

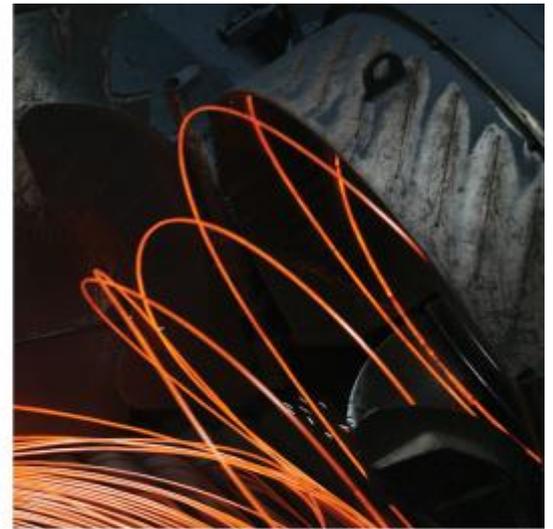
IHS ECONOMICS

# South Florida Regional Manufacturers Association

Manufacturing Sector Profile

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# Contents

<b>Introduction</b>	<b>3</b>
<b>Strategic summary</b>	<b>4</b>
– What is the situation today?	4
– What are our advantages?	5
– Where should we be concerned?	6
– Where should we focus our efforts?	8
<b>Characteristics of the regional economy</b>	<b>9</b>
– Population	9
– Unemployment rate	9
– Labor force	9
– Economic structure	9
– Structure diversity	10
<b>Characteristics of the manufacturing sector</b>	<b>11</b>
– Industry growth	11
– Durables and nondurables	11
– Output and productivity	14
– Establishment size	15
– Structure diversity	16
– Advanced manufacturing	16
<b>Risk rating by industry sector</b>	<b>19</b>
<b>Shift-share analysis</b>	<b>21</b>
<b>Wages in manufacturing occupations</b>	<b>24</b>
<b>Appendix A: Results of the shift-share analysis</b>	<b>25</b>

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# South Florida Regional Manufacturers Association Manufacturing Sector Profile

## Introduction

As part of its mission, FloridaMakes is working to provide Florida’s regional manufacturers associations (RMAs) with actionable information that will help them support and increase the economic competitiveness of small- and medium-size manufacturers located in their service areas. Small and medium manufacturers are defined as companies having 500 or fewer workers at a single establishment with small manufacturers defined as those firms that have 50 or fewer employees. FloridaMakes has retained IHS to prepare an economic profile of the South Florida regional economy, with a focus on the characteristics of the manufacturing sector. IHS defines the manufacturing sector as consisting of establishments assigned to North American Industry Classification System (NAICS) codes 31, 32, and 33.



The South Florida region comprises eight Florida counties: Broward, Indian River, Martin, Miami-Dade, Monroe, Okeechobee, Palm Beach, and St. Lucie.<sup>1</sup> Miami is the major city in the regional economy, situated within Miami-Dade County, a part of the Miami-Ft. Lauderdale-West Palm Beach, Florida, metropolitan statistical area (MSA), which also includes Broward and Palm Beach counties.

The Miami-Ft. Lauderdale-West Palm Beach MSA is a large regional economy, usually ranking between 8<sup>th</sup> and 10<sup>th</sup> among the largest MSAs in the United States, depending on the variable considered (e.g., employment, income, gross metro product). Martin and St. Lucie counties are in the Port St. Lucie, Florida, MSA; Indian River County is in the Sebastian-Vero Beach, Florida, MSA; Monroe is in the Key West micropolitan statistical area; and Okeechobee County is not in either a MSA or a micropolitan area.

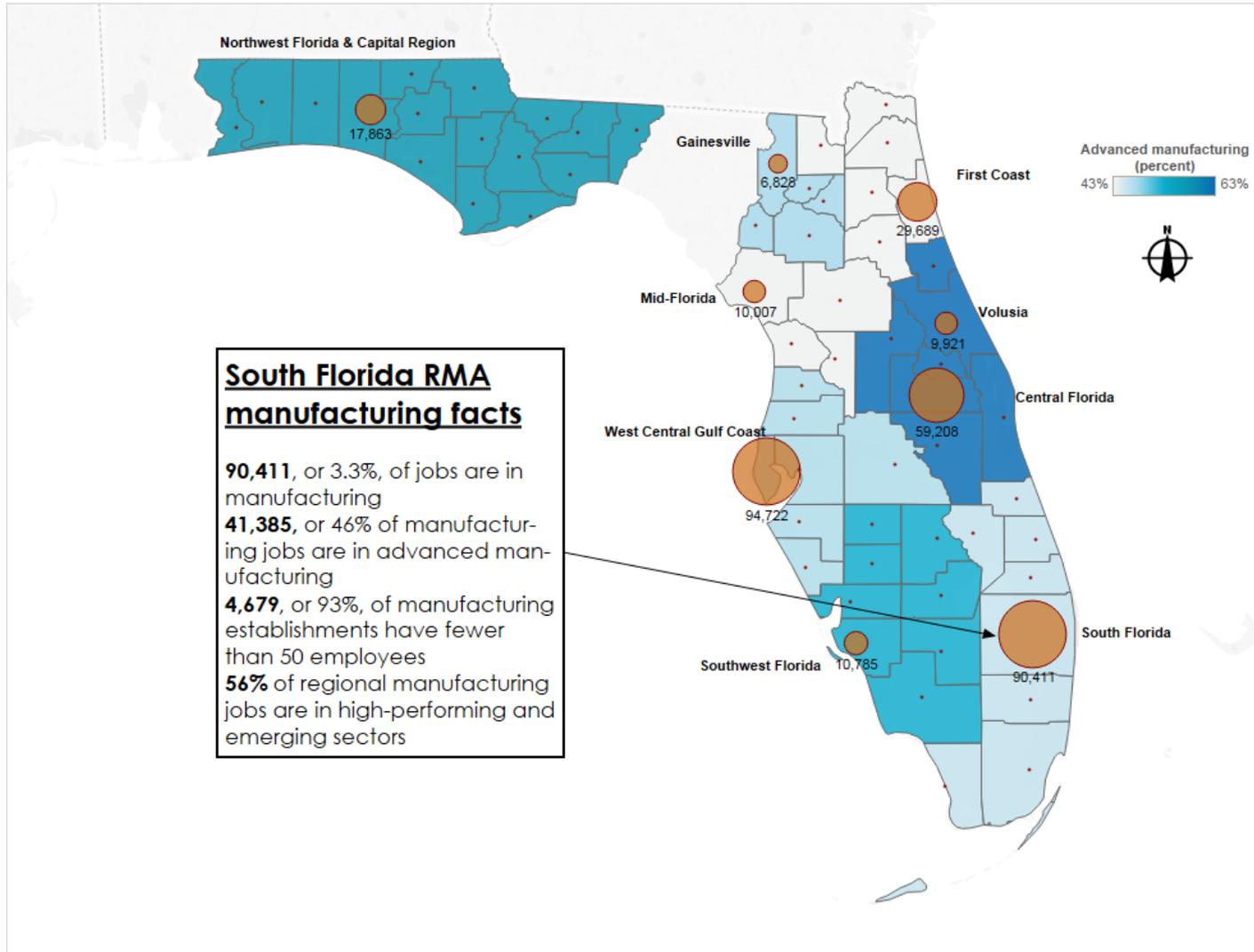
In the following sections, findings of potential interest to policymakers are presented in **bold**.

<sup>1</sup> While data for this study are presented for the eight-county study area, they are available by county upon client request.

# Strategic summary

## What is the situation today?

South Florida RMA 2015 manufacturing and advanced manufacturing employment



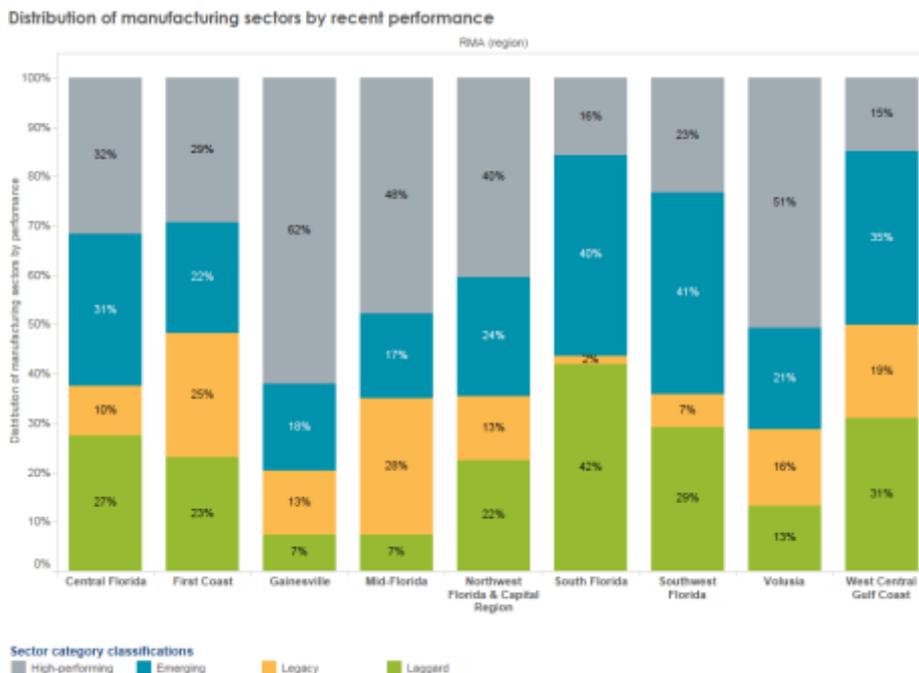
- The 2015 population of the South Florida RMA service area was 6,723,638 people, or a third of the state of Florida.
- Since 2011, **the average annual unemployment rate in the South Florida region has been on par with the statewide rate** and less than a third of a percentage point higher than the national unemployment rate.
- The **South Florida region has a fairly diverse metro economy**. Of 22 major sectors in the South Florida region, half of the region’s sectors are less concentrated, based on employment, than they are in the United States, while the other half are more concentrated.
- **Private, services-providing (PSP) sectors comprise 79.0 percent of regional employment**, compared to the US share of 68.9 percent. Retail trade, Health care and social assistance, Accommodation and food services,

Administrative and waste services, and Professional and technical services accounted for just over half of the region’s total employment in 2015.

