

# *The Economic Importance of the U.S. Shipbuilding and Repairing Industry*

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# The Economic Importance of the U.S. Shipbuilding and Repairing Industry

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# *Executive Summary*

The U.S. shipbuilding and repairing industry is comprised of establishments that are primarily engaged in operating shipyards, which are fixed facilities with drydocks and fabrication equipment. Shipyard activities include ship construction, repair, conversion and alteration, as well as the production of prefabricated ship and barge sections and other specialized services. The industry also includes manufacturing and other facilities outside of the shipyard, which provide parts or services for shipbuilding activities within a shipyard, including routine maintenance and repair services from floating drydocks not connected with a shipyard.

The purpose of this report is to measure the economic importance of the U.S. shipbuilding and repairing industry. The importance of the industry is not limited to the direct output and employment it generates (i.e., “direct impact”). Companies in the shipbuilding and repairing industry purchase inputs from other domestic industries, contributing to economic activity in those sectors (i.e., “indirect” impact). Employees spend their incomes, helping to support the local and national economies (i.e., “induced” impact). Thus, the economic importance of the U.S. shipbuilding and repairing industry includes direct, indirect, and induced effects. Put differently, the report seeks to document what happens in the shipbuilding and repairing industry and its relationships to the broader economy. It is important to note that the term “economic impacts” as used in this report reflects the association of employment, labor income, and gross domestic product (GDP) with the shipbuilding and repairing industry, but does not imply that some of this economic activity would not otherwise exist without the industry (particularly with regard to induced impacts).

The MIG model, an input-output (I-O) model based on Federal government data, was used to estimate the industry's overall economic impact. I-O modeling is typically employed to analyze how a change in economic activity in one sector of the economy affects activities in other sectors of the economy. In a so-called “marginal” impact analysis, I-O model results can be viewed as showing the impact of small changes in activity in one sector (e.g., shipbuilding) on the rest of the economy before any price adjustments and before businesses, workers, and consumers adjust their activities. The ultimate economic impact of a change in activity will be less pronounced than shown in initial I-O results, particularly if induced price changes are large.

I-O models can also be used in an economic contribution analysis, as done in this study. By simulating a “complete shutdown” of an existing industry, an economic contribution study attempts to quantify the portion of a region’s economy that can be attributed to such an existing industry. It uses the I-O model to identify all backward (i.e., upstream) linkages in the study area. An economic contribution analysis, when compared with the entire study area economy, offers insights into the relative extent and magnitude of the industry in the study area. However, this is not to say that a complete shutdown of the shipbuilding and repairing industry would result in the permanent loss of the jobs and output attributable to the industry through this exercise. In this unlikely event, the resources currently allocated to the shipyards may find employment in other industries, which would compensate in part for the loss of the jobs and output from the shipyard sector.

The study disaggregates the industry's economic activity into two components, operational and capital investment impacts. The operational impact is from purchases of intermediate goods and services, and its capital investment impact is from investment in new structures and equipment.<sup>1</sup> These

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<sup>1</sup> The MIG model results were adjusted to include the economic activity attributable to capital spending by the shipbuilding and repairing sector.

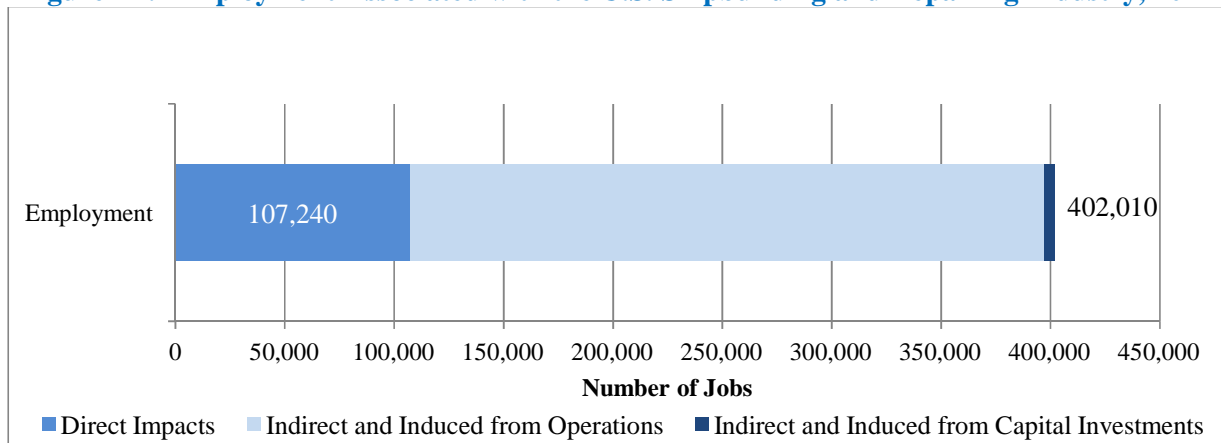
economic impacts represent all of the backward linkages of the U.S. shipbuilding and repairing industry to its suppliers. They do not capture any forward linkages (i.e., the economic impact on production in sectors that use ships or other shipyard products as an input).

Currently there are 117 shipyards in the United States, spread across 26 states, that are classified as active shipbuilders. In addition, there are more than 200 shipyards engaged in ship repairs or capable of building ships but not actively engaged in shipbuilding.<sup>2</sup> The majority of shipyards are located in the coastal states, but there also are active shipyards on major inland waterways such as the Great Lakes, the Mississippi River, and the Ohio River. Employment in shipbuilding and repairing is concentrated in a relatively small number of coastal states, with the top five states accounting for 62 percent of all private employment in the shipbuilding and repairing industry.

The Federal government, including the U.S. Navy, U.S. Army, and U.S. Coast Guard, is an important source of demand for U.S. shipbuilders. While just one percent of the vessels delivered in 2011 (15 of 1,459) were delivered to U.S. government agencies, eight of the 11 large deep-draft vessels delivered were delivered to the U.S. government, seven to the U.S. Navy and one to the National Oceanic and Atmospheric Administration.

In 2011, the U.S. private shipbuilding and repairing industry directly provided 107,240 jobs (see **Figure E1**), \$7.9 billion in labor income, and \$9.8 billion in gross domestic product, or GDP, to the national economy (see **Figure E2**). Including direct, indirect, and induced impacts, on a nationwide basis, total economic activity associated with the industry reached 402,010 jobs, \$23.9 billion of labor income, and \$36.0 billion in GDP in 2011.

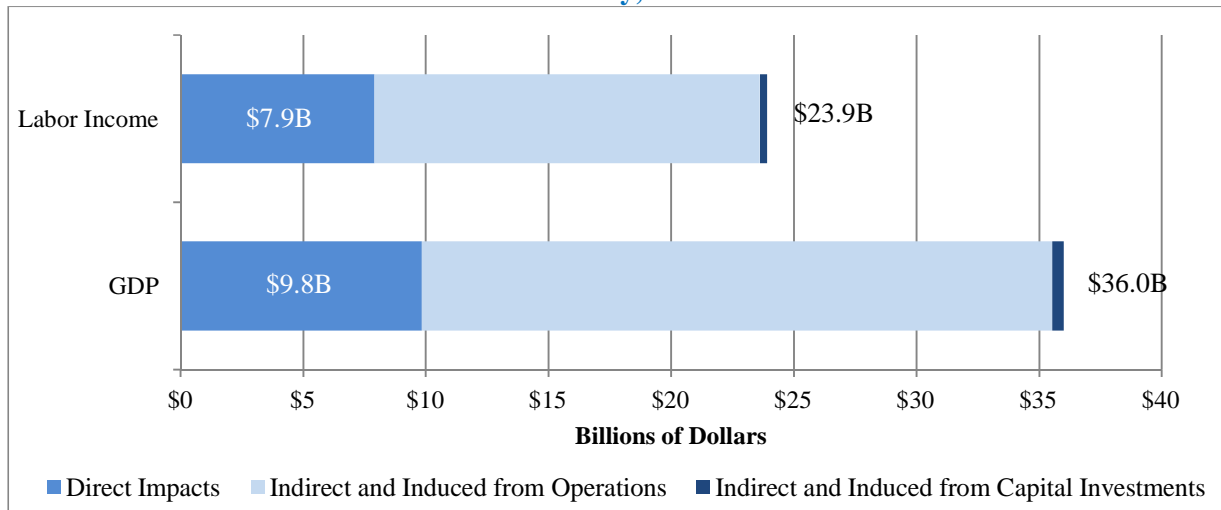
**Figure E1. Employment Associated with the U.S. Shipbuilding and Repairing Industry, 2011**



Source: Calculations using the MIG modeling system (2011 database).

<sup>2</sup> See [www.shipbuildinghistory.com](http://www.shipbuildinghistory.com) for details.

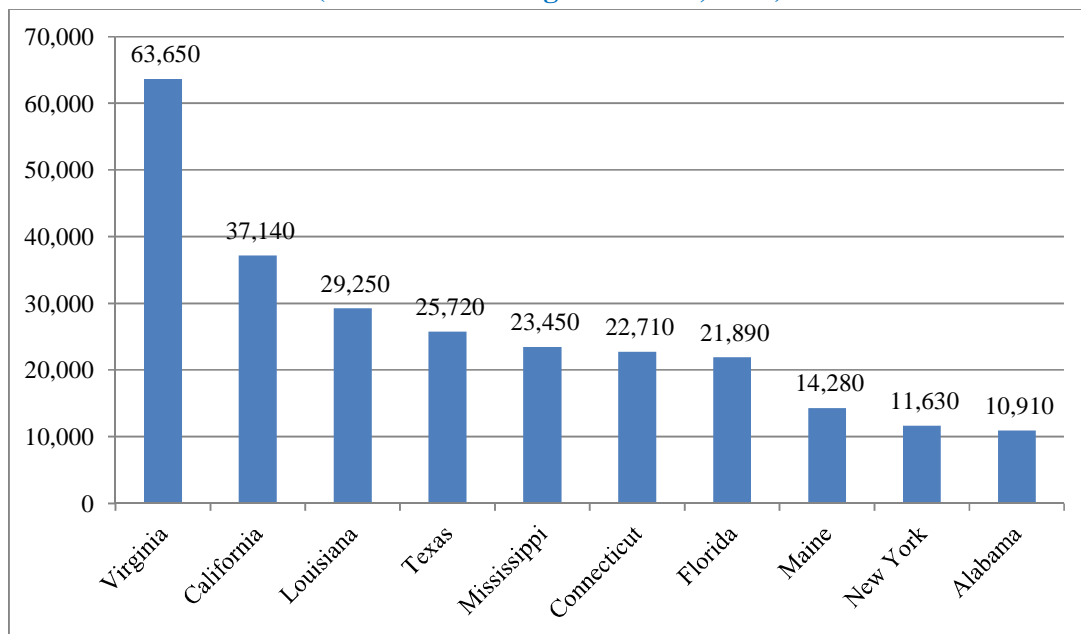
**Figure E2. Labor Income and GDP Associated with the U.S. Shipbuilding and Repairing Industry, 2011**



Source: Calculations using the MIG modeling system (2011 database).

The industry impact by state varies based on the level of direct activity and the share of the supply chain included in the state. The states with the highest levels of overall direct, indirect, and induced employment associated with the industry are Virginia, California, Louisiana, Texas, Mississippi, Connecticut, and Florida (see **Figure E3**).

**Figure E3. Total Direct, Indirect, and Induced Employment Associated with U.S. Shipbuilding and Repairing Industry Operations, by State (10 States with Highest Levels, 2011)**



Source: Calculations using the MIG modeling system (2011 database).

Considering the indirect and induced impacts, each direct job in the shipbuilding and repairing industry is associated with another 2.7 jobs in other parts of the US economy; each dollar of direct

labor income and GDP is associated with another \$2.03 in labor income and \$2.66 in GDP, respectively, outside of the shipbuilding and repairing industry.

