
Economic Contribution of the
Frozen Food Manufacturing Industry
(NAICS 31141)
To the U.S. Economy in 2012

American Frozen Food Institute



Submitted by:



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Executive Summary

This study estimates the economic impacts of the frozen food production industry in the United States (U.S.). This study estimates the economic impacts of the frozen food production industry in the United States (U.S.). The frozen food products in this classification had a market value (sales) of over \$32 billion in 2012 (Marketline, 2013). While this study specifically addresses 2012, the industry has continued to grow. While this study specifically addresses 2012, the industry has continued to grow. For the 52 weeks ending June 14, 2015, frozen food sales were \$53 billion. (Frozen & Refrigerated Buyer August 2015)

However, none of these figures represent the whole contribution of this industry to the economy. This study creates a more comprehensive estimate of the impact of this industry on the broader U.S. economy, as well as its contribution to the economies of individual states and U.S. Congressional districts. This study creates a more comprehensive estimate of the impact of this industry on the broader U.S. economy, as well as its contribution to the economies of individual states and U.S. Congressional districts.

Due to the capital-intensive nature of frozen food production, firms in this sector buy many goods and services from other sectors of our economy. Growers provide the fruit, vegetables and other fresh foods. Frozen food companies then use refrigerated transportation, rapid truck, rail, ship, and air transport and refrigeration and other machinery to create frozen foods. Planning these logistics requires management consulting and supply chain experts. Freezing and preserving these foods requires specialty machinery, specialty buildings and electricity to run the refrigeration equipment. All of these sectors – from the growers to the electric utility – benefit from U.S. frozen food production. This analysis creates an estimate of all this economic activity.

The U.S. frozen food production industry comprises establishments primarily engaged in creating frozen fruits and vegetables and frozen dinners and side dishes of several ingredients. For the purposes of this study, the frozen food industry is defined as companies classified under the North American Industry Classification System (NAICS) under the code 31141, frozen seafood processors under NAICS code 31171 and an estimate of frozen bakery items under NAICS codes 31181 and 31182. This report provides economic impacts estimates for 2012, the most recent year for which a consistent set of national and state-level data are available.

This study provides an estimate of the economic impacts of U.S. frozen food production in terms of employment, labor income, and value added. Employment is defined as the number of payroll and self-employed jobs, including part time jobs. Labor income is all forms of employment income, including employee compensation (wages and benefits) and proprietor income for self-employed individuals.

Value added is the additional value created by a particular firm or sector. It includes employee compensation, income to owners, proprietor's income, income from property and indirect business taxes. Total value added by an industry

represents the contribution of the industry to gross domestic product (GDP). According to the Bureau of the Census, value added is considered to be the best value measure available for comparing the relative economic importance of manufacturing among industries and geographic areas. By definition, value added will be less than gross sales.

The sectors of the frozen food industry included in this report generated sales of \$46 billion in the U.S. Counting direct, indirect and induced impacts, the industry’s total impact on labor income (including proprietors’ income) was \$35 billion. (See Table ES-1) The industry’s total impact on U.S. GDP was \$56 billion.

The U.S. frozen food industry’s total employment impact to the national economy in 2012 was 670,000 jobs. Each direct job in frozen food companies supported approximately 4.35 jobs elsewhere in the U.S. economy in 2012.

Table ES-1: Total Operational and Capital Investment Impacts of the Frozen Food Industry on the U.S. Economy in 2012

Impact	Direct Effects	Indirect and Induced Effects	Capital Investment Effects	Total Impact
Employment (full-time equivalent)	154,000	502,000	14,000	670,000
Labor Income (millions \$)	7,710	26,600	800	35,100
Value Added (millions \$)	10,100	44,300	1,300	55,700

Frozen food production is ubiquitous throughout the U.S., occurring in all but one state (Wyoming) and in a preponderance of the 435 U.S. Congressional districts. The total number of jobs directly or indirectly attributable to the frozen food manufacturing sector’s operations (i.e., not counting any capital investment impacts) ranged from a less than 10 jobs in Montana to almost 50,000 in California.

