



Summer 2015

Rick Snyder, Governor  
Department of Technology, Management & Budget  
Bureau of Labor Market Information & Strategic Initiatives  
[www.michigan.gov/lmi](http://www.michigan.gov/lmi)

# Michigan Economic and Workforce Indicators and Insights

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## Forward

Friends,

August 2015

Michigan's labor market continues to improve in 2015. Payroll jobs have finally exceeded the level recorded prior to the start of the Great Recession, the unemployment rate has fallen to essentially match the national rate, and the labor force participation rate continues to climb as optimism spreads. These and other indicators suggest that the state's labor market has made significant progress in recent years. However, it will take time for the labor market to return to peak levels seen prior to the recent recessionary lows still in memory.

In this edition of the *Michigan Economic and Workforce Indicators and Insights* publication, our team takes a critical look at the state's labor market. In doing so, we update our key indicators, including the unemployment rate, job trends, payroll jobs by industry, personal income, and real-time demand. In addition, we refresh periodic indicators focusing on exports, education program completers, jobs in high-tech industries, and automotive related employment. We also discuss the important topics of disabilities, skilled trades occupations, and immigration. Finally, we look to the future, highlighting our recently released long-term industry and occupational projections.

Everyday we work to provide our national, state, and local partners and customers with accurate, objective, reliable, timely, accessible, and transparent information and insights. Please let us know if you have any questions or comments about anything you see here, or if you have something you would like to see in a future edition of the *Michigan Economic and Workforce Indicators and Insights* report.

Sincerely,



Jason S. Palmer

Director,  
DTMB, Bureau of Labor Market Information & Strategic Initiatives

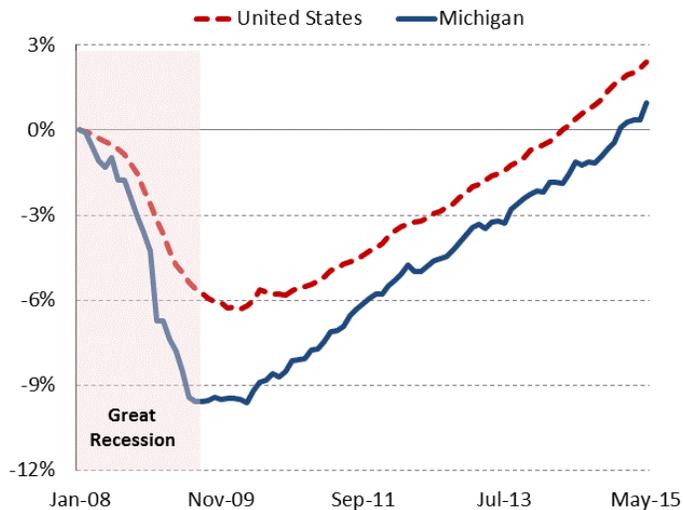
## Michigan Job Trends

Jeff Aula

There are two government surveys that measure the state of the labor market: the Current Employment Statistics (CES) program, a monthly survey of nonfarm **business establishments**, and the Current Population Survey (CPS), a monthly survey of **households**. The establishment survey is the primary source used to generate monthly estimates of payroll jobs in Michigan, while the household survey is combined with other indicators to estimate total employed in Michigan, including the self-employed and agricultural workers.

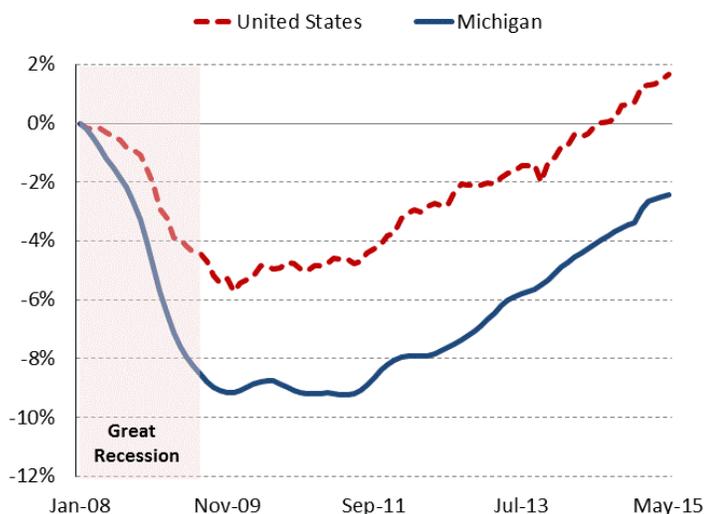
- Total nonfarm employment increased by 1.4 percent during the five-month period ending in May, or by 60,200 jobs. This outpaced the 0.8 percent job growth nationally during this period.
- Michigan payroll job levels in January 2015 reached 4,240,600, finally exceeding the job level recorded seven years previously at the start of the Great Recession. However, total nonfarm jobs levels still remain 8.8 percent below the peak level attained in 2000.
- The industry sectors of *Professional and business services* and *Education and health services* were by far the largest contributors to this milestone, adding 62,200 and 53,100 jobs respectively since January 2008.
- The sectors with the widest remaining employment deficit since January 2008 include *Government* (-53,000), *Trade, transportation, utilities* (-19,200), and *Construction* (-6,500).
- Total employment from the household survey in Michigan advanced by 1.0 percent during the first five months of 2015, or by 45,000. This essentially matched the 0.9 percent growth nationally during this period.
- Despite this positive performance so far this year, total employment in Michigan remains 2.4 percent below the January 2008 level of 4,598,000, and 9.8 percent below the peak levels recorded in 2000.
- The University of Michigan, Research Seminar in Quantitative Economics (RSQE) most recent forecasts predict payroll job expansion in Michigan of 93,300 in 2015 and 64,000 in 2016.

### Nonfarm Payroll Jobs, Percent Change Since January 2008



Source: U.S. Bureau of Labor Statistics, Current Employment Statistics

### Household Employment, Percent Change Since January 2008



Source: U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics

# Payroll Jobs by Industry Sector

Jeff Aula

Payroll job estimates come from a monthly survey of business establishments and government agencies nationwide known as the *Current Employment Statistics (CES)* program. This survey helps to produce monthly estimates of nonfarm jobs by detailed industry (except self-employed) for the nation, states, and metro areas.

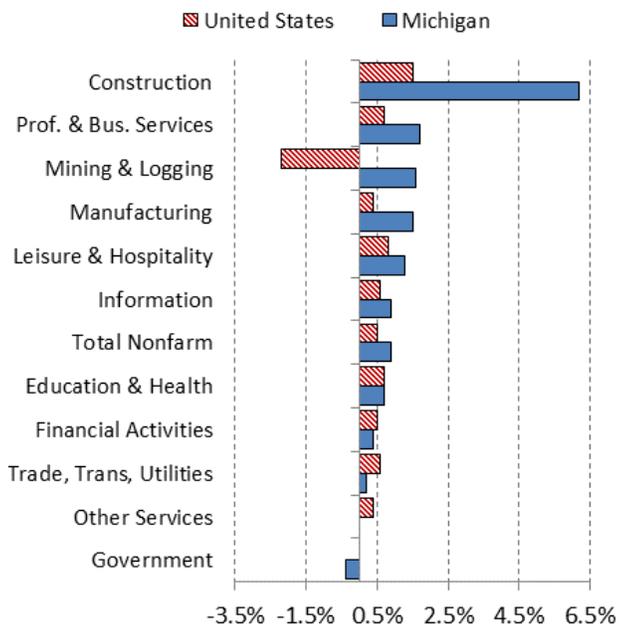
- Total payroll jobs continued to expand in Michigan (1.7 percent) during 2014 but at a slightly slower pace (1.9 percent) than 2013. Comparatively, total payroll jobs grew by 1.9 percent nationally in 2014.
- Job growth in Michigan occurred in every broad industry sector during 2014 except *Government*, where payrolls continued to contract but at a much slower pace.
- The industry sectors in Michigan reporting more job gains in 2014 compared to 2013 include *Construction* (2,500), *Manufacturing* (1,300), and *Mining and logging* (100).
- On a quarterly basis, payroll employment in Michigan rose by 0.9 percent during the first quarter of 2015 and marked the 20<sup>th</sup> consecutive quarter of job gains. This compared favorably to the 0.5 percent advance nationally during this period.

**Michigan Numeric Annual Job Change  
2014 vs. 2013**

Industry Sectors	2014	2013
<b>Total Nonfarm</b>	<b>+70,400</b>	<b>+76,000</b>
Mining and Logging	+300	+200
Construction	+7,800	+5,300
Manufacturing	+19,800	+18,500
Trade, Transportation, and Utilities	+13,200	+13,900
Information	+1,700	+2,000
Financial Activities	+1,900	+6,400
Professional and Business Services	+16,200	+21,900
Educational and Health Services	+5,000	+7,200
Leisure and Hospitality	+7,100	+9,400
Other Services	+500	+1,100
Government	-3,200	-9,900

Source: U.S. Bureau of Labor Statistics, Current Employment Statistics

**Michigan Percentage Job Change  
Q4:2014 to Q1:2015**



Source: U.S. Bureau of Labor Statistics, Current Employment Statistics

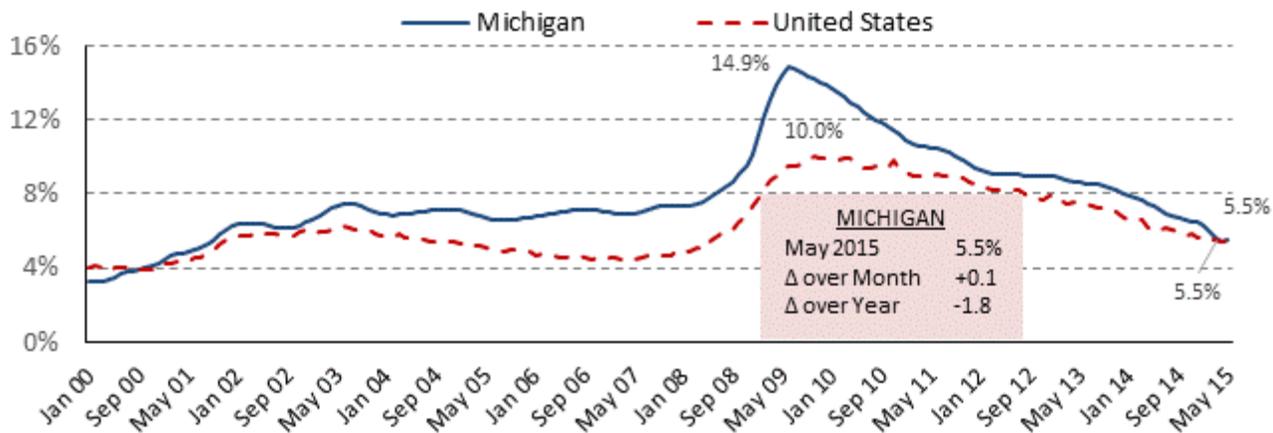
- The *Construction* sector (6.2 percent) recorded the largest job expansion during the first quarter. Since the recessionary low of 120,100 jobs in the first quarter 2010, payrolls have advanced by 26.3 percent or 31,600 jobs. Nearly half of this growth, however, has taken place over the past five quarters.
- The *Professional and business services* sector continued to be a key component in Michigan’s job creation, adding jobs in 21 of the past 22 quarters. During the first quarter of 2015, payrolls grew by 1.7 percent which was nearly double the state average.
- *Mining and logging* jobs increased by 1.6 percent in Michigan in the first quarter. Nationally, job levels contracted by 2.2 percent due to lower energy prices that caused layoffs in the oil and natural gas industry.
- Payroll jobs in *Education and health services*, which is Michigan’s second largest industry sector, have increased in 19 of the past 20 quarters, adding 44,000 positions. In the first quarter of 2015, employment rose by 0.8 percent. Most of the long-term growth since the first quarter of 2010 has occurred in *Health care and social assistance* (43,200).

