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Rick Snyder, Governor
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Michigan Economic and Workforce Indicators and Insights

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Forward

Friends,

December 18, 2014

It is hard to believe that we are five and a half years into the economic recovery that followed the “Great Recession.” While it took the recovery a while to take hold here in Michigan, the recent years have brought some welcome economic and labor market news. Today, our economy is growing at an impressive clip, unemployment is at its lowest point in several years, and our economy is creating jobs in multiple industry sectors.

In this edition of the *Michigan Economic and Workforce Indicators and Insights* publication, our team explores how the recent recovery has impacted our state. In doing so, we have updated our key indicators, including the unemployment rate, job trends, payroll jobs by industry, real-time demand, and state gross domestic product.

In addition, this publication provides updates of periodic indicators focusing on educational attainment, migration of the young knowledge population, scientists and engineers, patents, and venture capital. We also provide brief discussions of the topics of union members and the minimum wage as well as the popular subject of middle-skill jobs.

During recoveries and recessions, the Bureau of Labor Market Information and Strategic Initiatives is committed to providing accurate, objective, relevant, timely, accessible, and transparent economic, demographic, and labor market information. This will hopefully assist our customers and our citizens to gauge the economy and labor market in order to make informed decisions.

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.

Warm regards,



Jason S. Palmer

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

Michigan Job Trends

Jeffrey Aula

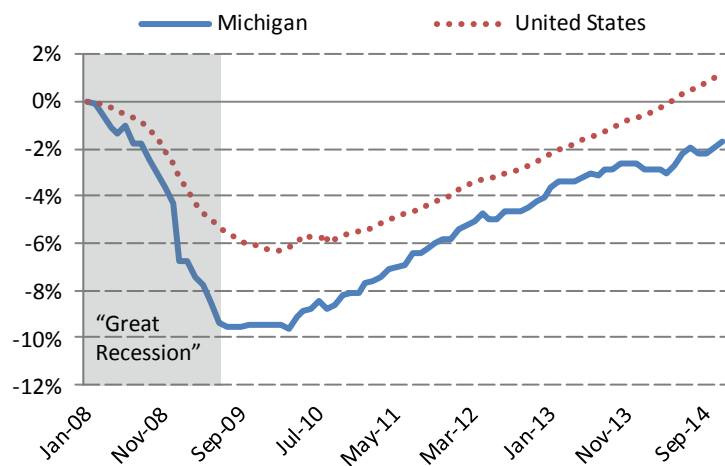
There are two government surveys that measure the state of the labor market: the Current Employment Statistics (CES) program, a monthly survey of nonfarm business establishments, and the Current Population Survey (CPS), a monthly survey of households. The establishment survey is the primary source used 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 jobs in Michigan advanced by 0.9 percent during the 11-month period ending in November, or by 37,700 jobs. This compares to the 1.7 percent growth rate nationally during this period, and to a 1.5 percent gain statewide during the same period in 2013.

- The more modest pace of 2014 industry job growth was partially due to less rapid job increases in *Transportation equipment manufacturing* (3.1 percent in 2014 vs. 6.9 percent in 2013) and *Professional and business services* (2.2 percent in 2014 vs. 2.7 percent in 2013) during the 11-month period ending in November.

- Total nonfarm payrolls have expanded by 333,900 jobs (8.7 percent) since the recessionary low in March of 2010. Despite this significant increase, employment levels remain 72,500 (1.7 percent) below their pre-recessionary level in January 2008.

Nonfarm Payroll Jobs, Percent Change Since January 2008



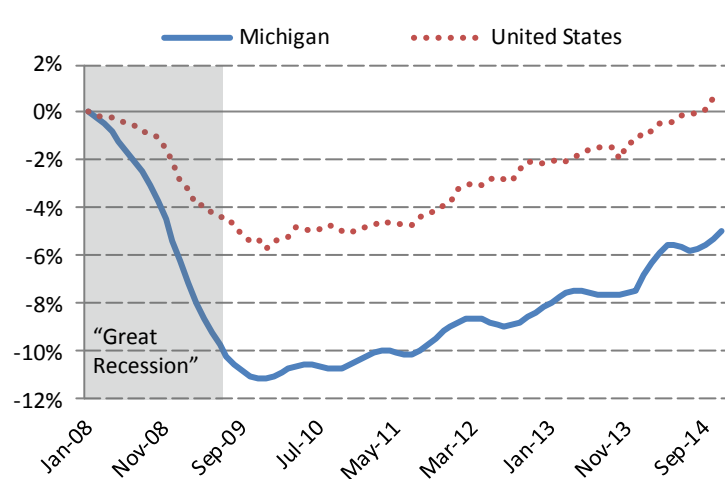
Source: U.S. Bureau of Labor Statistics, Current Employment Statistics

