2 million in GDP. See Table 2-4.

Table 2-4. American Samoa: Total Economic Impacts Using I/O Analysis (FY 2018)

Description	Total Employment Impact (# of workers)	Total Employee Compensation Impact ($'000, 2018$)	Total Value-Added Impact ($'000, 2018$)
Direct impacts	1,058	$30,534	$35,069
Indirect and induced impacts	124	$2,230	$106
Total economic impacts	**1,182**	**$32,765**	**$35,174**

Source: RTI estimates based on IMPLAN (2013).

The significance of OIA's economic contributions can be better understood when viewed in relation to the American Samoa economy, which is summarized in Table 2-5. As this table illustrates, the 1,182 jobs directly and indirectly supported by OIA payments represent 9% of American Samoa's estimated total employment. Similarly, $32.8 million of employee compensation associated with these employees' accounts for approximately 16% of total employee compensation inside the region, and the $35.2 million of GDP associated with these employees represents 5% of total GDP produced by the insular area.

Table 2-5. American Samoa: Estimated Impact Relative to National Economy (FY 2018)

	Total Economic Impact for FY 2018 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	1,182	13,692	9%
Employee compensation ($'000; 2018$)	$32,765	$202,704	16%
GDP ($'000; 2018$)	$35,174	$649,486	5%

Source: RTI estimates based on IMPLAN (2013).

3. GUAM

3.1 FY 2018 OIA Payments Summary

Although among the wealthier of the insular areas, Guam continues to face challenges in implementing effective government, health care, and education systems. Guam's economy is largely based on tourism from Asia and is, therefore, sensitive to regional consumer spending trends. Tourism sectors like accommodations and amusement have only recently begun to experience growth after years of decline. Guam is also experiencing growth as a result of the proposed relocation of 5,000 U.S. Marines and roughly 1,300 dependents from the military base in Okinawa, Japan, to the insular area by 2021.

The average GDP per capita for Guam in 2016 was $36,547 (2018$), about 60% of the GDP per capita of the United States ($61,390) (World Bank, 2019a, 2019b).

OIA payments to Guam in FY 2018 totaled $106.7 million and were primarily directed to the government sector with additional support for education and construction. A detailed breakdown of OIA payments is presented in Table 3-1. The largest block of OIA payments, totaling $77.0 million, came in the form of fiscal payments associated with Section 30 Income Taxes. These are funds transferred by OIA from the U.S. Treasury to Guam and largely consist of federal income taxes paid by military personnel stationed on Guam, immigration fees, and miscellaneous duties (Limtiaco, 2008). OIA also provided $14.9 million through the Compact of Free Association, which Guam intends to use for a variety of equipment purchases and infrastructure. RTI estimates that all spending associated with Guam was initiated within Guam.

Guam received $3.0 million through the Assistance to Territories—General Technical Assistance payments, which provided direct grants, judicial training, and funding for the PITI-VITI and the Close-Up Foundation. The Close-Up Foundation is a civic education program designed to teach democracy and citizenship and improve civic education in the insular areas.

Other technical assistance programs, which made up about $10.1 million of the Assistance to Territories payments, include infrastructure maintenance assistance, funding for Guam construction, funding for the Coral Reef Initiative, and Brown Tree Snake Control. The Brown Tree Snake Control program is intended to fund research and implementation techniques to eradicate this invasive species. OIA distributed funds for the Compact Impact Discretionary, which provides funding to offset impacts to the educational systems from immigration of FAS citizens.

Table 3-1. OIA Payments and Estimated Spending within Guam (FY 2018)

Appropriation	Spending ($'000; 2018$)	Impact Treatment
Fiscal Payments		
Guam Section 30 income taxes	$77,047	Government
Total, Fiscal Payments	$77,047	
Compact of Free Association		
DOE/DPW schools leaseback	$6,662	Education
DOE/DPW operations offset	$8,245	Government
Total, Compact of Free Association	$14,907	
Assistance to Territories		
General technical assistance—Direct grants	$1,367	Government
General technical assistance—U.S. Department of Agriculture (USDA) Graduate School PITI-VITI	$654	Education
General technical assistance—BEA	$236	
General technical assistance—Prior Service Benefits Program	$298	Education
General technical assistance—Civic education	$430	Government
Subtotal	$2,986	
Brown Tree Snake Control	$426	Government
Northern Mariana Covenant Grants—Guam construction	$6,620	Construction
Maintenance assistance	$1,000	
Coral Reef Initiative	$515	Government
Compact Impact Discretionary	$1,988	Education
Empowering Insular Communities		
Wholesale purchases	$417	Education
Installations	$417	Education
Capacity building	$417	Education
Subtotal	$1,250	
Subtotal, Other	$11,799	
Total, Assistance to Territories	$14,785	
Total Spending Inside Guam	**$106,739**	

Source: RTI estimates based on OIA (2018, 2019a, 2019b).

3.2 Economic Impacts of OIA Payments Using Input-Output Analysis

To determine the direct impacts of OIA payments in Guam, the payments from Table 3-1 were each applied to a corresponding IMPLAN sector code. Direct impacts were estimated using output and employee compensation-to-employee ratios from the IMPLAN modeling system. The direct employment, employee compensation, and output inputs are reported in Table 3-2.

Table 3-2. Guam: Direct Economic Impacts of OIA Payments Using I/O Analysis (FY 2018)

Industry	IMPLAN Code	FY 2018 Payments ($'000, 2018$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2018$)	Direct Effects[a]	Direct Value-Added Change ($'000, 2018$)
State and local government, noneducation	437	$89,267	$32,265	$32,265	2,767	$89,267	1.00	$89,267
State and local government, education	438	$10,852	$23,573	$23,573	460	$10,852	1.00	$10,852
Maintenance and repair construction of nonresidential structures	39	$6,620	$48,717	$37,620	136	$5,112	0.90	$5,932
Health care	396	$0	$135,846	$40,848	0	$0	0.68	$0.00
Total		**$106,739**			**3,363**	**$105,231**		**$106,051**

[a] According to IMPLAN documentation, "Effects represent the Total Value Added and various Value Added subset dollars per $1,000,000 of production in the Industry" (IMPLAN, 2015).

Source: RTI estimates based on IMPLAN (2013).

We estimated that the $106.7 million spent in Guam directly supported 3,363 jobs and $105,2 million in employee compensation. These direct impacts were multiplied by Type II Social Accounting Matrix multipliers to estimate the total impact of OIA payments on the state's economy. These multipliers estimate the indirect and induced effects that occur throughout the local supply chain and as employees spend their wages. The relevant multipliers that were estimated for this analysis are reported in Table 3-3.

Table 3-3. Guam: Selected IMPLAN Multipliers by Industry

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Value-Added Multiplier
State and local government, noneducation	437	1.04	1.03	1.002
State and local government, education	438	1.03	1.03	1.002
Maintenance and repair construction of nonresidential structures	39	136	7	143
Health care	396		0	0

Source: RTI estimates based on IMPLAN (2013).

The indirect and induced impacts of OIA payments are estimated to be an additional 136 jobs and $3.0 million in employee compensation. Therefore, the total economic impacts of this activity in Guam support 3,499 employees, $108.2 million in employee compensation, and $106.2 million in GDP. These results are displayed in Table 3-4.

Table 3-4. Guam: Total Economic Impacts Using I/O Analysis (FY 2018)

Description	Total Employment Impact (# of workers)	Total Employee Compensation Impact ($'000, 2018)	Total Value-Added Impact ($'000, 2018)
Direct impacts	3,363	$105,231	$106,051
Indirect and induced impacts	136	$2,976	$174
Total	**3,499**	**$108,207**	**$106,225**

Source: RTI estimates based on IMPLAN (2013).

The significance of OIA's economic contributions can be better understood when viewed in relation to the Guam economy, which is summarized in Table 3-5. As this table illustrates, the 3,499 jobs directly and indirectly supported by OIA payments represent 6% of Guam's total employment. Similarly, $108.2 million of employee compensation associated with these employees' accounts for approximately 7% of total employee compensation inside the region, and the $106,051 million of GDP associated with these employees represents 2% of total GDP produced by the region.

Table 3-5. Guam: Estimated Impact Relative to National Economy (FY 2018)

	Total Economic Impact for FY 2017 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	3,499	60,170	6%
Employee compensation ($'000; 2018$)	$108,207	$1,593,261	7%
GDP ($'000; 2018$)	$106,225	$6,002,111	2%

Source: RTI estimates based on IMPLAN (2013).

4. COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS (CNMI)

4.1 FY 2018 OIA Payments Summary

In 2016, the GDP per capita for CNMI was approximately $29,594 (2018$), about 48% of the U.S. GDP per capita $61,390 (World Bank, 2019a, 2019b). From 2015 to 2016, CNMI saw large real GDP growth of 28.6 percent. This far outpaces the 3.8% increase from 2014 to 2015. Increases in private fixed investment and exports of services, like casino gambling, were some of the primary drivers of growth (BEA 2017).

OIA payments to CNMI in 2018 totaled $17.3 million and were primarily directed to the construction and government sectors with additional support for education, wholesale trade, and the private sector (Table 4-1). Assistance to Territories payments, totaling about $15.0 million, made up the majority of funding to CNMI. General technical assistance, which made up $3.4 million of all Assistance to Territories, provided payments for direct grants, judicial training, and PITI-VITI. Also included in general technical assistance were the CNMI Ombudsman's Office, CNMI Immigration, Labor and Law Enforcement General, Compact Impact (discretionary) and the Prior Service Benefits Program, which issues benefits to CNMI citizens who worked for the U.S. Navy or the U.S. Trust Territory of the Pacific Islands from 1944 through 1968. The remainder of the Assistance to Territories funding went to other activities such as the Coral Reef Initiative, maintenance assistance, construction, and the Brown Tree Snake Control program.

Table 4-1. OIA Payments and Estimated Spending within CNMI (FY 2018)

Appropriation	Spending ($'000, 2018$)	Impact Treatment
Division of Youth Services		
Department of Public Health	$895	Government
Division of Youth Services	$11	Government
Department of Public Safety	$262	Government
Department of Corrections	$416	Government
Office of Public Defender	$39	Government
Northern Mariana College	$41	Education
Public School System	$205	Education
Karidat	$51	Education
Judiciary	$113	Government
Department of Fire and Emergency Services	$276	Government
Total, Compact of Free Association	$2309	Government

(continued)

Table 4-1. OIA Payments and Estimated Spending within CNMI (FY 2018) (continued)

Appropriation	Spending ($'000, 2018$)	Impact Treatment
Assistance to Territories		
General technical assistance—Direct grants	$1,408	Government
General technical assistance—USDA Graduate School PITI-VITI	$993	Education
General technical assistance—BEA	$312	
General technical assistance—Prior service	$265	Private
General technical assistance—Judicial training	$421	Education
Subtotal, General Technical Assistance	$3,398	
Empowering Insular Communities		
Wholesale purchases	$417	Wholesale
Installations	$417	Construction
capacity building	$417	Government
Subtotal, Empowering Insular Communities	$1,250	
Brown Tree Snake Control	$337	Government
Coral Reef Initiative	$492	Government
Maintenance assistance	$971	Government
Northern Mariana Covenant Grants—CNMI construction	$8,124	Construction
Office of Insular Affairs	$142	Government
Compact Impact Discretionary	$308	Education
Subtotal Other	$10,374	
Total, Assistance to Territories	$15,022	
Total Spending Inside CNMI	$17,331	

Source: RTI estimates based on OIA (2018, 2019a, 2019b).

OIA also provided $2.3 million through the Compact of Free Association, which CNMI intends to use for a variety of government purposes, including funding for the Department of Public Health and Division of Youth Services.

RTI estimates that all spending associated with CNMI was initiated within CNMI.

4.2 Economic Impacts of OIA Payments Using Input-Output Analysis

To determine the direct impacts of OIA payments in CNMI, the payments from Table 4-1 were each applied to a corresponding IMPLAN sector code. Direct impacts were estimated using output and employee compensation-to-employee ratios from the IMPLAN model

software. For the Prior Service Benefits, we used the average ratios of the entire private sector. The direct employment, employee compensation, and output inputs are reported in Table 4-2.

Table 4-2. CNMI: Direct Economic Impacts of OIA Payments Using I/O Analysis (FY 2018)

Industry	IMPLAN Code	FY 2018 Payments ($'000, 2018$)	Output-to-Employee Ratio ($/ employee)	Employee Compen-sation-to-Employee Ratio ($/ employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2018$)	Direct Effects	Direct Value-Added Change ($'000, 2018$)
State and local government, noneducation	437	$4,636	$32,265	$32,265	144	$4,636	1.00	$4,636
State and local government, education	438	$3,427	$23,573	$23,573	145	$3,427	1.00	$3,427
Wholesale trade business	319	$417	$191,849	$13,482	2	$29	0.68	$284
Maintenance and repair construction of nonresidential structures	39	$8,541	$23,204	$19,484	368	$7,171	0.93	$7,916
Private sector	--	$312	$71,818	$15,740	4	$68	0.76	$236
Total		$17,331			664	$15,331		$16,498

[a] According to IMPLAN documentation, "Effects represent the Total Value Added and various Value Added subset dollars per $1,000,000 of production in the Industry" (IMPLAN, 2015).

Source: RTI estimates based on IMPLAN (2013).

We estimated that the $17.3 million spent in CNMI directly supported 664 jobs and $15.3 million in employee compensation. These direct impacts were multiplied by Type II Social Accounting Matrix multipliers to estimate the total impact of OIA payments on the region's economy. These multipliers estimate the indirect and induced effects that occur throughout the local supply chain and as employees spend their wages. For the private sector, we used the average multiplier across all private-sector industries. The relevant multipliers that were estimated for this analysis are reported in Table 4-3.

Table 4-3. CNMI: Selected IMPLAN Multipliers by Industry

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Value-Added Multiplier
State and local government, noneducation	437	1.25	1.13	1.003
State and local government, education	438	1.18	1.13	1.003
Wholesale trade business	319	1.60	1.81	1.001
Maintenance and repair construction of nonresidential structures	39	1.17	1.14	1.005
Private sector	—	1.31	1.37	1.006

Source: RTI estimates based on IMPLAN (2013).

The indirect and induced impacts of OIA payments are estimated to be an additional 127 jobs and $2.0 million in employee compensation. Therefore, the total economic impacts of this activity in CNMI support 791 employees, over $17 million in employee compensation, and $16.6 million in GDP. These results are displayed in Table 4-4.

Table 4-4. CNMI: Total Economic Impacts Using I/O Analysis (FY 2018)

Industry Description	Total Employment Impact (# of workers)	Total Employee Compensation Impact ($'000, 2018)	Total Value-Added Impact ($'000, 2018)
Direct impacts	664	$15,331	$16,498
Indirect and induced impacts	127	$2,044	$71
Total	**791**	**$17,375**	**$16,569**

Source: RTI estimates based on IMPLAN (2013).

The significance of OIA's economic contributions can be better understood when viewed in relation to the CNMI economy, which is summarized in Table 4-5. As this table illustrates, the 791 jobs directly and indirectly supported by OIA payments represent 3% of CNMI's total employment. Similarly, over $17 million of employee compensation associated with these employees' accounts for approximately 3% of total employee compensation inside the region, and the $16.6 million of GDP associated with these employees represents 1% of total GDP produced by the region.

Table 4-5. CNMI: Estimated Impact Relative to National Economy (FY 2018)

	Total Economic Impact for FY 2018 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	791	27,970	3%
Employee compensation ($'000; 2018$)	$17,375	$607,870	3%
GDP ($'000; 2018$)	$16,569	$1,631,910	1%

Source: RTI estimates based on IMPLAN (2013).

5. U.S. VIRGIN ISLANDS (USVI)

5.1 FY 2018 OIA Payments Summary

In 2016, the GDP per capita in USVI was about $36,816 (2018$) compared with $61,390 in the United States (World Bank, 2019a, 2019b).

OIA payments to USVI in 2018 totaled $264.5 million (Table 5-1). The largest block of OIA payments to USVI came in the form of rum excise tax payments totaling $254.0 million. Under current U.S. law, excise taxes are collected on rum imported into the United States that is not of USVI or Puerto Rican origin. A fixed percentage of these excise taxes is distributed by the U.S. government to USVI. Although this funding is not designated for a particular purpose, USVI generally uses it to finance public infrastructure or provide support to the rum industry (Maguire and Teefy, 2010). The Assistance to Territories—general technical assistance payments totaled just over $5.8 million and provided for general technical assistance for direct grants and the PITI-VITI, which is managed by the USDA Graduate School.

Through other Assistance to Territories programs, which made up $4.6 million in payments, OIA funds items such as USVI construction as part of the Northern Mariana Covenant Grant and the Coral Reef Initiative, which pursues the sustainable maintenance and protection of coral reefs through education, outreach programs, and the establishment of protected areas. RTI estimates that all spending associated with USVI was initiated within USVI.

