



Regional Economic Models, Inc.



Economic and Fiscal Impacts of the Louisiana Economic Development Quality Jobs Program

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Executive Summary

Louisiana Economic Development (LED) has retained Regional Economic Models, Inc. (REMI) to evaluate the economic and fiscal impacts on Louisiana of the Quality Jobs Program (QJP), which “is an incentive to encourage businesses to locate or expand existing operations in Louisiana and create quality jobs focusing on Louisiana Vision 2020 traditional and seed clusters industries”.¹

REMI uses a Louisiana-specific version of its Tax-PI model to perform an impact analysis over the 8-year period from 2010-2017. REMI considers both the employment provided by and the rebates provided to QJP-qualifying businesses, using data furnished by LED and the Louisiana Department of Revenue (LDR). Three types of rebates are associated with the QJP: Sales Tax Rebate, Jobs Credit, and Investment Credit. The analysis considers both a “high” case and a “low” case. In the high case, all direct employment in the state for businesses under the QJP is treated as being attributable to the program, while the low case allows for the possibility that some of the direct employment would have existed in the state anyway, and is therefore not attributable to the QJP.

During 2010-2017, the average total employment impact of the QJP on Louisiana in a given year ranges from 35,901 – 48,756 jobs between the low and high cases. The average impact on the size of the state economy, as measured by Gross State Product (GSP), ranges from \$4.3 – 5.6 billion. The average impact on state personal income ranges from \$1.9 – 2.6 billion. The average impact on the state population ranges from 30,112 – 41,212. The average impact on state government revenues ranges from \$77.5 – 104.5 million, while the average impact on state government expenditures ranges from \$31.1 – 43.3 million. Given an average rebate of \$60.7 million and accounting for the increase in state government expenditures, the implied return on investment (ROI) ratio of the QJP ranges from 0.76 – 1.01.²

While it is possible that the state government may not fully recoup its investment vis-à-vis the QJP rebates it offers, the program is associated with direct employment in generally high-paying and highly productive sectors that provide significant value to the Louisiana economy. Almost two-thirds of the direct job creation comes in the manufacturing sectors (including almost one-fifth in chemical manufacturing alone), which collectively pay twice as much as the average Louisiana sector and are over six times more economically productive than the average. This generates substantial economic spillover effects in the state through increased business investment, supply chain demand, and consumption activity. As such, the QJP may very well be a sound investment for the state of Louisiana to make to spur economic growth even if it does not entirely pay for itself.

¹ Tax Exemption Budget 2010-2011, Louisiana Department of Revenue, p. 381. Accessed at <https://revenue.louisiana.gov/NewsAndPublications/Publications>.

² We feel that this measure is most appropriate to capture the true fiscal ROI of the QJP, but recognize that other studies have not accounted for expenditures in calculating ROI. Under that approach, our ROI ratio is 1.10 – 1.72.

REMI Background & Experience

Regional Economic Models, Inc. (REMI) is an independent company with offices in Amherst, MA and Washington, D.C. that provides non-partisan economic analysis and modeling software to its clients, who include federal, state, and local government agencies, non-profit organizations, universities, and private companies. With approximately 40 years of experience, REMI is a worldwide leader in providing dynamic regional U.S. macroeconomic and demographic models used to evaluate taxes, economic development, and many other policy issues such as healthcare, transportation, energy and the environment, and trade.

REMI consultative services and modeling software have been utilized on a number of tax policy issues and economic development projects. At the federal level, REMI produced a 2017 report regarding the economic impacts of the 179D Energy Efficient Commercial Buildings Tax Deduction, which was renewed again at the end of 2019. At the state level, the REMI model was used in 2018 to generate several dynamic fiscal notes on behalf of the Arkansas Bureau of Legislative Research evaluating a series of personal and corporate income tax proposals, versions of which were passed in early 2019. Also in Arkansas, REMI analyzed the economic and fiscal impacts of the Big River Steel project in 2013, including a comparison of the fiscal benefits to the cost of the tax incentives. Additionally, REMI authored a 2018 study on the economic and fiscal impacts of the NYC Amazon HQ2 location on behalf of the state, and our estimates were quoted in the Governor's and Mayor's official press releases.

Glossary

Employment: Employment comprises estimates of the number of jobs, full-time plus part-time, by place of work for all sectors.

GSP: Gross State Product. The market value of goods and services produced by labor and property in a given state. Also, the sum of value-added across all sectors.

Intermediate Inputs: The goods and services that are used as inputs into the production of final goods and services.

North American Industry Classification System (NAICS): The North American Industry Classification System (NAICS) is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.

Output: The amount of production, including all intermediate goods purchased as well as value added (compensation and profit). This can also be thought of as sales or supply.

Personal Income: Income received by persons from all sources. It includes income received from participation in production as well as from government and business transfer payments.

Value-Added: The gross output of an industry or a sector less its intermediate inputs; the contribution of an industry or sector to gross domestic product (GDP). Value added by industry can also be measured as the sum of compensation of employees, taxes on production and imports less subsidies, and gross operating surplus.

Introduction

Louisiana Economic Development (LED) has retained Regional Economic Models, Inc. (REMI) to evaluate the economic and fiscal impacts on Louisiana of the Quality Jobs Program (QJP), which “is an incentive to encourage businesses to locate or expand existing operations in Louisiana and create quality jobs focusing on Louisiana Vision 2020 traditional and seed clusters industries”.³

REMI uses a Louisiana-specific version of its Tax-PI model to perform an impact analysis over the 8-year period from 2010-2017. REMI considers both the employment provided by and the rebates provided to QJP-qualifying businesses, using data furnished by LED and the Louisiana Department of Revenue (LDR). The analysis considers both a “high” case and a “low” case. In the high case, all direct employment in the state for businesses under the QJP is treated as being attributable to the program, while the low case allows for the possibility that some of the direct employment would have existed in the state anyway, and is therefore not attributable to the QJP.

Impacts are reported for employment, Gross State Product (GSP), personal income, population, and state government revenues and expenditures. The fiscal impacts are used to calculate the implied return on investment (ROI) ratio for the state vis-à-vis the QJP rebates it offers.

All results indicate an increase in the level of economic activity as a result of the QJP. The program is associated with direct employment in generally high-paying and highly productive sectors that provide significant value to the Louisiana economy. Almost two-thirds of the direct job creation comes in the manufacturing sectors (including almost one-fifth in chemical manufacturing alone), which collectively pay twice as much as the average Louisiana sector and are over six times more economically productive than the average. This generates substantial economic spillover effects in the state through increased business investment, supply chain demand, and consumption activity.

As such, while only the high case generates a fiscal breakeven scenario for the state government, the QJP may very well be a sound investment for the state of Louisiana to make to spur economic growth even if it does not entirely pay for itself.

³ Tax Exemption Budget 2010-2011, Louisiana Department of Revenue, p. 381. Accessed at <https://revenue.louisiana.gov/NewsAndPublications/Publications>.

Methodology

In order to assess the economic and fiscal impacts of the QJP, REMI uses a 1-region, 70-sector Tax-PI v2.3 model of Louisiana. More detailed information about the REMI Tax-PI model is available in Appendix I.

The analysis covers the 8-year period from 2010-2017. REMI considers two categories of direct impacts of the QJP based on data furnished by LED and the publicly available Tax Exemption Budgets published by the LDR: (1) the employment provided by, and (2) the rebates provided to, QJP-qualifying businesses.

Direct Impacts: Employment

LED provides REMI with raw annual employment data for all QJP-qualifying businesses at any point during 2010-2017, which REMI processes into annual sector level direct employment using the businesses' associated North American Industrial Classification System (NAICS) codes. Table 1.1 displays the total annual direct employment as well as direct employment for the top five sectors, and Table A3.1 in Appendix III displays it for all sectors. Overall, manufacturing sectors support 65.4% of the total direct employment (and chemical manufacturing alone supports 17.1%).

Table 1.1: Direct Employment (Total & Top 5 Sectors)

Sector	Units	2010	2011	2012	2013	2014	2015	2016	2017	Average
Total	Individuals (Jobs)	8,347	8,773	10,193	11,393	12,595	12,397	10,592	11,058	10,669
Chemical manufacturing	Individuals (Jobs)	922	1,142	1,298	1,493	2,183	2,548	2,302	2,682	1,821
Other transportation equipment manufacturing	Individuals (Jobs)	1,307	1,459	1,267	1,370	1,193	1,010	472	658	1,092
Primary metal manufacturing	Individuals (Jobs)	358	632	871	891	1,271	945	943	1,246	895
Management of companies and enterprises	Individuals (Jobs)	820	657	803	762	890	979	439	461	726
Professional, scientific, and technical services	Individuals (Jobs)	269	304	198	432	675	865	1,017	1,130	611

Note: Components may not sum to totals due to rounding.

The analysis considers both a “high” case and a “low” case. In the high case, all direct employment in the state for businesses under the QJP is treated as being attributable to the program. As such, the direct employment numbers are entered into the Tax-PI model as net new to the state using the Industry Sales (Exogenous Production) option. On the other hand, the low case allows for the possibility that some of the direct employment would have existed in the state anyway, and is therefore not attributable to the QJP. As such, the direct employment numbers are entered into the Tax-PI model using the Firm Sales (Competes Locally) option.

Direct Impacts: Rebates

REMI has accessed the Tax Exemption Budgets for Fiscal Years (FY) 2010-2018, which run July-June in Louisiana, from the LDR's website. Supplementing these with monthly data provided by LED, REMI constructed the QJP rebates by calendar year for 2010-2017, and input them as decreases in State Government Spending. Three types of rebates are associated with the QJP: Sales Tax Rebate, Jobs Credit, and Investment Credit. Table 1.2 displays the annual rebates by type. Overall, the Jobs Credit accounts for an average of 52.7% of the total annual rebates.