- The **manufacturing sector comprises just over 90,400 jobs, 3.3 percent of the region’s total employment**, and less than the manufacturing sector’s share of employment in the state and the country overall.
- **The Transportation equipment, Miscellaneous, Food, Fabricated metal products, Computer and electronic product, Nonmetallic mineral, Machinery, Chemical, and Furniture and related products manufacturing sectors** each offer more than 5,000 manufacturing jobs in the South Florida region, together **representing more than three-quarters of regional manufacturing employment**.
- Of the region’s largest manufacturing sectors, only **nonmetallic mineral, chemical, and miscellaneous manufacturing had positive compound annual growth rates (CAGR) in employment** between 2000 and 2015.
- While smaller in terms of employment, **the Petroleum and coal and Primary metal manufacturing sectors showed the most positive manufacturing employment growth** over the 15-year period, with CAGRs of 5.0 percent and 2.8 percent respectively.
- Of the region’s 15 largest manufacturing employers, all have more than 700 employees. Of particular note is Sunbeam Americas Holdings, LLC, which provides 6,000 jobs and is headquartered in Boca Raton, Florida. However, **the vast majority of manufacturers in the region (93.4 percent) employ fewer than 50 workers and almost three-quarters have fewer than ten employees**.

### What are our advantages?

- The **diversity of South Florida’s manufacturing sector is higher** than in all other Florida manufacturing regions, reflecting the fact that it is large metro economy.
- **More than half of the South Florida region’s manufacturing industry is composed of “High-performing” and “Emerging” sectors** (which means state and local economic development organizations such as FloridaMakes have a significant opportunity to support sectors with existing strengths).<sup>2</sup>



<sup>2</sup> See the “Shift-st

r sector category classifications.

- Two of South Florida’s high-performing four-digit North American Industry Classification System (NAICS) manufacturing sectors **are highly concentrated in the South Florida region and had higher than average employment growth between 2000 and 2015: these include Audio and Video Equipment and Medical Equipment and Supplies manufacturing.** Together, these two sectors represent nearly nine percent of regional employment.
- The **South Florida region has 38 emerging sectors** that, while not highly concentrated, performed better than their peers nationally in terms of annual employment growth and comprise more than 40 percent of regional employment. Those providing more than 2,000 jobs each include:
  - Navigational, measuring, electromedical, and control instruments
  - Pharmaceutical and medicine
  - Other miscellaneous
  - Cut and sew apparel
  - Ship and boat building
  - Office furniture (including fixtures)
- For two of the manufacturing industry’s most important occupational categories, Production workers and architects and engineers, **South Florida has competitive advantage in terms of labor costs.** Someone in either of these occupational categories in South Florida typically makes 15 percent less than their counterparts nationally.
- Refined petroleum, coke, and nuclear; basic metals; wood products; and mineral-based products manufacturing (manufacturing sectors which exhibited positive employment and output growth in the South Florida region between 2000 and 2015) all have **IHS composite sector risk ratings that are lower than that of the overall US manufacturing sector.**<sup>3</sup>

## Where should we be concerned?

- **15 of 21 manufacturing subsectors experienced job losses between 2000 and 2015.** A few of the most significant include:
  - Computer and electronic product manufacturing had a decline of more than 11,400 jobs
  - Transportation equipment more than halved its workforce size to employment of just over 10,200 in 2015.
  - Fabricated metal products witnessed a workforce reduction of 45 percent, leaving only 8,589 workers in the sector.
  - By 2015, printing was left with just over 40 percent of its 2000 employment of just under 10,700.
  - Textile mills decreased by more than three-quarters to only 670 workers in 2015.
  - Leather and allied product manufacturing declined by 87.5 percent, from 2,000 jobs to 250.
  - Plastics and rubber products manufacturing had a decline of 3,400 jobs.
  - Apparel experienced a rate of decline of 7.4 percent annually.
  - Furniture and related products lost more than 4,000 jobs in the 15-year period.
- The share of the region’s workforce in *durable*<sup>4</sup> manufacturing sectors (66 percent) is below Florida’s durable manufacturing jobs share of 67.9 percent. Having a **lower-than-average share of the manufacturing workforce in durable manufacturing subsectors** is less desirable since these sectors typically pay higher annual wages, require more highly skilled and educated workers, are slightly more labor intensive (i.e., generate more direct jobs per \$1 million in additional output), and have higher levels of productivity (measured in output per worker) than the nondurable sectors.
- The share of the region’s workforce in *advanced*<sup>5</sup> manufacturing sectors (45.8 percent) is below the US and Florida shares of 46.8 percent and 49.7 percent, respectively. Having a **lower than average share of the manufacturing**

<sup>3</sup> See definition in “Risk rating by industry sector” section.

<sup>4</sup> Durables, or hard goods, are defined as those that are not totally consumed during their immediate or first use.

<sup>5</sup> See definition in “Advanced Manufacturing” section.

**workforce in *advanced* manufacturing subsectors** indicates lost opportunities for innovation, productivity, and higher paid, higher skilled manufacturing jobs.

## Where should we focus our efforts?

- Given the large percentage of high-performing and growth sectors, local economic development programs and policies can be designed to capitalize on these sectors' existing strengths or minimize growth barriers. **Economic development practitioners might begin by identifying the names of individual firms in the high performing and emerging sectors to determine why they are high performers**, i.e. the extent to which their recent above-average performance was due to firm-level factors (such as excellent management, efficient operations, competitive prices, superior product quality, etc.) or regional competitive advantages (such as lower costs of doing business; high quality of labor; proximity to markets, suppliers, or both; lower tax rates; excellent transportation networks; favorable regulatory environment; etc.).
- Workforce training organizations and educational institutions can benefit **from identifying the skills required by high performing and emerging manufacturing sectors and develop programs or talent recruitment strategies to meet the industry's current and future needs for skilled workers.**
- To increase per capita incomes, South Florida should **encourage growth and worker training in manufacturing subsectors that pay above-average wages such as advanced and durable manufacturing** (i.e., basic chemicals or metalworking machinery). However, if increasing the *number* of manufacturing jobs in the region, rather than the *quality* of those jobs is the goal, **attracting manufacturing employers whose national competitive advantage is derived from being a low-cost producer may be an effective strategy.**
- **Teaming with local educators could provide opportunities to improve productivity and increase opportunities for innovation.** The University of Miami's technology transfer office or other research and development programs could additionally benefit local companies and economic development practitioners to develop or attract a workforce with science, technology, engineering, and mathematics (STEM) occupational skills and experience.
- Given the size of the majority of the South Florida region's manufacturers, sector development strategies should **focus on adopting best practices that are relevant for small or very small manufacturing enterprises.**
- Proximity to four ports (Port of Miami, Port Everglades, Palm Beach, and Fort Pierce) offers additional opportunities to **expand the value of exports** produced by South Florida manufacturing companies.
- **Explore what is driving the higher-than-average "industry structure" and "supply" risks threatening the chemicals manufacturing sector** to determine if there is a role local policymakers or economic development practitioners can play in mitigating these risks, as this sector has experienced positive employment, output, and productivity growth in the past 15 years in South Florida.

# Characteristics of the regional economy

## Population

IHS estimates the 2015 population in the South Florida region was 6,723,638 people, or a third of the state of Florida. The population density was 524.0 persons per square mile, 42 percent higher than the Florida population density of 369.5 persons per square mile.

## Unemployment rate

In April 2016, the region's unemployment rate (not seasonally adjusted and based on workers' place of residence rather than on workplace location), was 4.8 percent, above both the US and Florida rates of 4.7 percent and 4.5 percent, respectively, that month. **Since 2011, the average annual unemployment rate in the South Florida region has been on a par with the statewide rate and 0.3 percentage points higher than the national unemployment rate.** Between April 2015 and 2016, the unemployment rates in the South Florida RMA and Florida declined by 0.6 and 0.7 percentage points respectively, less than the decline of 0.4 percentage points in the US because its April 2015 rate was already at a low 5.1 percent.

## Labor force

In April 2016, South Florida's total labor force was 3,265,722 people, only 210 people fewer than in April 2015. In the South Florida region, 21,113 fewer people were unemployed in April 2016 than the year before, while the employment level increased by 20,903 workers (2.1 percent). The minimal *decline* in the South Florida regional labor force is in contrast to the moderate labor force *growth* in both Florida and the nation over the same period.

**The key finding is that the South Florida RMA's labor market was only moderately weaker than either the state or US markets in April 2016. However, because rates in all three jurisdictions were below the level of five percent—generally considered to be full employment—there may be some upward pressure on manufacturing wages.**

## Economic structure

Employment by major economic sector, according to two-digit NAICS codes, is presented in the accompanying table in descending order by number of jobs. IHS estimates there were 90,411 jobs in the South Florida region's manufacturing sector in 2015, as shown in the table below. The share of South Florida's total employment in manufacturing was 3.3 percent, lower than in the state overall, where 4.1 percent of total employment was in the manufacturing sector in 2015, and significantly below the share of employment in the United States overall, where the manufacturing sector represented 8.5 percent of the total in 2015. The below-average share of employment in South Florida's manufacturing sector is reflected by its low location quotient (LQ)<sup>6</sup> of 0.39.