Table 5-1. OIA Payments and Estimated Spending within USVI (FY 2018)

Appropriation	Spending ($'000; 2018$)	Impact Treatment
Fiscal Payment		
USVI rum excise tax payments	$254,026	Government
Total, fiscal payments	$254,026	
Assistance to Territories	—	
General technical assistance—Direct grants	$2,810	Government
General technical assistance—Disaster relief	$3,000	Government
General technical assistance—USDA Graduate School PITI-VITI	$64	Education
General technical assistance—Civic education	—	Education
General technical assistance—Judicial training	—	Education
Subtotal, general technical assistance	$5,873	
Empowering Insular Communities	—	
Wholesale purchases	$375	Wholesale
Installations	$375	Construction

(continued)

Table 5-1. OIA Payments and Estimated Spending within USVI (FY 2018) (continued)

Appropriation	Spending ($'000; 2018$)	Impact Treatment
Capacity building	$375	Government
Subtotal, Empowering Insular Communities	$1,124	
Coral Reef Initiative	$103	Government
Capital Improvement Projects—USVI construction	$2,655	Construction
Maintenance assistance	$750	Government
Office of Insular Affairs	—	Government
Subtotal, Other	$4,632	
Total, Assistance to Territories	$10,505	
Total Spending Inside Virgin Islands	**$264,531**	

Source: RTI estimates based on OIA (2018, 2019a, 2019b).

5.2 Economic Impacts of OIA Payments Using Input-Output Analysis

To determine the direct impacts of OIA payments in the USVI, the payments from Table 5-1 were each applied to a corresponding IMPLAN sector code. Direct impacts were estimated using output and employee compensation-to-employee ratios from the IMPLAN modeling system. The direct employment, employee compensation, and output inputs are reported in Table 5-2.

We estimated that the $264.5 million spent in USVI directly supported 6,085 jobs and nearly $262 million in employee compensation. These direct impacts were multiplied by Type II Social Accounting Matrix multipliers to estimate the total impact of OIA payments on the region's economy. These multipliers estimate the indirect and induced effects that occur throughout the local supply chain and as employees spend their wages. The relevant multipliers that were estimated for this analysis are reported in Table 5-3.

Table 5-2. USVI: Direct Economic Impacts of OIA Payments Using I/O Analysis (FY 2018)

Industry	IMPLAN Code	FY 2017 Payments ($'000, 2018$)	Output-to-Employee Ratio ($/employee)	Employee Compen-sation-to-Employee Ratio ($/employee)	Direct Employ-ment Impact (#)	Direct Employee Compen-sation Impact ($'000, 2018$)	Direct Effects[a]	Direct Value-Added Change ($'000, 2018$)
State and local government, noneducation	437	$261,063	$43,020	$43,020	6,068	$261,063	1.000	$261,063
State and local government, education	438	$64	$31,431	$31,431	2	$64	1.000	$64
Maintenance and repair construction of nonresidential structures	39	$3,030	$225,554	$55,026	13	$739	0.655	$1,984
Wholesale trade	319	$375	$423,158	$36,187	1	$32	0.687	$257
Total		$264,531			6,085	$261,898		$263,368

[a] According to IMPLAN documentation, "Effects represent the Total Value Added and various Value Added subset dollars per $1,000,000 of production in the Industry" (IMPLAN, 2015).

Source: RTI estimates based on IMPLAN (2013).

Table 5-3. USVI: Selected IMPLAN Multipliers by Industry

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Value-Added Multiplier
State and local government, noneducation	437	1.11	1.08	1.006
State and local government, education	438	1.08	1.08	1.006
Maintenance and repair construction of nonresidential structures	39	1.27	1.17	1.029
Wholesale trade	319	1.38	1.40	1.005

Source: RTI estimates based on IMPLAN (2013).

The indirect and induced impacts of OIA payments are estimated to be an additional 643 jobs and $19.8 million in employee compensation Therefore, the total economic impacts of this activity in USVI support 6,727 employees, $281.7 million in employee compensation, and $265.1 million in GDP. These results are displayed in Table 5-4.

Table 5-4. USVI: Total Economic Impacts Using I/O Analysis (FY 2018)

Industry Description	Total Employment Impact (# of workers)	Total Employee Compensation Impact ($'000; 2018$)	Total Value-Added Impact ($'000; 2018$)
Direct impacts	6,085	$261,898	$263,369
Indirect and induced impacts	643	$19,799	$1,722
Total	**6,727**	**$281,697**	**$265,090**

Source: RTI estimates based on IMPLAN (2013).

The significance of OIA's economic contributions can be better understood when viewed in relation to the USVI economy as a whole, which is summarized in Table 5-5. As this table illustrates, the 6,727 jobs directly and indirectly supported by OIA payments represent 17% of USVI's total employment. Similarly, $281.7 million of employee compensation associated with these employees accounts for approximately 20% of total employee compensation inside the region, and the $265 million of GDP associated with these employees represents 7% of total GDP produced by the insular area.

Table 5-5. USVI: Estimated Impact Relative to National Economy (FY 2018)

	Total Economic Impact for FY 2018 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	6,727	38,454	17%
Employee compensation ($'000; 2018$)	$281,697	$1,429,338	20%
GDP ($'000; 2018$)	$265,090	$3,949,162	7%

Source: RTI estimates based on IMPLAN (2013).

6. FEDERATED STATES OF MICRONESIA (FSM)

6.1 FY 2018 OIA Payments Summary

FSM faces severe challenges in implementing effective government, education, and health care systems and relies heavily on OIA support. FSM's economy is based on the fishing industry, which earns income through licensing fees charged to foreign tuna fishing vessels for fishing rights in FSM's exclusive economic zone. The FSM had an average GDP per capita of about $3,265 (2018$) in 2017.

OIA payments to FSM in 2018 totaled $112.1 million. A detailed breakdown of these payments is presented in Table 6-1. The largest block of OIA payments to FSM, totaling $111.5 million, came through the Compact of Free Association. The Compact provides essential funding for operating FSM's education, health care, and government systems and improves the insular area's infrastructure.

Table 6-1. OIA Payments and Estimated Spending within FSM (FY 2018)

Appropriation	Spending ($'000, 2018$)	Impact Treatment
Compact of Free Association		
Education	$25,629	Education
Health	$22,741	Health care
Capacity building	$1,904	Government
Private sector	$1,248	Government
Environment	$1,788	Government
Enhanced reporting & accountability	$1,528	Government
Infrastructure	$2,600	Construction
Compact Trust Fund	$30,820	Government
Balance	$23,241	Government
Total, Compact of Free Association	$111,500	
Assistance to Territories		
General technical assistance—Direct grants	$20	Government
Subtotal, general technical assistance	$20	
Office of Insular Affairs	$177	Government
Maintenance assistance	$230	Government
Coral Reef Initiative	$145	Government
Subtotal, Other	$552	
Total, assistance to territories	$572	
Total Spending Inside FSM	$112,072	

Source: OIA, 2018, 2019a, 2019b.

Payments associated with Assistance to Territories totaled $0.6 million. General technical assistance provided direct grants, and other Assistance to Territories programs included items such as the Coral Reef Initiative.

RTI estimates that all spending associated with FSM was initiated within FSM.

6.2 Direct Economic Impacts

Direct economic impacts of OIA payments were assigned to five economic sectors—education, construction, government, health care, and an assortment of private industries through the spending of Prior Service Benefits recipients. To calculate the employment and employee compensation impacts associated with this spending, as described in the methodology, we used the following output and employee compensation-to-employee ratios:[1]

- **Education:** Based on employment and gross wage data provided in Fiscal Year 2017 Economic Review for FSM (PITI-VITI, 2019b), the employee compensation-to-employee ratio for workers in the education sector was **$10,960** in 2018 dollars. Because information was not available for output associated with the education industry, the output-to-employee ratio for Commonwealth of North Marianna Islands was used ($40,944). CNMI was chosen to be the best point of comparison in this context because economic metrics, such as GDP per capita, were more similar to FSM than for any other area for which output-to-employee data were available. However, it should be noted that to the extent this proxy overestimates the true output-to-employee ratio for FSM the direct impacts of OIA spending will be underestimated because more jobs will be supported by each dollar of OIA spending.

- **Construction:** Based on employment and gross wage data provided in Fiscal Year 2017 Economic Review for FSM (PITI-VITI, 2019b), the employee compensation-to-employee ratio for workers in the construction sector was **$5,399** in 2018 dollars. Because information was not available for output associated with the construction industry, the output-to-employee ratio for CNMI was used ($49,596).