Table 1.2: Quality Jobs Program Rebates

Rebate Type	Units	2010	2011	2012	2013	2014	2015	2016	2017	Average
Jobs Credit	Millions of Nominal Dollars	22.0	21.6	36.0	36.9	37.8	59.9	59.5	60.0	41.7
Investment Credit	Millions of Nominal Dollars	14.3	13.7	3.4	14.5	5.3	62.3	28.9	19.1	20.2
Sales Tax Rebate	Millions of Nominal Dollars	22.4	8.5	1.5	12.5	11.0	25.8	34.6	21.4	17.2
Total Rebate	Millions of Nominal Dollars	58.7	43.8	40.9	63.9	54.0	148.0	123.1	100.5	79.1

Note: Components may not sum to totals due to rounding.

Results

This section reports the economic and fiscal impacts on Louisiana of the QJP over the period 2010 – 2017, specifically on employment, GSP, personal income, population, and state government revenues and expenditures. For each outcome measure, results are provided for both the low and high cases.

Employment

Table 2.1 shows low and high case employment impacts of the QJP. During 2010 – 2017, the average employment impact ranges from 35,901 – 48,756 jobs between the low and high cases. Table A3.2 in Appendix III shows impacts for all private, nonfarm sectors. Given the average direct employment of 10,669 jobs associated with QJP-qualifying businesses, this implies an average employment multiplier of 3.4 – 4.6, even after accounting for the decrease in state government spending associated with providing the rebates.

These robust impacts come largely because almost two-thirds of the direct job creation comes in the high-paying and highly productive manufacturing sectors. This generates substantial economic spillover effects in the state through increased business investment, supply chain demand, and consumption activity. These impacts are reflected in the composition of the top five most affected sectors.

The business investment (and residential investment driven by the population impacts discussed below) drive the significant construction employment impacts. The professional, scientific, and technical services and administrative and support services sector employment impacts are driven both by direct employment as well as supply chain demand-driven employment. The large employment impacts on the retail trade and food services and drinking places sectors are driven by spending the large increase in labor income (the total impacts on personal income will be detailed below).

Table 2.1: Employment Impacts (Total & Top 5 Sectors)

Sector	Units	2010	2011	2012	2013	2014	2015	2016	2017	Average
<i>Low Case</i>										
Total	Individuals (Jobs)	22,337	28,630	34,731	38,573	45,146	43,999	38,803	34,989	35,901
Construction	Individuals (Jobs)	3,772	5,806	6,926	7,495	8,484	8,152	7,132	5,188	6,619
Retail trade	Individuals (Jobs)	1,738	2,279	2,798	3,154	3,761	3,784	3,385	3,046	2,993
Professional, scientific, and technical services	Individuals (Jobs)	1,080	1,303	1,560	1,842	2,258	2,396	2,209	2,116	1,846
Administrative and support services	Individuals (Jobs)	1,252	1,490	1,801	1,924	2,248	2,158	1,928	1,716	1,815
Chemical manufacturing	Individuals (Jobs)	916	1,130	1,283	1,464	2,119	2,460	2,214	2,563	1,769
<i>High Case</i>										
Total	Individuals (Jobs)	34,467	41,351	48,054	52,981	60,186	58,242	50,032	44,737	48,756
Construction	Individuals (Jobs)	5,577	8,171	9,347	10,018	10,991	10,445	8,827	6,205	8,698
Retail trade	Individuals (Jobs)	2,616	3,237	3,819	4,288	4,967	4,963	4,336	3,872	4,012
Professional, scientific, and technical services	Individuals (Jobs)	1,729	1,978	2,205	2,696	3,308	3,538	3,327	3,249	2,754
Administrative and support services	Individuals (Jobs)	2,261	2,504	2,944	2,911	3,241	3,052	2,732	2,316	2,745
Food services and drinking places	Individuals (Jobs)	1,264	1,584	1,968	2,323	2,799	2,910	2,726	2,649	2,278

Note: Components may not sum to totals due to rounding.

Gross State Product

Table 2.2 shows low and high case GSP and value-added impacts of the QJP. During 2010 – 2017, the average GSP impact ranges from \$4.3 – 5.6 billion. Table A3.3 in Appendix III shows value-added impacts for all private, nonfarm sectors.

The construction sector is also among the top five in value-added impacts, driven by the strong business (and residential) investment response. Also, the relatively productive real estate and wholesale trade sectors see large value-added impacts as a result of increased supply chain demand. Most of the remaining top five in value-added impacts come from direct employment in the highly productive chemical manufacturing and petroleum and coal products manufacturing sectors.

Table 2.2: GSP & Value-Added Impacts (Total & Top 5 Sectors)

Sector	Units	2010	2011	2012	2013	2014	2015	2016	2017	Average
<i>Low Case</i>										
Total	Millions of 2010 Dollars	2,698.7	3,270.2	3,878.0	4,326.3	5,389.5	5,576.4	5,042.0	4,248.6	4,303.7
Chemical manufacturing	Millions of 2010 Dollars	386.4	480.4	562.1	656.2	966	1142.2	1023.7	1185.9	800.4
Petroleum and coal products manufacturing	Millions of 2010 Dollars	438.9	459.4	485.8	498.2	692.5	757.9	729.7	141.5	525.5
Construction	Millions of 2010 Dollars	209.5	325.2	408.8	446.2	513.1	494.5	421.6	310.8	391.2
Real estate	Millions of 2010 Dollars	139.3	180.1	233.2	263.8	313.1	309.1	277	244.8	245.1
Oil and gas extraction	Millions of 2010 Dollars	176.4	193.9	194.6	197.7	287.9	280.6	279.5	94.2	213.1
<i>High Case</i>										
Total	Millions of 2010 Dollars	3,896.6	4,479.4	5,152.7	5,760.2	6,999.8	7,196.4	6,327.3	5,277.9	5,636.3
Chemical manufacturing	Millions of 2010 Dollars	422.7	530.9	622.9	724.9	1,079.0	1,316.0	1,189.6	1,358.7	905.6
Petroleum and coal products manufacturing	Millions of 2010 Dollars	541.3	537.7	576.8	601.8	886.4	979.0	903.0	165.3	648.9
Construction	Millions of 2010 Dollars	309.8	457.9	552.2	597.0	665.7	634.6	523.2	373.6	514.3
Real estate	Millions of 2010 Dollars	209.3	256.4	319.8	359.8	414.3	405.3	354.3	310.0	328.7
Wholesale trade	Millions of 2010 Dollars	190.2	206.6	261.2	313.6	345.1	375.2	311.4	293.3	287.1

Note: Components may not sum to totals due to rounding.

Personal Income

Table 2.3 shows low and high case personal income impacts of the QJP. During 2010 – 2017, the average personal income impact ranges from \$1.9 – 2.6 billion, driven almost entirely by the growth in labor income derived from both the highly-paid direct jobs and the many spillover jobs.

Table 2.3: Personal Income Impacts

Case	Units	2010	2011	2012	2013	2014	2015	2016	2017	Average
Low	Millions of 2010 Dollars	1,123.2	1,376.6	1,722.8	1,969.8	2,410.1	2,446.9	2,240.3	2,125.0	1,926.8
High	Millions of 2010 Dollars	1,702.1	1,963.5	2,364.1	2,694.8	3,200.9	3,230.1	2,890.2	2,724.5	2,596.3

Note: Components may not sum to totals due to rounding.

Population

Table 2.4 shows low and high case population impacts of the QJP. During 2010 – 2017, the average population impact ranges from 30,112 – 41,212. This population growth is driven heavily by the increase in in-migration to Louisiana generated by the addition of job opportunities.

Table 2.4: Population Impacts

Case	Units	2010	2011	2012	2013	2014	2015	2016	2017	Average
Low	Individuals	7,568	14,728	22,052	28,788	36,099	41,510	44,441	45,713	30,112
High	Individuals	11,506	21,508	31,225	40,150	49,384	56,165	59,332	60,423	41,212

Note: Components may not sum to totals due to rounding.

State Government Revenues & Expenditures

Table 2.5 shows low and high case state government revenue and expenditure impacts of the QJP, as well as the implied ROI ratios. During 2010 – 2017, the average state government revenue impact ranges from \$77.5 – 104.5 million, and the average state government expenditure impact ranges from \$31.1 – 43.3 million, for an average state government net revenue impact of \$46.4 – 61.2 million. Given the average rebate of \$60.7 million, this generates a ROI ratio of 0.76 – 1.01.⁴

Approximately three-quarters of the state government revenue impacts come from growth in personal income tax, sales tax, and corporate income tax. The first two revenue categories are driven primarily by the large increase in personal income, which is both taxed directly as well as spent on consumption goods and thereby taxed again via sales taxes. The growth in value-added, of which corporate profits are a key component, drives the increase in corporate income tax.

The most important single driver of the growth in state government expenditures is K-12 spending, which is driven primarily by the increase in population. While the jobs are taken by working age adults, their families – including their children – come with them and the children require an education in the state of Louisiana.

The average increase in state government net revenue exceeds the average value of the rebates provided by the state government under the QJP in the high case, and in the low case the net fiscal loss is \$14.3 million, which is less than one one-hundredth of one percent of the average Louisiana state budget over 2010 – 2017.

⁴ We feel that this measure is most appropriate to capture the true fiscal ROI of the QJP, but recognize that other studies have not accounted for expenditures in calculating ROI. Under that approach, our ROI ratio is 1.10 – 1.72.