- Rapid gains in total employment in Michigan are also evident from the survey of households. Total Michigan employment exceeded 4.4 million in October 2014 for the first time since 2008. So far during 2004, state employment has advanced by over 100,000, for a solid growth rate of 2.4 percent, exceeding national additions of 1.9 percent.

- Michigan recorded a fourth consecutive year of employment expansion in 2014, following four straight years of sharp job losses in 2007 through 2010. Although national employment has rebounded to exceed pre-recessionary levels, Michigan employment remains about 30,000 below 2006 levels.

- Continued advances are forecast for Michigan employment. The Research Seminar in Quantitative Economics at the University of Michigan forecasts a gain in Michigan household employment of 50,000 in 2015 and 52,000 in 2016.

Household Employment, Percent Change Since January 2008



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

Payroll Jobs by Industry Sector

Jeffrey 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.

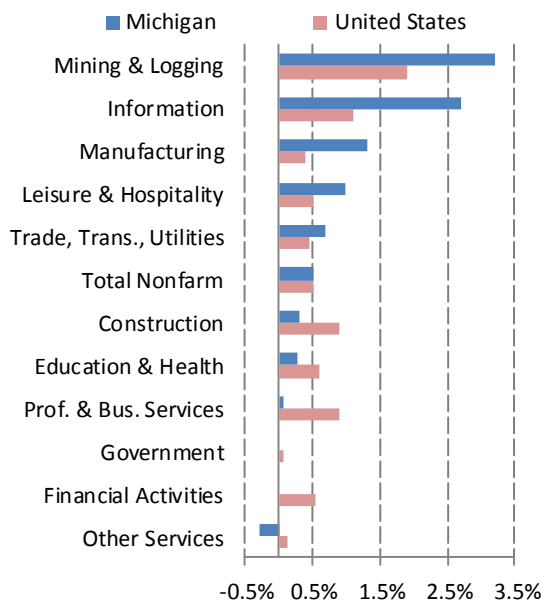
- Payroll job growth in Michigan (0.9 percent) has lagged the rate of gain nationally (1.9 percent) over the past year. The industry sectors where Michigan has outperformed the nation include *Mining and logging*, *Information*, and *Manufacturing*.
- Other industry sectors in Michigan with above average job expansion over the past year include *Construction*, *Leisure and hospitality*, and *Trade, transportation, and utilities*.
- The industry sectors in Michigan to report employment declines since the third quarter 2013 were *Financial activities* (-2.5 percent) and *Other services* (-1.5 percent).
- On a quarterly basis, payroll employment in Michigan has grown in 17 of the past 18 quarters, adding 312,500 jobs (8.2 percent). This compares favorably to the 7.3 percent advance in jobs nationally during this period.

**Over-the-Year Percent Job Change
(Third Quarter 2013 - Third Quarter 2014)**

Industry Sectors	Michigan	United States
Total Nonfarm	0.9%	1.9%
Mining and Logging	9.7%	5.7%
Construction	3.2%	3.9%
Manufacturing	2.2%	1.4%
Trade, Transportation, and Utilities	1.7%	2.1%
Information	3.9%	0.2%
Financial Activities	-2.5%	0.9%
Professional and Business Services	0.1%	3.5%
Educational and Health Services	0.1%	1.9%
Leisure and Hospitality	2.6%	2.6%
Other Services	-1.5%	0.8%
Government	0.1%	0.2%