# *I. Introduction*

The purpose of this report is to quantify the economic importance of the U.S. private shipbuilding and repairing industry in 2011, in terms of employment, labor income, and GDP.<sup>3</sup> The study quantifies the industry's *operational impact* (due to its purchases of intermediate inputs) at the national and state levels and *capital investment impact* (due to its investment in new structures and equipment) at the national level. These economic impacts represent all of the backward linkages of the U.S. shipbuilding and repairing industry to its suppliers. They do not capture any forward linkages (i.e., the economic impact on production in sectors that use ships as an input). It is important to note that the term “economic impact” as used in this report reflects the employment, labor income, and gross domestic product (GDP) associated with the shipbuilding and repairing industry, but does not imply that some of this economic activity would not otherwise exist without the industry.

In describing the economic importance of the U.S. shipbuilding and repairing industry through its employment and purchases of goods and services, this report considers three separate channels -- the direct impact, the indirect impact, and the induced impact -- that in aggregate provide a measure of the economic importance of the U.S. shipbuilding and repairing industry.

- **Direct impact** is measured as the jobs, labor income, and GDP within the shipbuilding and repairing industry.
- **Indirect impact** is measured as the jobs, labor income, and GDP occurring throughout the supply chain of the shipbuilding and repairing industry. The indirect impact also includes suppliers to the companies providing goods and services to the shipbuilding and repairing industry.
- **Induced impact** is measured as the jobs, labor income, and GDP resulting from household spending of labor income earned either directly or indirectly from the shipbuilding and repairing industry's spending under standard input-output modeling assumptions. It should be interpreted with caution as it involves personal spending decisions by employees of shipyards and its supply chain that are further removed from direct shipyard expenditure activities and is more difficult to estimate.

Together these effects demonstrate the shipbuilding and repairing industry's economic importance and relationship to all sectors of the U.S. economy.

The MIG model, an input-output (I-O) model based on Federal government data, was used to estimate the industry's overall economic impact. I-O modeling is typically employed to analyze how a change in economic activity in one sector of the economy affects activities in other sectors of the economy. In a so-called “marginal” impact analysis, I-O model results can be viewed as showing the impact of small changes in activity in one sector (e.g., shipbuilding) on the rest of the economy before any price adjustments and before businesses, workers, and consumers adjust their activities in response to potential changes. The ultimate economic impact of a change in activity will be less pronounced than shown in initial I-O results, particularly if induced price changes are large.

I-O models can also be used in an economic contribution analysis, as done in this study. By simulating a “complete shutdown” of an existing industry, an economic contribution study attempts to

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<sup>3</sup> Gross domestic product (GDP) reflects the income earned by labor (e.g., wages and salaries) and capital (e.g., profits) and any indirect business taxes (including excise taxes, property taxes, fees, licenses, and sales taxes paid by businesses).

quantify the portion of a region's economy that can be attributed to such an existing industry. It uses the I-O model to identify all backward (i.e., upstream) linkages in the study area. An economic contribution analysis, when compared with the entire regional economy, offer insights into the relative extent and magnitude of the industry in the study area. However, this is not to say that a complete shutdown of the shipbuilding and repairing industry would result in the permanent loss of the jobs and output attributable to the industry through this exercise. In fact, the resources currently allocated to the shipyards may find employment in other industries, which would compensate in part for the loss of the jobs and output from the shipyard sector.

The rest of this report is organized as follows. **Section II** provides a brief overview of the U.S. shipbuilding and repairing industry. **Section III** presents estimates of the industry's economic impact in 2011 in terms of employment, labor income, and GDP at the national and state levels. **Appendix A** provides additional details on the industry's economic impact at the state level. **Appendix B** provides a description of the data sources and methodology used for the study. **Appendix C** provides a brief description of the input-output model used in the analysis.



## *II. Overview of the U.S. Shipbuilding and Repairing Industry*

### *A. Industry Definition*

Economic activity directly associated with the U.S. shipbuilding and repairing industry is primarily captured in government data under the North American Industry Classification System (NAICS) sector 336611, Shipbuilding and Repairing. According to the U.S. Census Bureau, this industry comprises establishments that are primarily engaged in operating shipyards, which are fixed facilities with drydocks and fabrication equipment. Shipyard activities include ship construction, repair, conversion, and alteration. They also include the production of prefabricated ship and barge sections, and other specialized services.<sup>4</sup> The industry may also include manufacturing and other facilities outside of the shipyard, which provide parts or services for ship building activities within a shipyard.

The industry also includes a portion of NAICS sector 488390, Other Support Activities for Water Transportation. Among other activities, NAICS sector 488390 includes routine repair and maintenance of ships from floating drydocks, as well as ship scaling services not done in a shipyard. According to the 2007 Economic Census, approximately 89.5 percent of the revenues of NAICS sector 488390 were derived from routine repairs and maintenance of maritime vessels.<sup>5</sup>

### *B. Description of the Industry*

Currently there are 117 shipyards in the United States, spread across 26 states, that are classified as active shipbuilders. In addition there are more than 200 shipyards engaged in ship repairs or capable of building ships but not actively engaged in shipbuilding.<sup>6</sup> As shown in **Figure 1**, below, the majority of active shipbuilders are located in the coastal states. However, there also are active shipyards on major inland waterways such as the Great Lakes, the Mississippi River, and the Ohio River. The industry also includes manufacturing and other facilities outside of these shipyards that provide parts or services for the shipbuilding and repairing industry. Furthermore, the industry includes routine maintenance and repairs conducted from floating drydocks. As a result, the scope of economic activity directly attributable to the U.S. shipbuilding and repairing industry is wider than the 26 states shown in Figure 1.

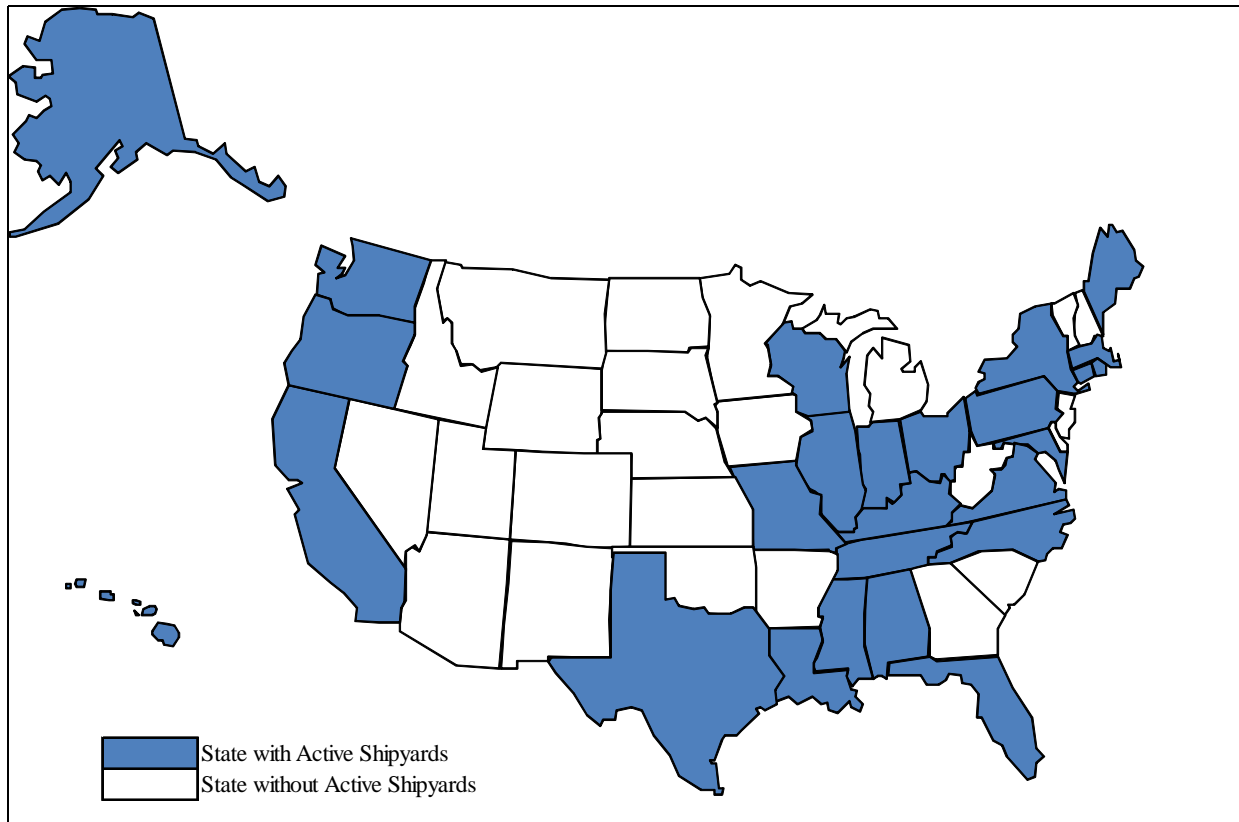
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<sup>4</sup> <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2007>

<sup>5</sup> U.S. Census Bureau, 2007 Economic Census, Report EC0748SLLS1, "Transportation and Warehousing: Subject Series - Product Lines: Product Lines Statistics by Kind of Business for the United States: 2007"

<sup>6</sup> See the directory of shipyards at <http://shipbuildinghistory.com>. Of the 117 shipyards summarized in Figure 1, five are public yards operated by the U.S. Navy or U.S. Coast Guard, six are major shipyards capable of building large naval vessels and/or deep-draft ocean going commercial ships, 20 are large shipyards capable of building mid-sized to large merchant ships, mid-sized to large naval vessels, offshore drilling rigs and high-value, high-complexity smaller vessels. The remaining 86 are relatively small shipyards, capable of building the simpler types of smaller commercial vessels, such as tugs, towboats, offshore service vessels, fishing vessels, ferries and barges. In addition to these shipyards, there are nine shipyards currently producing large yachts and 13 occasionally producing larger vessels. There is also a shipyard in the Virgin Islands which builds multi-hull vessels such as ferries and charter boats. Shipbuildinghistory.com also lists 293 shipyards and boatyards that are classified as inactive.

**Figure 1. 26 States with Active Shipbuilders**



Source: Directory of shipyards at <http://shipbuildinghistory.com>

### ***1. Private Employment***

The U.S. private shipbuilding and repairing industry accounted for an estimated 107,240 jobs in 2011, including both payroll employees and self-employed workers and both full-time and part-time workers. The vast majority of these jobs (97,450) were in NAICS sector 336611, with the remainder (9,790) accounted for by routine maintenance and repair conducted outside of a shipyard (NAICS sector 488390).<sup>7</sup>

Employment in shipbuilding and repairing is concentrated in a relatively small number of states (see **Figure 2**, below). In fact, as shown in **Table 1**, 62 percent of all private direct employment in the industry is located in just five states: Virginia, Louisiana, Mississippi, Connecticut, and California.

<sup>7</sup> These numbers do not include federal government employment. According to the U.S. Bureau of Labor Statistics, total employment at federal government-operated shipyards was 29,452 in 2011, up from 28,234 in 2010.