Table 2.5: State Government Revenue & Expenditure Impacts, and Fiscal Return on Investment

Fiscal Category	Units	2010	2011	2012	2013	2014	2015	2016	2017	Average
<i>Low Case</i>										
Revenue Impact	Millions of 2010 Dollars	26.7	56.4	70.7	80.6	93.6	102.8	98.8	90.6	77.5
Expenditure Impact	Millions of 2010 Dollars	4.9	10.4	19.4	28.0	36.5	44.3	50.8	54.6	31.1
Net Revenue Impact	Millions of 2010 Dollars	21.8	46.0	51.3	52.6	57.1	58.5	48.0	36.0	46.4
Total Rebate	Millions of 2010 Dollars	52.2	37.4	33.6	50.6	41.3	110.4	89.6	70.6	60.7
Return on Investment	Ratio									0.76
<i>High Case</i>										
Revenue Impact	Millions of 2010 Dollars	40.0	82.5	98.5	110.0	125.3	135.6	128.1	115.9	104.5
Expenditure Impact	Millions of 2010 Dollars	7.5	15.7	28.4	39.9	51.1	60.9	69.1	73.6	43.3
Net Revenue Impact	Millions of 2010 Dollars	32.5	66.8	70.1	70.1	74.2	74.7	59.0	42.3	61.2
Total Rebate	Millions of 2010 Dollars	52.2	37.4	33.6	50.6	41.3	110.4	89.6	70.6	60.7
Return on Investment	Ratio									1.01

Note: Components may not sum to totals due to rounding.

Conclusion

LED has retained REMI to evaluate the economic and fiscal impacts on Louisiana of the QJP. REMI performs an impact analysis over the 8-year period from 2010-2017, considering both the employment provided by and the rebates provided to QJP-qualifying businesses under low and high cases with respect to the amount of direct employment attributable to the QJP.

During 2010-2017, the average total employment impact of the QJP on Louisiana in a given year ranges from 35,901 – 48,756 jobs. The average impact on the size of the state economy, as measured by Gross State Product (GSP), ranges from \$4.3 – 5.6 billion. The average impact on state personal income ranges from \$1.9 – 2.6 billion. The average impact on the state population ranges from 30,112 – 41,212. The average impact on state government revenues ranges from \$77.5 – 104.5 million, while the average impact on state government expenditures ranges from \$31.1 – 43.3 million. Given an average rebate of \$60.7 million and accounting for the increase in state government expenditures, the implied ROI ratio of the QJP ranges from 0.76 – 1.01.

While it is possible that the state government may not fully recoup its investment vis-à-vis the QJP rebates it offers, the program is associated with direct employment in generally high-paying and highly productive sectors that provide significant value to the Louisiana economy. Almost two-thirds of the direct job creation comes in the manufacturing sectors (including almost one-fifth in chemical manufacturing alone), which collectively pay twice as much as the average Louisiana sector and are over six times more economically productive than the average. This generates substantial economic spillover effects in the state through increased business investment, supply chain demand, and consumption activity. As such, the QJP may very well be a sound (and relatively small) investment for the state of Louisiana to make to spur economic growth even if it does not entirely pay for itself.

Appendix I: REMI Model Framework

Tax-PI is a structural economic forecasting and policy analysis model. The following core framework applies to all REMI model builds. The model integrates input-output, computable general equilibrium, econometric and economic geography methodologies. The model is dynamic, with forecasts and simulations generated on an annual basis and behavioral responses to compensation, price, and other economic factors.

The model consists of thousands of simultaneous equations with a structure that is relatively straightforward. The exact number of equations used varies depending on the extent of industry, demographic, demand, and other detail in the specific model being used. The overall structure of the model can be summarized in five major blocks: (1) Output and Demand, (2) Labor and Capital Demand, (3) Population and Labor Supply, (4) Compensation, Prices, and Costs, and (5) Market Shares. The blocks and their key interactions are shown in Figures 1 and 2.

Figure A2.1: REMI Model Linkages

REMI Model Linkages (Excluding Economic Geography Linkages)

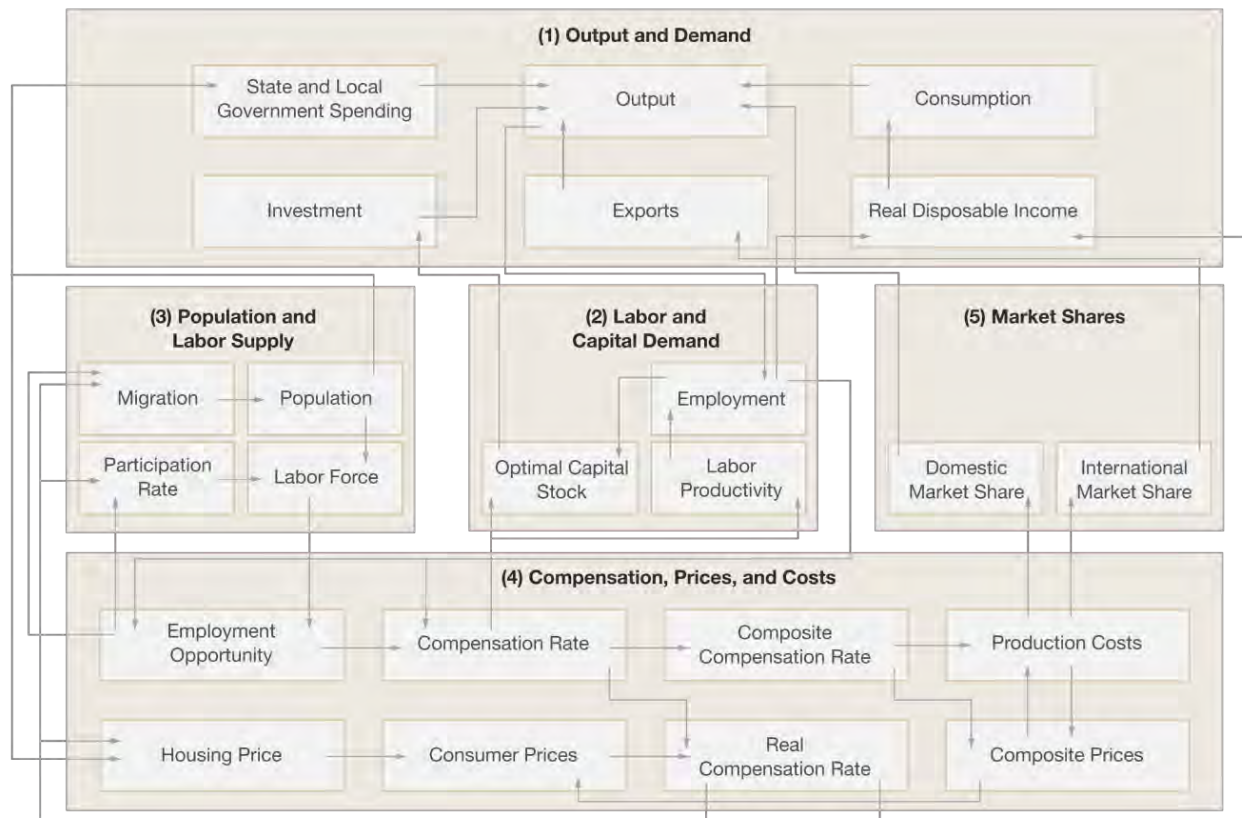
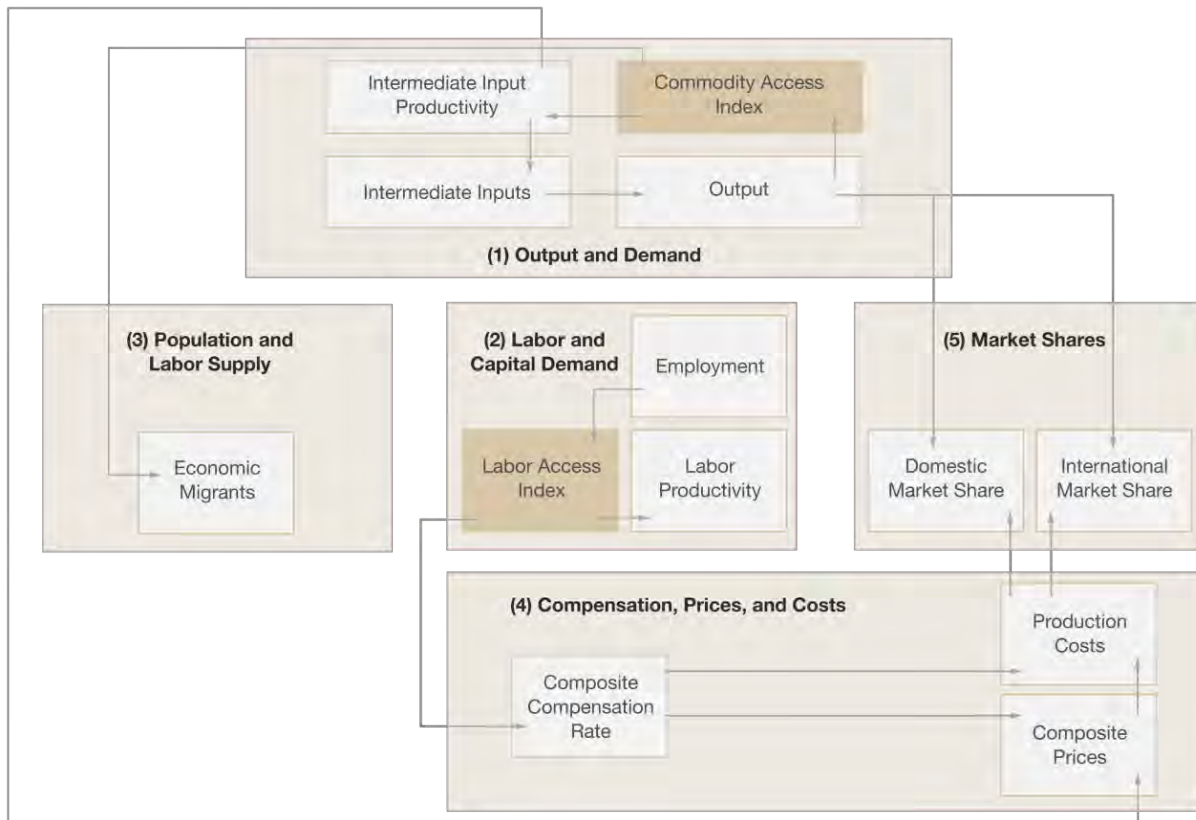


Figure A2.2: Economic Geography Linkages



The Output and Demand block consists of output, demand, consumption, investment, government spending, exports, and imports, as well as feedback from output change due to the change in the productivity of intermediate inputs. The Labor and Capital Demand block includes labor intensity and productivity as well as demand for labor and capital. Labor force participation rate and migration equations are in the Population and Labor Supply block. The Compensation, Prices, and Costs block includes composite prices, determinants of production costs, the consumption price deflator, housing prices, and the compensation equations. The proportion of local, inter-regional, and export markets captured by each region is included in the Market Shares block.