- **Government:** According to the Fiscal Year 2017 Economic Review for FSM (PITI-VITI 2019b), the government of Micronesia received approximately $282.3 million in revenue and employed approximately 6,192 individuals in 2016. Adjusting for inflation, this implies an output-to-employee ratio of **$46,703**. Similarly, according to information presented in the same report, these workers received approximately $61.1 million in employee compensation in 2018. This implies an employee compensation-to-employee ratio of **$11,247**.

- **Health care:** Based on employment and gross wage data provided in Fiscal Year 2017 Economic Review for FSM (PITI-VITI, 2019b), the employee compensation-to-employee ratio for workers in the health care sector was **$10,314** in 2018 dollars. Because information was not available for output associated with the health care industry, the output-to-employee ratio for CNMI was used ($62,377).

[1] All adjustments for inflation were made using the U.S. consumer price index for all urban consumers (BLS, 2019).

- **Private:** Based on employment and gross wage data provided in Fiscal Year 2017 Economic Review for FSM (PITI-VITI, 2019b), the average wage for a private-sector worker was **$5,066** in 2018 dollars. Because information was not available for output associated with the private sector, the output-to-employee ratio for CNMI was used ($101,849).

Dividing the payments directed toward each sector by the output-to-employee ratio yields the direct employment impacts, while multiplying the direct employment impacts by the employee compensation-to-employee ratio yields the direct employee compensation impacts. Direct impacts are reported in Table 6-2.

Table 6-2. FSM: Estimated Direct Economic Impacts Using EBA (FY 2018)

Industry	FY 2018 Payments ($'000, 2018$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2018$)
Education	$25,629	$40,944	$10,960	626	$6,860
Construction	$2,600	$49,596	$5,399	52	$283
Government	$61,102	$46,703	$11,247	1,308	$14,714
Health care	$22,741	$62,377	$10,314	365	$3,760
Private	0	$101,849	$5,066	0	$0
Total	**$112,072**			**2,351**	**$25,618**

Sources: RTI estimates based on PITI-VITI (2019b), Census (2017), and OIA (2018, 2019a, 2019b). All data were adjusted to 2018 dollars using the consumer price index (BLS, 2019).

6.3 Employment and Employee Compensation Base Multipliers

The employment and employee compensation multipliers were developed using 2017 employment and gross wage data from the Micronesia Fiscal Year 2017 Economic Review performed by researchers at PITI-VITI (Table 6-3).

The economic base of FSM is agriculture, fishing, manufacturing, and federal government activities. Industries supported by tourism can also be considered part of the economic base. Ideally, data would be available on the number of employees who are supported by tourism. However, because these data were unavailable, we assumed that the entire accommodation and food services industries are supported by tourism and are, therefore, part of the economic base.[2] This is likely a conservative approach because, to the extent that this approximation overrepresents the portion of the economy supported by tourism, employment and employee compensation multipliers will be reduced.

[2] A similar approach for creating a proxy for measuring the role of tourism in insular area economies was used in Government Accounting Office (GAO) (2006).

Table 6-3. FSM: Employment and Employee Compensation by Industry (2017 estimates)

Industry	Employment (#)	Employee Compensation ($'000, 2018$)
Economic Base Industries		
Agriculture, hunting, and forestry	29	$108
Mining and quarrying	0	$-
Fishing	246	$2,129
Extra-territorial organizations	66	$1,115
Government (public administration)[a]	6,198	$69,711
Manufacturing	169	$801
Tourism—Hotels and restaurants	769	$3,208
Noneconomic Base Industries		
Construction	891	$4,808
Education	843	$9,240
Electricity, gas, and water supply	412	$4,727
Financial intermediation	293	$4,446
Health and social work	129	$1,328
Other services	620	$4,098
Private households with employed persons	46	$2
Real estate, renting, and business activities	483	$3,062
Transport, storage, and communications	1,040	$8,693
Wholesale and retail trade and repairs	3,389	$17,066
Total	15,620	$134,542

[a] Because 61% of FSM's budget comes from external sources, it was assumed that only 61% of the employment and employee compensation associated with public administration was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Note: A significant portion of employment across all sectors was accounted for by public enterprises. However, employee compensation statistics were only provided for private-sector workers. Therefore, to estimate total employee compensation for all workers across industries, we calculated the total earnings by industry for public enterprises in RMI. We then multiplied total earnings in FSM not associated with the private sector by the share of total earnings for each industry in RMI. This allowed us to distribute earnings from public enterprises to industries in FSM. The distributed earnings were then added to the private-sector earnings for each industry.

Source: RTI estimates based on PITI-VITI (2019b).

In addition to these industries, a portion of FSM's territorial government is considered part of the economic base. Specifically, because over half of FSM's government revenue comes from external sources, approximately 61% of public administration was also included in the base employment for the purpose of calculating base multipliers (PITI-VITI, 2019b). Based on these assumptions and the data in Table 6-3, we calculated the following multipliers:

- **Base employment multiplier:** Base employment was calculated to include 5,059 employees out of a total of 15,620. Dividing total employment by base employment yields a multiplier of **3.09**, meaning that for every base employment position supported by OIA funding, an estimated 2.09 additional jobs are formed elsewhere in the economy.
- **Employee compensation multiplier:** Employee compensation associated with base employment was estimated to be $49.9 million. Dividing total employee compensation by base employee compensation yields a base multiplier of **2.70**, meaning that every dollar of employee compensation supported by the FY 2018 spending will create an additional $1.70 in employee compensation.

Multiplying the direct employment and employee compensation impacts in Table 6-2 by these multipliers yields a total employment impact of 7,260 employees and $69.1 million of employee compensation.

6.4 GDP Base Multipliers

As part of its strategic goals, OIA has funded the PITI-VITI to estimate more detailed and accurate economic indicators for the FAS. In 2019, PITI-VITI released updated FY 2017 economic reports for the FAS, which included estimates of GDP by industry. Using this data, we were able to estimate GDP multipliers, making for a more detailed analysis of the GDP impacts of OIA payments.

Direct GDP impacts are the sum of OIA payments to insular governments plus the impacts of OIA payments on private sectors. A GDP-to-employee ratio was used to determine the direct GDP impacts of OIA payments in the private sector. It is estimated that FSM's GDP was $345 million in 2017 (World Bank, 2019a). Dividing this by the total number of employees estimated to be working in FSM (15,620) implies a GDP-to-employee ratio of $22,063. Multiplying this ratio by the direct employment impact in the private sector (1,043 employees) yields a direct private-sector GDP impact of $23 million. This private-sector impact is then added to the $61.1 million of OIA payments spent in the public sector to produce an estimate of approximately $84.1 million in direct GDP impacts.

To determine the indirect and induced effects of OIA payments on GDP, we used the recent PITI-VITI data (Table 6-4) on GDP by industry to calculate a base multiplier using the same methodology as the employment and employee compensation base multipliers. It was assumed that the agriculture, hunting, and forestry; mining and quarrying; fishing; hotels and restaurants; and manufacturing sectors were economic base sectors, along with 58% of

the territorial government. The remaining territorial government and other private sectors were included in the noneconomic base industries.

Based on these assumptions and the data in Table 6-4, base GDP was calculated to be $120.6 million. Dividing total GDP by base GDP yields a multiplier of **2.86**, meaning that for every dollar of base GDP supported by OIA funding, an estimated 1.86 of additional GDP dollars are formed elsewhere in the economy. By multiplying the direct GDP impacts of OIA payments by the GDP base multiplier, we estimate the total impact on GDP is $240.3 million.

Table 6-4. FSM: GDP by Industry (2016)

Industry	GDP (in millions of 2018$)
Economic Base Industries	
Agriculture, hunting, and forestry	$50.7
Mining and quarrying	$0.0
Fishing	$40.8
Government (public administration)[a]	$34.8
Manufacturing	$1.9
Tourism—Hotels and restaurants	$6.0
Noneconomic Base Industries	$0.0
Construction	$8.7
Education	$33.9
Electricity, gas, and water supply	$10.0
Financial intermediation	$12.8
Health and social work	$15.6
Other services	$-0.7
Real estate, renting, and business activities	$36.4
Transport, storage, and communications	$20.6
Wholesale and retail trade and repairs	$41.0
Total at Basic Prices	$312.5
Taxes on products less subsidies	$25.5
Total at Purchasers' Prices	$338.0

[a] Because 61% of FSM's budget comes from external sources, it was assumed that only 61% of the employment and employee compensation associated with public administration was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Sources: RTI estimates based on PITI-VITI (2019b).