The top 10 states, in terms of the total number of jobs directly or indirectly attributable to the industry in 2012 were California, Washington, Texas, Illinois, Ohio, Oregon, Wisconsin, Florida, Arizona and Pennsylvania. Data for all states is found in Appendix A. Table ES-2 below provides the estimate of total employment, labor income and value added in the frozen food production in those states with the highest levels of employment related to frozen food.

Table ES-2: Initial Estimate of Top Ten States in the Frozen Food Industry by Number of Jobs

State	Employment	Labor Income (\$ million)	Value Added (\$ million)
California	49,000	2,950	4,200
Washington	33,400	1,760	2,580
Texas	29,200	1,270	2,000
Illinois	26,000	1,570	2,350
Ohio	25,400	1,450	2,260
Oregon	21,600	930	1,390
Wisconsin	20,300	1,010	1,450
Florida	17,500	890	1,390
Pennsylvania	15,900	840	1,220
Tennessee	13,800	710	1,180

This study also estimates impacts of this industry sector on local areas. Specifically, we calculate the direct, indirect and induced effects on jobs, labor income and value added for each Federal Congressional district. This information can be found in Appendix B.

The remainder of this report is organized as follows:

- Section 1 provides general information on the industry that is the subject of this study.
- Section 2 discusses the data sources and methodologies used to estimate the impacts of economic activity driven by the industry.
- Section 3 discusses the results of the study.
- Appendix A contains the detailed operational impacts for each state.
- Appendix B contains the detailed operational impacts for each Congressional district.

Section 1 Description of the Frozen Food Industry

In 2011, retail sales of frozen foods in the U.S. were nearly \$33 billion (Marketline 2013). The industry has a mature compound average growth rate over the period of 2007-2011 of 2.1 percent. Future growth is expected to be in line with recent growth.

As shown in Table 2.1, frozen ready meals were the largest market segment in the U.S. frozen food industry. Frozen pizza was the next most popular product in 2011. Frozen seafood, meat goods and vegetables are also important products.

Table 1-1: Market Segmentation in the US Frozen Food Industry

Category	Value (\$ Billions)	Percentage (%)
Frozen Ready Meals	11.9	36.4
Frozen Pizza	4.7	14.4
Frozen Fish/Seafood	2.9	8.8
Frozen Vegetables	2.5	7.7
Frozen Meat Products	2.4	7.4
Frozen Potato Products	2.1	6.6
Other	6.1	18.7
Total	32.6	100

Source: MarketLine (2013)

The U.S. market has four significant companies and many other producers. In 2011, four companies had a little more than 40 percent of the US market (MarketLine, 2013). Other firms produce specialty items and have regional market share. The numerous frozen food producers distributes the sector's impact more widely across the U.S. economy.

For the purposes of this study, the frozen food sector has three components. The primary component is made up of facilities classified under the North American Industry Classification System (NAICS) under the code 31141. This industry classification includes establishments primarily engaged in producing frozen fruits and vegetables, frozen dinners and frozen side dishes of several ingredients, except seafood. This industry classification excludes establishments primarily engaged in:

- Freeze-drying fruits and vegetables (31142, Fruit and Vegetable Canning, Pickling and Drying);

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- Manufacturing frozen dairy products (31152, Ice Cream and Frozen Dessert Manufacturing);
 - Manufacturing frozen meat products (31161, Animal Slaughtering and Processing);
 - Manufacturing frozen seafood products (31171, Seafood Product Preparation and Packaging);
 - Manufacturing frozen bakery products (31181, Bread and Bakery Product Manufacturing);
 - Manufacturing frozen doughs, made from purchased flour (31182, Cookie, Cracker and Pasta Manufacturing) and
 - Freezing eggs (31199, All Other Food Manufacturing).

The second and third components are those facilities that create frozen seafood and frozen bakery products. We do not include ice cream, freeze drying, frozen meat or frozen eggs goods.

At the national level, there is data on the total sales of frozen bakery products and frozen seafood. We use this output information to calculate the impacts of the applicable portions of NAICS sectors 31171, 31181, and 31182 that produce frozen foods.