Models can be built as single region, multi-region, or multi-region national models. A region is defined broadly as a sub-national area, and could consist of a state, province, county, or city, or any combination of sub-national areas.

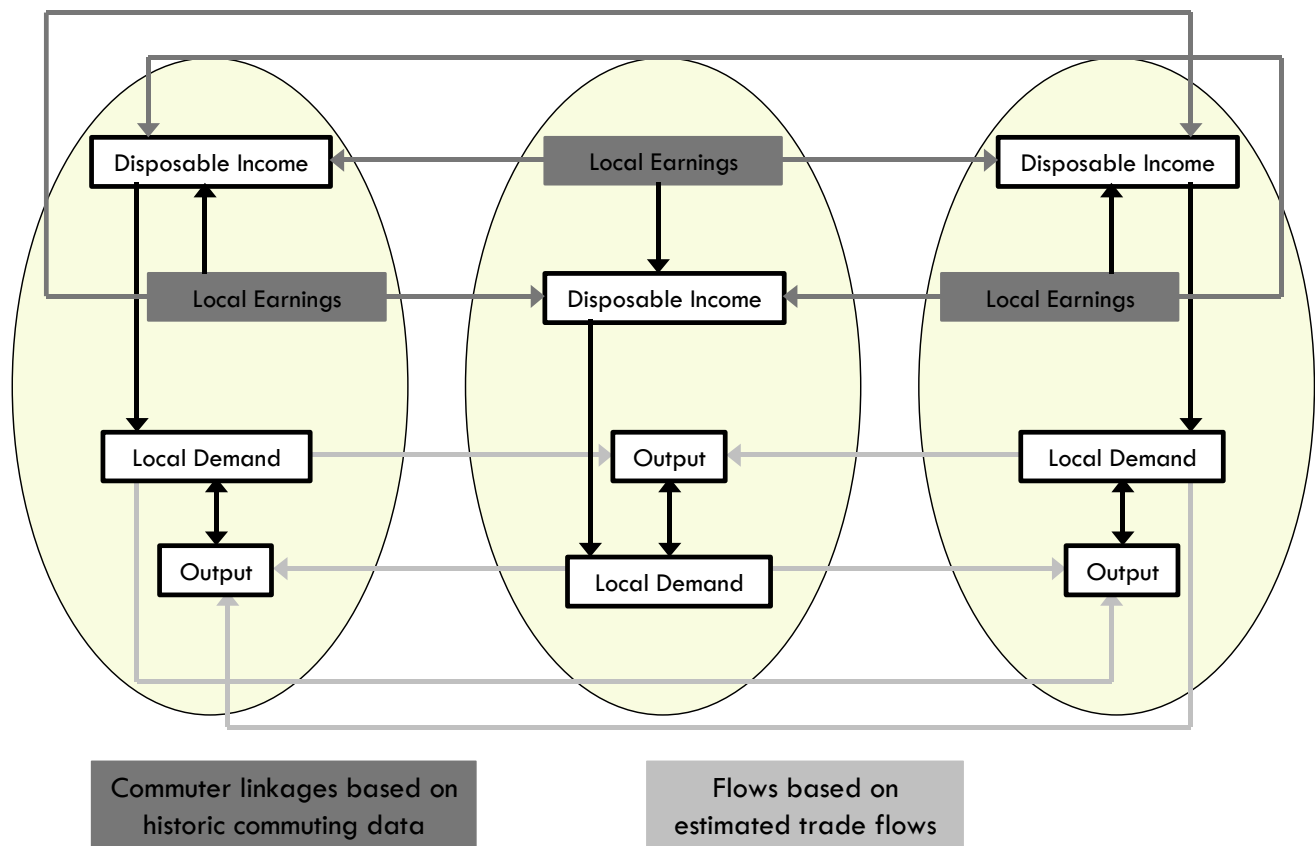
Single-region models consist of an individual region, called the home region. The rest of the nation is also represented in the model. However, since the home region is only a small part of the total

nation, the changes in the region do not have an endogenous effect on the variables in the rest of the nation.

Multi-regional models have interactions among regions, such as trade and commuting flows. These interactions include trade flows from each region to each of the other regions. These flows are illustrated for a three-region model in Figure 3.

Figure A2.3: Trade and Commuter Flow Linkages

Trade and Commuter Flow Linkages



Multiregional national models also include a central bank monetary response that constrains labor markets. Models that only encompass a relatively small portion of a nation are not endogenously constrained by changes in exchange rates or monetary responses.

Block 1. Output and Demand

This block includes output, demand, consumption, investment, government spending, import, commodity access, and export concepts. Output for each industry in the home region is determined by industry demand in all regions in the nation, the home region's share of each market, and international exports from the region.

For each industry, demand is determined by the amount of output, consumption, investment, and capital demand on that industry. Consumption depends on real disposable income per capita, relative prices, differential income elasticities, and population. Input productivity depends on access to inputs because a larger choice set of inputs means it is more likely that the input with the specific characteristics required for the job will be found. In the capital stock adjustment process, investment occurs to fill the difference between optimal and actual capital stock for residential, non-residential, and equipment investment. Government spending changes are determined by changes in the population.

Block 2. Labor and Capital Demand

The Labor and Capital Demand block includes the determination of labor productivity, labor intensity, and the optimal capital stocks. Industry-specific labor productivity depends on the availability of workers with differentiated skills for the occupations used in each industry. The occupational labor supply and commuting costs determine firms' access to a specialized labor force.

Labor intensity is determined by the cost of labor relative to the other factor inputs, capital and fuel. Demand for capital is driven by the optimal capital stock equation for both non-residential capital and equipment. Optimal capital stock for each industry depends on the relative cost of labor and capital, and the employment weighted by capital use for each industry. Employment in private industries is determined by the value added and employment per unit of value added in each industry.

Block 3. Population and Labor Supply

The Population and Labor Supply block includes detailed demographic information about the region. Population data is given for age, gender, and race, with birth and survival rates for each group. The size and labor force participation rate of each group determines the labor supply. These participation rates respond to changes in employment relative to the potential labor force and to changes in the real after-tax compensation rate. Migration includes retirement, military, international, and economic migration. Economic migration is determined by the relative real after-tax compensation rate, relative employment opportunity, and consumer access to variety.

Block 4. Compensation, Prices and Costs

This block includes delivered prices, production costs, equipment cost, the consumption deflator, consumer prices, the price of housing, and the compensation equation. Economic geography concepts account for the productivity and price effects of access to specialized labor, goods, and services.

These prices measure the price of the industry output, taking into account the access to production locations. This access is important due to the specialization of production that takes place within each industry, and because transportation and transaction costs of distance are significant. Composite prices for each industry are then calculated based on the production costs of supplying regions, the effective distance to these regions, and the index of access to the variety of outputs in the industry relative to the access by other uses of the product.

The cost of production for each industry is determined by the cost of labor, capital, fuel, and intermediate inputs. Labor costs reflect a productivity adjustment to account for access to specialized labor, as well as underlying compensation rates. Capital costs include costs of non-residential structures and equipment, while fuel costs incorporate electricity, natural gas, and residual fuels.

The consumption deflator converts industry prices to prices for consumption commodities. For potential migrants, the consumer price is additionally calculated to include housing prices. Housing prices change from their initial level depending on changes in income and population density.

Compensation changes are due to changes in labor demand and supply conditions and changes in the national compensation rate. Changes in employment opportunities relative to the labor force and occupational demand change determine compensation rates by industry.

Block 5. Market Shares

The market shares equations measure the proportion of local and export markets that are captured by each industry. These depend on relative production costs, the estimated price elasticity of demand, and the effective distance between the home region and each of the other regions. The change in share of a specific area in any region depends on changes in its delivered price and the quantity it produces compared with the same factors for competitors in that market. The share of local and external markets then drives the exports from and imports to the home economy.

Appendix II: Tax-PI Calibration Methodology

The economic and fiscal analysis of the QJP has been conducted by REMI using their Tax-PI v2.3 software, which is a dynamic regional macroeconomic, demographic, and fiscal model. Specifically, REMI has used a 1-region, 70-sector custom model of Louisiana that is calibrated to revenues and expenditures from the Louisiana state government budget.

Each budget category is assigned both an “economic driver” that allows it to respond to changes in a specific economic variable (e.g., Personal Income for Personal Income Tax Revenue) and a “policy variable” that allows it to directly impact a specific economic variable (e.g., Personal Taxes for Personal Income Tax Revenue). Because the Tax-PI model integrates the economic outlook with fiscal projections, this analysis explicitly captures the interaction between economic activity and fiscal outcomes.

This model utilizes Louisiana state government tax revenue data from the 2010 State Government Tax Tables from the U.S. Census Bureau to calibrate state government revenues, and Louisiana general fund expenditure data from the 2010 State Expenditure Report from the National Association of State Budget Officers to calibrate state government expenditures.