# Unemployment Rate

Jim Rhein

The unemployment rate is a key economic indicator for states and regions. As one measure of the relative labor market success of the population, the jobless rate is widely utilized. It is defined as the ratio of the number of unemployed persons to all of those active in the workforce. To be considered unemployed, individuals must have no earnings from work in a given month, be actively seeking a job, and be able to accept a position if offered.

**Monthly Unemployment Rate, Seasonally Adjusted**



Source: U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics

- Michigan's jobless rate in 2015 has fallen to essentially match the national rate. From December 2014 to May 2015, the state's unemployment rate fell by -0.9 of a percentage point to 5.5 percent. Over that same period, the U.S. rate was little changed, edging downward by -0.1 of a percentage point. March through May 2015 marked the first period since the early 2000s that Michigan's jobless rate was essentially the same as the national rate.
- The gap between the Michigan and U.S. jobless rates peaked in June 2009, when the Michigan rate was 5.4 percentage points higher than the national rate. From 2012 through 2014, the Michigan unemployment rate remained about 1.0 percentage point above the U.S. rate. The rates have finally converged in 2015.
- From May 2014 to May 2015, Michigan's jobless rate dropped by -1.8 percentage points, the second largest rate reduction of any state, trailing only Rhode Island's -2.0 percent decline. In May 2015, Michigan's unemployment rate ranked as the 29<sup>th</sup> lowest state rate in the U.S.
- In May 2015, the state's jobless rate edged upward over the month by 0.1 of a percentage point to 5.5 percent. Prior to May 2015, Michigan had recorded a string of 20 consecutive monthly rate reductions dating back to September 2013.
- From January 2000 through May 2015 (see chart), Michigan's lowest seasonally adjusted unemployment rate (3.2 percent) occurred in both February and March 2000. This was the lowest rate recorded in Michigan's official series dating back to 1976. From 2000 to 2015, the lowest rate nationally (3.8 percent) was posted in April 2000.
- From 2000 through May 2015, Michigan's average unemployment rate was 7.9 percent, while the U.S. average over that period was 6.4 percent.

## Looking Beyond the Jobless Rate

Jim Rhein

Michigan's April 2015 seasonally adjusted unemployment rate of 5.4 percent was the lowest rate for the state since the 5.3 percent rate posted in August 2001. The jobless rate for a given area is a good general overview of the health of its labor market. However, it is also important to examine other economic indicators to put the jobless rate change in perspective.

In August 2001, Michigan's unemployment rate was actually elevated compared to rates recorded in the prior year. In 2001 the state was in the grips of a relatively mild national recession that lasted from March to November, but the jobless rates of that year were still historically low.

Michigan's labor market since 2000 has experienced a fundamental change due to major restructuring in the auto industry, along with the fallout from the Great Recession, and the impact of an aging workforce. The state's unemployment rates in 2015 may be similar to those in 2001, but various other labor market indicators present a different picture:

- Michigan payroll job levels in April 2015 remained 308,000 below August 2001 levels, a drop of 6.8 percent. Seventy-one percent of this reduction was due to job losses in manufacturing.
- From August 2001 to April 2015, the state's workforce recorded a reduction of 365,000 or 7.2 percent, while the number of unemployed was similar over those two periods.
- Michigan's employment to population ratio, which measures the number of total employed as a percentage of the 16 and older non-institutionalized population, has fallen dramatically since 2001. In August 2001 the state's ratio was 63.8 percent, while the April 2015 ratio stood at 56.9 percent, for a sharp reduction of 6.9 percentage points over that period. This drop in Michigan employment share reflects the impact of the Great Recession, as well as an aging workforce.

Current Population Survey (CPS) demographic data for the state can also be used to show similarities or differences in the demographic makeup of Michigan's labor market over time:

- The CPS indicated that although the number of unemployed in the state was similar in 2001 and 2015, the number of weeks individuals remained unemployed has risen significantly. In 2001, those unemployed for over 26 weeks accounted for 3.2 percent of the total unemployed. In 2014, 34.7 percent of the state's unemployed were jobless for over 26 weeks.
- The CPS also indicated that the number of individuals desiring full-time work, but only able to find part-time work, has risen substantially since 2001. In 2001, those working part-time involuntarily were 1.8 percent of the total employed. In 2014, involuntary part-time work in Michigan rose to 5.8 percent of the total employed.

Although Michigan's labor market has made a strong comeback from the Great Recession, the state's labor market situation since 2001 has shown fundamental change. Recent jobless rates have fallen dramatically, but the state lags behind 2001 levels in population, labor force size, and the number of payroll jobs. The number of long-term unemployed remains elevated. It will take time for these and other economic indicators to return to peak levels.

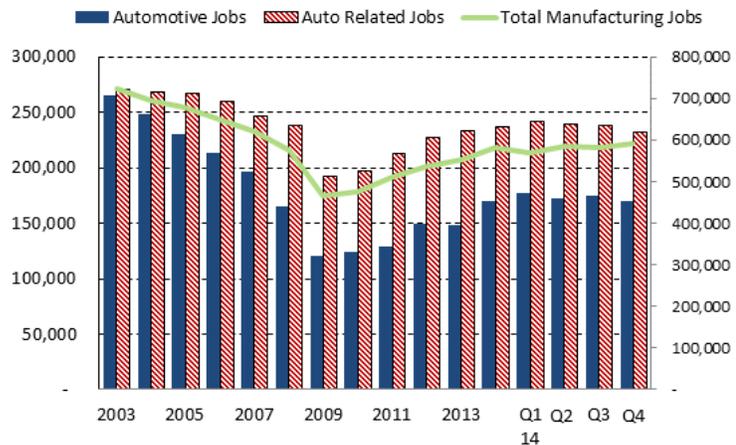
# Automotive and Related Employment

Leonidas Murembya, PhD

The automotive industry includes not only direct automotive production in *Motor vehicle manufacturing; Motor vehicle body and trailer manufacturing; and Motor vehicle parts manufacturing*, but also many support activities to the auto industry, ranging from manufacturers such as *Plastic products, Primary and Fabricated metals*, etc. to *Professional and business services* such as Engineering and Research & Development (Appendix 3).

- o Manufacturing employment in Michigan has steadily declined since the first wave of layoffs during the 2001 economic recession. Manufacturing lost about 143,000 jobs between 2004 and 2014. Approximately 90 percent of this employment reduction in manufacturing has been concentrated in the automotive production and related industries (-128,500).
- o Manufacturing jobs dropped by 25 percent during the Great Recession, with auto production employment plunging by (-76,200) or 39 percent, and jobs in auto related industries falling by (-54,000) or 22 percent.
- o Since the official end of the 2007-2009 recession, 65 percent of the jobs in automotive production and 81 percent in auto related industries have been recovered. Manufacturing as a whole has recouped 75 percent of the 156,300 jobs that were cut during the recession.
- o Between 2013 and 2014, annual average employment in automotive production expanded considerably by 21,700. Jobs in auto related industries rose by 3,300, and employment in manufacturing improved by 27,200.
- o When looking at careers in auto production and related industries, four of the top ten high-demand, high-wage occupations require less than a Bachelor’s degree. Only 55 percent of team assemblers are employed in the auto industries. This occupation is projected to produce many job openings to replace current workers who retire.

**Automotive and Related Employment**



Source: DTMB/LMISI, Quarterly Census of Employment and Wages

## High-Demand, High-Wage Occupations in Michigan’s Auto Production and Auto-Related Industries

Occupational Title	Statewide	Percent in Auto	Average Hourly	Projected 2022
Mechanical Engineers	38,700	80.3%	\$44.04	12.5%
Architectural and Engineering Managers	10,280	66.6%	\$60.18	12.4%
Industrial Engineers	22,390	65.0%	\$39.78	14.9%
Mechanical Engineering Technicians	4,570	79.9%	\$28.14	14.8%
Tool and Die Makers	11,750	85.3%	\$25.26	10.9%
Civil Engineers	5,820	56.2%	\$32.92	18.3%
Comp Cont. Mach Tool Opr., Mtl. & Plastic	10,720	75.5%	\$16.31	25.7%
Engineers, All Other	8,690	58.8%	\$44.49	11.4%
Commercial and Industrial Designers	48,40	69.2%	\$38.22	9.9%
Machinists	26,550	60.1%	\$19.78	16.6%

Source: DTMB/LMISI, Occupational Employment Statistics

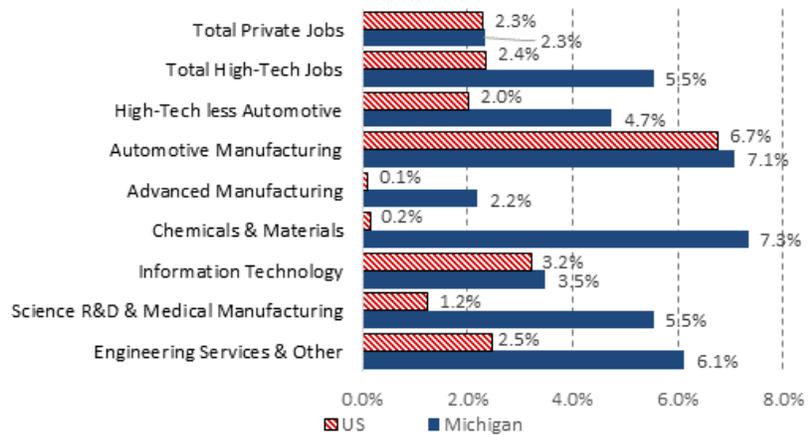
# Jobs in High-Tech Industries

Leonidas Murembya, PhD

Traits that are common to high-tech industries include an above average concentration of Science, Technology, Engineering and Math (STEM) workers, a high level of R&D expenditure, innovative processes, and the use of cutting-edge technologies. Michigan high-tech jobs have been categorized into sectors such as auto-related, advanced manufacturing, chemicals and materials, information technology, science research and development, and medical equipment, and engineering services. (Appendix 2).