6.5 EBA Economic Impact Estimate

In summary, the $112.1 million spent by OIA inside FSM directly supports 2,351 jobs, $25.6 million in employee compensation, and $84.1 million in GDP. Accounting for secondary effects, we estimate that OIA spending supports a total of 7,260 jobs, $69.1 million in employee compensation, and $240.3 million in GDP. This information is summarized in Table 6-5.

Table 6-5. FSM: Total Estimated Economic Impact Using EBA (FY 2018)

	Direct Economic Impact	Indirect/Induced Economic Impact	Total Economic Impact
Employment (#)	2,351	4,909	7,260
Employee compensation ($'000; 2018$)	$25,618	$43,475	$69,093
GDP ($'000; 2018$)	$84,112	$156,198	$240,311

Sources: RTI estimates based on OIA (2018, 2019a, 2019b), PITI-VITI (2019a, 2019b), and Census (2019). All data were adjusted to 2018 dollars using the consumer price index (BLS, 2019).

The significance of OIA's economic contributions can be better understood when viewed in relation to the FSM economy as a whole, which is summarized in Table 6-6. The 7,260 jobs directly and indirectly supported by OIA payments represent 46% of FSM's total employment in 2018. Similarly, $769.1 million of employee compensation associated with these employees accounts for approximately 51% of total employee compensation inside the region, and the $240.3 million of GDP associated with these employees represents 70% of the $344.6 million of total GDP produced by the region.

Table 6-6. FSM: Estimated Impact Relative to National Economy Using EBA (FY 2018)

	Total Economic Impact for FY 2018, OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	7,260	15,620	46%
Employee compensation ($'000; 2018$)	$69,093	$134,542	51%
GDP ($'000; 2018$)	$240,311	$344,617	70%

Sources: RTI estimates based on OIA (2018, 2019a, 2019b), PITI-VITI (2019a, 2019b), and Census (2017). All data were adjusted to 2018 dollars using the consumer price index (BLS, 2019).

7. REPUBLIC OF THE MARSHALL ISLANDS (RMI)

7.1 FY 2018 OIA Payments Summary

RMI faces severe challenges in implementing effective government, education, and health care systems and relies heavily on OIA support. RMI had an average GDP per capita of only about $3,936 ($2018) in 2017.

OIA payments to RMI in 2018 totaled $80.2 million. A detailed breakdown of these payments is presented in Table 7-1. The largest block of OIA payments, totaling $76.9 million in spending inside RMI, came through the Compact of Free Association. The Compact provides essential funding for operating RMI's education, government, and health care systems; improving infrastructure; and protecting the environment. Assistance to Territories payments totaled $2.1 million. General technical assistance provided direct grants, and other Assistance to Territories programs included items such as maintenance assistance.

Table 7-1. OIA Payments and Estimated Spending within RMI (FY 2018)

Appropriation	Spending ($'000, 2018$)	Impact Treatment
Compact of Free Association		
Enewetak	$550	69% government, 31% transfer
Education	$11,023	Education
Health	$6,869	Health care
ESN capital	$9,426	Construction
Environment	$181	Government
Ebeye special needs—Education	$6,090	Education
Kwajalein environmental impact	$241	Government
RMI trust fund	$16,855	Government
Kwajalein landowner payments	$21,670	Government
Disaster assistance emergency fund	$241	Government
RMI single audit	$500	Government
Kwajalein Impact Fund	$2,287	Government
Balance	$1,565	Government
Total Compact of Free Association	$76,948	
Assistance to Territories		
General technical assistance—Direct grants	$1,054	Government
General technical assistance—USDA Graduate School PITI-VITI	$0	Education

(continued)

Table 7-1. OIA Payments and Estimated Spending within RMI (FY 2018) (continued)

Appropriation	Spending ($'000, 2018$)	Impact Treatment
General technical assistance—Atoll Health Care Program	$1,400	Health care
Subtotal, general technical assistance	$2,454	
Coral Reef Initiative		Government
Maintenance assistance	$10	
Office of Insular Affairs	$240	Government
Subtotal, Other	$250	
Total assistance to territories	$2,704	
Total Payments	**$80,202**	
Total Spending Inside RMI	$171	
Total Spending Outside RMI	**$80,032**	

Source: RTI estimates based on OIA (2018, 2019a, 2019b).

RTI estimates that all spending associated with RMI was initiated within RMI.

For the Enewetak assistance program, 31% of funding provides imported food for the citizens of this atoll and, thus, was not included in the analysis because this assistance is not being spent in the insular area. Therefore, the total amount of OIA payments spent within RMI is about $80 million.

7.2 Economic Impacts of OIA Payments Using Economic Base Analysis

Direct economic impacts of OIA payments were assigned to five economic sectors—education, construction, government, health care, and an assortment of private industries through the spending of Prior Service Benefits recipients. To calculate the employment and employee compensation impacts associated with this spending, as described in the methodology, we used the following output and employee compensation-to-employee ratios:[1]

- **Education:** Based on FY 2017 employment and wage cost data provided in the Fiscal Year 2017 Economic Review for RMI (released in 2019), the employee compensation-to-employee ratio for private-sector workers in the education sector was **$17,113** in 2018 (PITI-VITI, 2019c). Because information was not available for output associated with the education industry, the output-to-employee ratio for American Samoa was used ($78,056). American Samoa was chosen to be the best point of comparison in this context because economic metrics, such as GDP per

[1] All adjustments for inflation were made using the U.S. consumer price index for all urban consumers (BLS, 2019).

capita, were more similar to RMI than for any other area for which output-to-employee data were available. However, it should be noted that to the extent this proxy overestimates the true output-to-employee ratio for RMI the direct impacts of OIA spending will be underestimated because more jobs will be supported by each dollar of OIA spending.

- **Construction:** Based on employment and wage cost data provided in the Fiscal Year 2016 Economic Review for RMI, the employee compensation-to-employee ratio for private-sector workers in the construction sector was estimated to be **$9,426** in 2018 (PITI-VITI, 2019c). Because information was not available for output associated with the construction industry, the output-to-employee ratio for American Samoa was used ($79,503).

- **Government:** Based on data provided in the Fiscal Year 2016 Economic Review for RMI, the RMI government received approximately $145.5 million in revenue and employed approximately 3,752 individuals in 2017 (PITI-VITI, 2019c). Adjusting for inflation, this implies an output-to-employee ratio of **$39,782** in 2018 dollars. Similarly, 3,689 government workers received $48.0 million in employee compensation in 2017. This implies an employee compensation-to-employee ratio of **$13,113**.

- **Health care:** Based on employment and wage cost data provided in the Fiscal Year 2018 Economic Review for RMI, the employee compensation-to-employee ratio for private-sector workers in the health care sector was estimated to be **$10,861** in 2018 dollars (PITI-VITI, 2019c). Because information was not available for output associated with the health care industry, the output-to-employee ratio for American Samoa was used ($16,593). American Samoa was chosen to be the best point of comparison in this context because economic metrics, such as GDP per capita, were more similar to RMI than for any other area for which data were available.

- **Private:** According to the Fiscal Year 2017 Economic Review for RMI, the average wage for a private worker in RMI was estimated to be **$6,345** in 2017 (PITI-VITI, 2019c). Because information was not available for output associated with the private industry, the output-to-employee ratio for American Samoa was used ($178,462). American Samoa was chosen to be the best point of comparison in this context because economic metrics, such as GDP per capita, were more similar to RMI than for any other area for which data were available.

Dividing the payments directed toward each sector by the output-to-employee ratio yields the direct employment impacts, while multiplying the direct employment impacts by the employee compensation-to-employee ratio yields the direct employee compensation impacts. Direct impacts are reported in Table 7-2.

Table 7-2. RMI: Estimated Direct Economic Impacts Using EBA (FY 2018)

Industry	FY 2018 Payments ($'000, 2018$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2018$)
Education	$17,113	$78,056	$12,770	219	$2,800
Construction	$9,426	$79,503	$7,324	119	$868
Government	$45,473	$39,728	$13,113	1,145	$15,010
Health care	$8,269	$16,593	$10,861	498	$5,412
Private	$0	$178,462	$6,345	0	$0
Total	$80,282			1,981	$24,090

Sources: RTI estimates based on OIA (2018, 2019a, 2019b), PITI-VITI (2019c), and Census (2019). All data were adjusted to 2018 dollars using the consumer price index (BLS, 2019).