Of 22 major sectors in the South Florida region, 11 had employment LQs greater than one, and 11 had employment LQs less than one, meaning half of the region's sectors are less concentrated, based on employment, than they are in the United States, while the other half are more concentrated. Relative to shares of US employment overall, the real estate, rental, and leasing sector is a particularly notable part of the South Florida economy.

<sup>6</sup> An LQ score greater than 1 indicates a regional economy has a higher share of its total employment in an individual economic sector than the sector's share of total US employment, and vice versa.

**Because of its historical role as a center of tourism, transportation, and business and health services, Florida has an above-average concentration of its total employment in the private, services-providing (PSP) sectors.<sup>7</sup>** The PSP share of employment in Florida in 2015 was 75.9 percent, compared to the US share of 68.9 percent. The PSP share for the South Florida region is even higher at 79.0 percent, confirming that its economic structure is even more dependent on the production of services, which reduces the relative importance of the manufacturing sector.

In addition to being less concentrated in manufacturing employment than the United States as a whole, South Florida experienced a 3.2 percent decline in manufacturing employment in the last 15 years, an even greater decline than experienced by the state of Florida, which had a compound annual rate of decline of -2.4 percent, on a par with the US rate of -2.3 percent in the same time period.

Employment by major economic sector (by two-digit NAICS code) is ranked in the above table in descending order by number of jobs.

**Employment by major economic sector (2015)**

Industry	Number of jobs	% share	LQ	CAGR 2000-15
44-45 Retail trade	369,240	13.3	1.24	0.8% ▲
62 Healthcare and social assistance	342,290	12.3	0.96	2.0% ▲
72 Accommodation and food service	292,493	10.5	1.18	2.0% ▲
900L Local government	263,445	9.5	0.96	0.5% ▲
56 Administrative and waste services	220,784	8.0	1.31	2.2% ▲
54 Professional and technical service	183,733	6.6	1.11	2.0% ▲
42 Wholesale trade	153,387	5.5	1.35	0.8% ▲
81 Other services, excluding public	136,044	4.9	1.28	1.4% ▲
23 Construction	123,963	4.5	1.01	-1.0% ▼
52 Finance and insurance	119,704	4.3	1.05	0.5% ▲
48-49 Transportation and warehousing	102,818	3.7	1.13	0.2% ▲
31-33 Manufacturing	90,411	3.3	0.39	-3.2% ▼
53 Real estate, rental, and leasing	65,472	2.4	1.63	0.7% ▲
61 Educational services	65,107	2.3	0.99	4.8% ▲
71 Arts, entertainment, & recreation	53,148	1.9	1.29	0.7% ▲
51 Information	50,702	1.8	0.96	-1.7% ▼
900S State government	36,584	1.3	0.37	-0.7% ▼
900F Federal government	35,952	1.3	0.69	0.0%
11 Agriculture, forestry, fishing	30,429	1.1	0.47	-2.8% ▼
55 Management of companies & enterprises	28,638	1.0	0.69	2.1% ▲
22 Utilities	8,100	0.3	0.77	-0.8% ▼
21 Mining	407	0.0	0.03	-1.1% ▼
<b>Total</b>	<b>2,772,851</b>			<b>0.9% ▲</b>

Notes: CAGR stands for compound annual growth rate; LQ stands for location quotient.  
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### Structure diversity

To evaluate the diversity of the South Florida region’s industrial structure, IHS calculated the Hachman Index, which compares a regional economy’s distribution of economic activity by sector (in this case, employment) to that of the US economy. With the Hachman Index<sup>8</sup>, the maximum value is 1.00, or in other words, the closer the region’s Hachman Index value is to 1.00, the more similar that region’s economic structure is to the US economy.

For the South Florida region, the Hachman Index was 0.923, slightly less diverse than the Florida economy, which has a Hachman index of 0.941. Since large MSAs like Miami tend to have diverse economies, often comparable to those of states, **the South Florida region’s Hachman score confirms that it has a fairly diverse metro economy**, even with its well-known and large tourism sector.

<sup>7</sup> The private, services-providing (PSP) sector consists of the following major sectors: trade, transportation, and utilities; information; financial activities; professional and business services; education and health care; leisure and hospitality; and other services. The PSP sector excludes employment in the private, goods-producing sectors—agriculture; natural resources and mining; construction; manufacturing; and government.

<sup>8</sup> Calculate two-digit LQs by NAICS sector weighted by employment shares, and then invert the result.

# Characteristics of the manufacturing sector

To provide a more accurate picture of the South Florida region’s overall manufacturing industry, the following sections provide data on manufacturing subsectors’ growth, structure, diversity, and risk ratings. We conclude with a shift-share analysis to get a more detailed perspective on regional manufacturing sector performance in 2015.

## Industry growth

As shown, the South Florida region had 2015 employment in 21 three-digit manufacturing subsectors, with positive employment growth rates between 2000 and 2015 in only six of them. of these, **employment grew the most during the study period in the petroleum and coal manufacturing sector** (5.0 percent compound annual growth rate—CAGR). The sector grew nearly twice as fast as the **primary metal manufacturing industry, the second-fastest-growing sector in the area in terms of employment.**

However, none of the growing sectors are more concentrated in the South Florida region than in the United States as a whole (as shown by their LQs of less than 1.0). In fact, only the apparel manufacturing sector is more concentrated in the South Florida region than in the United States as a whole, although just barely, as its employment LQ is 1.01.

In addition to being less concentrated in manufacturing employment than the United States as a whole, the South Florida region experienced a 3.2 percent compound annual decline in manufacturing employment during the last 15 years, a rate of decline that was higher than that of the state of Florida (-2.4 percent CAGR) and the United States (-2.3 percent CAGR) in the same period.

## Durables and nondurables

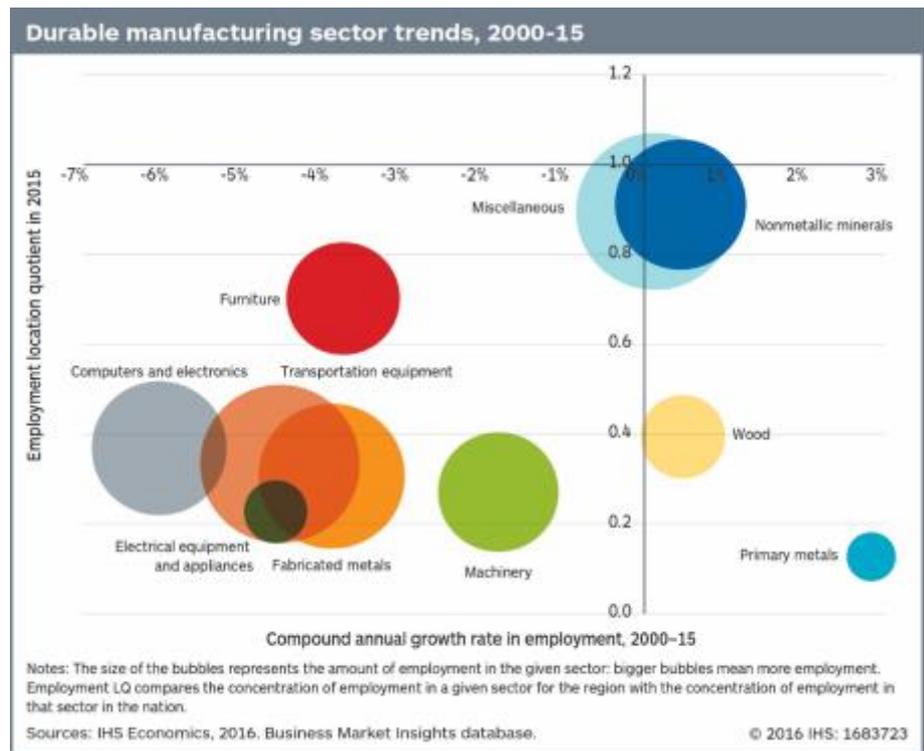
Additional insight into a region’s manufacturing sector can be obtained by analyzing the durable and nondurable sectors. Durables, or hard goods, are defined as those that are not totally consumed during their immediate or first use (i.e., used over an extended period of time, usually with a useful life of at least three years, and thus do not have to be purchased often). By contrast, nondurables, or soft or consumable goods, are immediately and totally consumed when initially used, have a useful life of less than three years, and need to be purchased frequently. The following charts present the employment trends in the South Florida region for the individual three-digit NAICS code manufacturing subsectors that make up the durable and nondurable sectors. Each chart presents the CAGR in employment between 2000 and 2015 on the x axis, the 2015 employment LQ on the y axis, and the size of each bubble presents that sector’s



total employment in 2015. Each chart provides a visual representation of the performance of the individual subsectors and the structure of the manufacturing economy. Approximately 66 percent and 34 percent of the South Florida region's manufacturing employment in 2015 was in the durable and nondurable sectors, respectively, with the South Florida region's durable manufacturing sector constituting a slightly smaller share of manufacturing jobs than in Florida overall, where durable manufacturing accounted for 67.9 percent of manufacturing employment.