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

**Over-the-Year Percent Job Change
(Second Quarter 2014 - Third Quarter 2014)**



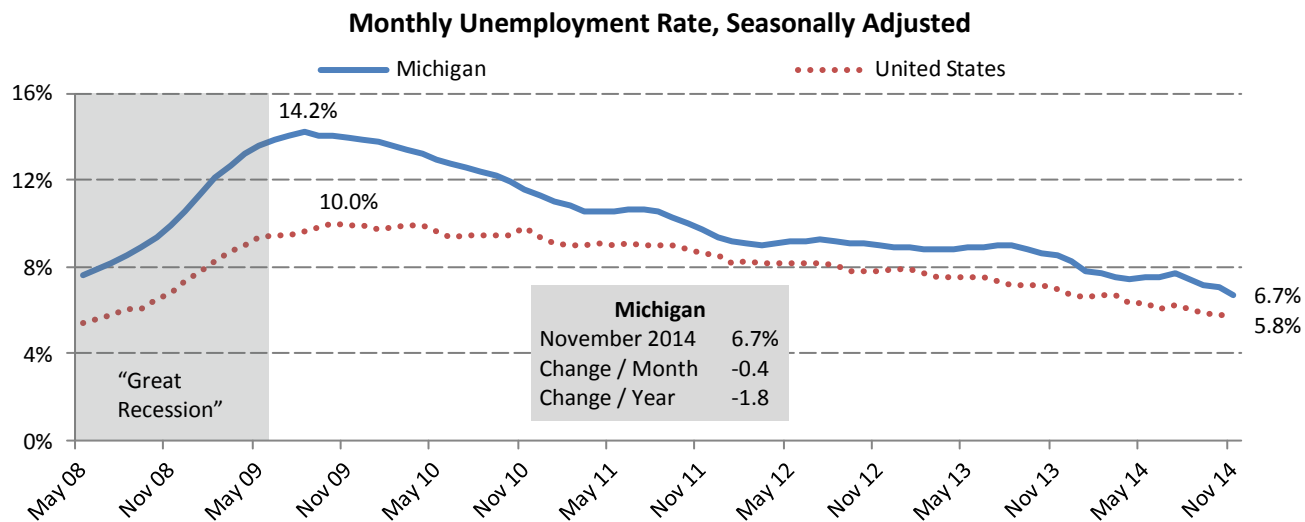
Source: U.S. Bureau of Labor Statistics,
Current Employment Statistics

- Michigan's *Mining and logging* sector recorded the largest employment gain (3.2 percent) during the third quarter. This compared favorably to 1.9 percent growth nationally in this sector. Since the end of the Great Recession, Michigan *Mining and logging* jobs rose by 29.9 percent or 2,000. This was well above the statewide growth rate of 7.0 percent over this period.
- Information* job levels have advanced in seven of the past nine quarters. Since the third quarter of 2012, payrolls in this sector rose by 4,200, or 7.9 percent. This was just over three times the job growth rate statewide (2.6 percent) during this period.
- The *Manufacturing* sector continues to lead job growth in Michigan. During third quarter 2014, payrolls rose by 1.3 percent (7,100) which was significantly above the rate of gain nationally (0.4 percent). In Michigan, nearly one-third of these additional jobs were in *Transportation equipment manufacturing* (2,200). Since the significant restructuring in the automotive industry in 2009, job levels in this sector have advanced in 19 of the past 21 quarters.

Unemployment Rate

Bruce Weaver

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, persons must have no earnings from work in a given month, be actively seeking a job, and be able to accept a job if offered.



- Michigan's jobless rate continued to show improvement during 2014, falling by nearly two percentage points since the fourth quarter of 2013. The state unemployment rate has declined for 12 of the last 15 months through November 2014. Over the past year, only nine states have recorded a larger jobless rate cut than Michigan's decline of -1.5 percentage points.
- The state jobless rate of 6.7 percent in November was slightly below the rate recorded back in the first quarter of 2008, just prior to the sharp increase in rates due to the national recession. Michigan's rate has now been cut in half since its recessionary peak of 14.2 percent in August 2009.
- Although Michigan's jobless rate has now approached pre-recessionary levels, this does not mean the labor market has fully recovered. The number of Michigan employed residents in November remained about 260,000 below 2007 averages, and the state workforce has also dropped sharply. However, the number of unemployed in 2014 has fallen to the lowest levels since 2007.
- Michigan's jobless rate remains high relative to other states. In October 2014, only four states had a higher unemployment rate than Michigan.
- The year 2014 will mark the fifth consecutive year of unemployment rate reductions in Michigan. That marks the longest such trend since the 1990s.
- The University of Michigan's Research Seminar in Quantitative Economics (RSQE) recently released a forecast calling for continued jobless rate reductions in Michigan, to 6.8 percent in 2015 and 6.4 percent in 2016.