Employment and Employee Compensation Base Multipliers. The employment and employee compensation multipliers were developed for 2018 using data from the RMI Fiscal Year 2017 Economic Review performed by researchers at PITI-VITI (Table 7-3).

The economic base of RMI is agriculture, hunting, forestry, manufacturing, and federal government activities. Industries supported by tourism can also be considered part of the economic base. Ideally, data would be available on the number of employees supported by tourism. However, because these data were unavailable, we assumed that the entire accommodation and food services industries are supported by tourism and are, therefore, part of the economic base.[2] This is likely a conservative approach because, to the extent that this approximation overrepresents the portion of the economy supported by tourism, employment and employee compensation multipliers will be reduced.

In addition to these industries, a portion of RMI's territorial government is considered part of the economic base. Specifically, because approximately 63.9% of RMI's government revenue comes from external sources, 63.9% of public administration was also included in the base employment for the purpose of calculating base multipliers (PITI-VITI, 2019c). Based on these assumptions and the data in Table 7-3, we calculated the following multipliers:

- **Base employment multiplier:** Base employment was calculated to include 4,571 employees out of a total of 11,066. Dividing total employment by base employment yields a multiplier of **2.42**, meaning that for every base employment position supported by OIA funding, an estimated 1.42 additional jobs are formed elsewhere in the economy.

[2] A similar approach for creating a proxy for measuring the role of tourism in insular area economies was used in GAO (2006).

- **Employee compensation multiplier:** Employee compensation associated with base employment was estimated to be $59.3 million. Dividing total employee compensation by base employee compensation yields a base multiplier of **2.09**, meaning that every dollar of employee compensation supported by the FY 2018 spending will create an additional $1.09 in employee compensation.

Table 7-3. RMI: Employment and Employee Compensation by Industry (2018 estimates)

Industry	Employment (#)	Employee Compensation ($'000, 2018$)
Economic Base Industries		
Agriculture, hunting, and forestry	17	$81
Fishing	696	$4,106
Extra-territorial organizations	1,042	$20,430
Government (public administration)[a]	3,752	$49,196
Manufacturing	124	$1,249
Tourism—Hotels and restaurants	296	$1,990
Noneconomic Base Industries		
Community, social & personal service activities	207	$1,654
Construction	659	$4,828
Education	544	$6,940
Electricity, gas and water supply	351	$4,780
Financial intermediation	296	$5,348
Health and social work	228	$2,476
Private households with employed person	11	$61
Real estate, renting, and business activities	151	$1,329
Transport, storage, and communications	728	$7,606
Wholesale and retail trade	1,965	$12,071
Total	11,066	$124,145

[a] Because 63.9% of RMI's budget comes from external sources, we assumed that only 63.9% of the employment and employee compensation associated with public administration was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Source: RTI estimates based on PITI-VITI (2019c).

Multiplying the direct employment and employee compensation impacts in Table 7-2 by these multipliers yields a total employment impact of 4,795 employees and $50.4 million of employee compensation.

7.3 GDP Base Multipliers

Direct GDP impacts are the sum of OIA payments to insular governments plus the impacts of OIA payments on private sectors. A GDP-to-employee ratio was used to determine the direct GDP impacts of OIA payments in the private sector. It is estimated that RMI's GDP was $209 million in 2017 (World Bank, 2019a). Dividing this by the total number of employees estimated to be working in RMI (11,066) implies a GDP-to-employee ratio of $18,894. Multiplying this ratio by the direct employment impact in the private sector (836 employees) yields a direct private-sector GDP impact of $15.8 million. This private-sector impact is then added to the $45.5 million of OIA payments spent in the public sector to produce an estimate of approximately $61.3 million in direct GDP impacts.

Total GDP impacts are determined by multiplying the direct GDP impacts by a GDP base multiplier. Because of RMI's high percentage of OIA payments compared with GDP (a ratio of 0.42, the highest of the insular areas), small size of economy, and small base sector (in terms of GDP), using a GDP base multiplier from the PITI-VITI FY 2017 Economic Report would create a high base GDP multiplier and potentially overestimate the impacts of OIA payments on GDP. Therefore, we used the smaller value employment base multiplier of **3.50** as a proxy GDP base multiplier. Using this multiplier created a total GDP impact that was consistent with previous analyses and the other FAS.

By multiplying the direct GDP impacts of OIA payments by the proxy GDP base multiplier, we estimate the total impact on GDP is $134.8 million.

7.4 EBA Economic Impact Estimate

In summary, the $80 million spent by OIA inside RMI directly supports 1,981 jobs, $24.3 million in employee compensation, and $73.5 million in GDP. Accounting for secondary effects, we estimate that OIA spending supports a total of 4,795 jobs, $50.4 million in employee compensation, and $134.8 million in GDP. This information is summarized in Table 7-4.

Table 7-4. RMI: Total Estimated Economic Impact Using EBA (FY 2018)

	Direct Economic Impact	Indirect/ Induced Economic Impact	Total Economic Impact
Employment (#)	1,981	2,814	4,795
Employee compensation ($'000; 2018$)	$24,090	$26,349	$50,440
GDP ($'000; 2018$)	$61,272	$73,526	$134,798

Sources: RTI estimates based on OIA (2018, 2019a, 2019b), PITI-VITI (2019a, 2019c), and Census (2017). All data were adjusted to 2018 dollars using the consumer price index (BLS, 2019).

The significance of OIA's economic contributions can be better understood when viewed in relation to the RMI economy as a whole, which is summarized in Table 7-5. As this table illustrates, the 4,795 jobs directly and indirectly supported by OIA payments represent 43% of RMI's total employment in 2017. Similarly, $50.4 million of employee compensation associated with these employees accounts for approximately 41% of total employee compensation inside the region, and the $134.8 million of GDP associated with these employees represents 64% of total GDP produced by the insular area.

Table 7-5. RMI: Estimated Impacts Relative to National Economy Using EBA (FY 2018)

	Total Economic Impact for FY 2018 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	4,795	11,066	43%
Employee compensation ($'000; 2018$)	$50,440	$124,145	41%
GDP ($'000; 2018$)	$134,798	$209,085	64%

Sources: RTI estimates based on OIA (2018, 2019a, 2019b), PITI-VITI (2019a, 2019c), and Census (2019). All data were adjusted to 2018 dollars using the consumer price index (BLS, 2019).

8. REPUBLIC OF PALAU

8.1 FY 2018 OIA Payments Summary

Like the other insular areas, Palau faces a number of obstacles to economic development, including limited land and resources, a small population, limited local technical expertise, a narrow economic base, and vulnerability to natural disasters. The average GDP per capita for Palau in 2018 was $13,663 (2018$) as compared with the GDP per capita of the United States, which was $61,390 (World Bank, 2019a). Through their funding and support, OIA strives to foster economic development, promote sound management, and improve quality of life in Palau.

In September 2010, the governments of the United States and Palau signed a 15-year Compact agreement that offers $250 million in assistance through 2024. In September 2018, the Republic of Palau and the United States agreed to amend the 2010 agreement. This amendment resulted in a large increase in OIA payments to Palau in 2018. The Fiscal Year 2020 Budget Justification lists a total of $123,824,000 in payments to Palau for the Palau Compact Extension (OIA, 2019a, 2019b). According to the amendment signed by the United States and Palau, approximately $89.36 million of these funds were spent in 2018. This includes $65.25 million transferred to the fund created in the original agreement, $2 million transferred to a fund for infrastructure maintenance, and a further $22.106 million for economic assistance. The remaining funds are to be transferred to Palau between 2019 and 2024, as specified in the amendment (Agreement Between the Government of the United States of America and The Government of the Republic of Palau to Amend the Agreement Between the Government of the United States of America and the Government of the Republic of Palau Following the Compact of Free Association Section 432 Review, 2018). This report uses the estimated $89.36 million spent in FY 2018 as OIA spending in Palau for the Compact Extension in place of the $123.8 million listed in the Budget Justification. OIA payments made to Palau in 2018, including both the Compact of Free Association and other OIA funding, totaled just under $91 million and were primarily dedicated to the government sector. A detailed breakdown of OIA payments to Palau is presented in Table 8-1. The largest block of OIA payments to Palau, totaling $89.9 million in spending inside the island, came through the Compact of Free Association. This includes funding for infrastructure improvements, economic assistance, and government fiscal support (OIA, 2019a).

RTI estimates that all spending associated with Palau was initiated within Palau.

Assistance to Territories payments totaled $0.6 million. General technical assistance provided direct grants, judicial training, the Prior Service Benefits Program, and the PITI-VITI. Therefore, the total amount of OIA payments spent within Palau is about $89.9 million.