**Table 1. -- Total Private Sector Direct Employment in the U.S. Shipbuilding and Repairing Industry, Top 10 States in 2011**

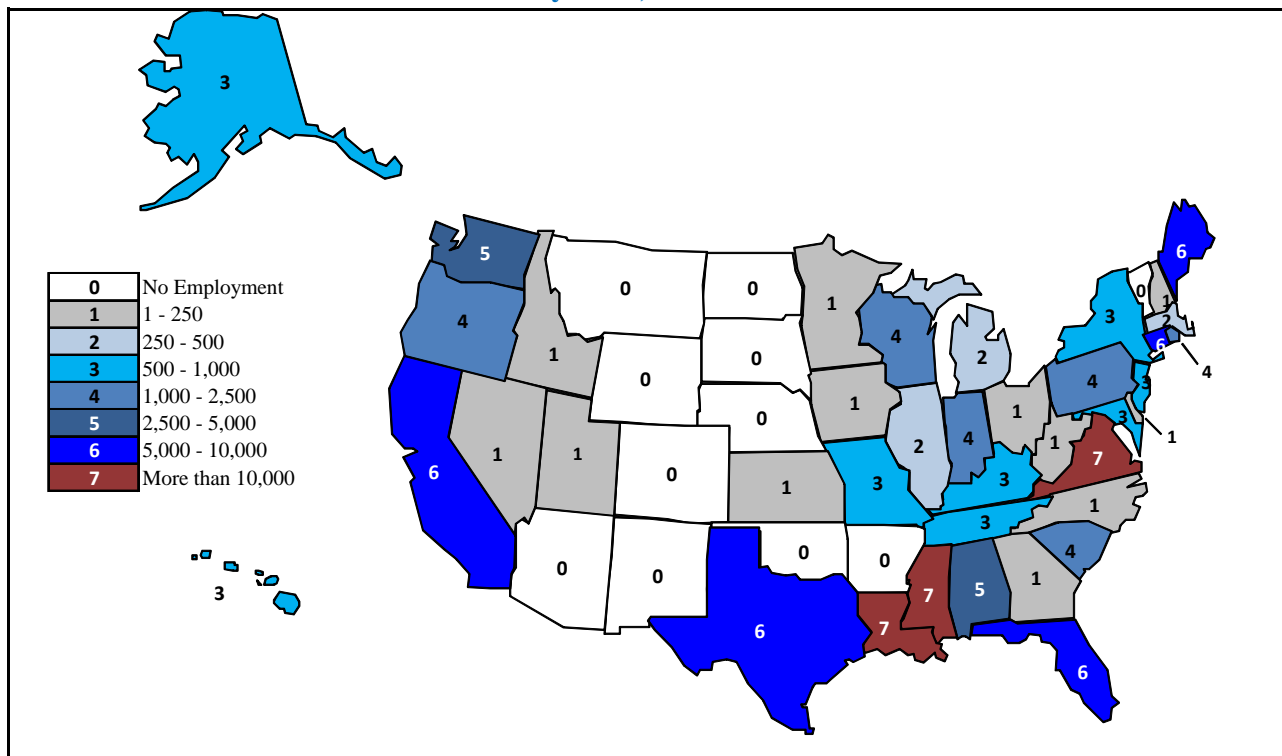
State	Private Employment <sup>a</sup>	Percent of U.S. Total
<i>Virginia</i>	<i>26,730</i>	<i>24.9%</i>
<i>Louisiana</i>	<i>12,970</i>	<i>12.1%</i>
<i>Mississippi</i>	<i>10,100</i>	<i>9.4%</i>
<i>Connecticut</i>	<i>8,870</i>	<i>8.3%</i>
<i>California</i>	<i>8,100</i>	<i>7.6%</i>
Maine	5,980	5.6%
Florida	5,790	5.4%
Texas	5,480	5.1%
Alabama	3,810	3.6%
Washington	3,520	3.3%
All other states combined	15,880	14.8%
<b>U.S. Total</b>	<b>107,240</b>	<b>100%</b>

Source: Estimates based on data from the MIG Modeling system (2011 database).

Note: Details may not add to totals due to rounding.

<sup>a</sup> Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.

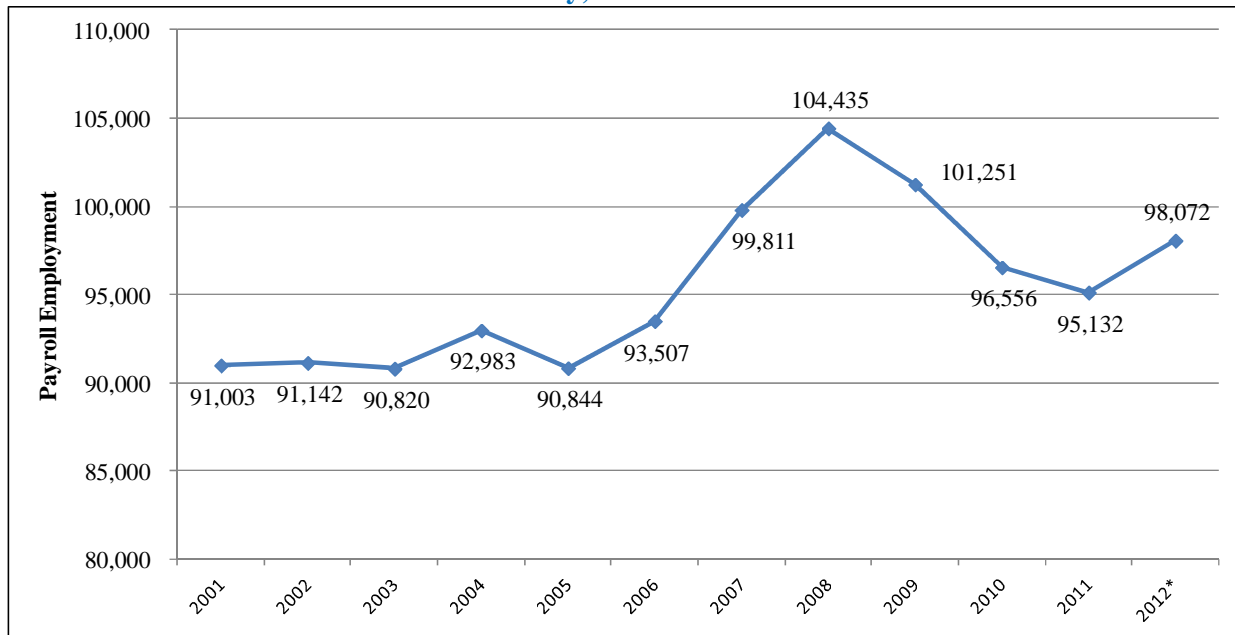
**Figure 2. Private Sector Direct Employment in the U.S. Shipbuilding and Repairing Industry by State, 2011**



Source: Estimates based on data from the MIG Modeling system (2011 database).

The majority of private sector jobs in the U.S. shipbuilding and repairing industry are payroll jobs. In 2011, payroll employment accounted for 95,130 of the total 97,450 jobs in NAICS sector 336611, nearly 98 percent of the total. Payroll employment in NAICS 336611 grew rapidly between 2005 and 2008, from 90,840 to 104,440 (see **Figure 3**). As a result of the global recession the industry contracted, losing more than 9,000 payroll jobs between 2008 and 2011, before rebounding in 2012. Payroll employment in NAICS sector 336611 averaged 98,070 over the first half of 2012.

**Figure 3. -- Private Sector Direct Payroll Employment in the U.S. Shipbuilding and Repairing Industry, 2001 to 2012\***



Source: Total private sector payroll employment for NAICS sector 336611 from U.S. Bureau of Labor Statistics, *Quarterly Census of Employment and Wages* (Downloaded February 25, 2013). Excludes the portion of the industry classified in NAICS sector 488390.

\*Data for 2012 is average for January through June.

## 2. Labor Income

Total private sector labor income in the U.S. shipbuilding and repairing industry (including wages and salaries and benefits as well as proprietors' income) amounted to \$7.9 billion in 2011. As with private employment, industry labor income is concentrated in a relatively small number of states, with five states (Virginia, Mississippi, Louisiana, Connecticut, and California) accounting for nearly 67 percent of all direct labor income for the U.S. shipbuilding and repairing industry (see **Table 2**).

Average labor income per job was approximately \$73,630 in 2011, 45 percent higher than the national average for the private sector economy (\$50,786).

**Table 2. -- Total Private Sector Direct Labor Income in the U.S. Shipbuilding and Repairing Industry, Top 10 States in 2011**

<b>State</b>	<b>Private Labor Income<sup>a</sup> (\$ millions)</b>	<b>Percent of U.S. Total</b>
Virginia	\$1,924.8	24.0%
Mississippi	1,087.8	13.8%
Louisiana	839.0	10.6%
Connecticut	827.4	10.5%
California	573.1	7.3%
Maine	443.7	5.6%
Texas	346.9	4.4%
Florida	325.9	4.1%
Washington	239.5	3.0%
Alabama	232.7	2.9%
All other states combined	1,055.3	13.4%
<b>U.S. Total</b>	<b>\$7,896.1</b>	<b>100%</b>

Source: Estimates based on data from the MIG Modeling system (2011 database).

Note: Details may not add to totals due to rounding.

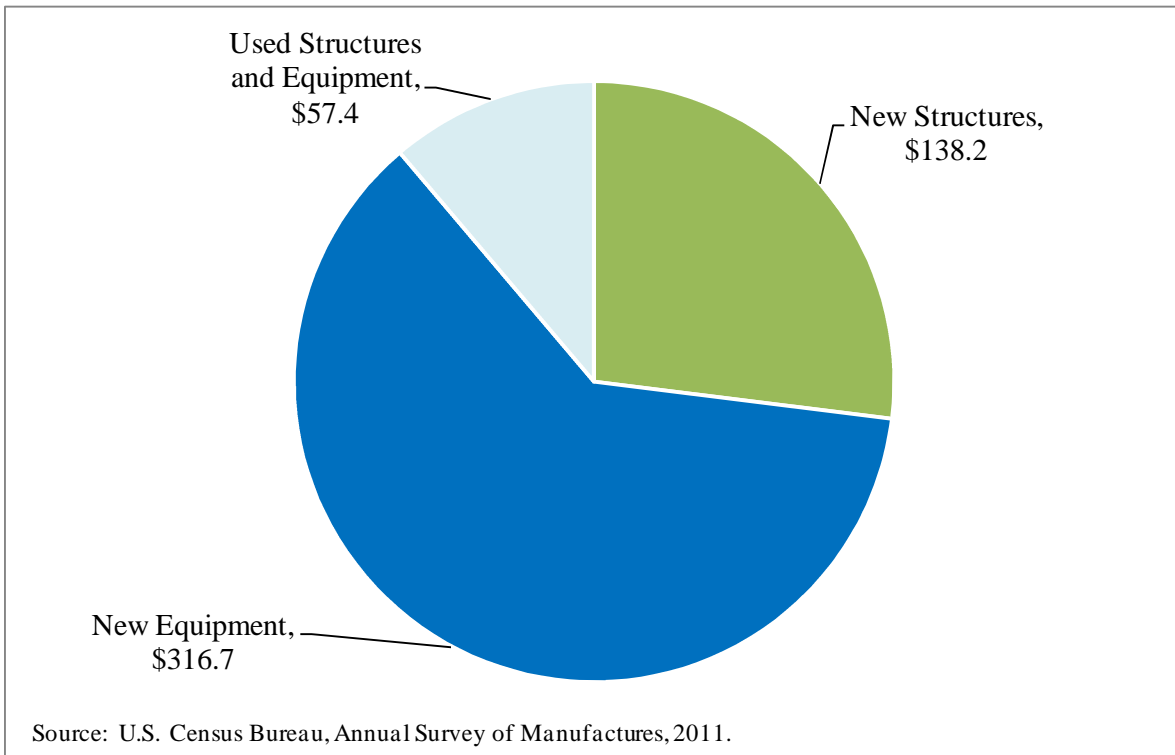
<sup>a</sup> Labor income is defined as wages and salaries, benefits, and proprietors' income.

### **3. Capital Expenditures**

According to the U.S. Census Bureau's *Annual Survey of Manufactures*, the shipbuilding and repairing industry (NAICS sector 336611) spent a total of \$512.3 million on new and used capital assets in 2011, down from \$833.7 million in 2010. The majority of capital spending for the industry is spending on new structures and equipment. In 2011, the industry spent an estimated \$455 million on new capital assets (\$316.7 million on new equipment and \$138.2 million on new structures) and \$57.4 million on used structures and equipment (see **Figure 4**).<sup>8</sup>

<sup>8</sup> Total capital expenditures are split between new and used assets using information from the Annual Capital Expenditure Survey from the U.S. Census Bureau for Other Transportation Equipment manufacturing.

**Figure 4. -- Capital Expenditures by U.S. Shipbuilders, by Type, 2011 (in \$ millions)**



#### 4. Industry Output

U.S. shipbuilders delivered 1,260 vessels of all types in 2012, down from 1,457 vessels in 2011 (see **Table 3**). Over 80 percent of vessels delivered in the last three years have been inland tank and deck barges. Deliveries of tugs and towboats, passenger vessels, commercial fishing vessels, and inland tank barges increased from 2010 to 2012.