Appendix III: Additional Tables

Table A3.1: Direct Employment in All 66 Private, Nonfarm Sectors

Sector	Units	2010	2011	2012	2013	2014	2015	2016	2017	Average
Forestry and Logging; Fishing, hunting and trapping	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Support activities for agriculture and forestry	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Oil and gas extraction	Individuals (Jobs)	73	95	105	126	226	177	177	182	145
Mining (except oil and gas)	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Support activities for mining	Individuals (Jobs)	411	520	525	545	347	200	17	24	324
Utilities	Individuals (Jobs)	89	84	64	132	61	50	12	0	62
Construction	Individuals (Jobs)	27	13	17	6	0	26	55	71	27
Wood product manufacturing	Individuals (Jobs)	416	424	662	728	847	483	160	202	490
Nonmetallic mineral product manufacturing	Individuals (Jobs)	67	130	142	175	159	26	22	47	96
Primary metal manufacturing	Individuals (Jobs)	358	632	871	891	1,271	945	943	1,246	895
Fabricated metal product manufacturing	Individuals (Jobs)	193	371	528	894	802	843	820	267	590
Machinery manufacturing	Individuals (Jobs)	165	390	486	467	372	243	224	291	330
Computer and electronic product manufacturing	Individuals (Jobs)	55	7	7	0	0	0	0	3	9
Electrical equipment, appliance, and component manufacturing	Individuals (Jobs)	10	19	20	35	38	40	60	84	38
Motor vehicles, bodies and trailers, and parts manufacturing	Individuals (Jobs)	13	6	6	6	0	0	0	0	4
Other transportation equipment manufacturing	Individuals (Jobs)	1,307	1,459	1,267	1,370	1,193	1,010	472	658	1,092
Furniture and related product manufacturing	Individuals (Jobs)	0	0	6	9	8	8	7	5	5
Miscellaneous manufacturing	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Food manufacturing	Individuals (Jobs)	1,038	183	234	293	313	331	378	396	396
Beverage and tobacco product manufacturing	Individuals (Jobs)	16	16	21	29	8	12	26	31	20
Textile mills; Textile product mills	Individuals (Jobs)	8	9	17	17	11	8	7	8	11
Apparel manufacturing; Leather and allied product manufacturing	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Paper manufacturing	Individuals (Jobs)	385	443	504	555	668	620	611	690	560
Printing and related support activities	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Petroleum and coal products manufacturing	Individuals (Jobs)	290	314	323	327	442	472	466	110	343

Chemical manufacturing	Individuals (Jobs)	922	1,142	1,298	1,493	2,183	2,548	2,302	2,682	1,821
Plastics and rubber products manufacturing	Individuals (Jobs)	283	337	445	265	114	151	251	344	274
Wholesale trade	Individuals (Jobs)	158	160	311	476	401	584	382	375	356
Retail trade	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Air transportation	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Rail transportation	Individuals (Jobs)	0	0	69	139	154	108	79	124	84
Water transportation	Individuals (Jobs)	53	69	111	103	132	141	152	134	112
Truck transportation	Individuals (Jobs)	0	0	0	42	82	89	67	90	46
Couriers and messengers	Individuals (Jobs)	0	0	0	0	0	0	6	16	3
Transit and ground passenger transportation	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Pipeline transportation	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Scenic and sightseeing transportation; Support activities for transportation	Individuals (Jobs)	79	92	46	39	117	74	8	19	59
Warehousing and storage	Individuals (Jobs)	31	35	39	49	56	69	79	88	56
Publishing industries, except Internet	Individuals (Jobs)	43	43	42	41	41	0	0	0	26
Motion picture and sound recording industries	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Data processing, hosting, and related services; Other information services	Individuals (Jobs)	5	5	15	29	18	31	46	55	26
Broadcasting, except Internet	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Telecommunications	Individuals (Jobs)	41	97	160	209	278	522	512	357	272
Monetary authorities - central bank; Credit intermediation and related activities	Individuals (Jobs)	17	5	29	119	203	190	0	0	70
Securities, commodity contracts, other investments; Funds, trusts, other financial vehicles	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Insurance carriers and related activities	Individuals (Jobs)	27	29	26	39	100	97	209	452	122
Real estate	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Rental and leasing services; Lessors of nonfinancial intangible assets	Individuals (Jobs)	0	0	0	0	0	0	0	20	3
Professional, scientific, and technical services	Individuals (Jobs)	269	304	198	432	675	865	1,017	1,130	611
Management of companies and enterprises	Individuals (Jobs)	820	657	803	762	890	979	439	461	726
Administrative and support services	Individuals (Jobs)	507	533	699	424	385	340	420	206	439
Waste management and remediation services	Individuals (Jobs)	7	7	6	6	0	0	0	0	3

Educational services; private	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Ambulatory health care services	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Hospitals; private	Individuals (Jobs)	0	0	0	0	0	0	31	44	9
Nursing and residential care facilities	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Social assistance	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Performing arts, spectator sports, and related industries	Individuals (Jobs)	123	143	91	121	0	115	135	146	109
Museums, historical sites, and similar institutions	Individuals (Jobs)	41	0	0	0	0	0	0	0	5
Amusement, gambling, and recreation industries	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Accommodation	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Food services and drinking places	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Repair and maintenance	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Personal and laundry services	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Religious, grantmaking, civic, professional, and similar organizations	Individuals (Jobs)	0	0	0	0	0	0	0	0	0
Private households	Individuals (Jobs)	0	0	0	0	0	0	0	0	0

Note: Components may not sum to totals due to rounding.

Table A3.2: Employment Impacts in All 66 Private, Nonfarm Sectors

Sector	Units	2010	2011	2012	2013	2014	2015	2016	2017	Average
<i>Low Case</i>										
Forestry and Logging; Fishing, hunting and trapping	Individuals (Jobs)	123	99	135	146	166	109	71	73	115
Support activities for agriculture and forestry	Individuals (Jobs)	15	14	17	17	21	11	6	5	13
Oil and gas extraction	Individuals (Jobs)	402	384	484	527	719	714	712	249	524
Mining (except oil and gas)	Individuals (Jobs)	37	54	84	85	107	100	97	102	83
Support activities for mining	Individuals (Jobs)	484	632	676	694	580	428	203	125	478
Utilities	Individuals (Jobs)	119	132	147	178	193	193	170	178	164
Construction	Individuals (Jobs)	3,772	5,806	6,926	7,495	8,484	8,152	7,132	5,188	6,619
Wood product manufacturing	Individuals (Jobs)	362	386	573	623	721	448	194	215	440
Nonmetallic mineral product manufacturing	Individuals (Jobs)	97	167	184	215	209	82	69	82	138
Primary metal manufacturing	Individuals (Jobs)	307	536	733	757	1,035	809	797	1,031	751

Fabricated metal product manufacturing	Individuals (Jobs)	286	483	658	1,010	955	967	887	385	704
Machinery manufacturing	Individuals (Jobs)	188	412	508	495	413	283	250	303	357
Computer and electronic product manufacturing	Individuals (Jobs)	68	24	25	19	21	18	12	12	25
Electrical equipment, appliance, and component manufacturing	Individuals (Jobs)	10	19	20	34	37	38	57	81	37
Motor vehicles, bodies and trailers, and parts manufacturing	Individuals (Jobs)	24	23	23	16	11	13	12	10	17
Other transportation equipment manufacturing	Individuals (Jobs)	1,114	1,234	1,073	1,158	1,018	852	400	543	924
Furniture and related product manufacturing	Individuals (Jobs)	11	14	22	29	30	31	28	24	24
Miscellaneous manufacturing	Individuals (Jobs)	9	11	12	13	15	14	11	8	12
Food manufacturing	Individuals (Jobs)	777	221	277	331	372	388	400	413	397
Beverage and tobacco product manufacturing	Individuals (Jobs)	20	24	31	41	32	33	41	43	33
Textile mills; Textile product mills	Individuals (Jobs)	13	15	23	23	20	16	12	12	17
Apparel manufacturing; Leather and allied product manufacturing	Individuals (Jobs)	5	5	6	6	5	4	2	1	4
Paper manufacturing	Individuals (Jobs)	365	415	471	517	621	576	562	632	520
Printing and related support activities	Individuals (Jobs)	16	18	21	23	28	27	23	21	22
Petroleum and coal products manufacturing	Individuals (Jobs)	248	266	270	269	362	380	369	68	279
Chemical manufacturing	Individuals (Jobs)	916	1,130	1,283	1,464	2,119	2,460	2,214	2,563	1,769
Plastics and rubber products manufacturing	Individuals (Jobs)	247	292	375	254	156	180	241	307	257
Wholesale trade	Individuals (Jobs)	844	970	1,201	1,391	1,634	1,698	1,348	1,223	1,289
Retail trade	Individuals (Jobs)	1,738	2,279	2,798	3,154	3,761	3,784	3,385	3,046	2,993
Air transportation	Individuals (Jobs)	22	25	32	35	43	40	31	26	32
Rail transportation	Individuals (Jobs)	12	13	80	148	166	119	88	128	94
Water transportation	Individuals (Jobs)	54	66	102	93	119	123	129	112	100
Truck transportation	Individuals (Jobs)	317	349	411	480	595	602	505	449	464
Couriers and messengers	Individuals (Jobs)	28	32	37	40	49	47	46	53	42
Transit and ground passenger transportation	Individuals (Jobs)	45	64	87	100	127	155	201	194	122
Pipeline transportation	Individuals (Jobs)	44	50	51	51	67	73	59	12	51
Scenic and sightseeing transportation; Support activities for transportation	Individuals (Jobs)	128	145	133	133	205	169	101	89	138
Warehousing and storage	Individuals (Jobs)	81	95	119	133	150	158	136	127	125