Annual Jobless Rate, Michigan

Year	Jobless Rate	Annual Trend
2014*	7.5%	▼
2013	8.8%	▼
2012	9.1%	▼
2011	10.4%	▼
2010	12.7%	▼
2009	13.5%	▲

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

*Year to Date Average

Michigan's Real Gross Domestic Product (GDP)

Ryan J. Gimarc

Real Gross Domestic Product (GDP) by state is an inflation-adjusted measure of a state's production, wherever sold, and is a useful gauge of the overall health of the state's economy. This analysis looks at the recent trend in GDP for Michigan and the United States as well as GDP by industry in Michigan. This is important in understanding which industries are driving Michigan's recent expansion, and which sectors are restraining growth.

- Michigan's real state GDP measured \$408.2 billion (chained 2009 dollars) in 2013, which ranked 13th out of the 50 states. This value represents a 2.0 percent growth rate from the 2012 level of \$400.2 billion, continuing its positive trend since the depths of the recession in 2009.
- Michigan's GDP has grown by 11.4 percent from 2009 to 2013 and has returned to prerecession levels last seen in 2007. This was mainly due to the large GDP gains contributed by industries such as *Manufacturing, Professional and business services, and Wholesale trade*.
- In 2013, *Manufacturing* was by far the largest contributor to Michigan's GDP, totaling \$82.2 billion, a 53.6 percent increase from the \$53.5 billion registered in 2009. While *Manufacturing* accounted for 12.5 percent of total GDP for the United States in 2013, in Michigan this proportion was 20.1 percent, highlighting the relative importance of the industry to the state of Michigan.
- Since the state GDP low point in 2009, Michigan has added \$41.9 billion of value back to total economic output. Of that total number, \$28.7 billion came from GDP gains in *Manufacturing*. Specifically, *Durable goods manufacturing* has grown from \$37.1 billion in 2009 to \$64.5 billion in 2013, a 74.0 percent increase.
- Michigan ranked 9th out of the 50 states during the decade leading up to the recession in terms of GDP. This ranking fell to 12th in 2008, before sitting at 13th each of the last five years. However, from 2012 to 2013, Michigan narrowed the gap slightly on Massachusetts. In 2012, the state GDP of Massachusetts was higher than Michigan by \$14 billion, compared to a gap of \$12 billion in 2013.
- The U.S. industry recording the largest GDP gains since 2009 was *Professional and business services*, which increased by \$241.6 billion over the period. This was closely followed by *Manufacturing* GDP, which rose by \$221.0 billion in value since 2009.

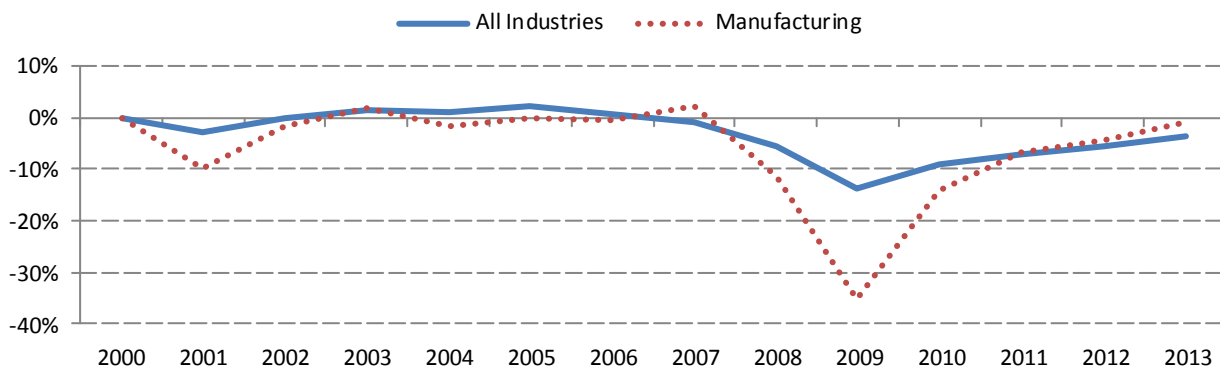
Total GDP (State and National), in Millions of USD

	2012	2013	Change
Michigan	400,232	408,218	+2.0%
United States	15,245,906	15,526,715	+1.8%