**Table 3. -- Deliveries by U.S. Shipyards, by Type of Vessel, 2010-2012**

Type of Vessel	2010	2011	2012
Large Deep-Draft Vessels	16	11	11
Offshore Service Vessels and Crew Boats	38	21	28
Tugs and Towboats	81	109	118
Passenger Vessels (>50 feet)	22	30	33
Commercial Fishing Vessels (>50 feet)	8	20	15
Other Self-Propelled Vessels (>50 feet)	19	23	25
Large Oceangoing Barges	14	6	2
Inland Tank Barges	142	184	279
Inland Freight and Deck Barges	861	1,053	749
<b>Total Delivered</b>	<b>1,201</b>	<b>1,457</b>	<b>1,260</b>

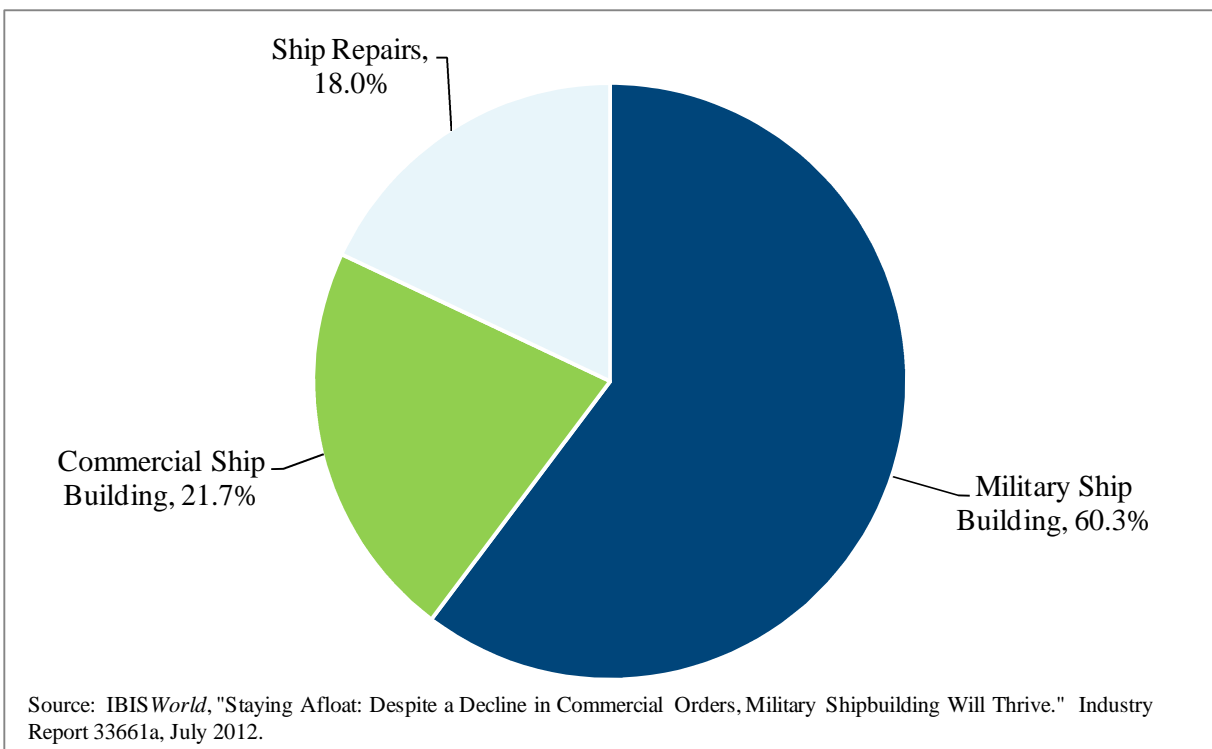
Source: www.shipbuildinghistory.com

Note: The delivery date for a vessel was determined by the date on which its Certificate of Documentation was issued, which should be, but may not be, the date on which the shipyard made delivery.

The federal government, including the U.S. Navy, U.S. Army, and U.S. Coast Guard, remains an important source of demand for U.S. shipbuilders. While only 15 of the 1,459 vessels delivered in 2011 were delivered to the U.S. government, nearly all (8 out of 11) of the large deep-draft vessels delivered were delivered to U.S. government agencies (seven to the U.S. Navy and one to the National Oceanic and Atmospheric Administration).

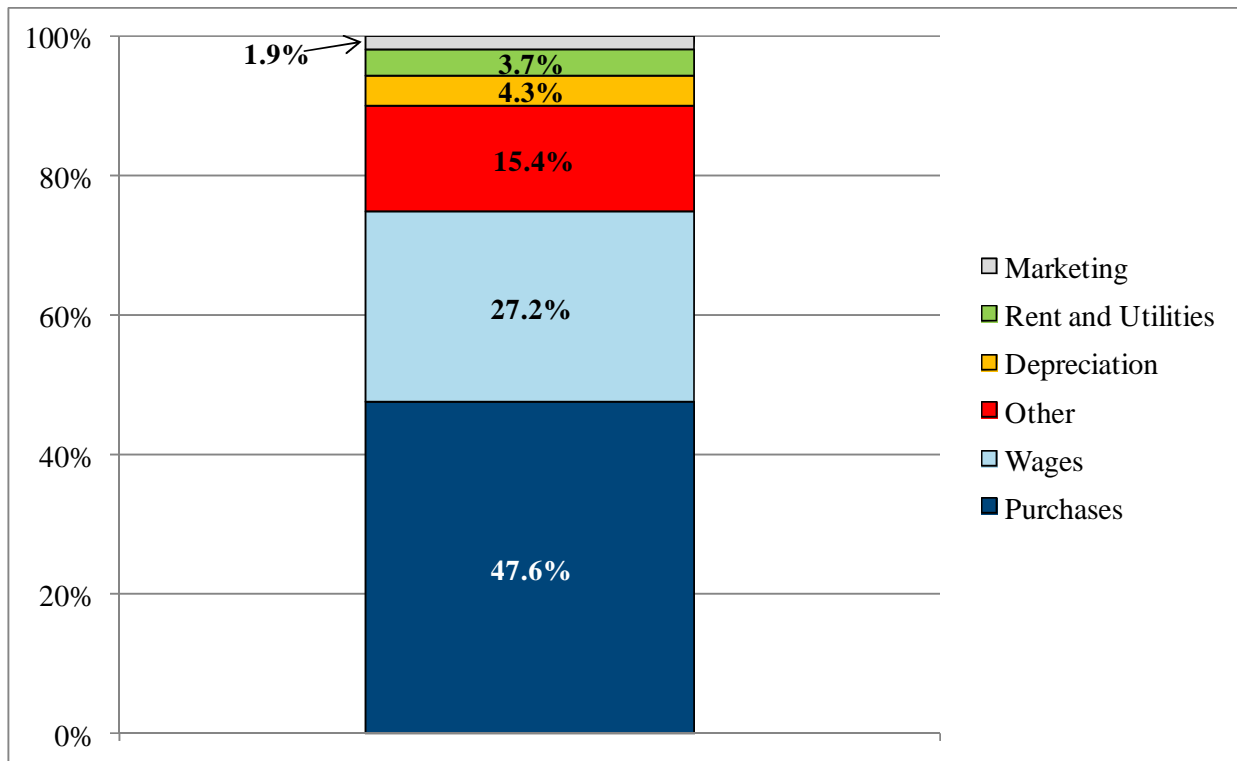
According to the *Annual Survey of Manufactures*, total revenues for the U.S. shipbuilding and repairing industry amounted to \$21.9 billion in 2011, down from \$22.1 billion in 2010. Initial estimates for 2012 from industry sources indicate total revenues of \$19.7 billion for the U.S. shipbuilding and repairing industry, with 60.3 percent coming from military shipbuilding, 21.7 percent from commercial shipbuilding, and the remaining 18.0 percent from ship repairs (see **Figure 5**).

**Figure 5. -- Industry Revenues by Product Type, 2012**



**Figure 6**, below, provides a breakdown of industry costs. The largest expense for ship builders is purchases of raw materials and supplies used in the construction and repair of ships, including paints, steel plates, copper tubing, aluminum, and iron castings. These purchases account for an estimated 47.6 percent of total industry costs. Labor costs are the second largest expenditure for the industry, amounting to approximately 27.2 percent of industry costs. Depreciation, rent and utilities, marketing and other costs represent 25.2 percent of industry costs.

Figure 6. -- Industry Costs by Type, 2012

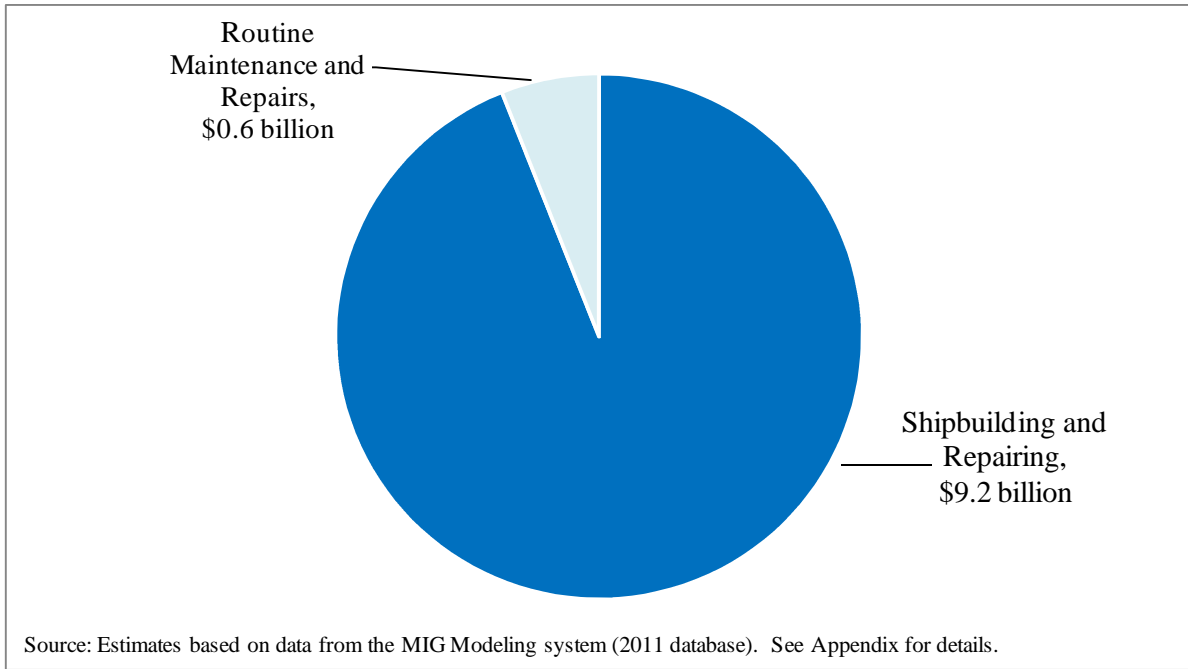


Source: Estimates based on IBISWorld, "Staying Afloat: Despite a Decline in Commercial Orders, Military Shipbuilding will Thrive." Industry Report 33661a, July 2012.

Total GDP in the U.S. private shipbuilding and repairing industry (including routine maintenance and repairs conducted outside of shipyards) amounted to \$9.8 billion in 2011. As with employment, the majority of the industry's GDP (\$9.2 billion) was related to shipbuilding and repairing tied to shipyards (NAICS sector 336611), compared to \$0.6 billion for routine maintenance and repairs conducted outside of a shipyard (see **Figure 7**).