- Jobs in high-tech industries in Michigan dropped faster than the national rate of decline in this sector during the recent Great Recession of 2007-2009. However, since the official end of the recession, high-tech employment has expanded faster each year in Michigan than nationwide, except in 2012-2013 (third quarter) when the rate of growth in this sector dropped to almost half the rate of the prior year.

**Annual Percent Change in Payroll Jobs (Q3:2013-2014)**



Source: DTMB/LMISI, Quarterly Census of Employment and Wages

- In 2013-2014 (third quarter), Michigan’s high-tech employment growth rebounded over the previous year’s rate of expansion by about two percentage points. *Automotive manufacturing* accounted for about 43 percent of the gain in high-tech employment in Michigan during 2014, with 11,300 new jobs. *Engineering and other consulting services* ranked 2<sup>nd</sup> in Michigan high-tech job creation during 2014 (7,000 or 6.1 percent), mostly in *Architecture and engineering services* (5,200 or 7.2 percent).
- Nine of the top ten high-demand, high-wage occupations in Michigan’s high-tech sector require at least a bachelor’s degree. These occupations are expected to grow by 4 to 21 percentage points above average, offering many job openings every year due to job expansion in the industry as well as the need to replace current workers that permanently leave these jobs.

**Top 10 High-Demand, High-Wage Occupations in Michigan’s High-Tech Sector**

Occupational Title	Statewide Employment	Percent in High-Tech Industry	Average Hourly Wage	Projected 2022 Growth
Software Developers, Systems Software	12,010	81.3%	\$41.85	19.6%
Software Developers, Applications	14,960	69.1%	\$38.60	21.3%
Mechanical Engineers	38,700	70.6%	\$43.20	12.5%
Computer Systems Analysts	13,530	57.6%	\$40.65	22.6%
Architects, Except Landscape and Naval	1,720	86.0%	\$35.53	17.1%
Architectural and Engineering Managers	10,280	61.9%	\$58.10	12.4%
Industrial Engineers	22,390	61.0%	\$38.83	14.9%
Computer Hardware Engineers	1,010	75.2%	\$46.38	13.6%
Information Security Analysts	1,840	70.1%	\$37.72	30.2%
Mechanical Engineering Technicians	4,570	73.1%	\$27.95	14.8%

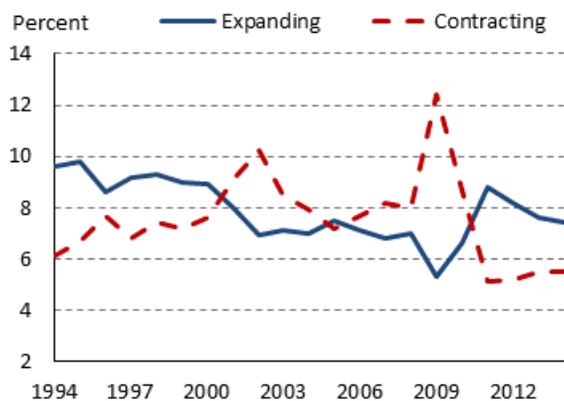
Source: DTMB/LMISI, Occupational Employment Statistics

## Business Employment Dynamics: Job Gains and Losses

Aneesa Rashid, PhD

The underlying dynamics of net monthly job gains or losses can be used as an indicator of the direction of the economy. These dynamics can show if job growth is due to business openings or business expansions. They can also show if job gains are merely a byproduct of slowing business contractions or fewer closings, defined as firms that reported positive employment in the prior quarter and reporting zero employment in the following quarter. Business Employment Dynamics (BED) data, derived from the Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW), gives us this detailed information. Annual data is released each March.

**Business Expansions and Contractions  
Job Gains and Losses  
(March 1994—March 2014)**

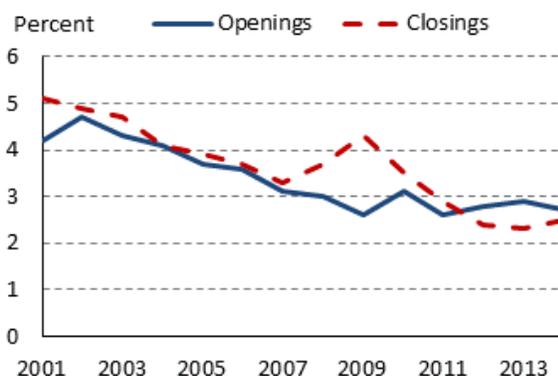


Source: U.S. Bureau of Labor Statistics, Business Employment Dynamics

- The chart on the right shows the other component of gross job gains and gross job losses that can lead to the monthly net job change.
- Business openings and closings have been declining since 2002 and have been close to one another during the same period. Job losses from closings started increasing from 2007 and reached a peak of 4.3 percent in 2009. However, in 2001 the rate of closings was higher at 5.1 percent. Since 2012, losses from closings have averaged 2.4 percent.
- Jobs gains from business openings have experienced a steady decline since 2002, reaching a low of 2.6 percent in 2009. Job gains increased to 3.1 percent in 2010, and have averaged 2.8 percent. Prior to the 2007-2009 recession and automotive restructuring in 2009-2010, job gains averaged 4.1 percent.

- The chart on the left shows job gains and job losses from expanding and contracting firms. These are expressed as a percentage of the average of the previous and current quarter employment levels. Losses from businesses contractions reached their highest rate of 12.4 percent in 2009. They reached their lowest rate of 5.1 percent in 2011 and have since remained flat, averaging 5.4 percent.
- Job gains from business expansions were relatively stable from 2001-2008, and then dropped in 2009, reaching a low of 5.3 percent. Though expanding businesses added jobs at a rate of 8.8 percent in 2011, this did not recoup the jobs lost due to business contractions that took place in 2009. Gains from expansions have averaged 7.7 percent from 2010 to 2014. This data show that businesses are still cautious about hiring workers and are not laying off their current workers resulting in a low level of job turnover.

**Business Openings and Closings  
Job Gains and Losses  
(March 2001—March 2014)**



Source: U.S. Bureau of Labor Statistics, Business Employment Dynamics

# Local Employment Dynamics: New Hire Wages

Aneesa Rashid, PhD

Wages are looked upon as an indicator of the state of the labor market. As demand for labor increases with higher levels of economic activity, wages are expected to rise. The U.S. Census Bureau, Local Employment Dynamics (LED) program produces data on new hires and their earnings. This report gives insights on the average monthly earnings of new hires and how these compare with the earnings of all employed workers from first quarter 2002 to first quarter 2014.

**Average Monthly Earnings  
New Hires and Incumbents**

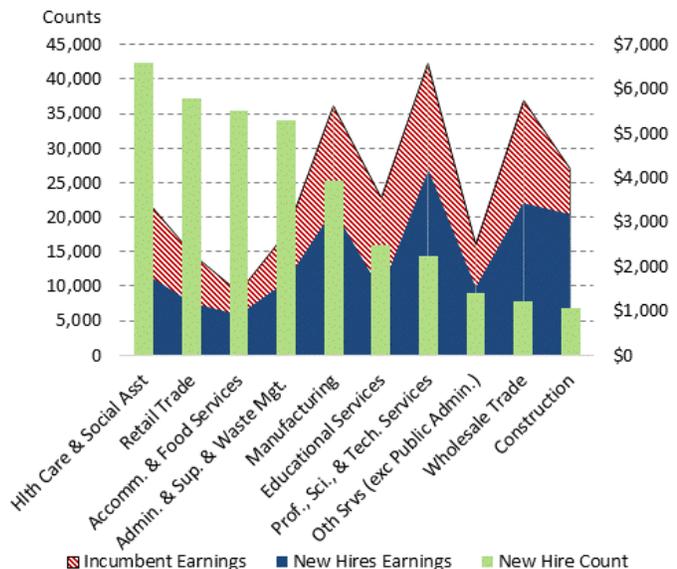


- New hire earnings for full quarter employment were approximately 50 percent below the average monthly earnings of incumbent workers for the period (2002-2014).
- In 2010 new hire earnings dropped by 2.6 percent compared to the prior eight-year average, but in 2014 were 18 percent above 2010 levels. Incumbent worker earnings edged down by 0.5 percent and went up by 18 percent over the same periods.
- The new hires employment count fell by 24 percent in 2010 over the prior eight-year average, but picked up by 39 percent in 2014 over the 2010 low level.

Source: U.S. Census Bureau, Longitudinal Employer-Household Dynamics

- The chart to the right shows the top ten industry sectors with new hires in the first quarter 2014. *Health care and social assistance* led the way in hiring, however, the new hire average monthly earnings were just 52 percent of the incumbent earnings.
- New hires in *Manufacturing* earned 59 percent of the incumbent earnings, while in *Construction* the ratio was higher at 76 percent. The difference in earnings of new hires to incumbent workers in different industry sectors would vary based on a number of factors including bonuses paid to incumbents and premiums paid for higher skills and experience.

**Top Ten Hiring Industries, Earnings of New Hires and Incumbents (2014:Q1)**



Source: U.S. Census Bureau, Longitudinal Employer-Household Dynamics

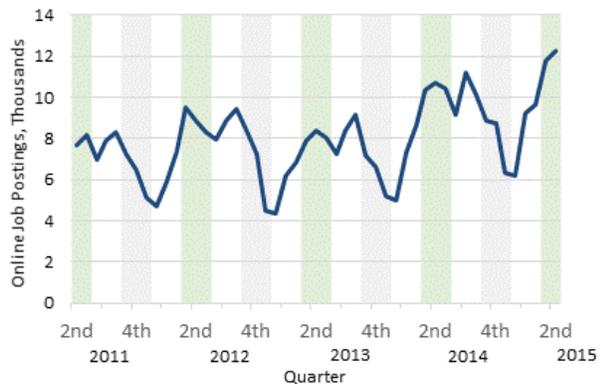
# Real-Time Demand

Kevin Doyle

The Conference Board’s Help Wanted Online (HWOL) data series provides a key measure of real-time labor demand in the state’s job market. The Bureau of Labor Market Information and Strategic Initiatives, through a partnership with The Conference Board, uses the HWOL data series to supplement traditional labor market information, providing insights into the characteristics of real-time labor demand. This indicator highlights the nature of online job demand today, as well as the groups of occupations that see the highest percentage of new job advertisements in the lead-up to the summer months.