Michigan Rank (GDP Size): 13 / 50
Michigan Rank (GDP Growth): 21 / 50

Source: U.S. Bureau of Economic Analysis

All-Industry and Manufacturing GDP, Indexed to 2000, Michigan



Source: U.S. Bureau of Economic Analysis

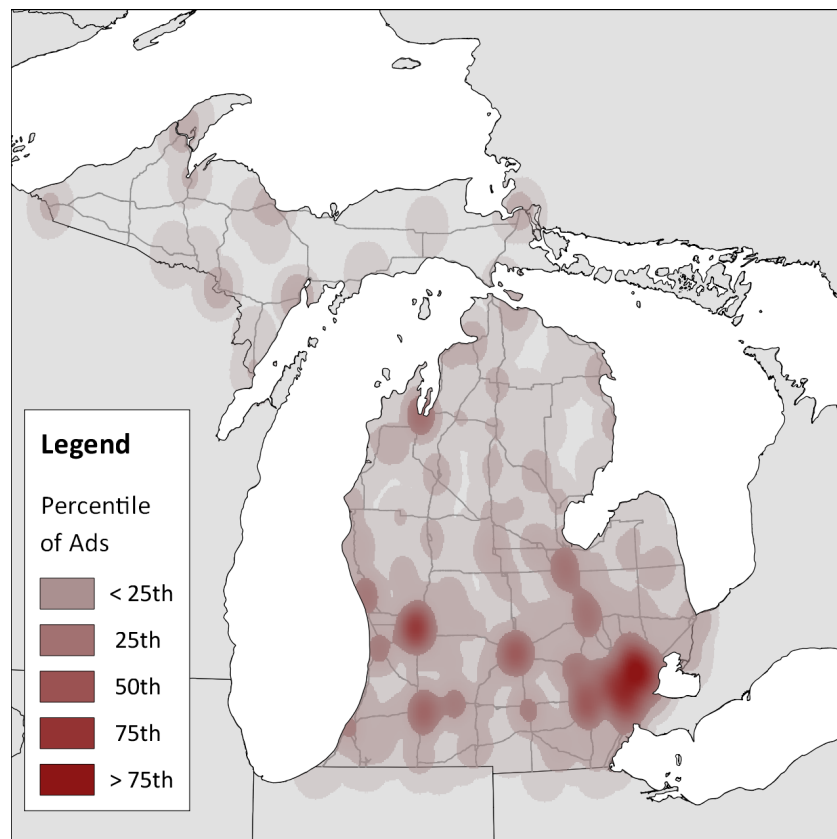
Real-Time Demand: Online Advertised Job Vacancies

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 total online job demand in Michigan and summarizes characteristics of job ads posted for the holiday season.

- There were 170,330 seasonally adjusted advertised job vacancies in Michigan during November, the most recent data available. This was an increase of 5,960, or 3.6 percent from the October total, continuing an upward trend in job ads throughout most months of this year. In fact, Michigan has outpaced national growth in 2014 by nearly nine percentage points.
- Holiday hiring is a regular occurrence in the labor market typically beginning in November and continuing through December each year. Although seasonal hiring is difficult to quantify until months after the fact, real-time data helps to solve this problem by providing counts of job advertisements before hiring even takes place.
- As of November, there were 5,600 online job ads containing the keyword "seasonal" which, around this time of the year, serves as a indicator for holiday-related job ads. The ramp-up in advertising for the holiday season is immediately apparent as the November total represents a rise of 400 from October and 1,700 from September.
- Sales and related occupations led by far, with 2,170 seasonal job ads posted in November. *Transportation and materials moving* occupations such as *Delivery drivers* and *Packers and packagers*, trailed behind *Sales* with 880 ads, followed by *Office and administrative* occupations such as *Customer service representatives* and *Clerks* with 810 job ads.
- Grand Rapids led the state's cities in terms of seasonal job ads posted (300 ads), followed by Ann Arbor (250), Troy (240), and Detroit (160). Together, cities in the Detroit metro area drove Southeast Michigan to be the top region in the state in terms of seasonal job advertisements. Other areas of significant seasonal labor demand can be seen in the map to the right.