**Figure 7. -- Total GDP in U.S. Shipbuilding and Repairing Industry, 2011**



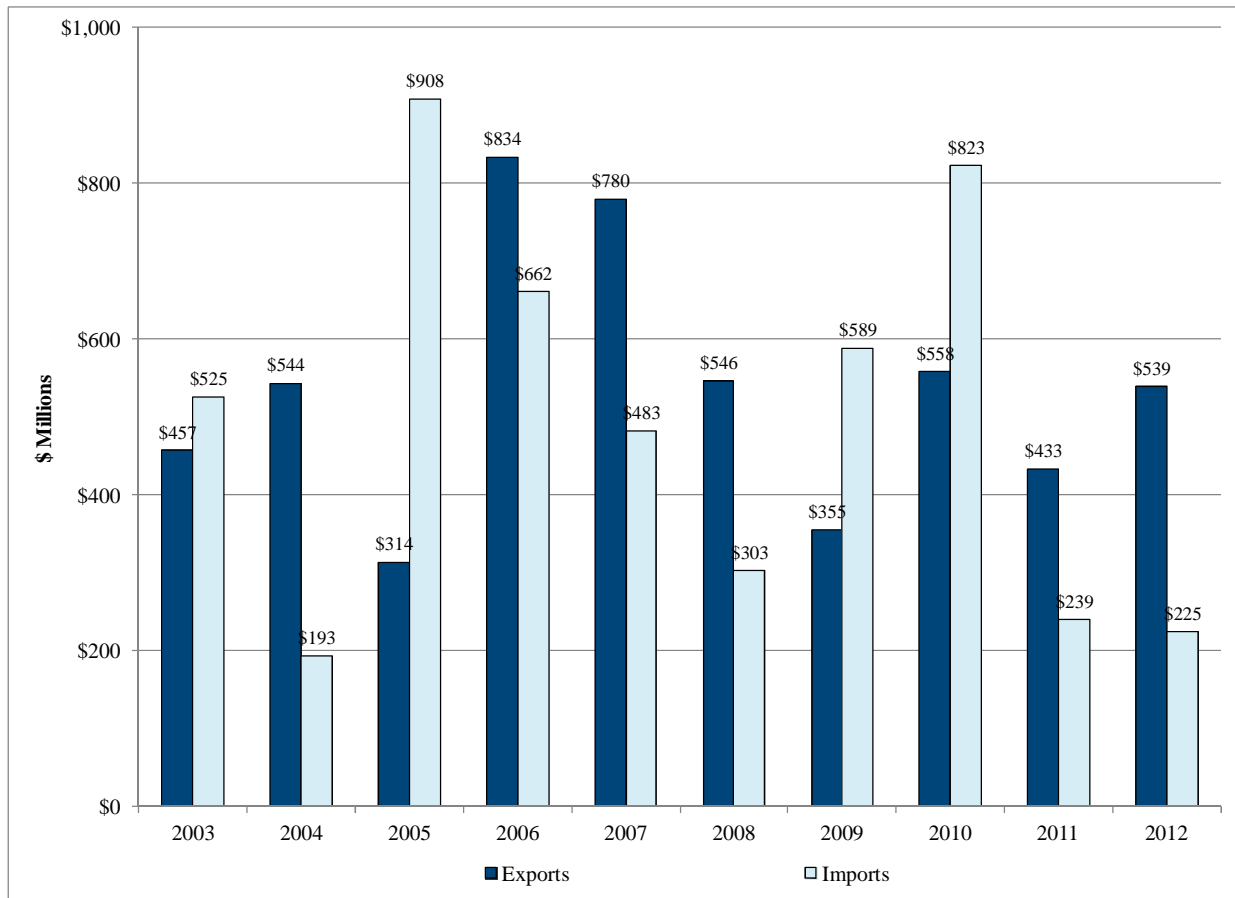
### **5. Foreign Trade**

As shown in **Figure 8**, below, the value of imports and exports of ships and repair services varies considerably over time, in part due to the long lead time associated with manufacturing and delivering finished ships.

Imports of finished ships, inputs, and repair services amounted to \$224.7 million in 2012, down from \$239.4 million in 2010. Industry imports are limited by industry regulation; in particular, the Jones Act (section 27 of the Merchant Marine Act of 1920) requires that all vessels carrying goods between U.S. ports be manufactured (or rebuilt) in the United States and be owned, operated, and crewed by U.S. citizens. Additionally, the defense sector remains the industry's biggest client, accounting for more than 60 percent of industry revenues. Because defense contracts typically require access to sensitive military technology and information, the U.S. government generally limits any foreign involvement in defense contracts.

In contrast, despite an increase in foreign competition, exports by U.S. shipbuilders have strengthened in recent years, rising to \$539.1 million in 2012 (representing 2.7 percent of industry revenues). As a result, the U.S. shipbuilding industry has run a trade surplus in six out of the last ten years. In fact, combined over the last ten years the industry has run a trade surplus of \$410 million.

**Figure 8. -- Imports and Exports for the U.S. Shipbuilding and Repairing Industry, 2003-2012**



Source: IBISWorld, "Staying Afloat: Despite a Decline in Commercial Orders, Military Shipbuilding will Thrive." Industry Report 33661a, July 2012.

### *III. The Economic Importance of the U.S. Shipbuilding and Repairing Industry*

In this study, the economic importance of the U.S. shipbuilding and repairing industry is measured in terms of its direct, indirect and induced impacts, as previously stated.

The MIG model, an input-output (I-O) model based on Federal government data, is used to quantify these linkages.<sup>9</sup> The MIG model does not track capital expenditures (such as spending on equipment) by industry; consequently, the activity associated with capital spending by the shipbuilding and repairing industry has been separately calculated. This detail is only available on a national basis. The study also estimates interstate spillover effects (i.e., indirect and induced impacts in a given state resulting from direct shipbuilding and repair activities in another state). See Appendix C for a more detailed description of the methodology used for this study.

#### *A. National Impact*

In 2011, on a national basis, the U.S. shipbuilding and repairing industry directly provided 107,240 jobs (see **Table 4**). Including direct, indirect, and induced impacts, approximately 402,010 jobs were associated with the industry. Total labor income associated with all direct, indirect, and induced jobs was \$23.9 billion. The industry directly and indirectly was associated with \$36.0 billion in GDP in 2011.

**Table 4. Economic Importance of the U.S. Shipbuilding and Repairing Industry, 2011**

	Direct Impacts	Indirect & Induced Impacts		Total Impacts
		Operational Impacts	Capital Investment Impacts	
Employment <sup>a</sup>	107,240	289,860	4,910	402,010
Labor Income (\$ millions) <sup>b</sup>	\$7,896	\$15,710	\$306	\$23,912
GDP (\$ millions)	\$9,837	\$25,700	\$464	\$36,001

Source: Calculations using the MIG modeling system (2011 database).

Note: Details may not add to totals due to rounding.

<sup>a</sup> Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.

<sup>b</sup> Labor income is defined as wages and salaries and benefits as well as proprietors' income.

By segment, the majority of the direct economic activity is in the primary industry code, shipbuilding and repairing (NAICS 336611), which was responsible for 97,450 jobs of the overall 107,240 direct jobs, paid \$7.3 billion in labor income, and generated \$9.2 billion in GDP in 2011. Routine ship maintenance and repair activities (part of NAICS 488390) directly accounted for 9,790 jobs, \$574 million in labor income, and \$593 million in GDP (see **Table 5**).

<sup>9</sup> The MIG model is based on input-output (I-O) tables that map the flow of value along the supply chain for the different industries in the economy. For example, for the shipbuilding and repairing industry these tables provide the value of inputs purchased from other industries that supply the shipbuilding and repairing industry. The supplying industries also purchase inputs from other industries to deliver their products; these impacts are also captured. See **Appendix D** for a description of the model.

**Table 5. Direct Economic Impact of the U.S. Shipbuilding and Repairing Industry, by Segment, 2011**

NAICS	Segment Description	Employment <sup>a</sup>	Labor Income <sup>b</sup>	GDP
		Amount	(\$ Millions)	(\$ Millions)
336611	Shipbuilding and repairing	97,450	\$7,322	\$9,244
488390	Routine ship maintenance and repairs	9,790	\$574	\$593
	<b>Total</b>	<b>107,240</b>	<b>\$7,896</b>	<b>\$9,837</b>

Source: MIG, U.S. Census Bureau, U.S. Bureau of Labor Statistics, and U.S. Bureau of Economic Analysis.

<sup>a</sup> Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.

<sup>b</sup> Labor income is defined as wages and salaries and benefits as well as proprietors' income.

Most of the indirect and induced economic impact of the industry is associated with the industry's ongoing operations, rather than its capital expenditures (see **Table 6**). The largest amount of indirect and induced economic activity associated with the industry is in the services sector. Other significant indirect and induced activities occur in manufacturing; finance, insurance and real estate; and wholesale and retail trade.

Considering the indirect and induced impacts, each direct job in the U.S. shipbuilding and repairing industry is associated with another 2.7 jobs in other parts of the national economy; each dollar of direct labor income and GDP is associated with another \$2.03 in labor income and \$2.66 in GDP, respectively, outside of the shipbuilding and repairing industry .

**Table 6. Indirect and Induced Activities Associated with the U.S. Shipbuilding and Repairing Industry, by Industry, 2011**

Sector Description	Employment*	Labor Income (\$ million)**	GDP (\$ million)
<b>Direct Impact of the Shipbuilding and Repairing Industry</b>	<b>107,240</b>	<b>\$7,896.1</b>	<b>\$9,837.3</b>
<b>Indirect and Induced Impact on Other Industries</b>	<b>294,770</b>	<b>\$16,015.8</b>	<b>\$26,164.1</b>
<i>Operational Impact</i>	<i>289,870</i>	<i>\$15,710.0</i>	<i>\$25,699.9</i>
Agriculture	3,560	\$105.9	\$165.8
Mining	1,520	\$111.2	\$361.1
Utilities	1,150	\$151.9	\$558.8
Construction	5,270	\$292.8	\$333.2
Manufacturing	31,080	\$2,300.0	\$3,924.0
Wholesale and retail trade	35,270	\$1,591.6	\$2,647.9
Transportation and warehousing	11,900	\$620.5	\$841.3
Information	6,200	\$629.0	\$1,261.8
Finance, insurance, real estate, rental and leasing	33,140	\$1,734.5	\$5,713.5
Services	150,140	\$7,414.0	\$9,032.2
Other	10,630	\$758.6	\$860.2
<i>Capital Investment Impact</i>	<i>4,910</i>	<i>\$305.8</i>	<i>\$464.2</i>
Agriculture	40	\$1.4	\$2.2
Mining	20	\$1.4	\$4.7
Utilities	10	\$2.0	\$7.3
Construction	60	\$3.2	\$3.7
Manufacturing	1,120	\$92.6	\$127.0
Wholesale and retail trade	770	\$41.2	\$67.8
Transportation and warehousing	160	\$8.4	\$11.5
Information	120	\$13.2	\$27.1
Finance, insurance, real estate, rental and leasing	420	\$19.8	\$70.4
Services	2,140	\$119.5	\$139.7
Other	40	\$3.0	\$2.8
<b>Total Economic Impact</b>	<b>402,010</b>	<b>\$23,911.9</b>	<b>\$36,001.4</b>

Source: Calculations using the MIG modeling system (2011 database).

Note: Details may not add to totals due to rounding.

\* Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.

\*\* Labor income is defined as wages and salaries and benefits as well as proprietors' income.

## *B. State Impacts*

The operations of the shipbuilding and repairing industry directly provided employment in 40 states in 2011. The five states with the largest direct employment impacts are Virginia, Louisiana, Mississippi, Connecticut, and California (see **Table 7**). Operations in these states represented approximately 62 percent of total industry operations in 2011.