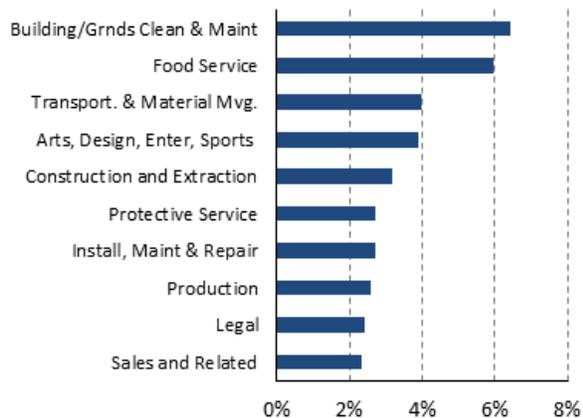
- Michigan’s seasonally adjusted online advertised job postings rose to 180,420 in May, the latest month of data available at the time of publication. This was a gain of 2,360 ads or 1.3 percent over the previous month. The May gain in job advertisements marks the first increase in three months, and the third month of gain this year. Since May 2014, job ads have risen by a relatively modest 2,380, or 1.3 percent. However, the May 2014 count of job ads was the final of ten consecutive months of growth in job postings for the state, meaning although the over-the-year growth is modest, the previous year’s data represents a significant high point to compare against.
- There were 94,350 newly posted job ads in May, a good indicator of seasonal hiring for the summer months. The May total of new ads was 4,250 higher than the previous month and 6,850 higher than the previous year. *Service* and *Construction and repair* occupations led in new ads as a share of total ads in May, when nearly two in every three job ads were newly posted in both groups, a sign of a seasonal advertising increase.
- Growth in new ads for *Service* occupations was focused in the *Building and grounds cleaning and maintenance* and *Food preparation and serving related* occupational groups. The second quarter is typically the peak month for *Service* advertising. These ads will likely decrease in the summer as hiring needs are met, but rise again in the late third quarter when younger seasonal workers return to school.
- *Building and grounds cleaning and maintenance* occupations typically see the greatest increase in newly posted job ads as a percentage of total ads from the fourth quarter of the year to the second quarter of the year. The chart on the right shows that on average, over the nearly ten years of HWOL data, the percentage of job ads for the group that are newly posted are 6.4 percentage points higher in the second quarter than in the fourth quarter, increasing from 65.6 percent newly-posted ads to 72.0 percent newly-posted ads.

**New Job Ads for Service Occupations  
Second Quarter 2011-2015**



Source: The Conference Board. Help Wanted Online (HWOL)/DTMB

**Difference in New Ads as a Percentage  
Of Total Ads, 2005-2015:Q4 to Q2, Avg.**



Source: The Conference Board. Help Wanted Online (HWOL)/DTMB

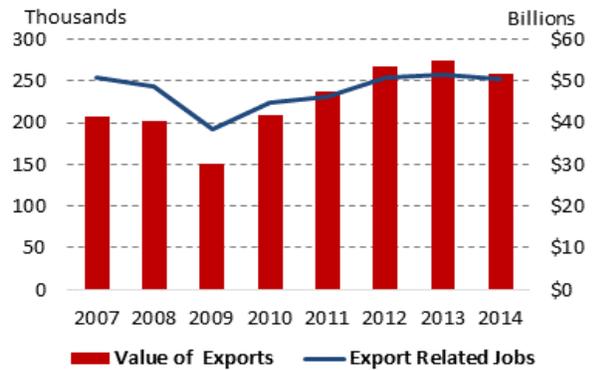
# Export Related Employment

Aneesa Rashid, PhD

Exports reflect the global demand for goods produced in Michigan and create jobs. A number of factors affect our exports, among them are: the value of the dollar (an increase will make our goods more expensive and reduce demand), economic growth in our trading partners, and free trade agreements. The Department of Commerce, Office of Trade and Economic Analysis, has estimated jobs supported by goods exported from the 50 States. Goods exports refer to manufactured products, agricultural products, natural resources and used/second-hand products. This report looks at employment related to Michigan’s goods and manufactured products exports.

- In 2014, exports of goods and services directly and indirectly supported an estimated 11.7 million U.S. jobs. Since 2009, the estimated number of jobs supported by goods exports nationally have grown by one million. Michigan is among the five states that accounted for over 50 percent of the total change in jobs that were supported by goods exports. The other four states are: Texas, Washington, California and Louisiana. Michigan produced 3.8 percent of the total U.S. jobs related to goods exports.

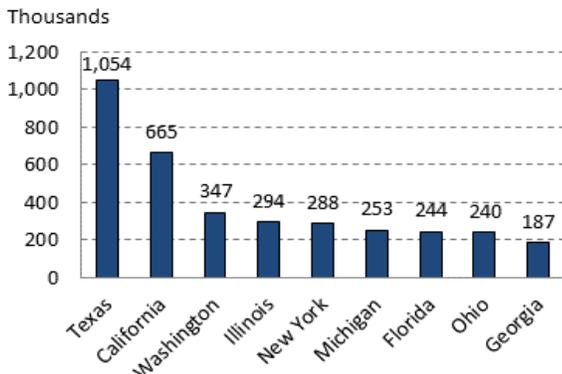
**Michigan Value of Manufactured Goods Exports and Supporting Employment (2007-2014)**



Source: Office of Trade and Economic Analysis, Intern. Trade Admin.

- In 2014 the total value of goods exported by Michigan were \$55.75 billion, an increase of 55 percent from a decade earlier. The goods produced for exports supported approximately 270,900 jobs in 2014. Michigan ranked 6<sup>th</sup> for employment supported by goods exports and 8<sup>th</sup> among states for the total value of goods exported.
- A total of 14,843 companies exported from Michigan in 2013 (264 fewer than the prior year), of which 89 percent were small and medium sized enterprises (fewer than 500 employees). These firms produced over one-fifth of total merchandise exports in 2013.
- Jobs supported by Michigan’s manufactured product exports fell 26 percent from 2008 to 2009, reaching an all time low since the series began in 2000. Since then, jobs have expanded by 31 percent.

**Top Ten States for Employment in Manufactured Related Exports (2014)**



Source: Office of Trade and Economic Analysis, Intern. Trade Admin.

- In 2012, export related employment surpassed the pre-recession level of 2007 and peaked in 2013, but fell by two percent from 2013 to 2014.
- Michigan ranks 6<sup>th</sup> in the nation for jobs related to exports of manufactured goods and seventh for the value of manufactured goods exported.
- Free Trade Agreements between the U.S. and 20 other countries accounted for seventy-one percent of Michigan’s exports in 2014.

# Michigan Exports

Kevin Doyle

Exports are an important driver of employment and are viewed as a cornerstone of economic expansion. Using data from the International Trade Administration’s TradeStats Express website tool, we can identify Michigan’s top exporting industries, top destinations for exports, and find Michigan’s rankings among all states for its trade partners.

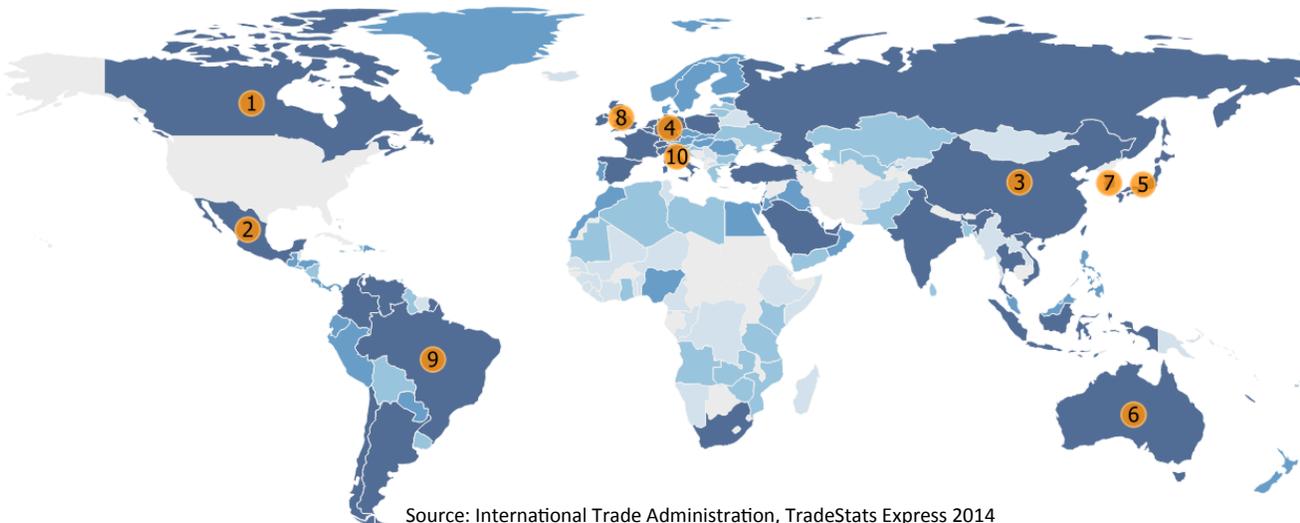
- In 2014, Michigan exported \$55.75 billion worth of goods to other countries. This represented a decrease of \$2.9 billion, or 4.9 percent from the 2013 total of exported goods. Michigan ranked 8<sup>th</sup> among all states by total export value in 2014.
- In the past 5 years, exports from Michigan have risen by \$23.10 billion, or 70.7 percent. While this figure shows tremendous improvement, note that exports were at a ten-year low in 2009.
- Michigan’s top exporting industry, NAICS 336, *Transportation equipment manufacturing*, sent \$25.86 billion worth of goods abroad in 2014. This was a decrease of \$3.13 billion, or 10.8 percent, from 2013 and a gain of \$11.74 billion, or 83.2 percent, from 2009.
- Among each of Michigan’s top five trading partners, exports from firms in NAICS 336, *Transportation equipment manufacturing* have topped the list of exports by value, with the exception of Japan. The top exporting industry to Japan in 2014 was NAICS 331, *Primary metal manufacturing*. Exports from NAICS 336 to these five countries combined comprised 79 percent of all Michigan *Transportation equipment manufacturing* exports.
- Although this data is extremely useful, it isn’t able to show another vital component of the whole exports picture: exports of services such as those that might be provided by the *Finance and insurance* industry. Due to this fact, an over-emphasis is placed on exports from *Agriculture* and *Manufacturing* industries in the TradeStats Express data series.