Publishing industries, except Internet	Individuals (Jobs)	45	44	43	42	41	0	-1	-2	27
Motion picture and sound recording industries	Individuals (Jobs)	10	13	21	31	36	49	35	28	28
Data processing, hosting, and related services; Other information services	Individuals (Jobs)	25	31	44	59	55	68	75	83	55
Broadcasting, except Internet	Individuals (Jobs)	21	25	30	33	41	40	36	29	32
Telecommunications	Individuals (Jobs)	71	128	192	241	314	539	520	368	297
Monetary authorities - central bank; Credit intermediation and related activities	Individuals (Jobs)	70	60	85	169	255	224	16	4	110
Securities, commodity contracts, other investments; Funds, trusts, other financial vehicles	Individuals (Jobs)	158	211	248	269	284	265	209	189	229
Insurance carriers and related activities	Individuals (Jobs)	104	126	135	154	231	220	309	528	226
Real estate	Individuals (Jobs)	604	804	1,019	1,177	1,441	1,436	1,302	1,179	1,120
Rental and leasing services; Lessors of nonfinancial intangible assets	Individuals (Jobs)	173	198	233	259	284	268	219	202	230
Professional, scientific, and technical services	Individuals (Jobs)	1,080	1,303	1,560	1,842	2,258	2,396	2,209	2,116	1,846
Management of companies and enterprises	Individuals (Jobs)	839	675	817	774	908	992	450	466	740
Administrative and support services	Individuals (Jobs)	1,252	1,490	1,801	1,924	2,248	2,158	1,928	1,716	1,815
Waste management and remediation services	Individuals (Jobs)	61	73	88	93	119	124	109	102	96
Educational services; private	Individuals (Jobs)	100	125	154	179	217	211	183	165	167
Ambulatory health care services	Individuals (Jobs)	645	813	988	1,099	1,320	1,304	1,146	1,053	1,046
Hospitals; private	Individuals (Jobs)	194	254	318	373	478	497	488	464	383
Nursing and residential care facilities	Individuals (Jobs)	92	115	139	158	185	179	159	147	147
Social assistance	Individuals (Jobs)	242	316	385	417	484	469	421	399	392
Performing arts, spectator sports, and related industries	Individuals (Jobs)	175	202	186	218	159	251	236	228	207
Museums, historical sites, and similar institutions	Individuals (Jobs)	41	1	1	1	1	0	-1	-2	5
Amusement, gambling, and recreation industries	Individuals (Jobs)	177	212	262	294	352	308	269	242	265
Accommodation	Individuals (Jobs)	109	125	149	161	198	197	168	151	157
Food services and drinking places	Individuals (Jobs)	834	1,108	1,428	1,694	2,096	2,191	2,089	2,041	1,685
Repair and maintenance	Individuals (Jobs)	265	312	363	386	452	441	388	347	369
Personal and laundry services	Individuals (Jobs)	359	463	570	644	784	817	658	599	612
Religious, grantmaking, civic, professional, and similar organizations	Individuals (Jobs)	307	361	435	463	548	514	427	380	429

Private households	Individuals (Jobs)	75	95	99	104	130	116	85	67	96
<i>High Case</i>										
Forestry and Logging; Fishing, hunting and trapping	Individuals (Jobs)	179	139	191	200	229	150	94	99	160
Support activities for agriculture and forestry	Individuals (Jobs)	23	20	24	24	29	16	8	7	19
Oil and gas extraction	Individuals (Jobs)	491	447	568	623	874	880	856	276	627
Mining (except oil and gas)	Individuals (Jobs)	46	65	102	103	128	124	118	127	102
Support activities for mining	Individuals (Jobs)	878	1,022	984	988	770	565	248	146	700
Utilities	Individuals (Jobs)	233	237	237	330	287	278	219	220	255
Construction	Individuals (Jobs)	5,577	8,171	9,347	10,018	10,991	10,445	8,827	6,205	8,698
Wood product manufacturing	Individuals (Jobs)	527	566	837	874	1,029	645	268	297	630
Nonmetallic mineral product manufacturing	Individuals (Jobs)	132	218	231	264	261	103	84	96	174
Primary metal manufacturing	Individuals (Jobs)	303	551	811	850	1,170	1,028	966	1,358	880
Fabricated metal product manufacturing	Individuals (Jobs)	378	610	842	1,360	1,287	1,268	1,060	453	907
Machinery manufacturing	Individuals (Jobs)	245	535	652	655	562	348	275	321	449
Computer and electronic product manufacturing	Individuals (Jobs)	81	34	34	28	29	23	13	12	32
Electrical equipment, appliance, and component manufacturing	Individuals (Jobs)	10	19	20	40	38	39	61	84	39
Motor vehicles, bodies and trailers, and parts manufacturing	Individuals (Jobs)	55	42	37	22	15	16	15	12	27
Other transportation equipment manufacturing	Individuals (Jobs)	2,730	2,762	2,264	2,333	2,047	1,461	554	720	1,859
Furniture and related product manufacturing	Individuals (Jobs)	16	20	27	37	38	38	35	30	30
Miscellaneous manufacturing	Individuals (Jobs)	13	15	16	17	19	17	13	10	15
Food manufacturing	Individuals (Jobs)	1,381	355	446	533	575	597	618	633	642
Beverage and tobacco product manufacturing	Individuals (Jobs)	40	44	55	75	46	49	64	67	55
Textile mills; Textile product mills	Individuals (Jobs)	15	18	26	28	25	20	15	14	20
Apparel manufacturing; Leather and allied product manufacturing	Individuals (Jobs)	7	7	7	8	7	5	3	1	6
Paper manufacturing	Individuals (Jobs)	430	507	589	653	809	757	732	840	665
Printing and related support activities	Individuals (Jobs)	23	25	29	31	36	34	29	26	29
Petroleum and coal products manufacturing	Individuals (Jobs)	306	311	320	324	463	491	456	79	344
Chemical manufacturing	Individuals (Jobs)	1,002	1,248	1,420	1,615	2,365	2,831	2,570	2,933	1,998

Plastics and rubber products manufacturing	Individuals (Jobs)	398	459	583	380	218	247	327	430	380
Wholesale trade	Individuals (Jobs)	1,273	1,373	1,697	2,000	2,245	2,377	1,813	1,645	1,803
Retail trade	Individuals (Jobs)	2,616	3,237	3,819	4,288	4,967	4,963	4,336	3,872	4,012
Air transportation	Individuals (Jobs)	33	35	44	47	56	52	39	33	42
Rail transportation	Individuals (Jobs)	15	15	76	143	158	117	88	135	93
Water transportation	Individuals (Jobs)	67	80	133	127	173	171	155	129	129
Truck transportation	Individuals (Jobs)	457	466	538	640	790	801	650	585	616
Couriers and messengers	Individuals (Jobs)	43	47	51	57	69	66	59	67	57
Transit and ground passenger transportation	Individuals (Jobs)	69	91	119	136	167	205	260	249	162
Pipeline transportation	Individuals (Jobs)	56	60	62	63	86	93	73	13	63
Scenic and sightseeing transportation; Support activities for transportation	Individuals (Jobs)	225	249	203	203	338	259	130	116	215
Warehousing and storage	Individuals (Jobs)	153	170	203	230	252	269	233	218	216
Publishing industries, except Internet	Individuals (Jobs)	53	53	52	51	49	-1	-2	-2	32
Motion picture and sound recording industries	Individuals (Jobs)	15	18	27	40	45	61	43	34	35
Data processing, hosting, and related services; Other information services	Individuals (Jobs)	37	44	60	80	71	87	94	105	72
Broadcasting, except Internet	Individuals (Jobs)	30	34	40	43	51	49	44	36	41
Telecommunications	Individuals (Jobs)	90	147	212	266	343	599	567	409	329
Monetary authorities - central bank; Credit intermediation and related activities	Individuals (Jobs)	98	82	106	198	295	245	15	0	130
Securities, commodity contracts, other investments; Funds, trusts, other financial vehicles	Individuals (Jobs)	239	299	335	361	368	340	260	232	304
Insurance carriers and related activities	Individuals (Jobs)	148	172	178	200	285	268	365	609	278
Real estate	Individuals (Jobs)	908	1,144	1,398	1,606	1,908	1,886	1,669	1,497	1,502
Rental and leasing services; Lessors of nonfinancial intangible assets	Individuals (Jobs)	248	269	306	337	360	335	268	253	297
Professional, scientific, and technical services	Individuals (Jobs)	1,729	1,978	2,205	2,696	3,308	3,538	3,327	3,249	2,754
Management of companies and enterprises	Individuals (Jobs)	1,009	799	946	869	998	1,014	462	472	821
Administrative and support services	Individuals (Jobs)	2,261	2,504	2,944	2,911	3,241	3,052	2,732	2,316	2,745
Waste management and remediation services	Individuals (Jobs)	87	98	116	122	151	159	135	124	124
Educational services; private	Individuals (Jobs)	151	178	210	243	287	277	234	209	224

Ambulatory health care services	Individuals (Jobs)	978	1,155	1,346	1,495	1,740	1,711	1,464	1,337	1,403
Hospitals; private	Individuals (Jobs)	294	363	437	510	635	658	644	613	519
Nursing and residential care facilities	Individuals (Jobs)	139	164	191	215	244	235	205	187	198
Social assistance	Individuals (Jobs)	368	450	526	569	640	617	540	509	527
Performing arts, spectator sports, and related industries	Individuals (Jobs)	243	272	247	291	203	322	306	300	273
Museums, historical sites, and similar institutions	Individuals (Jobs)	44	2	1	1	1	-1	-2	-3	5
Amusement, gambling, and recreation industries	Individuals (Jobs)	268	302	357	400	464	404	345	308	356
Accommodation	Individuals (Jobs)	165	177	203	219	260	257	213	192	211
Food services and drinking places	Individuals (Jobs)	1,264	1,584	1,968	2,323	2,799	2,910	2,726	2,649	2,278
Repair and maintenance	Individuals (Jobs)	390	432	485	513	585	568	486	435	487
Personal and laundry services	Individuals (Jobs)	547	658	778	879	1,036	1,076	842	765	823
Religious, grantmaking, civic, professional, and similar organizations	Individuals (Jobs)	461	509	589	626	718	668	542	480	574
Private households	Individuals (Jobs)	113	135	134	140	170	149	106	82	129

Note: Components may not sum to totals due to rounding.