**Table 7. Direct Impact of the U.S. Shipbuilding and Repairing Industry, 2011**

State	Direct Employment*		Direct Labor Income**		Direct GDP	
	Amount	Percent of U.S. Total	(\$ Million)	Percent of U.S. Total	(\$ Million)	Percent of U.S. Total
Alabama	3,810	3.6%	\$232.7	2.9%	\$313.4	3.2%
Alaska	510	0.5%	\$22.2	0.3%	\$37.7	0.4%
Arizona	0	0.0%	\$0.0	0.0%	\$0.0	0.0%
Arkansas	160	0.1%	\$5.9	0.1%	\$8.0	0.1%
California	8,100	7.6%	\$573.1	7.3%	\$777.7	7.9%
Colorado	0	0.0%	\$0.0	0.0%	\$0.0	0.0%
Connecticut	8,870	8.3%	\$827.4	10.5%	\$1,097.9	11.2%
Delaware	20	0.0%	\$1.1	0.0%	\$1.4	0.0%
District of Columbia	0	0.0%	\$0.0	0.0%	\$0.0	0.0%
Florida	5,790	5.4%	\$325.9	4.1%	\$381.9	3.9%
Georgia	180	0.2%	\$11.4	0.1%	\$11.0	0.1%
Hawaii	750	0.7%	\$79.9	1.0%	\$119.2	1.2%
Idaho	30	0.0%	\$1.8	0.0%	\$2.3	0.0%
Illinois	450	0.4%	\$25.6	0.3%	\$33.8	0.3%
Indiana	1,010	0.9%	\$52.5	0.7%	\$65.5	0.7%
Iowa	10	0.0%	\$0.6	0.0%	\$0.3	0.0%
Kansas	10	0.0%	\$0.6	0.0%	\$0.5	0.0%
Kentucky	870	0.8%	\$47.1	0.6%	\$58.0	0.6%
Louisiana	12,970	12.1%	\$839.0	10.6%	\$1,001.3	10.2%
Maine	5,980	5.6%	\$443.7	5.6%	\$597.7	6.1%
Maryland	680	0.6%	\$38.3	0.5%	\$41.5	0.4%
Massachusetts	500	0.5%	\$35.6	0.5%	\$45.1	0.5%
Michigan	270	0.3%	\$13.8	0.2%	\$12.5	0.1%
Minnesota	90	0.1%	\$2.3	0.0%	\$2.1	0.0%
Mississippi	10,100	9.4%	\$1,087.8	13.8%	\$1,246.7	12.7%
Missouri	490	0.5%	\$24.5	0.3%	\$32.9	0.3%
Montana	0	0.0%	\$0.0	0.0%	\$0.0	0.0%
Nebraska	0	0.0%	\$0.0	0.0%	\$0.0	0.0%
Nevada	30	0.0%	\$1.6	0.0%	\$7.1	0.1%
New Hampshire	80	0.1%	\$4.0	0.1%	\$5.5	0.1%
New Jersey	700	0.7%	\$52.3	0.7%	\$40.3	0.4%
New Mexico	0	0.0%	\$0.0	0.0%	\$0.0	0.0%
New York	770	0.7%	\$67.2	0.9%	\$79.6	0.8%
North Carolina	140	0.1%	\$5.9	0.1%	\$5.7	0.1%
North Dakota	0	0.0%	\$0.0	0.0%	\$0.0	0.0%
Ohio	200	0.2%	\$8.8	0.1%	\$9.2	0.1%
Oklahoma	0	0.0%	\$0.0	0.0%	\$0.0	0.0%
Oregon	1,190	1.1%	\$86.3	1.1%	\$101.9	1.0%
Pennsylvania	1,100	1.0%	\$69.2	0.9%	\$94.0	1.0%
Rhode Island	1,840	1.7%	\$144.0	1.8%	\$177.5	1.8%
South Carolina	1,190	1.1%	\$72.0	0.9%	\$96.9	1.0%
South Dakota	0	0.0%	\$0.0	0.0%	\$0.0	0.0%
Tennessee	660	0.6%	\$44.8	0.6%	\$69.8	0.7%
Texas	5,480	5.1%	\$346.9	4.4%	\$398.4	4.0%
Utah	10	0.0%	\$0.6	0.0%	\$15.4	0.2%
Vermont	0	0.0%	\$0.0	0.0%	\$0.0	0.0%
Virginia	26,730	24.9%	\$1,924.8	24.4%	\$2,358.6	24.0%
Washington	3,520	3.3%	\$239.5	3.0%	\$321.0	3.3%
West Virginia	10	0.0%	\$0.6	0.0%	\$0.5	0.0%
Wisconsin	1,960	1.8%	\$134.6	1.7%	\$167.7	1.7%
Wyoming	0	0.0%	\$0.0	0.0%	\$0.0	0.0%
<b>U.S. Total</b>	<b>107,240</b>	<b>100%</b>	<b>\$7,896.1</b>	<b>100%</b>	<b>\$9,837.3</b>	<b>100%</b>

Source: Calculations using the MIG modeling system (2011 database).

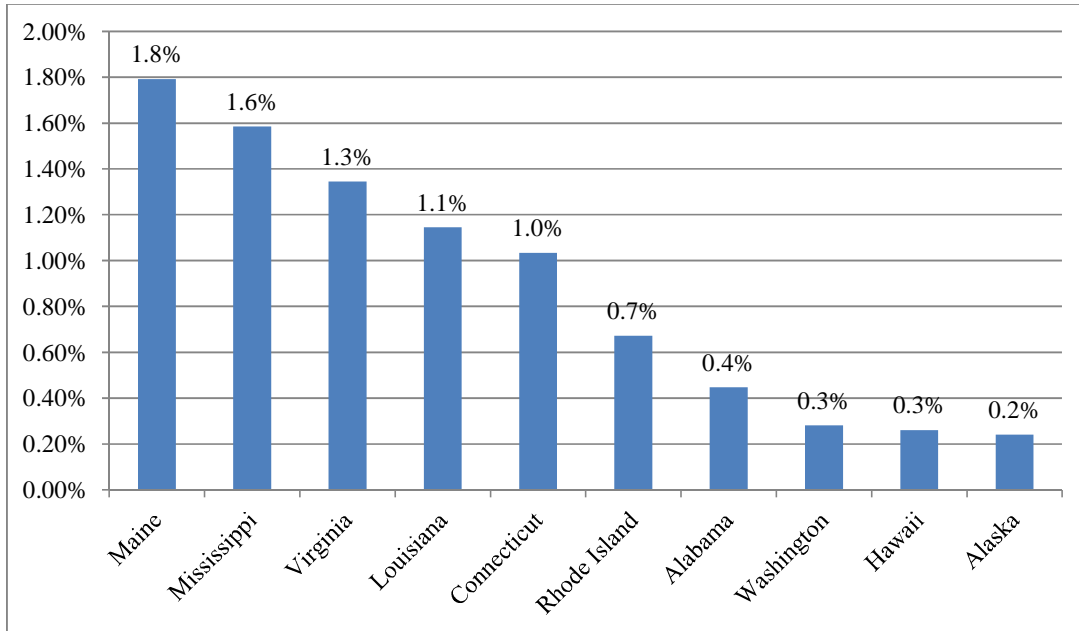
Note: Details may not add to totals due to rounding.

\* Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.

\*\* Labor income is defined as wages and salaries and benefits as well as proprietors' income.

In five states, the total direct, indirect, and induced economic activity associated with the shipbuilding and repairing industry amounts to more than 1 percent of total state employment (see **Figure 9**).

**Figure 9. Shipbuilding and Repairing Industry Employment / Total State Employment (10 States with Largest Shares, 2011)**

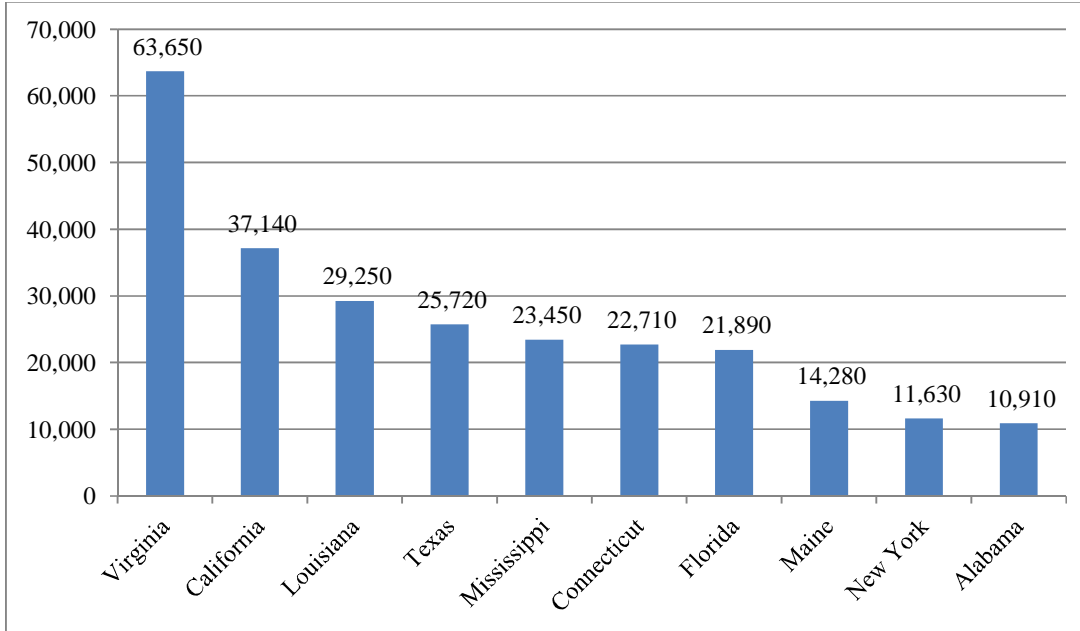


Source: Calculations using the MIG modeling system (2011 database).

In terms of the total number of direct, indirect, and induced jobs, employment associated with the operations of the shipbuilding and repairing industry is highest in Virginia, California, Louisiana, Texas, Mississippi, Connecticut, and Florida (see **Figure 10** and **Table 9**).

Additional detail is provided in Appendix A.

**Figure 10. Total Direct, Indirect, and Induced Employment Associated with the U.S. Shipbuilding and Repairing Industry's Operations (10 States with Largest Number of Jobs, 2011)**



Source: Calculations using the MIG modeling system (2011 database).



**Table 9. Total Direct, Indirect, and Induced Economic Activities Associated with the U.S. Shipbuilding and Repairing Industry's Operations, 2011**

State	Employment*		Labor Income**		GDP	
	Amount	Percent of State Total	(\$ Million)	Percent of State Total	(\$ Million)	Percent of State Total
Alabama	10,910	0.4%	\$548.0	0.5%	\$824.4	0.5%
Alaska	1,150	0.2%	\$63.9	0.2%	\$108.7	0.2%
Arizona	2,880	0.1%	\$140.8	0.1%	\$254.3	0.1%
Arkansas	1,740	0.1%	\$75.7	0.1%	\$122.7	0.1%
California	37,140	0.2%	\$2,378.7	0.2%	\$3,752.1	0.2%
Colorado	2,840	0.1%	\$158.9	0.1%	\$275.0	0.1%
Connecticut	22,710	1.0%	\$1,731.4	1.2%	\$2,526.5	1.1%
Delaware	500	0.1%	\$30.2	0.1%	\$49.7	0.1%
District of Columbia	660	0.1%	\$71.3	0.1%	\$99.9	0.1%
Florida	21,890	0.2%	\$1,089.3	0.2%	\$1,638.4	0.2%
Georgia	5,020	0.1%	\$262.8	0.1%	\$444.4	0.1%
Hawaii	2,290	0.3%	\$151.2	0.3%	\$233.1	0.3%
Idaho	810	0.1%	\$34.3	0.1%	\$57.6	0.1%
Illinois	8,010	0.1%	\$481.3	0.1%	\$779.6	0.1%
Indiana	5,780	0.2%	\$282.7	0.2%	\$450.5	0.2%
Iowa	1,800	0.1%	\$84.4	0.1%	\$146.8	0.1%
Kansas	1,580	0.1%	\$73.1	0.1%	\$126.3	0.1%
Kentucky	4,000	0.2%	\$187.4	0.2%	\$291.1	0.2%
Louisiana	29,250	1.1%	\$1,595.3	1.3%	\$2,239.3	1.1%
Maine	14,280	1.8%	\$803.0	2.2%	\$1,190.7	2.1%
Maryland	4,250	0.1%	\$249.0	0.1%	\$371.9	0.1%
Massachusetts	4,910	0.1%	\$349.0	0.1%	\$550.7	0.1%
Michigan	5,480	0.1%	\$280.7	0.1%	\$441.9	0.1%
Minnesota	3,420	0.1%	\$186.8	0.1%	\$314.5	0.1%
Mississippi	23,450	1.6%	\$1,609.3	2.6%	\$2,111.6	2.2%
Missouri	4,380	0.1%	\$221.4	0.1%	\$354.0	0.1%
Montana	510	0.1%	\$19.8	0.1%	\$36.9	0.1%
Nebraska	1,080	0.1%	\$51.2	0.1%	\$83.0	0.1%
Nevada	1,450	0.1%	\$71.0	0.1%	\$127.5	0.1%
New Hampshire	930	0.1%	\$52.5	0.1%	\$81.9	0.1%
New Jersey	5,910	0.1%	\$397.5	0.1%	\$609.5	0.1%
New Mexico	850	0.1%	\$38.7	0.1%	\$65.9	0.1%
New York	11,630	0.1%	\$941.6	0.1%	\$1,442.6	0.1%
North Carolina	4,810	0.1%	\$235.0	0.1%	\$398.8	0.1%
North Dakota	420	0.1%	\$24.0	0.1%	\$48.8	0.1%
Ohio	6,760	0.1%	\$352.5	0.1%	\$568.7	0.1%
Oklahoma	1,890	0.1%	\$88.7	0.1%	\$161.1	0.1%
Oregon	4,850	0.2%	\$259.1	0.3%	\$392.3	0.2%
Pennsylvania	9,720	0.1%	\$541.4	0.1%	\$857.9	0.1%
Rhode Island	3,970	0.7%	\$260.1	0.8%	\$360.9	0.7%
South Carolina	4,680	0.2%	\$227.7	0.2%	\$355.1	0.2%
South Dakota	480	0.1%	\$20.5	0.1%	\$33.5	0.1%
Tennessee	4,840	0.1%	\$253.8	0.1%	\$405.4	0.2%
Texas	25,720	0.2%	\$1,449.0	0.2%	\$2,343.6	0.2%
Utah	1,510	0.1%	\$71.7	0.1%	\$134.8	0.1%
Vermont	340	0.1%	\$15.3	0.1%	\$26.3	0.1%
Virginia	63,650	1.3%	\$3,961.9	1.3%	\$5,507.2	1.3%
Washington	10,620	0.3%	\$634.8	0.3%	\$972.8	0.3%
West Virginia	820	0.1%	\$39.0	0.1%	\$69.1	0.1%
Wisconsin	8,200	0.2%	\$437.2	0.3%	\$658.6	0.3%
Wyoming	310	0.1%	\$22.2	0.1%	\$39.1	0.1%
National Capital Expenditure Impact***	4,910		\$305.8		\$464.2	
<b>U.S. Total</b>	<b>402,010</b>	<b>0.2%</b>	<b>\$23,911.9</b>	<b>0.2%</b>	<b>\$36,001.4</b>	<b>0.2%</b>