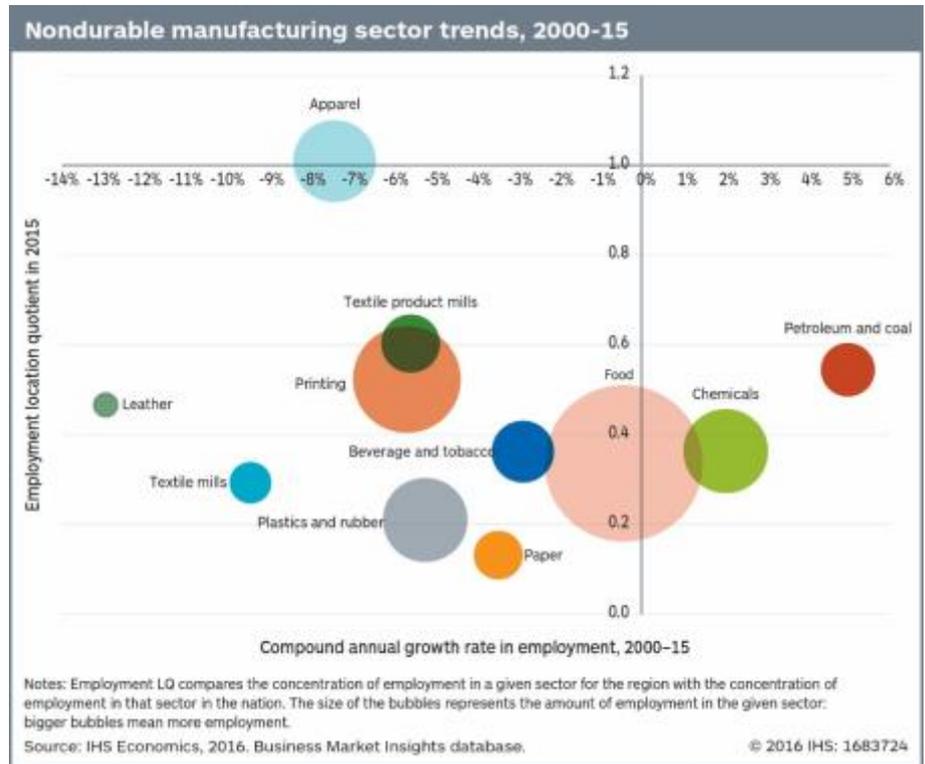
**Because of differences in the goods made and the production processes used, the durable and nondurable manufacturing sectors also differ from each other in terms of the mix of skilled workers required, level of wages paid, and productivity, all of which will determine appropriate economic and workforce development strategies.** IHS analyzed detailed occupational employment and wage data for 2015 by four-digit manufacturing subsector for the United States, identifying the following differences between the durable and nondurable sectors:

- Durable sectors require higher shares of skilled workers.** About 19.4 percent of the jobs, by detailed occupation, required a Bachelor's degree or higher to obtain an entry-level position, compared with only 12.4 percent in the nondurable sectors. Similarly, 26.0 percent of durable jobs required some type of postsecondary education, compared with only 18.8 percent for the nondurable sector. By contrast, 58.2 percent of durable sector jobs required a high school diploma or equivalent for an entry-level position, compared with 60.9 percent for the nondurables. Interestingly, 1.1 percent of the nondurable jobs require an advanced degree for an entry-level position, compared with only 0.5 percent in the durable sectors, because of the high share of STEM occupations required by the chemicals sector, especially in pharmaceuticals because of its high level of research and development spending.



- Durable jobs pay higher annual wages.** The average annual US wage in the durable sectors in 2015, based on a detailed analysis of occupations required, was \$49,387 compared with \$44,194 in the nondurable sectors.
- Durable sectors are slightly more labor intensive,** creating 2.7 direct jobs per \$1 million in output compared with 1.6 in the nondurable sectors; the latter figure is low because of the high level of output per employee in the petroleum refining and chemical manufacturing subsectors; if they are excluded, the nondurable figure rises to 2.5 jobs per \$1 million in output.

- **Nondurable sectors have higher shares of their employment in traditional “blue-collar” occupations and lower shares in STEM occupations.** The nondurables had 63.3 percent of their total employment in production, transportation, and material handling occupations in 2015 compared with only 57.4 percent for durables. By contrast, durable sectors had 12.2 percent of their total employment in three high-skill, high-education STEM occupations: architecture and engineering; computer and math; and life, physical, and social sciences, well above the 5.2 percent share for the nondurables.



**The difference between the durable and nondurable sectors indicates expanding the durable sector will require greater efforts to develop the supply of highly skilled workers in the local labor force.** However, the generally lower entry-level education and training requirements for the nondurables, excluding chemicals, indicate these sectors have a greater potential to employ less-skilled workers, thus providing more opportunities for them to begin careers. The first chart, durable manufacturing sector trends, shows the composition and performance of South Florida’s durable sector between 2000 and 2015. Note the **large number of jobs and positive employment growth rates of the nonmetallic minerals and miscellaneous manufacturing sectors.** The second chart presents the composition and performance of the nondurable sectors. Although not highly concentrated in the South Florida region, the high growth rates of the petroleum and coal and chemicals manufacturing sectors are notable. Meanwhile, the large **decreases in employment in the printing, apparel, and plastics sub-sectors** are a concern.

**If one of the objectives of a region’s economic development plan is to increase employment in the traditional, “blue-collar” manufacturing occupations, then expansion of the durable sectors (i.e., more direct jobs per \$1 million of output as noted above) and some nondurables sectors (e.g., textiles, apparel, leather, wood, and printing) should be promoted. Similarly, if the economic development objective is to attract higher-paying jobs in the STEM occupations that are often associated with nonproduction facilities such as research and development (R&D) centers, then policies and programs should be directed at the durable sectors, and some non-durables such as petroleum refining and chemicals. In adopting the latter strategy, complementary STEM programs to increase skills of the workforce will also have to be implemented.**

## Output and productivity

In addition to employment, it is helpful to consider output by sector and productivity (output per worker), to get a better sense of an individual manufacturing subsector's contribution to a regional economy. For example, a capital-intensive (i.e., high levels and values of structures and equipment per worker) sector such as petroleum refining, chemicals, or primary metals may not employ a lot of workers (i.e., have high levels of output per worker), but could generate substantial increases in regional economic activity through either their backward linkages (i.e., they purchase large amounts of inputs from suppliers located in the region) or through their forward linkages (i.e., the products they make are in turn purchased by other firms in the region who use them as inputs in making other types of goods or services). In other words, **when evaluating the manufacturing sector's regional economic health, it is important to note that, based on changes in productivity, employment growth rates may differ significantly from output growth rates.**

**Growth rates in the manufacturing sector: Output**



Sector	Output (millions of \$)		CAGR	Rank
	2000	2015		
324 Petroleum and coal manufacturing	\$291.9	\$1,241.3	10.1% ▲	1
331 Primary metal manufacturing	\$112.3	\$418.3	9.2% ▲	2
325 Chemical manufacturing	\$1,314.0	\$3,744.0	7.2% ▲	3
327 Nonmetallic mineral manufacturing	\$952.6	\$1,992.0	5.0% ▲	4
333 Machinery manufacturing	\$970.4	\$1,941.0	4.7% ▲	5
311 Food manufacturing	\$2,234.9	\$4,256.5	4.4% ▲	6
321 Wood product manufacturing	\$342.8	\$645.4	4.3% ▲	7
339 Miscellaneous manufacturing	\$1,283.2	\$2,415.3	4.3% ▲	8
312 Beverage and tobacco product manufacturing	\$823.9	\$1,482.6	4.0% ▲	9
322 Paper manufacturing	\$286.6	\$392.8	2.1% ▲	10
336 Transportation equipment manufacturing	\$3,236.3	\$3,939.1	1.3% ▲	11
337 Furniture and related products	\$818.7	\$937.0	0.9% ▲	12
332 Fabricated metal products manufacturing	\$1,827.8	\$1,878.1	0.2% ▲	13
326 Plastics and rubber products manufacturing	\$911.9	\$899.7	-0.1% ▼	14
335 Electrical equipment and appliance manufacturing	\$446.7	\$434.1	-0.2% ▼	15
323 Support activities—Printing	\$1,119.4	\$809.0	-2.1% ▼	16
314 Textile product mills	\$365.0	\$322.7	-3.2% ▼	17
313 Textile mills	\$363.2	\$188.3	-4.3% ▼	18
334 Computer and electronic product manufacturing	\$4,341.0	\$1,854.1	-5.5% ▼	19
316 Leather and allied product manufacturing	\$202.8	\$47.4	-9.2% ▼	20
315 Apparel manufacturing	\$745.6	\$161.1	-9.7% ▼	21
<b>Total manufacturing</b>	<b>\$22,990.7</b>	<b>\$29,899.7</b>	<b>1.8% ▲</b>	
<b>Total industries</b>	<b>\$275,787.8</b>	<b>\$510,994.4</b>	<b>4.2% ▲</b>	

Notes: CAGR is compound annual growth rate.  
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For example, in South Florida, 13 sectors had a positive compound annual growth rate for output, more than twice as many that had positive CAGRs for employment. Petroleum and coal manufacturing, primary metal manufacturing, and chemical manufacturing exhibited the greatest output growth, with compound annual growth rates of 10.1 percent, 9.2 percent, and 7.2 percent, respectively. Of the 13 manufacturing sectors with positive growth in output during 2000–15, all also demonstrated growth in productivity (output per worker), with beverage and tobacco product manufacturing, machinery manufacturing, primary metal manufacturing, and transportation equipment manufacturing leading the pack with productivity growth rates exceeding six percent annually.

Extending this report's durable and nondurable analysis, output per worker in the durable manufacturing sector in the United States in 2015 was \$375,043 compared with \$619,325 in the nondurable sector. The nondurable sector's level is greater because of the high level of productivity in the petroleum refining and chemical sectors.