Table 8-1. OIA Payments and Estimated Spending within Palau (FY 2018)

Appropriation	Spending ($'000, 2018$)	Impact Treatment
Compact of Free Association		
Federal services assistance	$636	Transfer
Program grant assistance	$0	Government
Infrastructure project	$0	Construction
Economic assistance	$0	Government
Compact extension	$89,356	
Total, Compact of Free Association	$89,992	
Assistance to Territories		
General technical assistance—Direct grant	$371	Government
Subtotal, general technical assistance	$371	
Coral Reef Initiative	$182	Government
Total, assistance to territories	$553	
Total Payments	$90,545	
Spending Outside Palau	$636	
Total Spending Inside Palau	$89,909	

Source: RTI estimates based on OIA (2018, 2019a, 2019b).

8.2 Direct Economic Impacts of Payments

Direct economic impacts of OIA payments were assigned to four economic sectors—education, construction, government, and an assortment of private industries through the spending of Prior Service Benefits recipients. To calculate the employment and employee compensation impacts associated with this spending, as described in the methodology, we used the following output and employee compensation-to-employee ratios:[1]

- **Education:** Based on data provided in the Fiscal Year 2018 Economic Review for Palau, the employee compensation-to-employee ratio in the education sector in 2017 was $12,990 (PITI-VITI, 2019d). Because information was not available for output associated with the education sector, the output-per-employee ratio for American Samoa was used ($78,056). American Samoa was chosen to be the best point of comparison in this context because economic metrics, such as GDP per capita, were more similar to Palau than for any other area for which data were available. However, it should be noted that to the extent this proxy overestimates the true output-to-employee ratio for Palau the direct impacts of OIA spending will be underestimated because more jobs would be supported by each dollar of OIA spending.

[1] All adjustments for inflation were made using the U.S. consumer price index for all urban consumers (BLS, 2019).

- **Construction:** According to the PITI-VITI (2019d) economic review, in 2017 1,052 workers were located in the construction sector, which received $8.8 million in employee compensation in 2017. This implies an average employee compensation-to-employee ratio of **$8,601** in 2018 dollars. Because information was not available for output associated with the construction sector, the output-to-employee ratio for American Samoa was used ($79,503).

- **Government**: Based on PITI-VITI Fiscal Year 2018 Economic Review, the government of Palau received nearly $118.6 million in revenue in FY 2017 and employed approximately 3,246 people that year (PITI-VITI, 2019d). This implies the ratio of government revenue to government employees was $37,423 in 2018 dollars. Similarly, based on 2017 average wage estimates from the PITI-VITI (2017d) Fiscal Year 2018 Economic Review, the employee compensation-to-employee ratio for government workers was estimated to be $16,165 in 2018 dollars.

- **Private:** Based on quarterly employment and gross wage/salary reports from PITI-VITI, 8,562 workers were located in the private sector who received $80.1 million in employee compensation in 2017. This implies an average employee compensation-to-employee ratio of **$9,578** in 2018 dollars. Because information was not available for output associated with the private sector, the output-to-employee ratio for American Samoa was used ($178,462).

Dividing the payments directed toward each sector by the output-to-employee ratio yields the direct employment impacts, while multiplying the direct employment impacts by the employee compensation-to-employee ratio yields the direct employee compensation impacts. Direct impacts are reported in Table 8-2.

Table 8-2. Palau: Estimated Direct Economic Impacts (FY 2018)

Industry	FY 2018 Payments ($'000, 2018$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2018$)
Education	$0	$78,056	$12,990	0	$0
Construction	$0	$79,503	$8,601	0	$0
Government	$89,909	$37,423	$16,165	2,403	$38,837
Private	$0	$178,462	$9,578	0	$0
Total	**$89,909**			**2,403**	**$38,837**

Sources: RTI estimates based on OIA (2018, 2019a, 2019b), ADB (2017), Census (2017b), and PITI-VITI (2019d). All data were adjusted to 2017 dollars using the consumer price index (BLS, 2017).

As a result of the large increase in OIA payments to Palau with respect to the size of Palau's economy, it was not possible to calculate realistic multipliers using EBA. Table 8-3 shows the direct impacts of OIA payments to Palau in comparison to the most recently published data on Palau's economy.

Table 8-3. Palau: Direct Economic Impacts and National Statistics (FY 2018)

Economic Impact Category	Direct Economic Impact FY 2018	2017 National Data
Employment (#)	2,403	11,832
Employee compensation ($'000; 2018$)	$38,837	$134,846
GDP ($'000; 2018$)	$89,909	$296,879

As of June 2019, the most recently published data on Palau's economy refer to 2018 economic activity. Data on 2017 economic activity would not account for any changes as a result of OIA's spending. In the past, OIA spending in Palau and Palau's economy has been relatively stable. As a result, multipliers calculated using previous years of economic data for Palau were largely applicable to OIA spending in the following year. Because of the large increase in OIA spending in Palau from 2017 to 2018 and because of the large ratio of this spending to Palau's overall economy, it is not possible to calculate realistic multipliers for 2018 spending using 2017 data. 2018 and 2019 data on Palau's economy will better reflect the results of this spending and allow the calculation of realistic multipliers. Because that data are currently unavailable, this report will only present a comparison of OIA's direct economic impacts to 2017 data on Palau's economy.

Table 8-3 shows that the direct impacts of OIA spending in Palau are significant in comparison to the size of Palau's economy. OIA spending in FY 2018 totaled $89.9 million. In comparison, Palau's 2017 GDP in 2018 dollars was only $296.9 million. Because of Palau's relatively small GDP, it is highly likely that the $89.9 million OIA spent in Palau in FY 2018 will have a significant impact on Palau's economy.

9. DISTRICT OF COLUMBIA AND HAWAII

In addition to payments spent directly in the insular areas, the OIA operates and spends payments in the District of Columbia and Hawaii. The economic impact of OIA operations in the District of Columbia and Hawaii was calculated using IMPLAN I/O modeling software.[1] Similarly to modeling for the U.S. territories, IMPLAN uses an I/O modeling framework that allows specific multipliers to be calculated for each industry.

9.1 Economic Impact Assessment of OIA Operations in District of Columbia

The FY 2018 budget for OIA operations and the Coral Reef Initiative in Washington, DC, was $10.3 million, which falls within the IMPLAN industry code 535: Federal Government, Nonmilitary. Similar to the analysis used for the insular areas, direct employment and employee compensation impacts can be measured using the output-to-employee and employee compensation-to-employee ratios for this sector.

Direct impacts were multiplied by IMPLAN-generated multipliers to estimate the total impact of OIA activity in Washington, DC. The relevant multipliers and total impacts that were estimated for this analysis are reported in Table 9-1. The total economic impacts of OIA operations on the District of Columbia are

- 59 employees,
- $9.2 million in employee compensation, and
- $11.5 million in GDP.

9.2 Economic Impact Assessment of OIA Operations in Hawaii

The FY 2018 budget for OIA operations in Hawaii was just under $18 million. The details of these payments and the IMPLAN codes to which they were assigned are reported in Table 9-2.

As in the previous analysis, direct impacts were estimated using output and employee compensation-to-employee ratios from the IMPLAN model. The direct employment, employee compensation, and output inputs are reported in Table 9-3.

[1] To estimate the total economic impact associated with this funding, we used 2013 I/O models of the Washington, DC, and Hawaii economies constructed using IMPLAN economic modeling software. IMPLAN categorizes businesses in these industries into a system of 536 industry codes. IMPLAN was selected because it is one of the most widely used I/O modeling software packages in economic development analysis. IMPLAN, like all I/O models, quantifies the economic impact using multipliers to represent indirect and induced impacts. Total impacts can be estimated by multiplying the direct impacts of the project by these multipliers.

Table 9-1. Economic Impact Assessment of OIA Operations in District of Columbia (FY 2018)

	Employment (# of employees)	Employee Compensation ($'000, 2018)	Total Value Added ($'000, 2018)
Direct Economic Impact			
OIA operations	49	$8,548	$10,307
Indirect and Induced Economic Impacts			
Multiplier	1.21	1.08	1.11
Total Economic Impact	**59**	**$9,232**	**$11,488**

Sources: RTI estimates based on OIA (2018, 2019a, 2019b) and IMPLAN.