Source: Calculations using the MIG modeling system (2011 database).

Note: Details may not add to totals due to rounding.

\* Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.

\*\* Labor income is defined as wages and salaries and benefits as well as proprietors' income.

\*\*\* Capital expenditure impact is not available at the state level.

# *Appendices*

## *Appendix A: Economic Impact Breakdown: State Level Detail*

Tables A1, A2, and A3 provide the state-by-state breakout of the direct, indirect, and induced impacts associated with the operations of the U.S. shipbuilding and repairing industry. These results do not include the additional indirect and induced economic impact resulting from the industry's capital expenditures.

**Table A1. Employment Associated with the U.S. Shipbuilding and Repairing Industry's Operations, 2011**

State	Direct Employment	Indirect Employment	Induced Employment	Total Employment	Total State Percentage
Alabama	3,810	3,700	3,400	10,910	0.4%
Alaska	510	320	320	1,150	0.2%
Arizona	-	1,160	1,720	2,880	0.1%
Arkansas	160	710	880	1,740	0.1%
California	8,100	13,190	15,850	37,140	0.2%
Colorado	-	1,160	1,680	2,840	0.1%
Connecticut	8,870	6,600	7,240	22,710	1.0%
Delaware	20	180	300	500	0.1%
District of Columbia	-	270	390	660	0.1%
Florida	5,790	7,190	8,920	21,890	0.2%
Georgia	180	2,020	2,810	5,020	0.1%
Hawaii	750	670	860	2,290	0.3%
Idaho	30	310	470	810	0.1%
Illinois	450	3,350	4,220	8,010	0.1%
Indiana	1,010	2,350	2,420	5,780	0.2%
Iowa	10	710	1,070	1,800	0.1%
Kansas	10	630	940	1,580	0.1%
Kentucky	870	1,470	1,660	4,000	0.2%
Louisiana	12,970	9,150	7,130	29,250	1.1%
Maine	5,980	3,980	4,310	14,280	1.8%
Maryland	680	1,490	2,090	4,250	0.1%
Massachusetts	500	1,830	2,590	4,910	0.1%
Michigan	270	2,320	2,890	5,480	0.1%
Minnesota	90	1,380	1,950	3,420	0.1%
Mississippi	10,100	7,170	6,180	23,450	1.6%
Missouri	490	1,680	2,220	4,380	0.1%
Montana	-	180	330	510	0.1%
Nebraska	-	410	670	1,080	0.1%
Nevada	30	570	850	1,450	0.1%
New Hampshire	80	380	480	930	0.1%
New Jersey	700	2,160	3,040	5,910	0.1%
New Mexico	-	330	530	850	0.1%
New York	770	4,240	6,630	11,630	0.1%
North Carolina	140	1,940	2,740	4,810	0.1%
North Dakota	-	150	270	420	0.1%
Ohio	200	2,970	3,590	6,760	0.1%
Oklahoma	-	800	1,090	1,890	0.1%
Oregon	1,190	1,720	1,940	4,850	0.2%
Pennsylvania	1,100	3,820	4,800	9,720	0.1%
Rhode Island	1,840	1,060	1,070	3,970	0.7%
South Carolina	1,190	1,630	1,860	4,680	0.2%
South Dakota	-	170	300	480	0.1%
Tennessee	660	1,860	2,320	4,840	0.1%
Texas	5,480	9,430	10,800	25,720	0.2%
Utah	10	630	870	1,510	0.1%
Vermont	-	130	220	340	0.1%
Virginia	26,730	20,170	16,750	63,650	1.3%
Washington	3,520	3,230	3,870	10,620	0.3%
West Virginia	10	340	470	820	0.1%
Wisconsin	1,960	3,100	3,140	8,200	0.2%
Wyoming	-	130	190	310	0.1%
<b>U.S. Total</b>	<b>107,240</b>	<b>136,530</b>	<b>153,330</b>	<b>397,110</b>	<b>0.2%</b>

Source: Calculations using the MIG modeling system (2011 database).

Note: Details may not add to totals due to rounding.

Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.

**Table A2. Labor Income Associated with the U.S. Shipbuilding and Repairing Industry's Operations, in \$ Millions, 2011**

State	Direct Labor Income	Indirect Labor Income	Induced Labor Income	Total Labor Income	Total State Percentage
Alabama	\$232.7	\$183.7	\$131.7	\$548.0	0.5%
Alaska	\$22.2	\$22.6	\$19.1	\$63.9	0.2%
Arizona	\$0.0	\$64.7	\$76.1	\$140.8	0.1%
Arkansas	\$5.9	\$36.1	\$33.7	\$75.7	0.1%
California	\$573.1	\$949.6	\$856.0	\$2,378.7	0.2%
Colorado	\$0.0	\$77.5	\$81.4	\$158.9	0.1%
Connecticut	\$827.4	\$514.6	\$389.3	\$1,731.4	1.2%
Delaware	\$1.1	\$13.4	\$15.8	\$30.2	0.1%
District of Columbia	\$0.0	\$36.0	\$35.3	\$71.3	0.1%
Florida	\$325.9	\$386.2	\$377.2	\$1,089.3	0.2%
Georgia	\$11.4	\$120.0	\$131.4	\$262.8	0.1%
Hawaii	\$79.9	\$34.3	\$37.1	\$151.2	0.3%
Idaho	\$1.8	\$14.8	\$17.7	\$34.3	0.1%
Illinois	\$25.6	\$235.5	\$220.2	\$481.3	0.1%
Indiana	\$52.5	\$130.7	\$99.4	\$282.7	0.2%
Iowa	\$0.6	\$40.4	\$43.4	\$84.4	0.1%
Kansas	\$0.6	\$34.2	\$38.4	\$73.1	0.1%
Kentucky	\$47.1	\$76.6	\$63.6	\$187.4	0.2%
Louisiana	\$839.0	\$471.6	\$284.7	\$1,595.3	1.3%
Maine	\$443.7	\$193.0	\$166.3	\$803.0	2.2%
Maryland	\$38.3	\$103.2	\$107.5	\$249.0	0.1%
Massachusetts	\$35.6	\$156.2	\$157.1	\$349.0	0.1%
Michigan	\$13.8	\$139.4	\$127.5	\$280.7	0.1%
Minnesota	\$2.3	\$92.2	\$92.3	\$186.8	0.1%
Mississippi	\$1,087.8	\$303.0	\$218.5	\$1,609.3	2.6%
Missouri	\$24.5	\$101.4	\$95.5	\$221.4	0.1%
Montana	\$0.0	\$8.3	\$11.5	\$19.8	0.1%
Nebraska	\$0.0	\$22.6	\$28.6	\$51.2	0.1%
Nevada	\$1.6	\$31.5	\$37.8	\$71.0	0.1%
New Hampshire	\$4.0	\$24.4	\$24.1	\$52.5	0.1%
New Jersey	\$52.3	\$170.2	\$175.0	\$397.5	0.1%
New Mexico	\$0.0	\$17.3	\$21.4	\$38.7	0.1%
New York	\$67.2	\$431.2	\$443.1	\$941.6	0.1%
North Carolina	\$5.9	\$111.0	\$118.1	\$235.0	0.1%
North Dakota	\$0.0	\$10.3	\$13.7	\$24.0	0.1%
Ohio	\$8.8	\$185.4	\$158.2	\$352.5	0.1%
Oklahoma	\$0.0	\$44.5	\$44.2	\$88.7	0.1%
Oregon	\$86.3	\$93.8	\$78.9	\$259.1	0.3%
Pennsylvania	\$69.2	\$242.2	\$229.9	\$541.4	0.1%
Rhode Island	\$144.0	\$65.7	\$50.4	\$260.1	0.8%
South Carolina	\$72.0	\$84.0	\$71.7	\$227.7	0.2%
South Dakota	\$0.0	\$8.4	\$12.1	\$20.5	0.1%
Tennessee	\$44.8	\$104.2	\$104.9	\$253.8	0.1%
Texas	\$346.9	\$590.9	\$511.2	\$1,449.0	0.2%
Utah	\$0.6	\$35.1	\$36.1	\$71.7	0.1%
Vermont	\$0.0	\$6.8	\$8.5	\$15.3	0.1%
Virginia	\$1,924.8	\$1,298.0	\$739.2	\$3,961.9	1.3%
Washington	\$239.5	\$208.8	\$186.4	\$634.8	0.3%
West Virginia	\$0.6	\$20.0	\$18.5	\$39.0	0.1%
Wisconsin	\$134.6	\$174.5	\$128.2	\$437.2	0.3%
Wyoming	\$0.0	\$10.7	\$11.5	\$22.2	0.1%
<b>U.S. Total</b>	<b>\$7,896.1</b>	<b>\$8,530.7</b>	<b>\$7,179.3</b>	<b>\$23,606.1</b>	<b>0.2%</b>

Source: Calculations using the MIG modeling system (2011 database).

Note: Details may not add to totals due to rounding.

Labor income includes wages and salaries and benefits as well as proprietors' income.