Seasonal Job Advertisements



Source: The Conference Board © Help Wanted Online

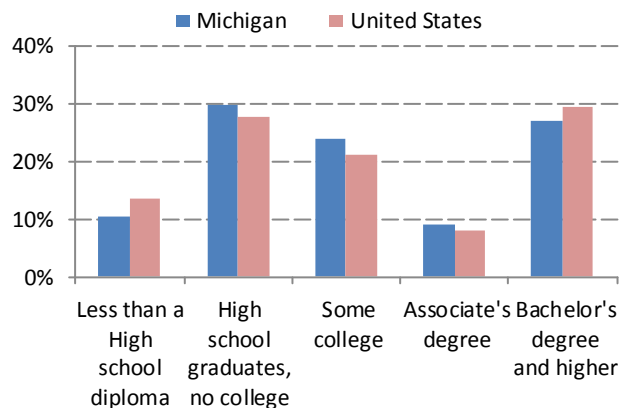
Educational Attainment

Eric Guthrie

Understanding the level of educational attainment of the population is key to understanding the creative and technical expertise and potential of the population. The U.S. Census Bureau collects data on this topic through the American Community Survey (ACS) and the Current Population Survey (CPS).

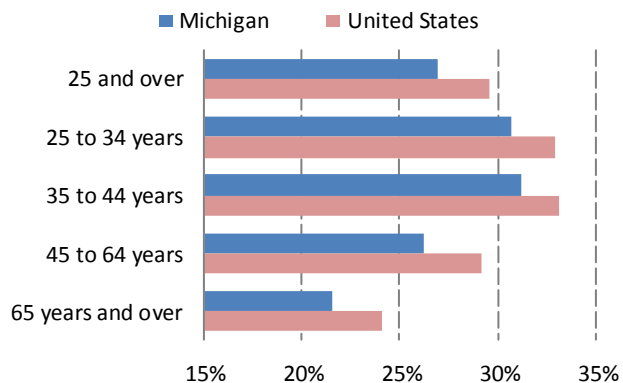
- The level of educational attainment for Michigan's 25 year old and over population exceeded that of the U.S. at the high school, some college, and associate's degree levels, but falls behind at the bachelor's degree or higher level.
- Michigan's population over 25 years old ranked 33rd at the bachelor's degree or higher level in 2013 which marked a slight improvement over 2012 when Michigan ranked 36th.
- Over the last 14 years, the proportion of the population 25 and over with a bachelor's degree or higher has been increasing in Michigan, but it has been losing some ground in narrowing the gap with the nation as a whole.
- Between 2000 and 2013, the population over 25 with a bachelor's degree grew by 28 percent, and the proportion of the population with a bachelor's degree increased from 21.7 percent to 26.9 percent.
- Michigan's share of the 25 and over population with at least a bachelor's degree lags U.S. averages across all age groups. The age categories 25-34 and 35-44 have the highest share of persons with advanced degrees.
- The overall proportion of the population 25 and over with a bachelor's degree or higher is brought down by the groups who entered the workforce in prior years when fewer academic credentials were required.
- The effects of increased levels of educational attainment are evident when looking at the labor force participation and unemployment rates for the population 25 and over. There is a clear negative relationship between educational attainment and the jobless rate. It is also apparent that additional education clearly enhances workforce participation.

Educational Attainment, 25 and Over, 2013



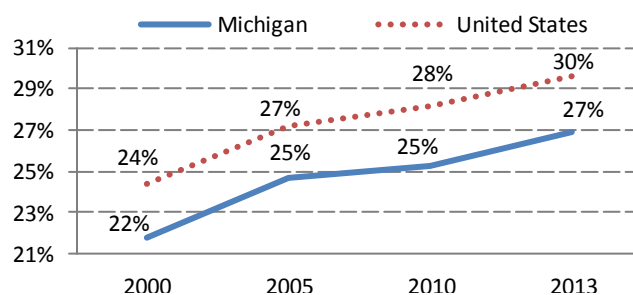
Source: 2013 ACS 1-year estimates

Bachelor's Degree and Higher



Source: 2013 ACS 1-year estimates

Bachelor's Degree and Higher, 25 and Over



Source: 2000 Census; 2005, 2010, and 2013 ACS 1-year estimates

Labor Force Demographics

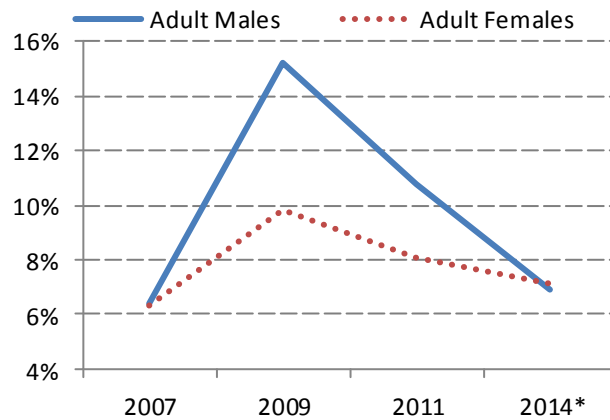
Jim Rhein

The Current Population Survey (CPS) provides a wealth of demographic data for national and state labor markets. As a result, it is a valuable tool for shedding light on the relative degree of labor market recovery among different segments of the Michigan labor force.