However, we found no Federal data source that would allow us to separate out the sales of frozen products from the sales of non-frozen products in baking or seafood processing at the state and district levels. For example, if bakeries show a million dollars in sales in a particular region, it is impossible to determine whether those sales are from commercial or retail bakeries, let alone whether the products are frozen or not. So, we combine the available U.S. Commerce information with information from a national marketing database to estimate the level of activity in each state and district (Manufacturers News Incorporated, 2014).

We use the manufacturing data compiled by Manufacturers News Incorporated (MNI) for the food manufacturing sector. We accessed the food manufacturing data in mid-October 2014 to obtain data on potential facilities producing frozen baked goods and frozen seafood. We construct our estimate from individual facility data in these three NAISC codes.

For baking, we broke out that portion of the industry most likely to be associated with the manufacture of frozen products using the following steps:

- The baking industry is classified under NAICS code 31181, 31182 and 31183.
- NAICS code 31183 consists of tortilla manufacturers and explicitly excludes frozen and canned products.

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- NAICS code 31181 is further divided into two subsectors at the six digit NAICS code level: 311811 consists of retail bakeries and 311812 consists of commercial bakeries. While some retail bakeries may make some products that are frozen, since they are not the primary focus of this report, we exclude them from this analysis.
 - For commercial bakeries we used a marketing database that lists all facilities in the U.S., including location, NAICS code and number of employees. We evaluated each facility to determine, through description of the facility products in the database, searches of the internet or direct phone calls, whether the facility was involved in making frozen products. We screened and evaluated thousands of facilities. If we determined that the facility was likely to make frozen products, we assigned the employment from those facilities to the impacts of frozen foods.
 - NAICS code 311813 consists entirely of facilities that produce frozen bakery products such as cakes and pies. If a facility in the marketing database reported this as their NAICS code, we included their employees in our calculation of impacts.
 - NAICS code 31182 consists of cookie and cracker manufacturers. However, data on producers of frozen dough is collected under this code rather than commercial bakeries. We included only those facilities that specifically reported manufacture of frozen dough.

For the frozen baked goods facilities we expect our results to be accurate (if the Federal data for such facilities were available at the local level), since we include the entire universe of facilities in this six-digit NAICS code. For frozen dough makers, our methodology could understate impacts, since we relied only on reported production of frozen dough to determine inclusion. For commercial bakeries, there is the potential that this methodology overstates the true impact of the frozen sector, since we have no way of assigning labor separately to the frozen and non-frozen production within the same facility.

For seafood processors (NAICS code 31171) we took a slightly different approach. We still start with the database of seafood processors from the commercial database. We examine all facilities in all 50 states that report NAICS code 31171. We exclude all facilities that reported canning operations rather than fresh and frozen processing. We also excluded a few facilities that were primarily in the business of processing fish for recreational anglers. There is a high degree of colocation of fresh and frozen production. That is, both activities tend to take place at the same facility. We thus use the national Commerce data to calculate the relative sales of fresh and frozen seafood products from these facilities. We determine that frozen seafood represents about 70 percent of total fresh and frozen sales. Therefore, we applied this 70 percent of sales to the number of the jobs at these facilities to frozen food related impacts.

These three sectors comprise the scope of this analysis. With this data on the frozen food industry, we then apply a standard economic model to estimate their contribution to the U.S. economy.

Section 2 Methodology

Overview and the IMPLAN Model

The most common and widely accepted methodology for measuring the economic impacts of industrial sectors is input-output (I-O) analysis. At its core, an I-O analysis is a table that records the flow of resources to and from firms and individuals within a region at a given time. For a specified region like a state or the nation, the input-output table accounts for all dollar flows between different sectors of the economy in a given time period. With this information, a model can then follow how a dollar added into one sector is spent and re-spent in other sectors of the economy, generating outgoing ripples of subsequent economic activity. This chain of economic activity generated by one event is called the “economic multiplier” effect.

The primary tool used in the performance of this study is the I-O model and dataset developed and maintained by IMPLAN Group LLC (formerly Minnesota IMPLAN Group, Inc.). IMPLAN is a widely-accepted and used software model first developed by the U.S. Forest Service in 1972. The data used in the baseline IMPLAN model and dataset come largely from Federal Government databases. The input-output tables themselves come from the Bureau of Economic Analysis. Much of the annual data on labor, wages, final demand and other market data comes from the Bureau of Labor Statistics, the Census Bureau, and other government sources.