Table 9-2. 2018 OIA Operations in Hawaii and Corresponding IMPLAN Codes

Funding Description	Funding Amount ($2018)	Industry Description	IMPLAN Code
Compact of Free Association			
Compact impact	$12,762	Healthcare	482
Total, Compact of Free Association	$12,762		
Assistance to Territories			
General technical assistance—USDA Graduate School PITI-VITI	$-	Education	472
General technical assistance—Pacific Basin Development Center	$-	Government	531
General technical assistance—Direct grant	$683	Government	531
General technical assistance—Close-Up Foundation	$-	Education	472
Subtotal, general technical assistance	$683		
Coral Reef Initiative	$-	Government	531
Brown Tree Snake Control	1,690	Government	531
Office of Insular Affairs	1,097	Government	531
Compact Impact Discretionary	$1,702	Education	472
Maintenance assistance	$-	Government	531
Subtotal other	$4,489		
Total, assistance to territories	$5,172		
Total Spending Inside Hawaii	**$17,934**		
Total Spending Inside Hawaii	**$17,934**		

Sources: RTI estimates based on OIA (2018, 2019a, 2019b) and IMPLAN.

Table 9-3. Direct Economic Impacts of OIA Operations in Hawaii (FY 2018)

Industry Description	IMPLAN Code	Direct Employment Impact (# of workers)	Direct Employee Compensation Impact ($'000; 2018$)	Direct Total Value-Added Impact ($'000; 2018$)
Hospitals	482	77	$6,823	$7,820
Education	472	29	$1,178	$1,267
State gov't—Noneducation	531	33	$2,967	$3,470
Total		**139**	**$10,968**	**$12,557**

Sources: RTI estimates based on OIA (2018, 2019a, 2019b) and IMPLAN.

As previously discussed, direct impacts were multiplied by Type II Social Accounting Matrix multipliers generated in IMPLAN to estimate the total impact of OIA payments on the state's economy. The relevant multipliers that were estimated for this analysis are reported in Table 9-4.

Table 9-4. Selected Multipliers by Industry, Hawaii

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Value-Added Multiplier
Hospitals	482	1.82	1.43	1.65
Education	472	1.28	1.30	1.54
State gov't—Noneducation	531	1.40	1.20	1.31

Source: IMPLAN.

The indirect and induced impacts of OIA payments are estimated to be an additional 85 jobs and $3.9 million in employee compensation. Therefore, the total economic impact of OIA payments to Hawaii is 224 jobs, $14.9 million in employee compensation, and $19.4 million in GDP. See Table 9-5.

Table 9-5. Total Economic Impacts of OIA Payments, Hawaii

Industry Description	Employment (# of employees)	Employee Compensation ($'000, 2018)	Total Value-Added Impact ($'000, 2018)
Direct impacts	139	$10,968	$12,557
Indirect and induced impacts	85	$3,902	$6,828
Total[a]	224	$14,870	$19,385

a Values may not add to total because of rounding.

Sources: RTI estimates based on OIA (2018, 2019a, 2019b) and IMPLAN.

10. ANALYSIS SUMMARY

The purpose of this study was to measure the economic impact of OIA payments on insular areas as measured by economic aggregates such as employment, employee compensation, and GDP. This task was accomplished primarily through the use of simple economic base models that were constructed for each of the seven insular areas. The results of this analysis are presented in the Tables 10-1 through 10-3 and in the Executive Summary.

Table 10-1. Estimated Employment Impact of OIA Payments (FY 2018)

	Direct Employment Impact (#)	Indirect/Induced Employment Impact (#)	Total Employment Impact (#)	Percentage of National Employment Supported by OIA Payments (%)
American Samoa	1,058	124	1,182	9%
Guam	3,363	136	3,499	6%
Northern Mariana Islands	664	127	791	3%
U.S. Virgin Islands	6,085	643	6,727	17%
Micronesia	2,351	4,909	7,260	46%
Marshall Islands	1,981	2,814	4,795	43%
Palau	2,398	N/A	N/A	N/A

Source: RTI estimates.

Table 10-2. Estimated Employee Compensation Impact of OIA Payments (FY 2018)

	Direct Employee Compensation Impact (`000, 2018$)	Indirect/ Induced Employee Compensation Impact (`000, 2018$)	Total Employee Compensation Impact (`000, 2018$)	Percentage of National Employee Compensation Supported by OIA Payments (%)
American Samoa	$30,534	$2,230	$32,765	16%
Guam	$105,231	$2,976	$108,207	7%
Northern Mariana Islands	$15,331	$2,044	$17,375	3%
U.S. Virgin Islands	$261,898	$19,799	$281,697	20%
Micronesia	$25,618	$43,475	$69,093	51%
Marshall Islands	$24,090	$26,349	$50,440	41%
Palau	$38,758	N/A	N/A	N/A

Source: RTI estimates.

Table 10-3. Estimated GDP Impact of OIA Payments (FY 2018)

	Direct GDP Impact (`000, 2018$)	Indirect/ Induced GDP Impact (`000, 2018$)	Total GDP Impact (`000, 2018$)	Percentage of National GDP Supported by OIA Payments (%)
American Samoa	$35,069	$106	$35,174	5%
Guam	$106,051	$174	$106,225	2%
Northern Mariana Islands	$16,498	$71	$16,569	1%
U.S. Virgin Islands	$263,368	$1,722	$265,090	7%
Micronesia	$84,112	$156,198	$240,311	70%
Marshall Islands	$61,272	$73,526	$134,798	64%
Palau	$89,727	N/A	N/A	N/A

Source: RTI estimates.

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APPENDIX A:
ALLOCATION OF FY 2018 TECHNICAL ASSISTANCE AND OTHER PAYMENTS BY INSULAR AREA

OIA grants and federal payments for technical assistance and other initiatives are made or distributed as needed during each fiscal year. For FY 2018 payments, we relied on two sources to determine payments to the insular areas. First, we used the 2018 Congressional Report as the most recent estimate of FY 2018 funding; we then used the FY 2020 Budget Justification from the OIA to further breakdown spending categories to understand which economic sector to apply certain payments. Table A-1 presents a breakdown of general technical assistance by grant/program and by the insular area receiving the funds. In several cases, the exact amount of funding going to each insular area was indicated in the Congressional Report or Budget Justification. However, in several cases, information was not available for how the funds associated with particular grants/programs would be distributed by area, so we made assumptions. These cases included the following:

- Allocation for the Direct Grants to Insular Areas, part of general technical assistance funding, was not available at the time of this report. Therefore, RTI applied a solver analysis through Excel to distribute the funds based on the totals specified for each General Technical Assistance category and the total General Technical Assistance spending in each area.
- USDA Graduate School PITI-VITI: A total of $2.4 million was allocated to this program for FY 2018. Because the PITI-VITI serves all seven insular areas, this $2.4 million was distributed across all seven areas and Hawaii (where the PITI-VITI offices are located) based on the solver program used earlier.
- Civic education funding: A total of $1.3 million was allocated to this program for FY 2018. This money is received directly by the Close-Up Foundation and Junior Statesmen Foundation, but no additional information for how these funds might be distributed across each insular areas was provided. Therefore, the $1.3 million was divided across all seven insular areas according to the solver function described earlier.
- Prior Service Benefits Program: A total of $904,332 was allocated to this program. These funds were allocated to each area based on the solver function described above.

Table A-1. Estimation of FY 2018 General Technical Assistance by Area

	Treatment	American Samoa (`000, 2018$)	CNMI (`000, 2018$)	Guam (`000, 2018$)	USVI (`000, 2018$)	Federated States of Micronesia (`000, 2018$)	Republic of Marshall Islands (`000, 2018$)	Republic of Palau (`000, 2018$)	Hawaii (`000, 2018$)	DC (`000, 2018$)	Total (`000, 2018$)
Direct Grants To Insular Areas	Government	$2,291	$1,408	$1,367	$2,810	$20	$1,054	$371	$683	$1,328	$11,331
USDA Grad School PITI-VITI	Education	$-	$993	$654	$64	$-	$-	$-	$-	$643	$2,354
U.S. Bureau of Commerce, BEA (for GDP data)	Government	$-	$265	$236	$-	$-	$-	$-	$-	$234	$736
Civic Ed	Education	$-	$421	$430	$-	$-	$-	$-	$-	$424	$1,275
Prior Service Benefits Program	Prior Service Benefits Program	$-	$312	$298	$-	$-	$-	$-	$-	$295	$904
Disaster Relief to USVI	Government	$-	$-	$-	$3,000	$-	$-	$-	$-	$-	$3,000
Atoll	Healthcare	$-	$-	$-	$-	$-	$1,400	$-	$-	$-	$1,400
Total		$2,291	$3,398	$2,986	$5,873	$20	$2,454	$371	$683	$2,924	$21,000