**Michigan Exports by Industry, 2014**

Industry	Total Exports (Billions)	Percent Going to Top Five Partners
Transportation Machinery Mfg.; Except Electrical	\$25.86	79.0%
Chemicals Mfg.	\$4.74	72.4%
Computer & Electronic Products Mfg.	\$4.72	55.6%
Primary Metal Mfg.	\$3.13	69.6%
Total, All Industries	\$55.75	77.0%

Source: International Trade Administration, TradeStats Express

**Total Michigan Exports by Destination Country and Top Ten Export Partners, 2014**



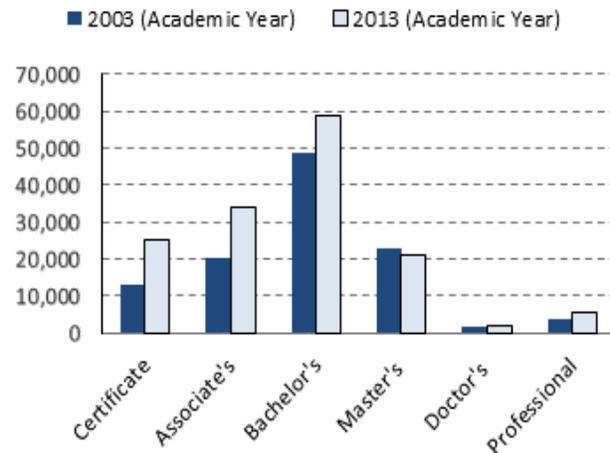
## Education Program Completers

Alonzia Stephens

Recognizing the total number and type of degrees/certificates granted can provide valuable insights into the potential supply of recent graduates entering the labor force. Importantly, identifying leading program types can illustrate potential mismatches between training and employer needs. This analysis evaluates the trends in program completers in Michigan between 2003 and 2013, with additional focus on gender related trends.

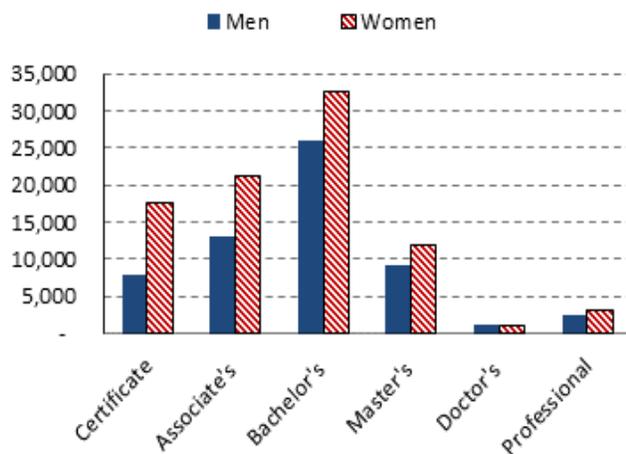
- During academic year 2013, Michigan institutions granted a total of 147,000 degrees and certificates to completers, up 36,700 or 33 percent from 2003.
- An estimated 40 percent of program completers earned a bachelor's degree. Associate's degrees and secondary certificates comprised 23 percent, and 19 percent of program completers, respectively. Nearly 18 percent of all completers attained master's, doctor's, or professional degrees.
- During the 2013 academic year, 27,200 postsecondary certificates were awarded with 12,300 or 41 percent in *Health professions and related programs*. Other programs granting large numbers of postsecondary awards were *Personal culinary services* (3,900), and *Medical clinical assistants* (3,600).
- Comparably, 34,200 associate's degrees were granted over the same period, an increase of 13,800 from 2003. The largest share of completers were in *Liberal arts and sciences* (12,200) followed by *Health profession and related services* (7,300).
- Michigan institutions awarded 58,600 bachelor's degrees in academic year 2013, up 9,900 from 2003. Leading all bachelor's award programs were *Business management and marketing and related support services* (11,600) and *Health professions and related programs* (6,500).
- During academic year 2013, women earned 60 percent of all degrees and certificates awarded in 2013, unchanged from 2003. Women received 87 percent of postsecondary certificates in *Health professions and related programs* and 86 percent of bachelor's degree granted in *Registered nursing*.
- Men received 93 percent of postsecondary certificates in *Engineering technologies*, and 81 percent in *Engineering* degrees (Bachelor's, Master's, and Doctor's), up 11 percent and two percent, respectively from 2003.

**Michigan Program Completers by Award Level**



Source: National Center for Education Statistics

**Program Completers by Award by Gender 2013**



Source: National Center for Education Statistics

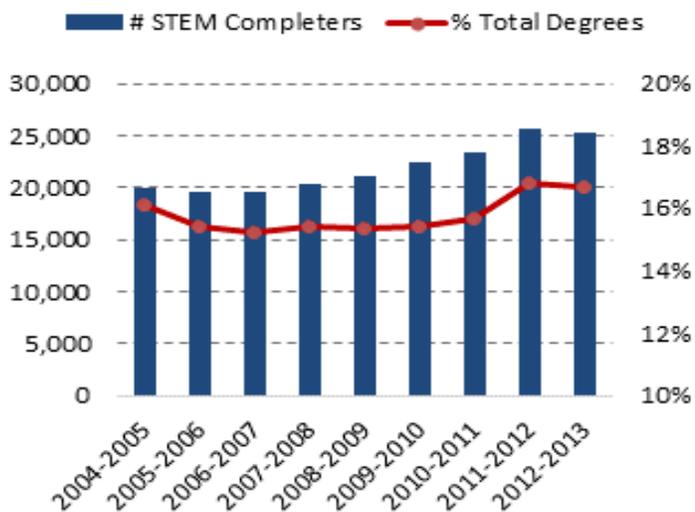
# Science, Technology, Engineering, and Math (STEM) Degrees

Luke Bunge

As a vital and dynamic portion of the labor market, it is of utmost importance to supply enough trained labor to fulfill opportunities in the Science, Technology, Engineering, and Math (STEM) field. One method of analyzing the potential STEM labor supply is through analyzing the number of individuals completing a program that is STEM related in Michigan. This can be done using the definition of a STEM program as defined by the Department of Homeland Security on the STEM-Designated Degree Program List.

- During the 2013 academic year, training providers in Michigan conferred 25,170 STEM degrees, which represents 16.7 percent of all degree completions. This compares favorably to the national share of STEM completions at 14.2 percent, continuing a decade long trend of Michigan outpacing the nation in share of STEM degrees awarded.
- Over the last eight academic years, Michigan's 2013 STEM completions and share of STEM completions were only outnumbered by 2012 numbers.
- Michigan remains a national leader in both the number of completions in STEM programs (8<sup>th</sup>) and in the share of total completions that are in STEM programs (9<sup>th</sup>).
- Michigan's top three most conferred STEM degrees were *General biology/biological sciences* (2,250), *Mechanical engineering* (1,530), and *Electrical and electronics engineering* (1,140), combining for nearly one in five of all STEM degrees awarded in the 2013 academic year.
- A potential sign of talent diversification, the top five STEM degrees conferred have gradually declined in total share, dropping almost three percentage points over the last five academic years. Over the same period, *Digital communication and media/multimedia* (386), *Network and system administration* (150), *Systems engineering* (124), and *Materials engineering* (105) have emerged as some of the fastest growing in STEM degrees awarded.

**Michigan Completers in STEM Programs**



Source: National Center of Education Statistics (NCES)

- Similar to STEM occupations, STEM completers are heavily dominated by males. In 2012-2013, over two-thirds (67.1 percent) of Michigan STEM degree completers were male. This is in stark contrast to overall completer trends in the 2012-2013 year, where women earned 60 percent of all degrees.
- While overall STEM degree completions are male dominated, there are a handful of STEM programs that are women-dominated, such as *Experimental psychology* (76.7 percent), *Neuroscience* (56.5 percent), and *Biology/biological sciences* (56.3 percent).

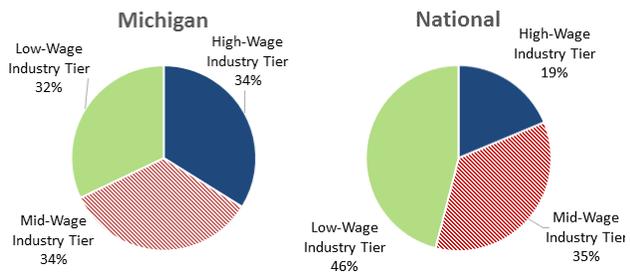
# Industry Job Gains by Wage Tier

David Cole

With the continued growth of payroll jobs in Michigan since the recession in 2008, much discussion has ensued surrounding what types of jobs are being created. To analyze job expansion in Michigan by industry by wage, Michigan industries were divided into three equal groups (approximately 20 industries each) based on 2013 annual average weekly wage. These industry groups were classified into three tiers, high-wage industries, mid-wage industries and low-wage industries. Payroll job changes from 2011-2014 were analyzed for each wage tier.

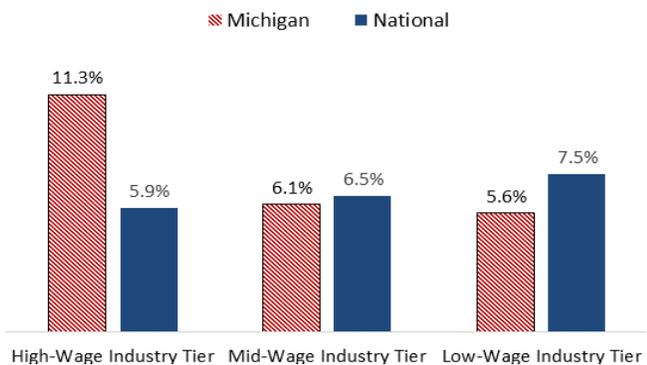
- Michigan numeric job growth has been split almost equally between the low, mid, and high wage tier industries. This is despite the fact that the high-wage industries represent only half the total employment of either the mid-wage or the low-wage industries.
- Michigan’s tier of high-wage industries accounted for 34 percent of job growth since 2011, well above the 19 percent nationally for these same industries.
- The rate of job gain in Michigan’s high-wage industries was almost double the rate of job expansion in mid- or low-wage industries.
- Michigan’s high-wage industry job growth rate was also about double the rate of increase in these same industries nationally.
- The industries driving Michigan’s high-wage industry job expansion were *Transportation equipment manufacturing, Architectural, engineering and related services, Merchant wholesalers, durable goods, Finance and insurance, Management of companies, and Management, scientific and technical consulting services.*
- High-wage industries also require more advanced education and skills than mid- and low-wage industries. Over 33 percent of jobs in the high-wage industries require a bachelor’s degree or higher, versus 17.8 percent of jobs in the mid-wage industries and 16.8 percent of positions in the low-wage industries.
- A detailed list of the industries in each wage tier can be found in (Appendix 4).