Government agencies, companies, and researchers use IMPLAN estimate the economic activities associated with spending in a particular industry or on a particular project. The IMPLAN model extends conventional I-O modeling to include the economic relationships between government, industry and household sectors, allowing IMPLAN to model transfer payments such as taxes.

The model works by tracking the flow of resources to and from firms and individuals within a region. Producers of goods and services must secure labor, raw materials and other services to produce their product. The resources transferred to the owners of that labor or those raw materials and services are then spent to secure additional goods and services or inputs to the products they sell. For example, a frozen food producer in a region may produce frozen beans with a value of \$1 million. However, to produce that product, they may be required to spend \$500,000 in wages and benefits, \$200,000 to growers of beans, \$100,000 for electricity, \$50,000 for transportation of goods and raw materials to and from the plant and \$50,000 in various professional services associated with operating a business (e.g. attorneys and accountants). The suppliers will, in turn, spend those resources on labor and raw materials necessary to produce the beans. Workers and the owners of the company will buy goods and services from other firms in the area (e.g. restaurants, gas stations, and taxes). The suppliers, employees and owners of this second tier will, in turn, spend those resources on other goods and services either within the study region or elsewhere. The cycle continues until all of the money leaves the region.

IMPLAN Methodology

The model uses national production functions for over 450 industries to determine how an industry spends its operating receipts to produce its commodities. These production functions are derived from U.S. Census Department data. IMPLAN couples the national production functions with a variety of county-level economic data to determine the impacts at a state and Congressional district level.

To estimate these regional impacts, IMPLAN combines national industry production functions with county-level economic data. IMPLAN collects data from a variety of economic data sources to generate average output, employment and productivity for each industry in a given county.

IMPLAN combines this data to generate a series of economic multipliers for the study area. The multiplier measures the amount of total economic activity generated by the frozen food industry's spending an additional dollar in the study area. Based on these multipliers, IMPLAN generates a series of tables to show the economic event's direct, indirect and induced impacts to gross receipts, or output, within each of the model's more than 450 industries.

The model calculates three types of effects:

- **Direct effects.** These effects represent the effects of a change on the individual firm or sector. For example, if the demand for frozen beans were to double, wages and benefits (and number of employees) would double, as would payments to suppliers and income to owners.
- **Indirect effects.** These represent additional (or reduced) spending by other industries as a result of the activities of the industry being studied. To continue with our example, if the demand for frozen beans doubles, the direct spending on beans from growers doubles. Growers then spend more on fertilizer, seed, and other inputs. This spending by the grower and associated industries is the indirect effect.
- **Induced effects.** These effects represent the effect of changes in household income. All (profitable) owners and employees associated with either direct or indirect effects spend some portion of their income on goods and services not necessarily related to any of the industries associated with the production of frozen food. They buy meals and homes and movie tickets. They pay taxes. The government buys goods and services with that tax money. All of these activities fall into the category of induced effects.

The economic impact of frozen food production is the sum of these three effects.

Application of IMPLAN

We built IMPLAN model runs for the U.S. economy as a whole, for the 50 states, and for the 435 U.S. House of Representative districts. We then use different methodologies to estimate the impact of the industry's operational and capital spending within these 586 study areas.

Operational Spending

Operational spending refers to the non-durable goods frozen food producers use for their products such as the fresh foods, the electricity, the transportation and labor

supply. To estimate the direct, indirect and induced impact of operational spending, we use different approaches for the frozen food, the frozen bakery and the frozen seafood sectors:

- Frozen Food. Since IMPLAN includes this NAISC sector, we remove all sales from this sector in the model.
- Frozen Bakeries. From the facilities that we identify as commercial bakeries that produce frozen baked goods, we add up the total employees from the facilities and remove them from the bakery sector in model.
- Frozen Seafood. As with the frozen baked goods, we use the number of employees in facilities likely to be producing frozen seafood and remove that number from the frozen and fresh food sector in IMPLAN. In some districts the reported number of jobs in the marketing database for seafood processors was higher than the total number of jobs reported in the Commerce data. In these instances, we used the 70 percent of the employment in the Commerce data as the cap on impacts from this sector.