The output-per-worker figures presented in the table on productivity growth rates in the manufacturing sector also show the direct increases in manufacturing employment that an increase in output would generate. For example, whereas apparel manufacturing will produce more than 11 direct jobs per \$1 million of new output, a sector such as petroleum and coal manufacturing, with \$541,520 of output per worker, will not even produce two new jobs per each additional \$1 million in output. Despite the relatively greater number of direct jobs that would be produced by additional investment in apparel manufacturing, new jobs in the petroleum and coal manufacturing sector are likely to pay substantially more.

**If a region’s economic development strategy is to maximize the direct increase in manufacturing employment, organizations should focus on those sectors with the lowest levels of worker productivity. However, there is an important caveat to this strategy: not all**

**manufacturing jobs are equal; they differ widely based on their annual wage levels. Economic development agencies must consider the prevailing annual wage levels in the manufacturing subsectors they want to promote, which are a function of the types of occupations required, which in turn are determined by the types of manufacturing activities performed.**

**Establishment size**

In addition to evaluating the South Florida manufacturing sectors’ growth in the last 15 years, IHS assessed regional structure in terms of distribution of manufacturing establishments by employment size. In the eight-county South Florida region, there are 4,679 manufacturing establishments with employment of less than 50, 315 with employment between 50 and 499, and 14 with 500 employees or more. These small and medium manufacturers make up the vast majority of the total, representing 93 percent and six percent, respectively. Manufacturing subsectors with high shares of very small employers (i.e., fewer than ten employees) include food, textile mill products, support activities—printing, chemicals, plastics and rubber, nonmetallic minerals, fabricated metal products, machinery, computers and electronic products, transportation equipment, furniture and related products, and miscellaneous.

The significance of the distribution of manufacturing establishments by employment size is that different types of strategies and accompanying services are required for small firms than for large ones. **Small and medium manufacturing enterprises (SMEs), usually defined as those with fewer than 500 employees, are more vulnerable to changes in the business cycle, fluctuations in interest and currency rates, and regulatory changes, may have more difficulty in accessing capital, and be less able to provide worker training. The RMAs need to be able to offer a broader range of services and supports to SMEs than to larger manufacturing firms.** We note the

**Growth rates in the manufacturing sector: Productivity**

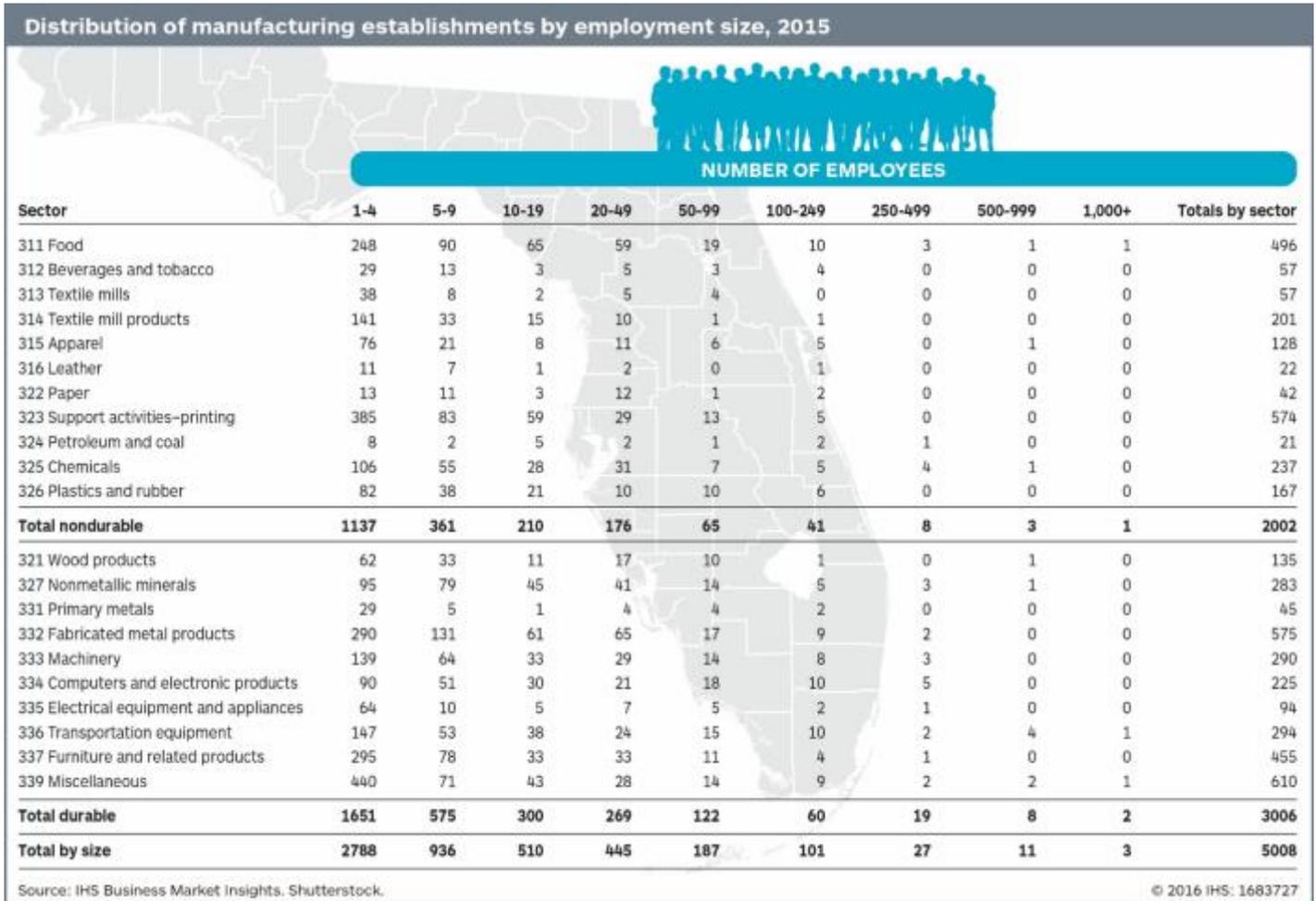


Output per worker (2010 \$)

Sector	2000	2015	CAGR	Rank
312 Beverage and tobacco product manufacturing	\$358,706	\$998,412	7.1% ▲	1
333 Machinery manufacturing	\$126,317	\$333,109	6.7% ▲	2
331 Primary metal manufacturing	\$176,512	\$432,595	6.2% ▲	3
336 Transportation equipment manufacturing	\$156,795	\$383,857	6.2% ▲	4
322 Paper manufacturing	\$184,292	\$428,363	5.8% ▲	5
313 Textile mills	\$122,318	\$281,056	5.7% ▲	6
326 Plastics and rubber products manufacturing	\$148,308	\$327,266	5.4% ▲	7
325 Chemical manufacturing	\$316,398	\$666,665	5.1% ▲	8
324 Petroleum & coal manufacturing	\$541,520	\$1,110,274	4.9% ▲	9
337 Furniture and related products	\$88,988	\$181,061	4.8% ▲	10
311 Food manufacturing	\$219,212	\$445,428	4.8% ▲	11
335 Electrical equipment and appliance manufacturing	\$136,597	\$269,322	4.6% ▲	12
327 Nonmetallic mineral manufacturing	\$146,709	\$286,746	4.6% ▲	13
332 Fabricated metal products manufacturing	\$117,051	\$218,663	4.3% ▲	14
316 Leather and allied product manufacturing	\$101,405	\$189,417	4.3% ▲	15
339 Miscellaneous manufacturing	\$129,666	\$239,181	4.2% ▲	16
321 Wood product manufacturing	\$129,512	\$226,841	3.8% ▲	17
323 Support activities—Printing	\$104,821	\$181,791	3.7% ▲	18
314 Textile product mills	\$116,916	\$168,712	2.5% ▲	19
334 Computer and electronic product manufacturing	\$231,481	\$252,527	0.6% ▲	20
315 Apparel manufacturing	\$89,753	\$61,567	-2.5% ▼	21
<b>Total manufacturing</b>	<b>\$156,616</b>	<b>\$330,709</b>	<b>5.1% ▲</b>	
<b>Total industries</b>	<b>\$112,990</b>	<b>\$184,285</b>	<b>3.3% ▲</b>	

Notes: CAGR is compound annual growth rate.  
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proportion of total establishments accounted for by SMEs varies widely by subsector based on production processes used, barriers to entry, need to achieve economies of scale, capital intensity, etc. Some subsectors, such as fabricated metals, machinery, and printing, have traditionally had higher shares of SMEs, whereas others, such as petroleum refining and chemicals, have low shares.