Share of 2011-2014 Job Growth by Wage Tier



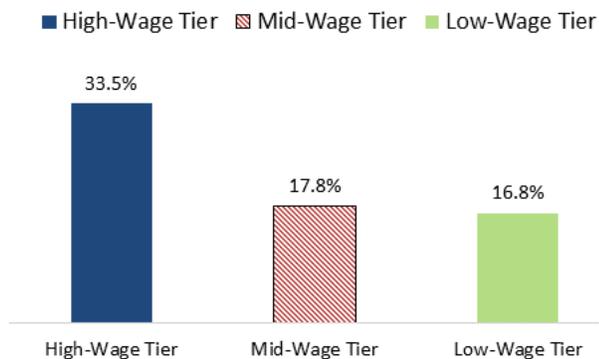
Source: DTMB/LMISI, CES & QCEW

Industry Job Growth Rates by Wage Tier (2011-2014)



Source: DTMB/LMISI, CES & QCEW

Percent of Jobs Requiring a Bachelor’s Degree or Higher by Industry by Wage Tier



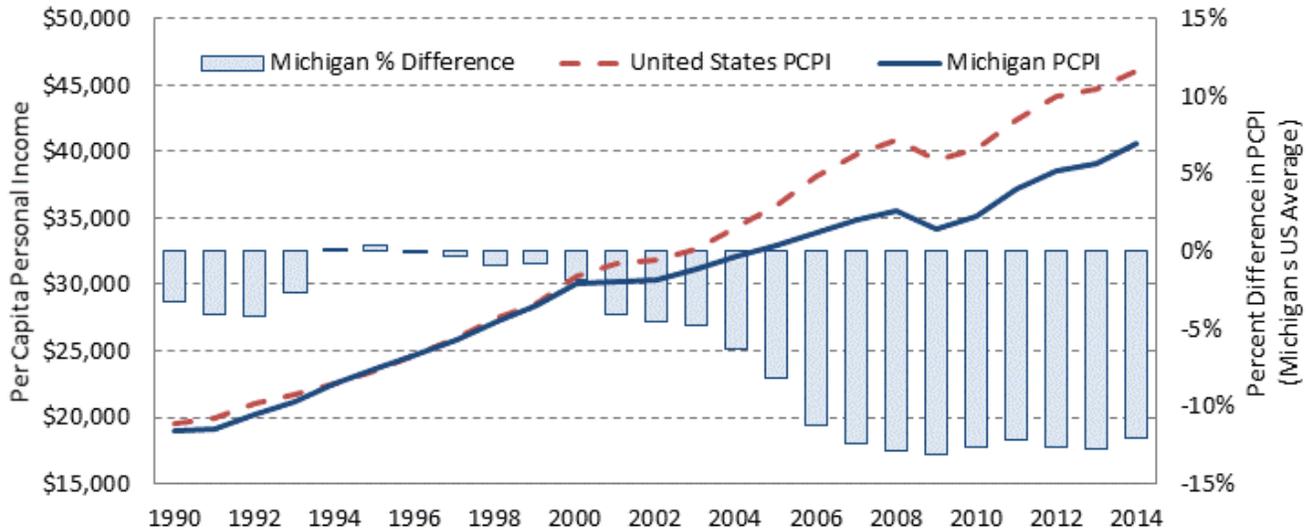
Source: DTMB/LMISI, CES & QCEW

# Per Capita Personal Income

Robert Walkowicz

Personal income is a widely-used measure of the economic health of a particular geographic region. It measures the total income earned from all sources. Per capita personal income (PCPI) data from the Bureau of Economic Analysis standardizes regional income statistics and allows for comparisons across states of different sizes. While per capita income does not address certain important issues such as overall income distribution or the demographic differences in income growth, it remains a key tool for tracking an area’s ability to maintain income growth patterns over time.

**Per Capita Personal Income and Percent Differences**



Source: U.S. Bureau of Economic Analysis

- Michigan’s per capita personal income measured \$40,556 in 2014, a 3.8 percent increase over 2013. The national PCPI was \$46,129 and the PCPI for the Great Lakes Region (Indiana, Illinois, Michigan, Ohio, and Wisconsin) was \$43,478, both higher than Michigan’s. But, while lower overall, Michigan’s PCPI did expand at a higher rate than either the nation or region, as both grew by approximately three percent.

- Michigan’s per capita income was 12 percent lower than the U.S. average in 2014, a slight increase from 2013, and 6.7 percent below the average for the Great Lakes Region. The recessionary struggles in the manufacturing sector, particularly auto manufacturing, led to a relative decline in many economic indicators in Michigan, and contributed to lower PCPI in Michigan. However, as the manufacturing sector continues to rebound, PCPI should gradually move closer to the national average.

- In 2014 Michigan ranked 37<sup>th</sup> in the U.S. in PCPI and ranked 4<sup>th</sup> out of five states in the Great Lakes Region. These ranks have been relatively consistent since 2010, but prior to that were much higher. Before 2000, Michigan was typically in the top 20 in the nation and one of the top two in the region with Illinois. However, Michigan’s rank has been on the decline for the last 60 years. It was a slow decline until about 15 years ago, when the PCPI ranking dropped rapidly, because of the slowdown in the manufacturing industry.

**PCPI Rank**

Year	National PCPI Rank	Trend	Regional PCPI Rank
1950	12	N/A	2
1970	16	▼ 4	2
1990	21	▼ 5	2
2000	19	▲ 2	2
2005	30	▼ 11	3
2010	38	▼ 8	4
2011	36	▲ 2	4
2012	38	▼ 2	4
2013	38	No Change	4
2014	37	▲ 1	4

Source: U.S. Bureau of Economic Analysis

# Immigration and Characteristics of the Foreign-Born

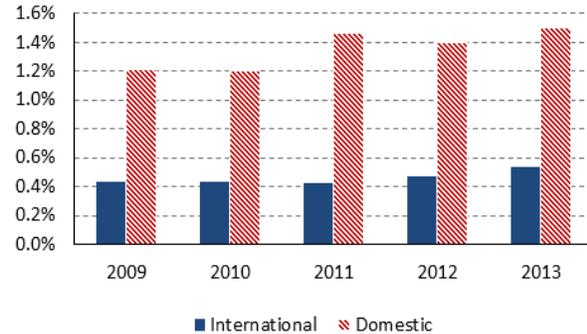
Eric Guthrie

The population of the U.S. has always seen strong growth through international migration, and while the international flows are considerably smaller than the interstate flows, they are important to Michigan as well.

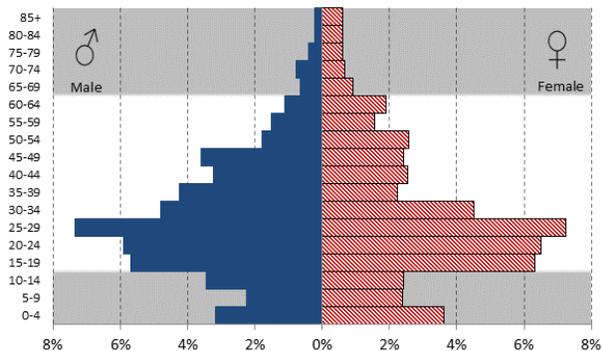
It is difficult to talk about net international migration due to the lack of a good source for the outflow component of that calculation, but observations are possible about the inflows and their relation to the inflows that we see from domestic sources.

- Over the period 2009-2013, international in-flows amounted to just under 0.5 percent of the Michigan population. This compares to interstate inflows that were between 1.2 and 1.5 percent during the same period.
- While international flows are small, especially in comparison to the domestic in-flows, they are not insignificant, accounting for a fifth to a quarter of the total in-flows.
- When looking at the structure of the population of recent immigrants (those that immigrated within the last year), in the period 2009-2013, it is apparent that a large proportion are young, between 15 and 30 years of age.
- Another interesting aspect of the structure of the population of recent immigrants is the differences in the proportion of males and females between the ages of 35 and 49 years.

Population In-flows 2009-2013



Recent Immigrants 2009-2013



Once new immigrants come to Michigan they become part of the Foreign-born population. This population contributes in every way to our state and has some characteristics which are of interest.

- The foreign-born population (25 years and over) has proportionally more people with a bachelor’s degree or higher, 37.7 versus 25.9 percent.
- Conversely, the foreign-born population has more than double the population with less than a high school education, on a proportional basis.
- Median household income is higher for the foreign-born population (\$49,831) than it is for the total population (\$48,411), and this population has a higher average workers per household than does the total population, 1.21 versus 1.08, respectively.
- Nearly 54 percent of our foreign-born population hails from ten countries with Mexico, India and Iraq being the top three, accounting for over a quarter of the foreign-born population.
- The majority of the foreign-born population are fluent English speakers with 60 percent either speaking only English or speaking it “very well”.
- Of the total estimated foreign-born population, which is just over 604,000, nearly half (49.9 percent) have become naturalized citizens.

Educational Attainment (25 Years +)	Foreign-born	Total Michigan
Less than High School		
School	22.4%	11.1%
High School	19.6%	30.4%
Some College	14.0%	24.0%
Associate’s	6.2%	8.6%
Bachelor’s Degree	19.3%	15.9%
Grad or Professional	18.4%	10.0%

Sources: U.S. Census Bureau, 2009, 2010, 2011, 2012, & 2013 American Community Survey (ACS) 1-year Micro data , 2009-2013 ACS 5-year Micro data, and 2009-2013 ACS 5-year Estimates

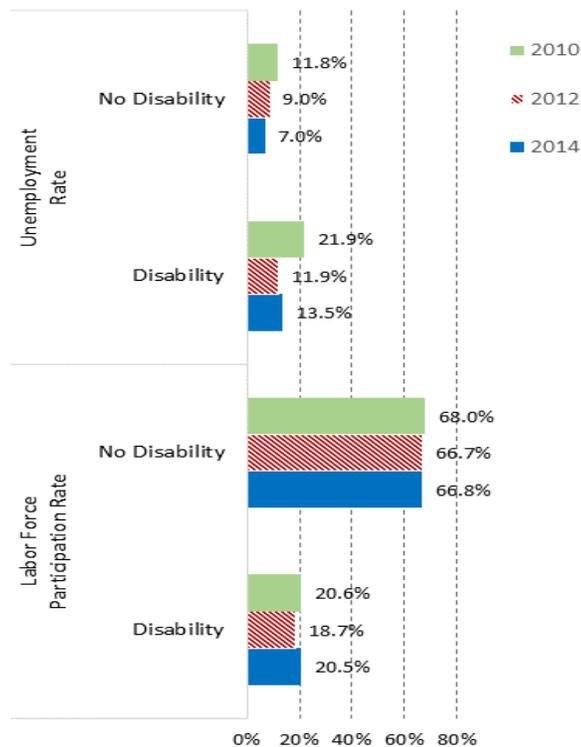
# Labor Force Characteristics of Individuals with Disabilities

Jason Palmer and Eric Guthrie

In October 2014, Governor Snyder issued an executive directive requiring state government to adopt a variety of policies and procedures eliminating hurdles faced by people with disabilities as they seek a career in public service. Indeed, individuals with disabilities report unfavorable labor market outcomes and face well-documented barriers to employment. This short article uses data from the Current Population Survey (CPS) to look at the labor force characteristics for and barriers faced by individuals with disabilities.