We then run each of the 586 models and measured the reduction in economic activity caused throughout the other industry sectors by these changes in spending and employment.

Capital Spending

We only estimate the impacts of capital spending at the national level since data on capital investments is not available for the at the state or district level. In addition, since many capital goods are procured outside of a particular study area, a national model better captures the indirect and induced economic activity. A frozen food producer in California may buy machinery from Illinois; due to the modeling structure, neither the California nor Illinois state model may capture the full economic impact of that purchase completely.

The Bureau of the Census collects data on capital spending by industry. We use this data from 2007 and 2012 in our analysis. The Census data gives the proportion of capital spending the industry buys from sectors such as non-residential construction, industrial machinery, computers, light and heavy truck manufacturing and so forth. Data on these capital investment patterns (i.e. what goods and services were purchased with each capital investment dollar in a given industry sector) were only available for 2007 and only for food manufacturing as a whole. Actual levels of capital expenditures on plant and equipment from 2012 were used along with the 2007 spending patterns to estimate the economic effects of capital spending.

Using data on capital spending by frozen food producers, we calculate and add into the national IMPLAN model additional purchases from these sectors. In other words, if 60 percent of the industry's capital spending is for machinery, we multiply the 2012 capital spending amount by 60 percent and increase the sales of the machinery sector by that amount. We take the same approach for the other major suppliers of durable goods to the industry. We then run the national IMPLAN model

to estimate the employment, labor income and value added from the frozen food industry's capital expenditures.

We also use this information to calculate the total capital expenditures for frozen food production. To do this calculation, we assume that the level of capital spending is proportional to sales and is consistent with capital spending patterns of the food manufacturing industry as a whole.

Form of Results

We combine the operational and capital spending impacts and present them in terms of employment, labor income and value added.

- Employment is defined as the number of payroll and self-employed jobs, including part time jobs. Specifically, a job in IMPLAN = the annual average of monthly jobs in that industry (this is the same definition used by BLS and BEA nationally). A job can be either full-time or part-time. Thus, 1 job lasting 12 months = 2 jobs lasting 6 months each = 3 jobs lasting 4 months each.
- Labor income is all forms of employment income, including employee compensation (wages and benefits) and proprietor income from self-employment.
- Value added is the additional value created by a particular firm or sector. It is calculated by subtracting the cost of all non-labor inputs (including contract labor) from the value of shipments. It includes employee compensation, income to owners, proprietor's income, income from property and indirect business taxes. Total value added by an industry represents the contribution of the industry to GDP. According to the Bureau of the Census, value added is considered to be the best value measure available for comparing the relative economic importance of manufacturing among industries and geographic areas.

Considerations Concerning IMPLAN

There are four important points about our use of IMPLAN (or any other input-output model):

1. It is a fixed price model. The model assumes that changes in consumption are not limited by capacity and do not affect prices. In our example above, doubling the output of frozen beans could be accomplished with existing plant and equipment and did not affect wages in the region. This simplifying assumption does not cause a problem for the analysis presented here because we are taking a snapshot of the industry in 2012. Therefore, the spending and prices are based on what was spent in 2012, not what might be spent if prices or demand change in the future.
2. Like in many studies using this type of model, the direct impacts are not calculated by the model, they are a reflection of actual spending levels and patterns. Changing the level of direct spending allows us to calculate the magnitude of the indirect and induced effects associated with the historical level of spending.

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3. This study does not estimate the forward impacts of the industry, i.e., the additional value created in the economy using frozen foods as an input. For example, frozen food wholesaling is an industry with sales three to four times that of frozen food manufacture (IBISWorld, 2014). Part of that income comes from the demand for the frozen foods that they sell. However, it is beyond the scope of this study to estimate these forward impacts.
 4. Because the model continues to calculate additional spending until all of the money leaves the region (we will refer to this phenomenon as "leakage"), the larger and more economically diverse the region, the longer it will take for spending to leave the region, and the larger the impact is likely to be. For example, employees may spend some amount of their income on automobiles. If they are in a state or district that has no automotive production, this spending will leave the region and the multiplier effect will stop. However, at the national level some portion of that same spending by that same individual may go to a domestic auto producer. Therefore, that spending would lead to more spending at the national level than would be captured by a more regional model. This leads us to assume that the national impact will be larger than the sum of the individual states and the individual state impact will be larger than the sum of the impacts in its congressional districts.