### Structure diversity

To evaluate the diversity of the region’s manufacturing sector, we again used the Hachman Index<sup>9</sup> based on four-digit NAICS employment, with LQs based on employment in the manufacturing sectors, not total employment. For the eight counties included in the South Florida region, the Hachman Index of 0.584 shows the region’s manufacturing sector diversity is lower than the manufacturing diversity of the state of Florida, which has a Hachman Index of 0.701. However, **the diversity of South Florida’s manufacturing sector is higher than in all the other Florida manufacturing regions we evaluated, reflecting the fact that it is a large metro economy.**

### Advanced manufacturing

**With 41,385 people employed in the advanced manufacturing sectors,** as defined either by researchers from the US Bureau of Labor Statistics (BLS) or the Brookings Institution<sup>10</sup> think tank, **the South Florida region has almost 46**

9 See Footnote 8 regarding the Hachman Index calculation.

10 The definition of advanced manufacturing subsectors comes from two sources: 1) Daniel E. Hecker, “High-technology employment: A NAICS-based update,” Monthly Labor Review, July 2005. (Hecker is an economist in the Office of Occupational Statistics and Employment Projections, US Bureau of Labor Statistics) and 2) Muro, M., Jonathan Rothwell, et al. “America’s Advanced Industries: What They Are, Where They Are and Why They Matter,” Brookings Advanced Industries Project, February 2015. Both studies identified high-tech and advanced sectors across the entire economy at the four-digit NAICS level; we defined advanced

**percent of its manufacturing industry employment in advanced manufacturing.** This share is just below the US and Florida shares of 46.8 percent and 49.7 percent, respectively. **It is in these sectors we should expect the greatest innovation to occur (i.e., have higher patent rates), and they have higher growth rates in productivity, require more highly skilled workers, and pay higher wages than other manufacturing sectors.**

The criteria applied in the two studies we used to identify advanced manufacturing:

- High levels of spending for R&D, including high intensity (i.e., above-average shares of R&D spending as a percentage of sales) and high levels per worker
- The share of employment in the STEM occupations

The BLS study also considered industries that use advanced manufacturing processes and that produced high-technology goods. The Brookings and BLS studies identified advanced and high-tech NAICS sectors at the four-digit level across the entire economy; for the purposes of this profile, we considered only the individual sectors that were part of the manufacturing sector.

Similar to the discussion for the durable and nondurable sectors, there are also differences between the advanced manufacturing subsectors and the entire manufacturing sector. Our analysis of detailed occupational employment and wage data for 2015 by four-digit manufacturing subsector for the United States found the following differences:

- **Advanced sectors require higher shares of skilled workers:** About 24.9 percent of the jobs required a Bachelor's degree or higher to obtain an entry-level position, compared with only 16.9 percent for the entire manufacturing sector. Similarly, 32.7 percent of advanced manufacturing jobs required some type of post-secondary education, compared with only 23.5 percent for all of manufacturing. In contrast, 53.9 percent of advanced sector jobs required a high school diploma or equivalent for an entry-level position, compared with 59.2 percent for total manufacturing.
- **Advanced manufacturing jobs pay higher annual wages.** The average annual US wage in advanced manufacturing sectors in 2015, based on a detailed analysis of occupations required, was \$52,635 compared with \$47,505 across the entire manufacturing sector.
- **Advanced manufacturing requires fewer workers in traditional blue-collar occupations and more in STEM occupations.** Advanced manufacturing had 50.8 percent of its total employment in production, transportation, and material handling occupations in 2015 compared with 59.5 percent for the entire manufacturing sector. Similarly, 16.9 percent of advanced manufacturing employment was in three high-skill, high-education occupations: architecture and engineering; computer and math; and life, physical, and social sciences versus 9.7 percent in all of manufacturing.
- **Productivity in advanced manufacturing is high.** In 2015 output per worker in the US advanced manufacturing sector was \$422,751 compared with \$325,000 for all of manufacturing.

**The key finding is that policies and strategies directed at the advanced manufacturing sector will have to concentrate on increasing the skill levels of the region's manufacturing labor force.** The training will have to be

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manufacturing to consist of all the manufacturing subsectors that were identified in either study. The result was that 37 of the 86 four-digit NAICS manufacturing subsectors were defined as advanced manufacturing subsectors.

provided by a range of organizations, including the University of Miami, local community colleges, workforce development boards, secondary career and technical education (CTE) schools, the South Florida RMA, labor union apprentice programs, and manufacturing companies themselves. IHS cautions that regions cannot be competitive in all advanced manufacturing sectors, so economic development policies should be designed for and targeted at those advanced manufacturing sectors where clear competitive advantages exist. Competitive sectors are identified in this report's shift-share analysis, but **local sector development strategies might also further explore the relationship between the University of Miami and local manufacturing companies. Major research universities typically have the potential to provide a breeding ground and test bed for new manufacturing products and processes, as well as yield STEM and management talent.**

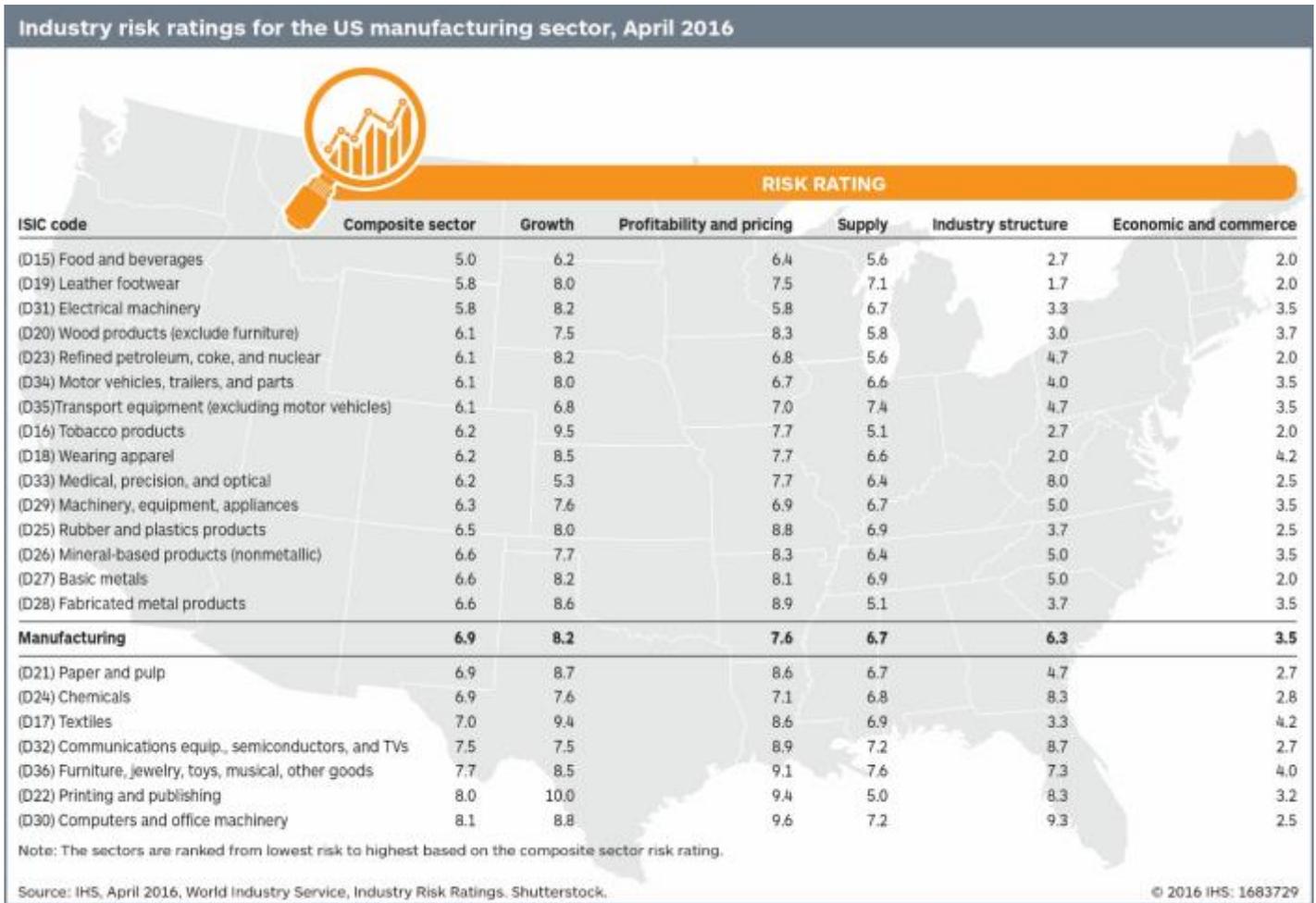
## Risk rating by industry sector

IHS World Industry Service Sector Risk Ratings for each manufacturing sector in the United States use a proprietary methodology that calculates 40 individual risk factors for industrial sectors for most major industrialized countries including the United States. We consider the following major types of risk faced by firms in industrial sectors:

- **Composite sector risk:** A weighted average of 40 different risk components distributed among five major risk categories; 1) growth, 2) price and profitability, 3) supply, 4) industry structure, and 5) economic and commerce risk
- **Growth risk:** Evaluates, for real revenue and nominal sales, the rate and volatility of growth in the sector and detects the presence of turning points and shifts in sales patterns
- **Profitability and pricing risk:** Evaluates the sector's ability to pass on cost increases, its historical and forecast profits, and cash-flow growth and volatility, as well as operating efficiency
- **Supply risk:** Evaluates risk accruing to capital usage, depreciation, and changes in productive capacity
- **Industry-structure risk:** Evaluates the sector's exposure that results from competitive and structural characteristics (These include factors such as barriers to entry and exit.)
- **Economic and commerce risk:** Evaluates the size of the cycle in the sector and sensitivity of output demand to interest rates and incorporates the specific macroeconomic risks related to currency, legal, financial, and tax initiatives

The IHS risk ratings provide a broad perspective on the current and future risks in the industry sectors that state and local economic development organizations may consider assisting in terms of strategy development, technical assistance, workforce development, or the provision of economic development incentives such as loans, grants, and tax credits or deductions. The risk ratings are presented for International Standard Industrial Classification (ISIC) codes, which correspond closely with three-digit NAICS codes, and risk scores range between one (least risk) and ten (highest risk). In our April 2016 release, the minimum (e.g., low risk) and maximum (e.g., high risk) composite risk scores for the US manufacturing sectors were 5.0 and 8.1, compared with 6.9 for the entire manufacturing sector. The ranges of scores in the five subcategories are wider than for the composite risk, especially for the growth, profitability and pricing, and supply risk categories. The accompanying table presents the IHS industry risk ratings for the US manufacturing sector from April 2016, listed in ascending order of composite risk (i.e., low scores indicate lower levels of risk, and vice versa).