- Two labor market metrics highlight the challenges faced by people with disabilities in the labor market: labor force participation rates and unemployment rates. At just 21 percent, the participation rate for individuals with disabilities is considerably lower than that for those with no disability (67 percent). When active in the labor market, individuals with disabilities face higher joblessness, with unemployment rates measuring 13.5 percent, nearly double the 7.0 percent reported for those with no disability.
- With 79 percent of individuals with disabilities on the sidelines of the labor market, it is important to understand the leading reasons for inactivity. As for those without a disability, retirement is the leading reason for nonparticipation among people with a disability. However, the second reason for inactivity for those with a disability is their disability, while other reasons such as education and training and household/family responsibilities were responsible for inactivity for those without a disability.
- According to the Bureau of Labor Statistics, when individuals with disabilities were asked to identify barriers they had encountered, most reported that their own disability was a leading barrier to employment. Other barriers cited included lack of education or training, lack of transportation, and the need for special features at the job.

**Participation and Unemployment by Disability Status**



Source: Derived from Current Population Survey

- There is an increased incidence of disability with age. Nationally, people with a disability were about three times as likely as those with no disability to be age 65 and over.
- When employed, workers with and without a disability are found in a similar mix of occupations. Nationally, *Management, professional, and related; Sales and office; and Service* occupations were responsible for the most employment opportunities for both groups.
- The industry distribution of workers with a disability and without a disability are also similar nationally, but with two exceptions: workers with a disability were more likely to be self-employed, while workers without a disability were slightly more likely to be employed in private industries.
- Workers with a disability are more likely to be working part time. According to the Bureau of Labor Statistics, 34 percent of workers with a disability were employed part time, compared with 19 percent of those with no disability.

# Michigan Industry and Occupational Outlook 2022

Mark Reffitt

In May, Michigan released the 2022 Long-Term Industry and Occupational Employment Projections, produced under Bureau of Labor Statistics guidelines and administered by the national Projections Managing Partnership (PMP) program. These projections are important for decision makers at all levels, including educators, workforce and economic developers, jobseekers and numerous state and local agencies. The program provides long-term projections biennially and includes information on projected new jobs by industry and occupation as well as replacement openings in the occupational data.

- Michigan's total employment level is anticipated to rise by over 371,000 jobs (8.7 percent) between 2012 and 2022. Though some of this projected gain has already been realized in the period between 2012 and the present, employment increases are expected to continue through most industry and occupational sectors through the end of the period, albeit at a somewhat slower pace in later years.

- More than half of all new jobs in the state during the 2012-2022 forecast period will be the result of increases in two industry supersectors: *Educational and Health Services* (28 percent of all new jobs) and *Professional and Business Services* (26 percent of all new jobs). *Construction, Manufacturing, and Trade, Transportation and Utilities* are expected to add a significant number of new jobs as well.

**Table 1. Employment by Major Industry Sector, 2012 and Projected**

Industry Super-Sector	Employment		Employment Change	
	2012	2022	10-Year	10-Year
<b>Total, All Industries</b>	<b>4,285,470</b>	<b>4,656,930</b>	<b>371,460</b>	<b>8.7%</b>
Natural Resources and Mining	59,340	62,270	2,930	4.9%
Construction	127,790	152,980	25,190	19.7%
Manufacturing	535,980	569,430	33,450	6.2%
Trade, Transportation, and Utilities	727,440	764,750	37,310	5.1%
Information	53,170	54,260	1,090	2.1%
Financial Activities	195,390	210,320	14,930	7.6%
Professional and Business Services	578,600	675,940	97,340	16.8%
Educational and Health Services	982,630	1,085,570	102,940	10.5%
Leisure and Hospitality	387,450	419,070	31,620	8.2%
Other Services (Exc. Government)	179,060	195,190	16,130	9.0%
Government	257,900	249,680	-8,220	-3.2%

- Healthcare Support Occupations* top the list of fastest-growing occupational groups in Michigan through 2022, expecting to grow roughly 18 percent or over twice the rate for total jobs overall (Table 2).

**Table 2. Employment by Major Occupational Group, 2012 and Projected**

Occupational Category	Employment		Employment Change		Total Average Annual Openings
	2012	2022	10-Year Numeric	10-Year Percent	
<b>Total, All Occupations</b>	<b>4,285,470</b>	<b>4,656,930</b>	<b>371,460</b>	<b>8.7%</b>	<b>139,517</b>
Management	253,350	276,010	22,660	8.9%	7,374
Business and Financial Operations	196,750	218,610	21,860	11.1%	6,020
Computer and Mathematical	99,610	115,610	16,000	16.1%	3,231
Architecture and Engineering	121,630	136,110	14,480	11.9%	4,591
Life, Physical, and Social Science	31,260	34,220	2,960	9.5%	1,226
Community and Social Service	64,360	71,460	7,100	11.0%	2,238
Legal	26,380	28,610	2,230	8.5%	650
Education, Training, and Library	263,300	281,120	17,820	6.8%	7,198
Arts, Design, Entertainment, Sports, and Media	59,460	64,090	4,630	7.8%	1,919
Healthcare Practitioners and Technical	272,450	307,000	34,550	12.7%	9,028
Healthcare Support	147,890	174,720	26,830	18.1%	5,511
Protective Service	78,200	81,010	2,810	3.6%	2,490
Food Preparation and Serving Related	352,120	381,470	29,350	8.3%	16,126
Building and Grounds Cleaning and Maintenance	144,020	157,340	13,320	9.2%	4,270
Personal Care and Service	131,770	146,950	15,180	11.5%	4,520
Sales and Related	432,080	455,940	23,860	5.5%	15,353
Office and Administrative Support	631,760	654,400	22,640	3.6%	17,685
Farming, Fishing, and Forestry	35,610	36,680	1,070	3.0%	1,130
Construction and Extraction	132,010	152,130	20,120	15.2%	4,287
Installation, Maintenance, and Repair	156,940	173,330	16,390	10.4%	5,273
Production	404,960	439,970	35,010	8.6%	11,544
Transportation and Material Moving	249,570	270,170	20,600	8.3%	7,856

Source: DTMB/LMISI, Industry and Occupational Employment Projections 2022

- Computer and Mathematical Occupations* and *Architecture and Engineering Occupations* are each expected to record double-digit percentage job expansion and add over 30,000 new jobs combined.

- Although *Production Occupations* are expected to only grow at an average pace, the prevalence of automotive manufacturing makes this group the largest in terms of overall new jobs for the projection period, increasing by 35,000 through 2022.

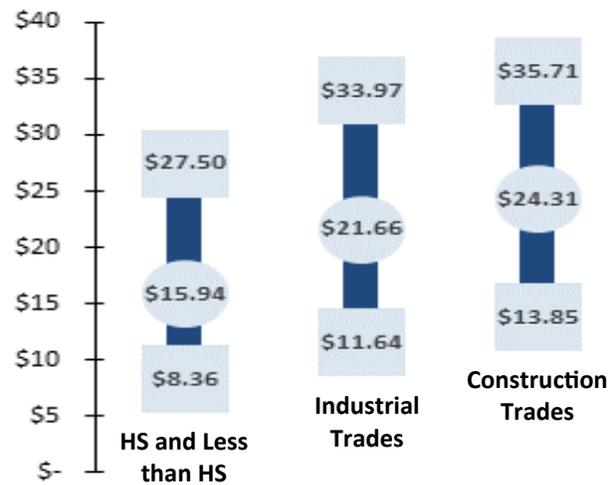
# Skilled Trades Occupations—An Update

Robert Walkowicz

Skilled trades can be divided into three subsets: Industrial, Construction, and Service Trades. This analysis will focus on the Industrial and Construction trades, a list of which can be found in (Appendix 5).

- o In Michigan there were 194,780 skilled trades jobs in 2014, which was 4.8 percent of all jobs in Michigan, compared to 4.4 percent of jobs nationwide.
- o Skilled trade positions require only a high school educational achievement level, but also typically require on the job training or an apprenticeship. Workers in these positions make more on average than other workers with similar education. The average hourly wage for skilled trades workers is \$21.74, while it is only \$15.95 for all workers with high school or less education.
- o The average hourly wage for Industrial Skilled Trades is \$21.66 per hour, and for Construction Skilled Trades is \$24.31 per hour. The average wage for all workers in Michigan is \$21.70 per hour.

**High, Low, & Average Hourly Wage Ranges for High School (HS) Education and Skilled Trade Occupations**



Source: DTMB/LMISI Occupational Employment Statistics

- o The top occupations in the Industrial Skilled Trades earn less in Michigan than in the rest of the country, with the exception of *Tool and die makers*. This occupation has a greater prevalence in Michigan than the rest of the country, as it only ranks 10<sup>th</sup> for employment nationwide.
- o Industrial Skilled Trade occupations are expected to increase 13.1 percent through 2022. The largest expected job growth rates are for *Computer numerically controlled machine programmers* at 37.9 percent, and *Industrial machinery mechanics* at 25.3 percent.
- o The top occupations in the Construction Skilled Trades are less numerous than the top Industrial Skilled Trades, but are more competitive in terms of wages with the rest of the country. *Electricians* and *Plumbers* both make more in Michigan than the U.S. average, while the other three occupations are close to the national average.
- o Construction Skilled Trade occupations are expected to expand by 15.1 percent through 2022. The largest expected rates of job gain are for *Insulation workers, mechanical* at 38.3 percent, and *Brickmasons and blockmasons* at 28.7 percent.