To address this fourth issue, we calculate the magnitude of this leakage and report it separately as a contribution of an individual district or state to the broader economy. For purposes of this study we make the simplifying assumption that the amount of leakage attributable to a given region is proportional to that region's share of the broader area in which it is located.

Section 3 Impact of Frozen Food Production on the Economy of the United States

This section presents the estimated total economic impact of frozen food production on the national and state economies.

A. National Impact

Table 3-1 shows the total economic impact of the U.S. frozen food production in terms of jobs, labor income and value added.

Employment

At the national level, the frozen food production's operations directly and indirectly supported 656,000 full-time and part-time jobs in 2012. Further, the industry's capital investment supported an additional 14,000 jobs. Combining the operational and capital investment impacts, industry's total employment impact on the national economy amounted to 670,000 full-time and part-time jobs in 2012.

Labor Income

The associated labor income (including wages and salaries and benefits, as well as proprietors' income) from jobs directly or indirectly supported by the frozen food production through its operational spending, and capital investment is estimated to be \$35.1 billion.

Value Added

The U.S. frozen food production industry's operations directly or indirectly generated \$54.4 billion of value added in 2012, and its capital investment added an additional \$1.3 billion of value added. The industry's total value added impact at was \$55.7 billion nationally, accounting for 0.34 percent of U.S. GDP (Bureau of Economic Analysis, 2014).

Table 3-1: Total Impact of the Frozen Food Industry on the U.S. Economy in 2012

Operational Impact	
Employment	656,000
Labor Income	\$34,300,000,000
Value Added	\$54,400,000,000
Capital Expenditure	
Employment	14,000
Labor Income	\$800,000,000
Value Added	\$1,300,000,000
Total Economic Impact	
Employment	670,000
Labor Income	\$35,100,000,000
Value Added	\$55,700,000,000

Also, by looking at a detailed breakout of direct and indirect and induced effects, we get a better sense of which industries are most affected by frozen food production. Table 3-2 shows the direct effects of frozen food production as well as the indirect and induced effects. The indirect and induced effects are broken out to show the ten industry sectors that are most affected by spending in the frozen food industry.

Table 3-2: Direct, Indirect, and Induced Effects of the Frozen Food Industry in 2012

Industry Sector	Employment	Labor Income (\$ millions)	Value Added (\$ millions)
Direct Impact of Frozen Food Manufacturing (including capital spending)	154,000	7,700	10,100
Indirect and Induced Effects in Other Industries	502,000	19,200	31,250
Operational Impact	656,000	34,300	54,400
Frozen Food Production	89,000	4,660	6,350
Bakery Products	46,800	2,090	2,670
Grain Farming	40,900	1,070	1,040

Industry Sector	Employment	Labor Income (\$ millions)	Value Added (\$ millions)
Wholesale Trade Businesses	29,200	2,430	4,230
Food Service and Drinking Places	25,600	592	859
Animal Production, except cattle and poultry	19,000	267	822
Real Estate Establishments	18,100	334	2,320
Seafood Product Processing and Packaging	18,000	956	1,010
Management of Companies and Enterprises	17,000	2,080	2,460
Support Activities for Agriculture and Forestry	17,000	515	416
All other Industries	335,400	19,300	32,100
Capital Investment Impact			
	13,700	848	1,340
Construction of New Non-residential Manufacturing Structures	1630	99	107
Wholesale Trade Businesses	1020	85	148
Food Services and Drinking Places	650	15	22
Custom Computer Programming Services	590	53	57
Employment Services	380	12	14
Real Estate Establishments	370	7	47
Other Industrial Machinery Manufacturing	340	27	48
Security, Commodity Contracts, Investments, and Related Activities	250	19	17
Offices of Physicians, Dentists, and Other Health Practitioners	240	20	20
All other Industries	8,230	511	860
Total Economic Impact			
	670,000	35,100	55,700

B. State Impacts

Frozen food companies are present in all states with the exception of Wyoming. The IMPLAN allows us to model each state independently to take into account factors that vary regionally such as industry mix, wage structure, spending and saving patterns and connections to other economies.