**IHS industry risk scores can assist state and local agencies in devising economic development strategies targeted at individual manufacturing subsectors. The appropriate way to use the industry risk rating is to first identify a specific subsector of interest in the table, then read across its row to identify the different types and levels of risks the sector is facing.** Informed policies can be developed then based on the potential risks. As some of the risks faced by an individual sector, such as pricing and profitability or industry structure, may not be able to be reduced through state or regional policies, economic development practitioners need to consider the risk factors facing an industry and their ability to lessen those risks when developing strategies for, or allocating scarce resources to, individual manufacturing sectors or companies.



From the above table, we see that refined petroleum, coke, and nuclear; basic metals; wood products; and mineral-based products manufacturing (which align with the three-digit NAICS manufacturing sectors noted earlier in this report for their positive employment and output growth) all have composite sector risk ratings below the overall US manufacturing sector’s composite risk score of 6.9. However, the chemicals manufacturing sector, which has experienced positive employment, output, and productivity growth in the past 15 years in South Florida, has a composite risk score on a par with that of the US manufacturing industry overall, with higher-than-average risks related to industry structure and supply. Meanwhile, the basic metals sector has above-average risks related to profitability and pricing and supply; and wood products and mineral-based products manufacturing have above-average risks related to profitability and pricing.

## Shift-share analysis

Finally, to examine the performance of the four-digit manufacturing subsectors based on changes in employment between 2000 and 2015, IHS conducted a shift-share analysis of the manufacturing subsectors in the regional study area.<sup>11</sup>

Shift-share analysis is an analytical technique used to decompose changes in a variable, such as employment or income, which occurred in a regional economy during a historical period. It compares the performance of an individual economic sector over time within the regional economy of interest to that same sector's performance in a larger reference economy, usually the United States, in the same time period. Shift-share analysis is based on the theory that an individual sector's performance in a regional economy over time is due to four effects:

- **National:** The share of growth in the larger reference economy that was captured by the region
- **Industry mix:** The shares of high-growth and low-growth sectors in the region and how they changed over time
- **Competitive:** The extent to which an individual economic sector in the region outperformed or underperformed the same sector at the level of the reference economy over the analysis period (The United States is the reference economy for the shift-share analysis presented in this profile.)
- **Allocation:** The extent to which a region has above-average shares of economic activity in those sectors where it has a competitive advantage

Stated another way, shift-share analysis enables an analyst to determine how much of the change in a variable, such as employment, in an individual economic sector over time was due to growth in the US economy and how much was attributable to characteristics of the regional economy, such as competitive advantages or disadvantages, and the distribution of economic activity into competitive and noncompetitive sectors.

Employment is the variable most often used in a shift-share analysis because it is the most widely available, the most current, and is published at the detailed NAICS level. For this study, using employment data at the four-digit NAICS code level (86 manufacturing subsectors) from the IHS Business Market Insights database, we classify each sector that has more than 50 employees into one of four types based on its performance.

- **Type A (“High Performing”):** The sector's 2015 employment LQ is greater than 1.0, and its employment CAGR during the analysis period was greater than the sector's employment CAGR for the United States in the same period.
- **Type B (“Emerging”):** The sector's 2015 LQ is less than 1.0, but its employment CAGR was greater than the sector's employment CAGR for the United States during the same period.
- **Type C (“Legacy”):** The sector's 2015 LQ is greater than 1.0, but its employment CAGR was less than the sector's employment CAGR for the United States in the same period.



<sup>11</sup> See Appendix A for full results of shift-share analysis.

- **Type D (“Laggard”):** The sector’s 2015 LQ is less than 1.0 and its employment CAGR during the analysis period was less than the sector’s employment CAGR for the United States during the same period.

In the South Florida region, there were five high-performing manufacturing sectors classified as A that outperformed the United States in terms of employment growth and represented an above-average share of the region’s economy (i.e., had employment LQs above 1.0). These included:

- Medical equipment and supplies
- Cement and concrete product
- Other furniture-related product
- Audio and video equipment
- Apparel accessories and other apparel

**These five high-performing sectors accounted for nearly 16 percent of total manufacturing employment in the South Florida region, or 14,293 jobs.** Of these, only medical equipment and supplies and audio and video equipment manufacturing had positive employment growth rates during the 15-year period. The others, despite their categorization as “A” sectors, were only labeled as such because of their high concentration in the region and slower-than-average rate of workforce contraction between 2000 and 2015.

Perhaps even more interesting than these A sectors are the large number (38) of B sectors that perform well compared with their peers nationally, at least in terms of increasing the number of jobs they can support. Although these emerging sectors are doing relatively well in terms of employment growth, with many showing positive employment growth during the 15-year period, they do not yet account for a large share of regional economic activity. Composing more than 40 percent of regional employment, the B sector category includes, among others, the following sectors, each of which provides more than 2,000 jobs in the region:

- Navigational, measuring, electromedical, and control instruments
- Pharmaceutical and medicine
- Other miscellaneous
- Cut and sew apparel
- Ship and boat building
- Office furniture (including fixtures)

Of these, the largest sectors are navigational, measuring, electromedical, and control instruments and pharmaceutical and medicine manufacturing, both of which employ more than 3,500 people in the South Florida region. **Combined, the A and B sectors represent 56.4 percent of regional manufacturing employment, meaning state and local economic development organizations such as FloridaMakes have a significant opportunity to support sectors with existing strengths in the South Florida region by researching these companies’ competitiveness drivers and designing programs or policies that capitalize on existing strengths and minimize growth barriers.**

For the traditionally important legacy industries in which the region still has above-average shares of economic activity, but, for a variety of reasons, the industries are underperforming their peers at the US level (the C sectors), we note only one in South Florida: sugar and confectionery product manufacturing, which has an LQ of 1.09 but a

*negative* 2.81 percent CAGR between 2000 and 2015. Still a large employer, this sector provides 1,650 manufacturing jobs or 1.8 percent of regional manufacturing employment.

Finally, of greatest concern to economic developers should be the large number of D sectors (33) in the region. These laggard sectors are underperforming both in terms of their relative importance to the regional economy (as compared with the nation as a whole) and in terms of their employment growth in the analysis period. **With the D sectors representing nearly 42 percent of employment, economic and workforce development practitioners in the region should pay them attention if they wish to maintain manufacturing as a key component of the South Florida economy.**

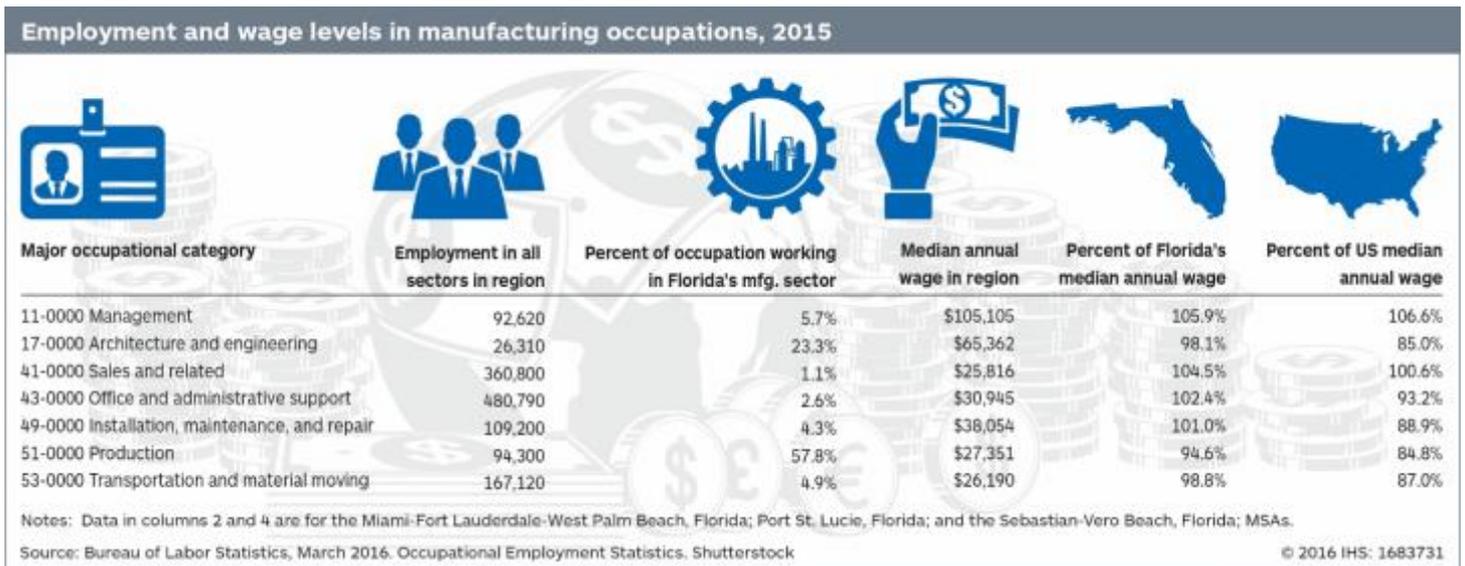
**The results of the shift-share analysis can be used for developing strategies in the following manner:**

- Analyze the economic sectors classified as either A or B, as they are the highest performers, to identify the competitive advantages in the region that drive their performance. **The B sectors should receive special attention because, while they currently account for below-average shares of economic activity, this is where growth opportunities are likely to be found.** The economic development objective is to turn B sectors into A sectors.
- **Identify the names of individual firms in each A and B sector and analyze them to determine why they are high performers.** It is essential to determine the extent to which their high performances are due to:
  - 1) firm-level factors such as excellent management, efficient operations, competitive prices, superior product quality, etc.
  - 2) regional competitive advantages such as lower cost of doing business; high quality of labor; proximity to markets, suppliers, or both; lower tax rates; excellent transportation networks; favorable regulatory environment; etc.
- **Analyze the C sectors and identify the factors that affect their competitiveness;** they constitute traditional centers of manufacturing activity so helping them remain profitable also maintains manufacturing employment.
- **Identify clusters of subsectors with similar needs** that also interact with each other through **buying and selling relationships.**
- **Identify those regional competitive advantages** that apply across all the manufacturing subsectors and those that are uniquely important to a few specialized subsectors.
- **Identify those regional competitive advantages where local actions can make a difference** (i.e., increasing the supply of skilled workers needed by the advanced manufacturing sectors).
- Begin to **develop strategies and programs** that maintain and enhance regional competitive advantage in the targeted sectors.