**Top 5 Occupations by Employment in Michigan for Industrial Skilled Trades**

Occupation	Employment	Michigan Wage	U.S. Wage
General Maintenance	40,370	\$17.36	\$18.46
Machinists	26,550	\$19.32	\$19.97
Industrial Mach Mech.	13,750	\$23.65	\$24.25
Welders and related	12,370	\$17.70	\$19.25
Tool and Die Makers	11,750	\$24.93	\$24.08

Source: DTMB/LMISI Occupational Employment Statistics

**Top 5 Occupations by Employment in Michigan for Construction Skilled Trades**

Occupation	Employment	Michigan	U.S.
Electricians	17,610	\$28.62	\$26.21
Carpenters	15,420	\$21.09	\$21.92
Plumbers and related	10,300	\$26.93	\$26.26
HVAC Rep & Install	6,920	\$22.25	\$22.54
Equip Oper. Engineer	6,070	\$22.50	\$23.09

Source: DTMB/LMISI Occupational Employment Statistics



## Appendix 1: STEM Programs, Defined

### Classification of Instruction Program (CIP) Codes for Science, Technology, Engineering, and Math (STEM) Degrees

CIP Code	CIP Title
1	Agriculture, Agriculture Operations, and Related Sciences*
3	Natural Resources and Conservation*
4	Architecture and Related Programs*
9	Communication, Journalism, and Related*
10	Communications Technologies / Technicians and Support Services*
11	Computer and Information Sciences and Support Services
13	Education*
14	Engineering
15	Engineering Technologies / Technicians
26	Biological and Biomedical Sciences
27	Mathematics and Statistics
28	Reserve Officer Training Corps (JROTC, ROTC)*
29	Military Sciences*
30	Multi/Interdisciplinary Studies*
40	Physical Sciences
41	Science Technologies / Technicians
42	Psychology*
43	Security and Protective Services*
45	Social Science*
49	Transportation and Materials Moving*
51	Health Professions and Related Clinical Sciences
52	Business, Management, Marketing, and Related Support Services*

**Source:** The Department of Homeland Security (DHS)

**Notes:** \*Select Programs

*Full list of STEM Programs available at:* <http://www.ice.gov/doclib/sevis/pdf/stem-list.pdf>

## Appendix 2: High-Tech Industries, Defined

### High Technology Industries

NAICS Code	2012 NAICS U.S. Title
<b>Automotive Manufacturing Cluster</b>	
3361	Motor Vehicle Manufacturing
3362	Motor Vehicle Body and Trailer Manufacturing
3363	Motor Vehicle Parts Manufacturing
<b>Advanced Manufacturing Cluster</b>	
3329	Other Fabricated Metal Product Manufacturing
3331	Agriculture, Construction and Mining Machinery Manufacturing
3333	Commercial and Service Industry Machine Manufacturing
3336	Engine, Turbine and Power Transmission Equipment Manufacturing
3339	Other General Purpose Machinery Manufacturing
3345	Navigational, Measuring, Electromedical, Control Instrument Manufacturing
3353	Electrical Equipment Manufacturing
3359	Other Electrical Equipment and Component Manufacturing
3364	Aerospace Product and Parts Manufacturing
3369	Other Transportation Equipment Manufacturing
<b>Chemicals &amp; Materials Cluster</b>	
3241	Petroleum and Coal Products Manufacturing
3251	Basic Chemical Manufacturing
3253	Pesticide, Fertilizer and Other Agricultural Chemical Manufacturing
3255	Paint, Coating and Adhesive Manufacturing
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing
3259	Other Chemical Product and Preparation Manufacturing
<b>Information Technology Cluster</b>	
3341	Computer and Peripheral Equipment Manufacturing
3342	Communications Equipment Manufacturing
3343	Audio and Video Equipment Manufacturing
3344	Semiconductor and Other Electronic Component Manufacturing
3346	Manufacturing and Reproducing Magnetic and Optical Media
5112	Software Publishers
5171	Wired Telecommunication Carriers
5172	Wireless Telecommunication Carriers (Except Satellite)
5174	Satellite Telecommunications
5179	Other Telecommunications
5182	Data Processing, Hosting, and Related Services
51913	Internet Publishing and Broadcasting and Web Search Portals
5415	Computer Systems Design and Related Services
<b>Science R&amp;D &amp; Medical Manufacturing Cluster</b>	
3254	Pharmaceutical and Medicine Manufacturing
3391	Medical Equipment and Supplies Manufacturing
5417	Scientific Research and Development Services
<b>Engineering Services &amp; Other Cluster</b>	
4234	Professional and Commercial Equipment & Supplies Merchant Wholesalers
5413	Architectural, Engineering and Related Services
5416	Management, Scientific, and Technical Consulting Services

## Appendix 3: Automotive and Related Employment, Defined

### Automotive Manufacturing and Related Industries

NAICS Code	2012 NAICS U.S. Title
<b>Automobile Production</b>	
3361	Motor Vehicle Manufacturing
3362	Motor Vehicle Body and Trailer Manufacturing
3363	Motor Vehicle Parts Manufacturing
336992	Military Armored Vehicle, Tank, and Tank Component Manufacturing
<b>Automobile Related Industries</b>	
326121	Unlaminated Plastics Profile Shape Manufacturing
326199	All Other Plastics Product Manufacturing
326211	Tire Manufacturing (except Retreading)
326220	Rubber and Plastics Hoses and Belting Manufacturing*
326291	Rubber Product Manufacturing for Mechanical Use
327211	Flat Glass Manufacturing
331111	Iron and Steel Mills
331511	Iron Foundries
332510	Hardware Manufacturing*
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing
333511	Industrial Mold Manufacturing
333514	Special Die and Tool, Die Set, Jig, and Fixture Manufacturing
333515	Cutting Tool and Machine Tool Accessory Manufacturing
333618	Other Engine Equipment Manufacturing
334514	Totalizing Fluid Meter & Counting Device Manufacturing*
335110	Electric Lamp Bulb and Part Manufacturing*
335911	Storage Battery Manufacturing*
423110	Automobile and Other Motor Vehicle Merchant Wholesalers
423120	Motor Vehicle Supplies and New Parts Merchant Wholesalers
423130	Tire and Tube Merchant Wholesalers
423830	Industrial Machinery and Equipment Merchant Wholesalers
425110	Business to Business Electronic Markets*
425120	Wholesale Trade Agents and Brokers*
541330	Engineering Services
541380	Testing Laboratories
541712	Research & Development in Physical, Engineering, and Life Sciences (except Biotech)**
55111	Management of Companies and Enterprises*

**Source:** DTMB / with assistance from the Center for Automotive Research (CAR)

**Notes:** \* Partial employment

\*\* Estimated

## Appendix 4: Industry Wage Tiers, Defined

<b>NAICS</b>	<b>High-Wage Industry Tier</b>	<b>NAICS</b>	<b>Low-Wage Industry Tier</b>
550000	Management of Companies & Enterprises	238300	Building Finishing Contractors
541700	Scientific Research & Development Services	541900	Other Prof Scientific, & Technical Services
220000	Utilities	530000	Real Estate & Rental & Leasing
711000	Performing Arts, Spect Sports, & Rel Industries	811000	Repair & Maintenance
541500	Computer Systems Design & Related Services	446000	Health & Personal Care Stores
325000	Chemical Manufacturing	610000	Educational Services
541300	Architectural, Engineering, & Related Services	560000	Admin & Sup & Waste Man & Remed Service
336000	Transportation Equipment Manufacturing	444000	Build Material & Garden Equip & Sup. Dealers
425000	Wholesale Electr Markets & Agents & Brokers	623000	Nursing & Residential Care Facilities
481000	Air Transportation	721000	Accommodation
210000	Mining	624000	Social Assistance
541600	Management, Scientific, & Tech Consult Service	812000	Personal & Laundry Services
541100	Legal Services	453000	Miscellaneous Store Retailers
423000	Merchant Wholesalers, Durable Goods	445000	Food & Beverage Stores
237000	Heavy & Civil Engineering Construction	452000	General Merchandise Stores
541800	Advertising & Related Services	813000	Religious, Grant, Civic, Prof, & Similar Organ
511000	Publishing Industries (except Internet)	451000	Sporting Goods, Hobby, Book, & Music Stores
520000	Finance & Insurance	447000	Gasoline Stations
517000	Telecommunications	448000	Clothing & Clothing Accessories Stores
334000	Computer & Electronic Product Manufacturing	713000	Amusement, Gambling, & Rec. Industries
		722000	Food Services & Drinking Places
<b>NAICS</b>	<b>Mid-Wage Industry Tier</b>		
333000	Machinery Manufacturing		
331000	Primary Metal Manufacturing		
327000	Nonmetallic Mineral Product Manufacturing		
337000	Furniture & Related Product Manufacturing		
238200	Building Equipment Contractors		
424000	Merchant Wholesalers, Nondurable Goods		
541200	Acct, Tax Prep, Bookkeeping, & Payroll Services		
621000	Ambulatory Health Care Services		
622000	Hospitals		
332000	Fabricated Metal Product Manufacturing		
236000	Construction of Buildings		
493000	Warehousing & Storage		
238900	Other Specialty Trade Contractors		
484200	Specialized Freight Trucking		
326000	Plastics & Rubber Products Manufacturing		
484100	General Freight Trucking		
311000	Food Manufacturing		
323000	Printing & Related Support Activities		
620000	Health Care & Social Assistance		
441000	Motor Vehicle & Parts Dealers		
238100	Foundation, Structure, & Build Ext. Contractors		

## Appendix 5: Skilled Trades Occupations, Defined

Skilled Construction Trades	Skilled Industrial Trades
Boilermakers	Boilermakers
Brickmasons & Blockmasons	Electricians
Carpenters	Plumbers, Pipefitters, & Steamfitters
Tile & Marble Setters	Elect & Electr Repair, Powerhouse, Substation, & Relay
Cement Masons & Concrete Finishers	Industrial Machinery Mechanics
Terrazzo Workers & Finishers	Maintenance Workers, Machinery
Operating Engineers & Other Const Equip Oper	Millwrights
Electricians	Precision Instrument & Equipment Repairers, All Other
Glaziers	General Maintenance & Repair Workers
Insulation Workers, Mechanical	Riggers
Painters, Construction & Maintenance	CNC Machine Tool Programmers
Pipelayers	Machinists
Plumbers, Pipefitters, & Steamfitters	Model Makers, Metal & Plastic
Plasterers & Stucco Masons	Patternmakers, Metal & Plastic
Sheet Metal Workers	Tool & Die Makers
Structural Iron & Steel Workers	Welders, Cutters, Solderers, & Brazers
Elevator Installers & Repairers	Tool Grinders, Filers, & Sharpeners
Heating, A.C., & Refrig Mech & Installers	Cabinetmakers & Bench Carpenters
Riggers	Model Makers, Wood
Crane & Tower Operators	Patternmakers, Wood
	Stationary Engineers & Boiler Operators
	Water & Wastewater Treat. Plant & System Operators
Skilled Service Trades	Complete Occupation Titles
Dental Hygienists	General Maintenance = General Maintenance
Emergency Medical Technicians & Paramedics	& Repair Workers
Ophthalmic Medical Technicians	Welders & related = Welders, Cutters, Solderers,
Dental Assistants	& Brazers
Medical Assistants	Plumbers & related = Plumbers, Pipefitters,
Medical Transcriptionists	& Steamfitters
Phlebotomists	HVAC Repair & Installers = Heating, Air Conditioning,
Chefs & Head Cooks	& Refrigeration Mechanics & Installers
Morticians, Undertakers, & Funeral Directors	Equipment Operating Engineers = Operating Engineers
Hairdressers, Hairstylists, & Cosmetologists	& Other Construction Equipment Operators
Manicurists & Pedicurists	
Legal Secretaries	
Medical Secretaries	
Automotive Body & Related Repairers	
Automotive Service Technicians & Mechanics	
Bus & Truck Mech & Diesel Engine Specialists	
Farm Equipment Mech & Service Technicians	
Bakers	
Shoe & Leather Workers & Repairers	
Jewelers & Precious Stone Metal Workers	
Dental Laboratory Technicians	
Medical Appliance Technicians	
Commercial Pilots	

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