**Table A3. GDP Associated with U.S. Shipbuilding and Repairing Industry's Operations, in \$ Millions, 2011**

State	Direct GDP	Indirect GDP	Induced GDP	Total GDP	Percent of State Total
Alabama	\$313.4	\$279.5	\$231.6	\$824.4	0.5%
Alaska	\$37.7	\$36.8	\$34.2	\$108.7	0.2%
Arizona	\$0.0	\$119.0	\$135.3	\$254.3	0.1%
Arkansas	\$8.0	\$57.0	\$57.8	\$122.7	0.1%
California	\$777.7	\$1,478.0	\$1,496.5	\$3,752.1	0.2%
Colorado	\$0.0	\$127.6	\$147.5	\$275.0	0.1%
Connecticut	\$1,097.9	\$760.7	\$667.9	\$2,526.5	1.1%
Delaware	\$1.4	\$21.4	\$26.8	\$49.7	0.1%
District of Columbia	\$0.0	\$49.0	\$50.9	\$99.9	0.1%
Florida	\$381.9	\$596.9	\$659.5	\$1,638.4	0.2%
Georgia	\$11.0	\$195.5	\$237.9	\$444.4	0.1%
Hawaii	\$119.2	\$50.7	\$63.3	\$233.1	0.3%
Idaho	\$2.3	\$24.7	\$30.6	\$57.6	0.1%
Illinois	\$33.8	\$366.5	\$379.3	\$779.6	0.1%
Indiana	\$65.5	\$210.8	\$174.3	\$450.5	0.2%
Iowa	\$0.3	\$67.8	\$78.7	\$146.8	0.1%
Kansas	\$0.5	\$56.8	\$69.0	\$126.3	0.1%
Kentucky	\$58.0	\$119.3	\$113.8	\$291.1	0.2%
Louisiana	\$1,001.3	\$731.1	\$506.9	\$2,239.3	1.1%
Maine	\$597.7	\$300.3	\$292.7	\$1,190.7	2.1%
Maryland	\$41.5	\$149.6	\$180.8	\$371.9	0.1%
Massachusetts	\$45.1	\$240.4	\$265.3	\$550.7	0.1%
Michigan	\$12.5	\$213.6	\$215.8	\$441.9	0.1%
Minnesota	\$2.1	\$151.0	\$161.5	\$314.5	0.1%
Mississippi	\$1,246.7	\$475.2	\$389.7	\$2,111.6	2.2%
Missouri	\$32.9	\$156.4	\$164.7	\$354.0	0.1%
Montana	\$0.0	\$15.6	\$21.3	\$36.9	0.1%
Nebraska	\$0.0	\$35.4	\$47.7	\$83.0	0.1%
Nevada	\$7.1	\$54.5	\$65.9	\$127.5	0.1%
New Hampshire	\$5.5	\$36.3	\$40.0	\$81.9	0.1%
New Jersey	\$40.3	\$265.6	\$303.6	\$609.5	0.1%
New Mexico	\$0.0	\$28.5	\$37.4	\$65.9	0.1%
New York	\$79.6	\$632.6	\$730.4	\$1,442.6	0.1%
North Carolina	\$5.7	\$178.2	\$214.9	\$398.8	0.1%
North Dakota	\$0.0	\$21.1	\$27.6	\$48.8	0.1%
Ohio	\$9.2	\$286.8	\$272.7	\$568.7	0.1%
Oklahoma	\$0.0	\$77.1	\$84.0	\$161.1	0.1%
Oregon	\$101.9	\$151.7	\$138.7	\$392.3	0.2%
Pennsylvania	\$94.0	\$374.1	\$389.8	\$857.9	0.1%
Rhode Island	\$177.5	\$97.4	\$86.0	\$360.9	0.7%
South Carolina	\$96.9	\$131.1	\$127.1	\$355.1	0.2%
South Dakota	\$0.0	\$13.6	\$19.9	\$33.5	0.1%
Tennessee	\$69.8	\$160.3	\$175.3	\$405.4	0.2%
Texas	\$398.4	\$987.3	\$957.9	\$2,343.6	0.2%
Utah	\$15.4	\$56.4	\$62.9	\$134.8	0.1%
Vermont	\$0.0	\$11.4	\$14.9	\$26.3	0.1%
Virginia	\$2,358.6	\$1,855.8	\$1,292.8	\$5,507.2	1.3%
Washington	\$321.0	\$322.0	\$329.8	\$972.8	0.3%
West Virginia	\$0.5	\$35.4	\$33.1	\$69.1	0.1%
Wisconsin	\$167.7	\$269.9	\$221.0	\$658.6	0.3%
Wyoming	\$0.0	\$18.5	\$20.5	\$39.1	0.1%
<b>U.S. Total</b>	<b>\$9,837.3</b>	<b>\$13,152.0</b>	<b>\$12,547.9</b>	<b>\$35,537.2</b>	<b>0.2%</b>

Source: Calculations using the MIG modeling system (2011 database).

Note: Details may not add to totals due to rounding.

GDP reflects incomes earned by labor (e.g., wages and salaries) and capital (e.g., profits) and any indirect business taxes (including excise taxes, property taxes, fees, licenses, and sales taxes paid by businesses).

## Appendix B: Data Sources and Methodology

This Appendix describes the methodology used to derive the results for the study. It first discusses the data sources used to develop the estimates of the shipbuilding and repairing industry's direct economic impacts. It then describes the development of the indirect and induced impact estimates for the industry.

### I. Estimates of the Industry's Direct Economic Impacts

The definition of the U.S. shipbuilding and repairing industry is based on the *North American Industry Classification System* (NAICS) and combines NAICS sector 336611 ("Shipbuilding and repairing") and a portion of NAICS sector 488390 ("Other support activities for water transportation"). Among other activities, NAICS sector 488390 includes routine repair and maintenance of ships from floating drydocks, as well as related activities not done in a shipyard.

NAICS sector 336611 corresponds exactly to MIG sector 290, thus the 2011 employment for this sector was obtained directly from the customized MIG impact models. Labor income for NAICS 336611 was estimated by combining employee compensation from the MIG model with estimates of proprietors' income based on data from the Bureau of Economic Analysis. In particular, estimates of proprietors' income for "other transportation equipment manufacturing" were allocated to shipbuilding and repair based on that industry's share of total output in "other transportation equipment manufacturing." GDP for NAICS 336611 was estimated by combining labor income with estimates of other property income (e.g., profits) and indirect business taxes (e.g., excise taxes, property taxes, fees, licenses, and sales taxes paid by businesses).

In contrast, NAICS sector 488390 is part of a larger MIG sector. Furthermore, only a portion of NAICS sector 488390 is part of the shipbuilding and repairing industry. As a result, it was necessary to estimate the amount of direct employment in NAICS sector 488390 in the shipbuilding and repairing industry outside of the MIG model. The following procedure was used for this purpose.

First, payroll employment for NAICS sector 488390 was obtained from the U.S. Department of Labor's Bureau of Labor Statistics (BLS) for 2011. For some states, the count of payroll employees was suppressed because of the small number of establishments in this sector in the state. Relying on employment counts available for the sector at the national-level and for higher-level industries at the state-level, a two-stage "raking" process was used to estimate the state-level employee count. The raking process uses information from known sectors within a state and across states to impute information for the sectors with suppressed data.<sup>10</sup>

Next, establishment counts from *Nonemployer Statistics* were used to estimate the number of self-employed individuals for NAICS 488390, who are not included in the BLS tabulations.<sup>11</sup> Because detail on NAICS 488390 was not available, the relationship between NAICS 488 ("Support activities for transportation") and NAICS 488390 for paid employees from the Census Bureau's County Business Patterns was used to allocate the self-employed to NAICS 488390. State-level estimates were scaled to hit the national-level estimate.

Combining the estimated number of payroll jobs with the estimated number of self-employed yields estimates of total employment (jobs) in NAICS sector 488390 at the national and state-levels.

<sup>10</sup> Oh, H.L. and Scheuren, F. (1987). Modified Raking Ratio Estimation. *Survey Methodology*, vol. 13, no. 2, pp. 209-219.

<sup>11</sup> A nonemployer is a business without paid employees. Most nonemployers are self-employed individuals operating small unincorporated businesses, which may or may not be the owner's principal source of income.

However, as discussed above, only a portion of NAICS sector 488390 is part of the shipbuilding and repairing industry. Based on data from the 2007 Economic Census, it is estimated that approximately 89.5 percent of the employment in NAICS sector 488390 is for routine repair and maintenance of ships not conducted at a shipyard. Labor income and GDP at the national and state levels were estimated using the MIG model.

Estimates of the U.S. shipbuilding and repairing industry's new capital investment in 2011 were developed using data from the Census Bureau's *Annual Capital Expenditure Survey* and *Annual Survey of Manufactures*. In particular, expenditures on new capital for "other transportation equipment manufacturing" (comprised of NAICS sectors 3365, 3366, and 3369) were obtained from the 2011 *Annual Capital Expenditure Survey* database. The ratio of total capital spending in shipbuilding and repairing (NAICS sector 336611) to other transportation equipment manufacturing from the 2011 *Annual Survey of Manufactures* was used to estimate the portion of new capital investment in other transportation equipment manufacturing that is attributable to shipbuilding and repairing.

For quantifying the economic impact of the U.S. shipbuilding and repairing industry's capital investment, its capital spending is translated into purchases of capital assets by type through use of the "capital flow matrix" from the U.S. Department of Commerce.<sup>12</sup>

## **II. Estimates of Indirect and Induced Economic Activities**

The initial round of output, income, and employment generated by shipbuilding and repairing leads to successive rounds of re-spending in the chain of production. Such indirect and induced economic impacts by the shipbuilding and repairing industry can be measured using various approaches. The most common is multiplier analysis. In broad terms, a multiplier is an index that indicates the overall change in the level of economic activity that results from a given initial change. It effectively adds up all the successive rounds of re-spending, based on a number of assumptions that are embedded in the method of estimation.

There are different methods available for calculating multipliers. The method used in this report is *input-output* analysis. It is the most commonly used approach in regional economic impact studies. The input-output model developed by MIG is one of the best known input-output models for regional economic studies in the United States and is widely used by government, academics and private-sector researchers. The MIG modeling system is similar to the Regional Input-Output Modeling System developed by the U.S. Department of Commerce. The system has been in use since 1979.

The MIG database represents a consistent set of economic data processed from various published sources (such as the Bureau of Economic Analysis's *National Income and Product Accounts* (NIPA) and *Regional Economic Information System* (REIS), the Census Bureau's *County Business Patterns* (CBP), and the Bureau of Labor Statistics' *Covered Employee and Wages Program* (CEW) in a variety of formats and under varying disclosure restrictions.

Estimates of indirect and induced economic impacts by the U.S. shipbuilding and repairing industry were derived based on the MIG model for the national economy and its regional models for each of the 50 states and the District of Columbia.

MIG uses an "input-output" framework that relates the output of each industry to inputs purchased from other industries. Output in one industry requires purchases of inputs from other industries, and these supply industries in turn make purchases from their suppliers, and so on. Employees and

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<sup>12</sup> <http://www.bea.gov/newsreleases/industry/capflow/capitalflownewsrelease.htm>

business owners make personal purchases out of the income that is generated by this process, which ripple through the economy. Multipliers describe these relationships. The Type I multiplier measures the direct and indirect effects of a change in economic activity. It captures the inter-industry effects only, i.e., industries buying from local industries. The Type II (Social Accounting Matrix or SAM) multiplier captures the direct and indirect effects and, in addition, it also reflects induced effects. The indirect and induced impacts by the shipbuilding and repairing industry on other sectors of the economy in terms of employment, labor income (including wages and salaries and benefits as well as proprietors' income), and GDP were calculated through the multiplier process built in each model.<sup>13</sup>

Because individual state models do not account for cross-state impacts, the sum of the state indirect and induced impacts will not add to the national totals. The indirect and induced effects crossing state borders ("cross-state spillover effects") were allocated across the 50 states and the District of Columbia in proportion to each state's share of the total national employment, labor income, and GDP in each industry. The state indirect and induced effects reported throughout this study include such allocation of the cross-state spillover effects.

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<sup>13</sup> Because the MIG models are used for total impact analysis (as opposed to marginal impact analysis) in this study, necessary adjustments are made to the initial indirect and induced impact estimates to prevent double-counting. For instance, any indirect or induced effects from the initial estimates for MIG sectors that are fully mapped to the shipbuilding and repairing industry are removed. Similarly, indirect and induced effects for MIG sectors that are partially mapped to the shipbuilding and repairing industry are proportionately adjusted.



## *Appendix C: Description of MIG Model*

MIG is a well known modeling system developed by the Minnesota MIG Group for estimating economic impacts and is similar to the Regional Input-Output Modeling System developed by the U.S. Department of Commerce. The model is primarily based on government data sources. It can address a wide range of impact topics in a given region (county, state, or the country as a whole). MIG is built around an “input-output” table that relates the purchases that each industry has made from other industries to the value of the output of each industry. To meet the demand for goods and services from an industry, purchases are made in other industries according to the patterns recorded in the input-output table. These purchases in turn spark still more purchases by the industry's suppliers, and so on. Meanwhile, employees and business owners make personal purchases out of the additional income that is generated by this process, further increasing demand that ripples through the economy. Multipliers describe these iterations. The Type I multiplier measures the direct and indirect effects of a change in economic activity. It captures the inter-industry effects only, i.e., industries buying from local industries. The Type II (Social Accounting Matrix or SAM) multiplier captures the direct and indirect effects. In addition, it also reflects induced effects (i.e., changes in spending from households as income increases or decreases due to the changes in production).

More information on MIG is available at [www.implan.com](http://www.implan.com).