- Recent demographic data for Michigan indicate that adult male and female jobless rates were similar in 2013 and 2014 after diverging greatly during the 2007 to 2009 recession. Adult male and female jobless rates were also similar prior to the Great Recession. Michigan's overall unemployment rate in late 2014 has reached a level that is comparable to pre-recession rates from 2003 through 2007.
- Jobless rates for adult females and males in Michigan from 2007 through 2014*. By 2009, adult male unemployment rates had soared well above female rates by over five full percentage points, with heavy job losses in *Manufacturing* and *Construction*. Despite a current overall jobless rate close to the pre-recession rate, and the disappearance of gender differences, a closer look at workforce demographics shows that males in Michigan have not yet fully recovered from the Great Recession.
- One reason behind recent jobless rate reductions is declining labor force levels and Labor Force Participation Rates (LFPRs). The LFPR is the number of people in the labor force divided by the non-institutionalized population. Far fewer unemployed adult males in the state are actively seeking jobs in 2014 as compared to 2007. The second chart records the LFPR declines for adult males in Michigan from 2007 through 2014*. LFPRs dropped dramatically over this period to near historic lows. The drop in workforce participation is related to both the economy and to demographic factors, as the "baby boom" generation ages out of the workforce.
- Since 2009, adult male total employment has rebounded by 113,000 or 5.3 percent, while the number of unemployed has dropped by 210,000 or 56.1 percent. However, adult males have withdrawn from Michigan's workforce at a significant rate, down by 97,000 or 3.9 percent since 2009, which was nearly the amount gained in employment.
- Michigan's full labor market recovery will be contingent on future gains in both employment and labor force participation.

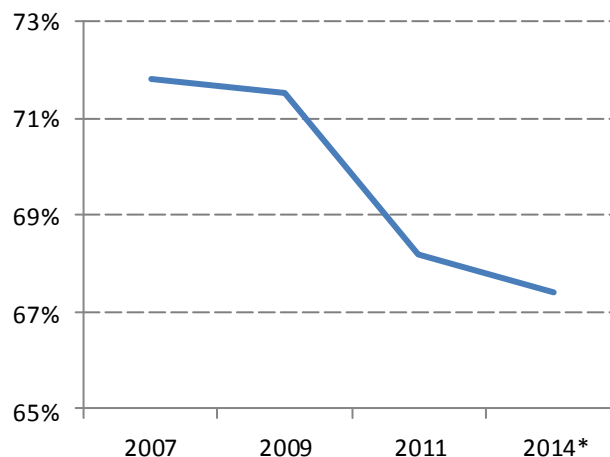
* Denotes a November 2013 through October 2014 moving average