Table A3.3: Value-Added Impacts in All 66 Private, Nonfarm Sectors

Sector	Units	2010	2011	2012	2013	2014	2015	2016	2017	Average
<i>Low Case</i>										
Forestry and Logging; Fishing, hunting and trapping	Millions of 2010 Dollars	4.0	3.3	4.3	4.7	5.4	3.6	2.4	2.5	3.8
Support activities for agriculture and forestry	Millions of 2010 Dollars	0.3	0.2	0.3	0.3	0.4	0.2	0.1	0.1	0.2
Oil and gas extraction	Millions of 2010 Dollars	176.4	193.9	194.6	197.7	287.9	280.6	279.5	94.2	213.1
Mining (except oil and gas)	Millions of 2010 Dollars	6.1	8.8	12.1	14.0	18.7	17.7	18.0	18.5	14.2
Support activities for mining	Millions of 2010 Dollars	28.2	32.7	32.6	34.9	29.8	25.8	16.5	9.8	26.3
Utilities	Millions of 2010 Dollars	71.3	79.4	88.1	109.3	119.6	117.5	100.2	98.8	98.0
Construction	Millions of 2010 Dollars	209.5	325.2	408.8	446.2	513.1	494.5	421.6	310.8	391.2
Wood product manufacturing	Millions of 2010 Dollars	27.9	30.4	47.5	51.9	61.0	39.0	17.0	18.7	36.7
Nonmetallic mineral product manufacturing	Millions of 2010 Dollars	9.0	15.4	18.0	21.6	21.6	8.8	7.3	8.6	13.8
Primary metal manufacturing	Millions of 2010 Dollars	24.9	42.3	60.8	67.0	91.6	73.7	74.5	98.9	66.7

Fabricated metal product manufacturing	Millions of 2010 Dollars	22.2	36.8	51.4	80.8	77.0	78.7	73.8	34.0	56.8
Machinery manufacturing	Millions of 2010 Dollars	18.2	40.2	52.1	52.7	45.3	31.8	28.7	35.1	38.0
Computer and electronic product manufacturing	Millions of 2010 Dollars	6.3	2.3	2.7	2.3	2.6	2.3	1.6	1.6	2.7
Electrical equipment, appliance, and component manufacturing	Millions of 2010 Dollars	0.9	1.7	1.8	3.3	3.6	3.8	5.7	8.2	3.6
Motor vehicles, bodies and trailers, and parts manufacturing	Millions of 2010 Dollars	1.9	1.9	2.0	1.4	0.9	1.0	0.9	0.8	1.4
Other transportation equipment manufacturing	Millions of 2010 Dollars	152.7	174.7	153.8	165.3	148.7	122.7	58.9	81.3	132.3
Furniture and related product manufacturing	Millions of 2010 Dollars	0.3	0.4	0.7	0.9	1.0	1.0	1.0	0.9	0.8
Miscellaneous manufacturing	Millions of 2010 Dollars	0.5	0.6	0.8	0.9	1.1	1.0	0.9	0.8	0.8
Food manufacturing	Millions of 2010 Dollars	66.7	19.1	24.0	28.8	32.6	34.3	35.6	36.7	34.7
Beverage and tobacco product manufacturing	Millions of 2010 Dollars	4.8	5.5	6.8	8.4	6.3	6.3	7.1	7.0	6.5
Textile mills; Textile product mills	Millions of 2010 Dollars	0.5	0.6	1.0	1.1	0.9	0.8	0.6	0.6	0.8
Apparel manufacturing; Leather and allied product manufacturing	Millions of 2010 Dollars	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2
Paper manufacturing	Millions of 2010 Dollars	77.7	92.6	111.9	128.5	159.1	152.5	153.7	179.4	131.9
Printing and related support activities	Millions of 2010 Dollars	0.8	0.9	1.1	1.3	1.6	1.6	1.4	1.4	1.3
Petroleum and coal products manufacturing	Millions of 2010 Dollars	438.9	459.4	485.8	498.2	692.5	757.9	729.7	141.5	525.5
Chemical manufacturing	Millions of 2010 Dollars	386.4	480.4	562.1	656.2	966.0	1,142.2	1,023.7	1,185.9	800.4
Plastics and rubber products manufacturing	Millions of 2010 Dollars	22.7	27.0	35.7	24.5	15.2	17.4	22.7	28.8	24.3
Wholesale trade	Millions of 2010 Dollars	126.1	146.0	184.8	218.2	251.0	268.0	231.2	217.9	205.4
Retail trade	Millions of 2010 Dollars	88.1	116.5	145.7	167.3	204.5	212.1	196.6	184.2	164.4
Air transportation	Millions of 2010 Dollars	4.2	4.9	6.5	7.7	9.6	9.1	7.2	6.1	6.9
Rail transportation	Millions of 2010 Dollars	1.9	1.9	12.4	23.5	26.4	19.3	15.6	24.1	15.6
Water transportation	Millions of 2010 Dollars	13.2	15.5	25.4	22.4	29.3	30.7	34.4	30.7	25.2
Truck transportation	Millions of 2010 Dollars	18.2	20.2	24.3	28.6	35.7	35.8	31.2	28.4	27.8
Couriers and messengers	Millions of 2010 Dollars	0.9	1.0	1.2	1.3	1.6	1.5	1.5	1.6	1.3
Transit and ground passenger	Millions of 2010 Dollars	1.8	2.5	3.2	3.6	4.0	3.8	3.6	3.5	3.3

transportation

Pipeline transportation	Millions of 2010 Dollars	7.6	8.6	8.8	9.0	11.4	12.3	10.0	2.0	8.7
Scenic and sightseeing transportation; Support activities for transportation	Millions of 2010 Dollars	10.4	11.7	10.8	11.0	16.5	13.2	8.6	7.5	11.2
Warehousing and storage	Millions of 2010 Dollars	9.3	11.1	13.2	14.6	16.8	16.4	13.8	12.2	13.4
Publishing industries, except Internet	Millions of 2010 Dollars	4.2	4.3	4.4	4.4	4.5	0.2	0.1	0.0	2.8
Motion picture and sound recording industries	Millions of 2010 Dollars	1.8	2.3	3.9	6.0	7.0	9.6	6.7	5.7	5.4
Data processing, hosting, and related services; Other information services	Millions of 2010 Dollars	3.2	3.9	5.4	7.2	6.5	7.8	8.7	9.6	6.5
Broadcasting, except Internet	Millions of 2010 Dollars	1.6	2.0	2.5	2.8	3.5	3.6	3.4	2.9	2.8
Telecommunications	Millions of 2010 Dollars	14.1	26.4	41.4	52.6	70.4	132.2	131.2	98.9	70.9
Monetary authorities - central bank; Credit intermediation and related activities	Millions of 2010 Dollars	5.4	4.8	7.0	13.9	21.0	19.2	1.8	0.8	9.2
Securities, commodity contracts, other investments; Funds, trusts, other financial vehicles	Millions of 2010 Dollars	4.2	5.1	6.3	6.6	7.4	6.9	5.2	4.6	5.8
Insurance carriers and related activities	Millions of 2010 Dollars	13.9	16.7	17.6	20.4	31.3	30.0	41.7	70.4	30.3
Real estate	Millions of 2010 Dollars	139.3	180.1	233.2	263.8	313.1	309.1	277.0	244.8	245.1
Rental and leasing services; Lessors of nonfinancial intangible assets	Millions of 2010 Dollars	34.7	42.3	51.2	57.6	67.4	64.9	51.7	48.2	52.3
Professional, scientific, and technical services	Millions of 2010 Dollars	98.5	120.9	147.3	174.0	214.2	227.3	214.5	209.7	175.8
Management of companies and enterprises	Millions of 2010 Dollars	64.2	52.0	62.5	58.9	68.0	74.6	33.3	34.5	56.0
Administrative and support services	Millions of 2010 Dollars	52.2	61.7	74.6	79.1	92.3	91.5	82.3	75.1	76.1
Waste management and remediation services	Millions of 2010 Dollars	6.3	7.4	8.9	9.4	11.7	12.3	11.1	10.2	9.7
Educational services; private	Millions of 2010 Dollars	4.1	5.1	6.2	7.1	8.4	8.0	7.1	6.5	6.6
Ambulatory health care services	Millions of 2010 Dollars	49.3	61.8	75.5	82.5	100.3	102.2	92.6	86.2	81.3
Hospitals; private	Millions of 2010 Dollars	14.0	18.6	23.5	27.8	37.1	40.0	40.4	39.2	30.1
Nursing and residential care facilities	Millions of 2010 Dollars	3.4	4.2	5.2	5.9	7.0	6.8	6.2	5.9	5.6
Social assistance	Millions of 2010 Dollars	6.0	7.9	9.1	9.7	11.2	10.8	9.8	9.4	9.2
Performing arts, spectator sports, and related industries	Millions of 2010 Dollars	6.5	7.5	6.9	8.2	5.9	9.0	8.9	8.6	7.7