Table 3-3 shows the industry's state-by-state total operational impact in terms of jobs, labor income and value added. Because capital expenditure data is not available at the state level, these estimates only reflect operational impacts. We also calculate a contribution for each state to the broader U.S. economy to account for spending on goods and services from the U.S., but beyond the borders of the state.

Employment

At the state level, the frozen food industry's operations directly and indirectly supported 440,000 full-time and part-time jobs in 2012. Employment level ranged from less than 10 jobs in Montana to almost 50,000 jobs in California. On average, the frozen food industry provided over 5,000 jobs in every state across the country.

Labor Income

The associated labor income (including wages and salaries and benefits, as well as proprietors' income) from jobs directly or indirectly supported by the frozen food industry through its operational spending ranged from \$1 million in Hawaii; to almost \$1 billion in Ohio, Washington and Wisconsin; and to over \$2 billion in California.

Value Added

The U.S. frozen food industry's operations ranged from nearly zero in West Virginia to over \$3.4 billion in California. On average, the industry contributed to over \$400 million per state.

When looking at state results, it is important to remember the effect of "leakage" as discussed in Section 2. Regional input-output models report the effects of spending within the region. Money spent outside of a region does not count toward the regional effect totals. So, the larger and more diverse a region the more opportunity for spending on goods and services produced within the region exists. As a result, we expect that the effect (labor, income, or value added) will be larger for a region than the sum of the effects of its sub-regions. In other words, the total effect measured by the national model is expected to be larger than the sum of the effects of the state models.

The significance of this "leakage" can be demonstrated by looking at any of the three effect measures from the model. For example, in Table 3-4 we compare the direct, indirect and induced employment numbers of the states to the same results from the national model. The data indicates that while the results for direct employment are relatively close, indirect and induced numbers are significantly lower for the states combined than the national model would suggest. This is

because the national model accounts for the jobs associated with the trade in goods and services between the states.

Table 3-3: Direct, Indirect, and Induced Employment, Nationally and by State

State	Direct Employment	Indirect Employment	Induced Employment	Total Employment
Alabama	1,400	1,500	520	3,420
Alaska	6,800	3,800	2,300	12,900
Arizona	760	510	370	1,640
Arkansas	3,600	3,500	1,900	9,000
California	18,000	18,000	13,000	49,000
Colorado	2,400	1,700	1,400	5,500
Connecticut	800	350	310	1,460
Delaware	310	200	130	640
District of Columbia	-	-	-	-
Florida	6,600	6,000	4,900	17,500
Georgia	3,800	2,600	2,300	8,700
Hawaii	320	190	94	604
Idaho	4,800	4,900	3,400	13,100
Illinois	11,000	7,900	7,100	26,000
Indiana	3,000	1,600	1,300	5,900
Iowa	2,600	1,900	1,400	5,900
Kansas	2,200	1,700	1,100	5,000
Kentucky	3,400	2,900	1,700	8,000
Louisiana	1,500	1,300	740	3,540

State	Direct Employment	Indirect Employment	Induced Employment	Total Employment
Maine	2,400	2,400	1,200	6,000
Maryland	1,100	760	530	2,390
Massachusetts	3,700	2,600	2,100	8,400
Michigan	3,400	3,000	2,100	8,500
Minnesota	4,400	4,000	3,100	11,500
Mississippi	1,900	2,600	760	5,260
Missouri	2,700	2,200	1,800	6,700
Montana	4	3	1	8
Nebraska	780	660	510	1,950
Nevada	620	320	200	1,140
New Hampshire	340	280	170	790
New Jersey	3,100	1,900	1,500	6,500
New Mexico	380	230	160	770
New York	5,800	3,500	2,300	11,600
North Carolina	2,800	2,000	1,500	6,300
North Dakota	830	460	400	1,690
Ohio	8,400	9,300	7,700	25,400
Oklahoma	1,800	1,200	830	3,830
Oregon	7,700	9,200	4,700	21,600
Pennsylvania	7,300	4,500	4,100	15,900
Rhode Island	400	220	160	780
South Carolina	2,400	1,800	1,200	5,400