Based on our experience in other studies, it is always valuable to have economic development professionals with detailed knowledge of the regional economy review the list of the subsectors assigned to each of the four shift-share types. Ideally, the distribution of subsectors by type should generally confirm their understanding of the region's economic composition (i.e., the subsectors they expect to be classified as A or B sectors actually appear there).

# Wages in manufacturing occupations

A review of the major occupational categories involved in Florida’s manufacturing sector statewide shows **57.8 percent of all production workers in Florida were employed in the manufacturing sector in 2015, followed by 23.3 percent of all architects and engineers.** As such, these are two of the most significant categories for evaluating manufacturing occupation wages in the South Florida region. From the table on manufacturing employment and wage levels in 2015, we can infer that a production worker is paid slightly less than a production worker statewide, and much less than a production worker nationally. The same is true for an architect or engineer, while a management worker is paid more. These lower-than-average wages in occupations critical to the manufacturing sector give South Florida a modest competitive advantage in terms of labor costs compared to the rest of the state and a significant one when compared to the US.



**One implication of these findings is that, if the South Florida region wants to increase per capita incomes, it should encourage growth in manufacturing subsectors that pay above-average wages such as advanced and durable manufacturing (i.e., basic chemicals or metalworking machinery). However, if increasing the *number* of manufacturing jobs in the region, rather than the *quality* of those jobs is the goal, attracting manufacturing employers whose national competitive advantage is derived from being a low-cost producer may be an effective strategy.**

# Appendix A: Results of the shift-share analysis

Appendix A: Shift-share analysis of the South Florida manufacturing sector (2015)						
NAICS sector	Description	Allocation code	Employment	LQ	% of Private Sector Employment	Employment CAGR 2000-15
3391	Medical equipment and supplies	A	7,343	1.18	0.30%	1.06%
3273	Cement and concrete product	A	4,786	1.36	0.20%	-0.29%
3379	Other furniture-related product	A	1,165	1.70	0.05%	-2.04%
3343	Audio and video equipment	A	681	1.67	0.03%	4.54%
3159	Apparel accessories and other apparel	A	318	1.79	0.01%	-7.27%
3345	Navigational, measuring, electromedical, and control instruments	B	4,205	0.56	0.17%	2.76%
3254	Pharmaceutical and medicine	B	3,511	0.63	0.14%	3.05%
3399	Other miscellaneous	B	2,755	0.50	0.11%	-1.82%
3152	Cut and sew apparel	B	2,187	0.97	0.09%	-7.02%
3366	Ship and boat building	B	2,176	0.77	0.09%	1.03%
3372	Office furniture (including fixtures)	B	2,069	0.84	0.08%	-2.13%
3334	Ventilation, heating, air-conditioning, and commercial refrigeration equipment	B	1,674	0.66	0.07%	1.25%
3219	Other wood product	B	1,504	0.34	0.06%	1.88%
3212	Veneer, plywood, and engineered wood product	B	1,330	0.99	0.05%	-0.81%
3114	Fruit and vegetable preserving and specialty food	B	1,260	0.37	0.05%	1.83%
3363	Motor vehicle parts	B	1,241	0.12	0.05%	-1.33%
3272	Glass and glass product	B	1,134	0.61	0.05%	3.14%
3241	Petroleum and coal products	B	1,118	0.53	0.05%	4.98%
3256	Soap, cleaning compound, and toilet preparation	B	1,098	0.53	0.05%	4.30%
3119	Other food	B	1,034	0.27	0.04%	2.22%
3279	Other nonmetallic mineral product	B	920	0.59	0.04%	4.09%
3116	Animal slaughtering and processing	B	794	0.08	0.03%	0.47%
3115	Dairy product	B	754	0.29	0.03%	2.76%
3353	Electrical equipment	B	715	0.25	0.03%	-0.80%
3262	Rubber product	B	628	0.25	0.03%	-2.48%
3336	Engine, turbine, and power transmission equipment	B	621	0.30	0.03%	4.50%
3325	Hardware	B	481	0.91	0.02%	-4.63%
3332	Industrial machinery	B	438	0.20	0.02%	-2.11%
3362	Motor vehicle body and trailer	B	384	0.12	0.02%	-0.72%
3252	Resin, synthetic rubber, and artificial synthetic fibers and filaments	B	344	0.19	0.01%	13.72%
3315	Foundries	B	323	0.12	0.01%	-0.70%
3314	Nonferrous metal (except aluminum) production and processing	B	291	0.23	0.01%	8.06%
3122	Tobacco	B	252	0.90	0.01%	8.32%
3313	Alumina and aluminum production and processing	B	232	0.19	0.01%	7.09%
3331	Agriculture, construction, and mining machinery	B	191	0.04	0.01%	2.14%
3221	Pulp, paper, and paperboard mills	B	174	0.09	0.01%	-0.11%
3346	Manufacturing and reproducing magnetic and optical media	B	156	0.47	0.01%	-6.10%
3112	Grain and oilseed milling	B	125	0.11	0.01%	2.60%
3311	Iron and steel mills and ferroalloy	B	109	0.06	0.00%	5.33%
3271	Clay product and refractory	B	107	0.15	0.00%	-4.92%
3326	Spring and wire product	B	91	0.11	0.00%	-3.15%
3352	Household appliance	B	60	0.05	0.00%	18.02%
3369	Other transportation equipment	B	50	0.13	0.00%	11.33%
3113	Sugar and confectionery product	C	1,650	1.09	0.07%	-2.81%
3364	Aerospace product and parts	D	6,402	0.62	0.26%	-6.23%
3323	Architectural and structural metals	D	4,553	0.65	0.19%	-3.19%
3231	Printing and related support activities	D	4,450	0.50	0.18%	-5.67%
3118	Bakeries and tortilla	D	3,539	0.61	0.15%	-0.50%
3261	Plastics product	D	2,121	0.19	0.09%	-5.84%
3371	Household and institutional furniture and kitchen cabinet	D	1,941	0.43	0.08%	-5.80%
3327	Machine shops; turned product; and screw, nut, and bolt	D	1,735	0.22	0.07%	-2.94%
3339	Other general purpose machinery	D	1,639	0.30	0.07%	-2.19%
3344	Semiconductor and other electronic component	D	1,313	0.18	0.05%	-7.43%
3121	Beverage	D	1,233	0.31	0.05%	-3.85%
3149	Other textile product mills	D	913	0.74	0.04%	-5.41%
3328	Coating, engraving, heat treating, and allied activities	D	772	0.28	0.03%	-1.88%
3333	Commercial and service industry machinery	D	757	0.43	0.03%	-6.00%

Note: Only sectors with employment of 10 or more were considered; LQ = location quotient and CAGR = compound annual growth rate.

Source: IHS Business Market Insights © 2016 IHS

Appendix A: Shift-share analysis of the South Florida manufacturing sector (2015) - continued

NAICS sector	Description	Allocation code	Employment	LQ	% of Private Sector Employment	Employment CAGR 2000-15
3222	Converted paper product	D	743	0.14	0.03%	-4.03%
3351	Electric lighting equipment	D	630	0.70	0.03%	-6.94%
3341	Computer and peripheral equipment	D	602	0.18	0.02%	-5.81%
3329	Other fabricated metal product	D	538	0.11	0.02%	-8.58%
3335	Metalworking machinery	D	507	0.14	0.02%	-4.62%
3141	Textile furnishings mills	D	407	0.39	0.02%	-5.94%
3342	Communications equipment	D	385	0.21	0.02%	-19.27%
3132	Fabric mills	D	322	0.29	0.01%	-8.24%
3133	Textile and fabric finishing and fabric coating mills	D	318	0.47	0.01%	-10.37%
3321	Forging and stamping	D	250	0.10	0.01%	-7.14%
3255	Paint, coating, and adhesive	D	246	0.20	0.01%	-3.80%
3117	Seafood product preparation and packaging	D	212	0.33	0.01%	-6.38%
3359	Other electrical equipment and component	D	207	0.09	0.01%	-6.92%
3169	Other Leather and Allied Product	D	205	0.92	0.01%	-6.52%
3259	Other chemical product and preparation	D	203	0.12	0.01%	-4.90%
3111	Animal food	D	188	0.18	0.01%	-1.78%
3253	Pesticide, fertilizer, and other agricultural chemical	D	159	0.23	0.01%	-3.35%
3324	Boiler, tank, and shipping container	D	121	0.06	0.00%	-5.14%
3151	Apparel knitting mills	D	111	0.43	0.00%	-12.34%
3251	Basic chemical	D	55	0.02	0.00%	-6.26%

Note: Only sectors with employment of 10 or more were considered; LQ = location quotient and CAGR = compound annual growth rate.

Source: IHS Business Market Insights © 2016 IHS

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