Museums, historical sites, and similar institutions	Millions of 2010 Dollars	1.9	0.1	0.1	0.1	0.1	0.0	0.0	-0.1	0.3
Amusement, gambling, and recreation industries	Millions of 2010 Dollars	7.4	8.8	10.8	12.0	14.2	13.9	11.4	10.4	11.1
Accommodation	Millions of 2010 Dollars	9.5	10.9	13.2	14.4	17.7	17.7	15.0	13.3	14.0
Food services and drinking places	Millions of 2010 Dollars	24.2	32.0	41.0	47.7	58.9	62.3	59.2	57.4	47.8
Repair and maintenance	Millions of 2010 Dollars	13.8	15.9	18.7	20.2	24.2	24.0	21.1	19.2	19.6
Personal and laundry services	Millions of 2010 Dollars	10.1	12.2	14.7	16.2	19.9	19.6	16.7	15.3	15.6
Religious, grantmaking, civic, professional, and similar organizations	Millions of 2010 Dollars	9.0	11.1	14.0	15.2	17.7	16.6	14.2	12.7	13.8
Private households	Millions of 2010 Dollars	1.2	1.5	1.6	1.8	2.2	2.0	1.6	1.3	1.7
<i>High Case</i>										
Forestry and Logging; Fishing, hunting and trapping	Millions of 2010 Dollars	5.9	4.6	6.1	6.4	7.5	5.0	3.1	3.3	5.2
Support activities for agriculture and forestry	Millions of 2010 Dollars	0.4	0.4	0.4	0.4	0.5	0.3	0.2	0.2	0.4
Oil and gas extraction	Millions of 2010 Dollars	215.9	226.1	228.2	233.5	349.7	345.6	335.5	103.1	254.7
Mining (except oil and gas)	Millions of 2010 Dollars	7.6	10.7	14.6	17.0	22.3	22.1	21.8	23.0	17.4
Support activities for mining	Millions of 2010 Dollars	51.2	52.8	47.6	49.8	39.7	34.1	20.3	11.6	38.4
Utilities	Millions of 2010 Dollars	139.1	143.0	142.0	202.3	178.1	169.7	129.3	122.2	153.2
Construction	Millions of 2010 Dollars	309.8	457.9	552.2	597.0	665.7	634.6	523.2	373.6	514.3
Wood product manufacturing	Millions of 2010 Dollars	40.6	44.6	69.5	72.9	87.1	56.2	23.5	25.8	52.5
Nonmetallic mineral product manufacturing	Millions of 2010 Dollars	12.3	20.2	22.7	26.6	26.9	11.0	8.9	10.1	17.3
Primary metal manufacturing	Millions of 2010 Dollars	24.5	43.5	67.4	75.3	103.6	93.6	90.3	130.4	78.6
Fabricated metal product manufacturing	Millions of 2010 Dollars	29.3	46.5	66.0	108.9	103.7	103.3	88.5	40.3	73.3
Machinery manufacturing	Millions of 2010 Dollars	23.7	52.2	67.1	69.8	61.8	39.4	32.0	37.7	48.0
Computer and electronic product manufacturing	Millions of 2010 Dollars	7.4	3.4	3.7	3.4	3.6	2.9	1.8	1.7	3.5
Electrical equipment, appliance, and component manufacturing	Millions of 2010 Dollars	0.9	1.7	1.9	3.9	3.7	3.9	6.2	8.5	3.8
Motor vehicles, bodies and trailers, and parts manufacturing	Millions of 2010 Dollars	4.4	3.5	3.2	1.9	1.3	1.4	1.2	1.0	2.2
Other transportation equipment	Millions of 2010 Dollars	374.2	390.9	324.6	333.3	298.9	211.0	82.5	108.7	265.5

manufacturing

Furniture and related product manufacturing	Millions of 2010 Dollars	0.4	0.6	0.8	1.2	1.2	1.3	1.2	1.1	1.0
Miscellaneous manufacturing	Millions of 2010 Dollars	0.7	0.9	1.0	1.2	1.4	1.3	1.1	0.9	1.1
Food manufacturing	Millions of 2010 Dollars	118.6	30.8	38.6	46.5	50.4	52.6	55.0	56.2	56.1
Beverage and tobacco product manufacturing	Millions of 2010 Dollars	9.3	10.0	12.1	15.4	9.2	9.2	11.1	10.8	10.9
Textile mills; Textile product mills	Millions of 2010 Dollars	0.6	0.7	1.2	1.3	1.2	1.0	0.8	0.8	1.0
Apparel manufacturing; Leather and allied product manufacturing	Millions of 2010 Dollars	0.2	0.2	0.3	0.3	0.3	0.2	0.1	0.1	0.2
Paper manufacturing	Millions of 2010 Dollars	91.7	113.3	140.0	162.4	207.2	200.5	200.5	238.4	169.3
Printing and related support activities	Millions of 2010 Dollars	1.1	1.2	1.5	1.7	2.0	2.1	1.8	1.8	1.7
Petroleum and coal products manufacturing	Millions of 2010 Dollars	541.3	537.7	576.8	601.8	886.4	979.0	903.0	165.3	648.9
Chemical manufacturing	Millions of 2010 Dollars	422.7	530.9	622.9	724.9	1,079.0	1,316.0	1,189.6	1,358.7	905.6
Plastics and rubber products manufacturing	Millions of 2010 Dollars	36.5	42.5	55.5	36.6	21.2	23.8	30.8	40.3	35.9
Wholesale trade	Millions of 2010 Dollars	190.2	206.6	261.2	313.6	345.1	375.2	311.4	293.3	287.1
Retail trade	Millions of 2010 Dollars	132.7	165.5	199.0	227.6	270.3	278.4	252.2	234.5	220.0
Air transportation	Millions of 2010 Dollars	6.3	7.0	8.9	10.4	12.6	11.9	9.1	7.7	9.2
Rail transportation	Millions of 2010 Dollars	2.4	2.3	11.8	22.7	25.3	18.9	15.6	25.5	15.6
Water transportation	Millions of 2010 Dollars	16.4	18.7	33.3	30.6	42.6	42.6	41.6	35.6	32.7
Truck transportation	Millions of 2010 Dollars	26.3	26.9	31.8	38.2	47.4	47.6	40.3	37.1	37.0
Couriers and messengers	Millions of 2010 Dollars	1.4	1.5	1.7	1.9	2.3	2.1	1.9	2.1	1.9
Transit and ground passenger transportation	Millions of 2010 Dollars	2.8	3.6	4.4	4.9	5.2	5.0	4.7	4.5	4.4
Pipeline transportation	Millions of 2010 Dollars	9.7	10.3	10.6	11.2	14.6	15.7	12.2	2.2	10.8
Scenic and sightseeing transportation; Support activities for transportation	Millions of 2010 Dollars	18.3	20.0	16.4	16.9	27.2	20.2	11.1	9.9	17.5
Warehousing and storage	Millions of 2010 Dollars	17.6	19.7	22.5	25.1	28.3	27.9	23.5	20.9	23.2
Publishing industries, except Internet	Millions of 2010 Dollars	5.0	5.2	5.3	5.4	5.4	0.2	0.1	0.0	3.3
Motion picture and sound recording industries	Millions of 2010 Dollars	2.6	3.2	5.1	7.8	8.8	11.8	8.1	6.9	6.8
Data processing, hosting, and related	Millions of 2010 Dollars	4.7	5.7	7.5	9.7	8.4	10.0	10.9	12.1	8.6

services; Other information services										
Broadcasting, except Internet	Millions of 2010 Dollars	2.3	2.7	3.3	3.6	4.4	4.5	4.1	3.5	3.6
Telecommunications	Millions of 2010 Dollars	17.9	30.4	45.6	58.0	77.0	146.9	143.3	110.1	78.7
Monetary authorities - central bank; Credit intermediation and related activities	Millions of 2010 Dollars	7.6	6.7	8.7	16.4	24.5	21.1	1.9	0.7	11.0
Securities, commodity contracts, other investments; Funds, trusts, other financial vehicles	Millions of 2010 Dollars	6.3	7.3	8.5	8.9	9.6	8.9	6.5	5.7	7.7
Insurance carriers and related activities	Millions of 2010 Dollars	19.8	22.7	23.3	26.5	38.6	36.5	49.3	81.2	37.2
Real estate	Millions of 2010 Dollars	209.3	256.4	319.8	359.8	414.3	405.3	354.3	310.0	328.7
Rental and leasing services; Lessors of nonfinancial intangible assets	Millions of 2010 Dollars	49.6	57.6	67.2	75.1	85.4	81.4	63.7	60.5	67.6
Professional, scientific, and technical services	Millions of 2010 Dollars	157.6	183.5	208.4	254.7	313.6	335.3	322.4	320.9	262.1
Management of companies and enterprises	Millions of 2010 Dollars	77.2	61.7	72.5	66.2	75.0	76.6	34.6	35.3	62.4
Administrative and support services	Millions of 2010 Dollars	94.2	103.6	121.9	119.8	133.2	129.6	116.7	101.7	115.1
Waste management and remediation services	Millions of 2010 Dollars	8.9	9.9	11.7	12.3	15.0	15.7	13.8	12.5	12.5
Educational services; private	Millions of 2010 Dollars	6.2	7.3	8.5	9.7	11.1	10.5	9.1	8.3	8.8
Ambulatory health care services	Millions of 2010 Dollars	74.9	87.9	103.0	112.3	132.4	134.2	118.5	109.6	109.1
Hospitals; private	Millions of 2010 Dollars	21.2	26.6	32.3	38.1	49.5	53.0	53.4	51.8	40.7
Nursing and residential care facilities	Millions of 2010 Dollars	5.1	6.0	7.1	8.0	9.2	9.0	8.0	7.5	7.5
Social assistance	Millions of 2010 Dollars	9.1	11.3	12.4	13.3	14.8	14.3	12.6	12.0	12.5
Performing arts, spectator sports, and related industries	Millions of 2010 Dollars	9.0	10.0	9.2	11.0	7.6	11.5	11.5	11.3	10.1
Museums, historical sites, and similar institutions	Millions of 2010 Dollars	2.0	0.1	0.1	0.1	0.1	0.0	-0.1	-0.1	0.3
Amusement, gambling, and recreation industries	Millions of 2010 Dollars	11.2	12.5	14.7	16.4	18.8	18.3	14.6	13.2	15.0
Accommodation	Millions of 2010 Dollars	14.5	15.5	18.0	19.6	23.2	23.2	19.1	16.9	18.8
Food services and drinking places	Millions of 2010 Dollars	36.6	45.8	56.5	65.4	78.7	82.8	77.3	74.6	64.7
Repair and maintenance	Millions of 2010 Dollars	20.3	22.0	25.1	26.9	31.4	30.9	26.5	24.1	25.9
Personal and laundry services	Millions of 2010 Dollars	15.4	17.3	20.0	22.2	26.3	25.8	21.3	19.5	21.0

Religious, grantmaking, civic, professional, and similar organizations	Millions of 2010 Dollars	13.5	15.6	19.0	20.6	23.2	21.7	18.1	16.1	18.5
Private households	Millions of 2010 Dollars	1.8	2.1	2.2	2.4	2.8	2.5	2.0	1.6	2.2

Note: Components may not sum to totals due to rounding.