State	Direct Employment	Indirect Employment	Induced Employment	Total Employment
South Dakota	200	160	120	480
Tennessee	5,800	4,400	3,600	13,800
Texas	9,100	14,000	6,100	29,200
Utah	3,000	2,600	1,900	7,500
Vermont	120	55	43	218
Virginia	2,200	1,800	960	4,960
Washington	12,000	14,000	7,400	33,400
West Virginia	16	6	4	26
Wisconsin	6,800	8,300	5,200	20,300
Wyoming	-	-	-	-
Sum of State Totals	175,000	159,000	106,000	440,000
National Model Estimate	154,000	288,000	214,000	656,000

One can see from these results that even though the sum of direct jobs in the states is slightly higher than the direct jobs in the national model, the indirect and induced employment are higher at the national level. We believe this to be an artifact of the greater opportunities for money to cycle in a broader economy.

To account for this significant difference between the sum of state model results and the national model results, we assign back the lost amount to each state depending on their relative contribution to the total value added from the state models. We define this as the contribution to the U.S. economy outside of the state being studied. Table 3-4 shows total employment, labor income and value added effects from the frozen food production sector in each state and the contribution of those activities to GDP outside of the state.

Table 3-4: State-by-State Economic Impact

State	Employment	Labor Income (\$ millions)	Value Added (\$ millions)	Contribution to US Economy Outside of State (\$ millions)
Alabama	3,420	107	161	100
Alaska	12,900	680	950	590
Arizona	1,640	70	114	71
Arkansas	9,000	410	630	390
California	49,000	2950	4200	2600
Colorado	5,500	285	410	250
Connecticut	1,460	85	123	76
Delaware	640	33	49	30
District of Columbia	0	0	0	0
Florida	17,500	890	1390	860
Georgia	8,700	439	690	430
Hawaii	604	23	32.5	20
Idaho	13,100	650	930	580
Illinois	26,000	1570	2350	1500
Indiana	5,900	267	396	250
Iowa	5,900	304	470	290
Kansas	5,000	238	362	220
Kentucky	8,000	325	580	360
Louisiana	3,540	155	248	150
Maine	6,000	229	355	220
Maryland	2,390	127	197	120
Massachusetts	8,400	490	660	410
Michigan	8,500	417	640	400
Minnesota	11,500	610	910	560
Mississippi	5,260	165	266	160
Missouri	6,700	345	500	310
Montana	8	0.25	0.4	0.24
Nebraska	1,950	105	152	94
Nevada	1,140	51	79	49
New Hampshire	790	35.5	52	32
New Jersey	6,500	368	540	330
New Mexico	770	35	49	30
New York	11,600	650	930	580
North Carolina	6,300	297	580	360

State	Employment	Labor Income (\$ millions)	Value Added (\$ millions)	Contribution to US Economy Outside of State (\$ millions)
North Dakota	1,690	91	157	97
Ohio	25,400	1450	2260	1400
Oklahoma	3,830	174	251	160
Oregon	21,600	930	1390	860
Pennsylvania	15,900	840	1220	750
Rhode Island	780	37.4	48	30
South Carolina	5,400	214	324	200
South Dakota	480	22	36	22
Tennessee	13,800	710	1180	730
Texas	29,200	1270	2000	1200
Utah	7,500	345	520	320
Vermont	218	8.3	11.6	7.2
Virginia	4,960	223	440	270
Washington	33,400	1760	2580	1600
West Virginia*	26	0.96	1.32	NA
Wisconsin	20,300	1010	1450	900
Wyoming	0	\$0	\$0	\$0

**West Virginia shows no contribution outside of the state. This is likely due to rounding and the very small size of the industry in the state.*

While the industry is widely distributed throughout the U.S., there are states where the industry is a larger contributor to the local economy. Table 3-5 lists the states with the largest number of jobs associated with frozen food production.

Table 3-5: States with Highest Employment Impacts from Frozen Food Industry

State	Employment	Labor Income (\$ million)	Value Added (\$ million)
California	49,000	2,950	4,200
Washington	33,400	1,760	2,580
Texas	29,200	1,270	2,000
Illinois	26,000	1,570	2,350
Ohio	25,400	1,450	2,260

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