Michigan Adult Unemployment Rates by Gender



Source: U.S. Bureau of Labor Statistics,
Current Population Survey

Michigan Labor Force Participation Rate, Male



Source: U.S. Bureau of Labor Statistics,
Current Population Survey

Minimum Wage

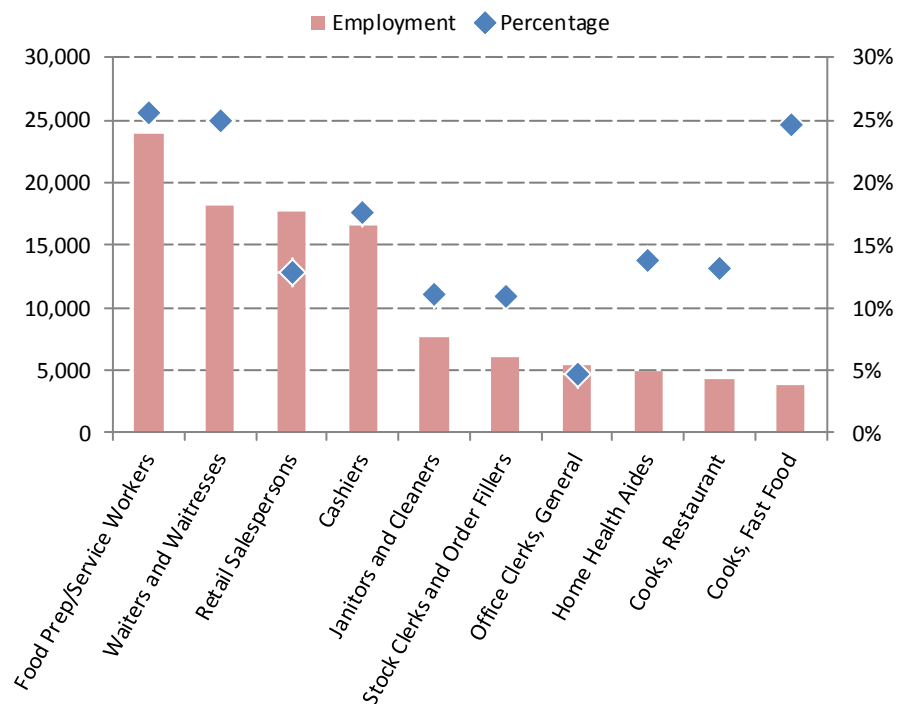
Robert Walkowicz and Geoffrey Okorom

Thousands of Michigan employees received a wage increase when the Workforce Opportunity Wage Act took effect September 1, 2014. This new law changed Michigan's minimum wage from \$7.40 per hour to \$8.15 per hour, and will increase to \$9.25 per hour by 2018.

- o In 2013, Michigan had 4.0 million total employees with a median wage of \$16.67 per hour, and five percent earned under \$8.15 per hour.
- o Employees in the occupations most impacted by the minimum wage increase are concentrated in three industry subsectors: *Food services and drinking places* (restaurants, bars, and other eating establishments), *General merchandise stores* (department stores, warehouse clubs, and supercenters), and *Food and beverage stores* (grocery stores, markets, and beer, wine, and liquor stores).

- o These three subsectors are the only ones to have had over 10,000 employees and more than 10 percent of workers earning under \$8.15 per hour. The *Food services and drinking places* industry had about 59,700 employees and 19.3 percent of its workforce earning under \$8.15 per hour. *General merchandise stores* had about 14,400 employees and 12.7 percent, while *Food and beverage stores* had about 10,400 employees and 13.9 percent of its workforce earning under \$8.15 per hour.

Employees Earning Under \$8.15 per Hour in Michigan, by Occupation



Source: DTMB, Occupational Employment Statistics, May 2013 Panel

- o There are several occupations with high levels of employment under the new minimum wage prevalent in the three subsectors identified above. *Combined food preparation and service workers*, *Waiters and waitresses*, and *Fast food and Restaurant cooks* are all a large part of the *Food services and drinking places* industry. These occupations have a combined 50,000 employees who were earning under \$8.15 per hour. These occupations also had a high share of workers paid less than the new minimum wage; about 25 percent of *Combined food preparation and service workers*, *Waiters and waitresses*, and *Fast food cooks* made under \$8.15 per hour.
- o *Retail salespersons*, *Cashiers*, *Stock clerks and order filers*, and *Janitors and cleaners* are a large part of the *General merchandise* and *Food and beverage store* industries; these occupations have a combined 48,000 employees earning under \$8.15 per hour.
- o Michigan's minimum wage is set to increase to \$9.25 per hour in 2018. In 2013, 15 percent of Michigan workers were earning under this amount.

Migration of Michigan's Young Knowledge Population

Eric Guthrie

The interstate migration of highly educated young persons is a topic that has been of much concern to leaders in our state. Much of this concern stems from the fact that Michigan has had trouble retaining and attracting youth between the ages of 22 and 34 with a bachelor's degree or higher and has been a net exporter of this young knowledge population.

- Out-migration of this group from Michigan decreased slightly in 2011, but has since increased, with the most recent estimates from 2013 putting the net out-migration of this cohort at -3.5 percent.

- The most important region to Michigan, in terms of interstate migration, is the East North Central Region, which along with Michigan consists of Wisconsin, Illinois, Indiana, and Ohio. Together the other four states of this region accounted for nearly a third of Michigan's in-migration. Similarly, Illinois and Ohio (along with California) accounted for the top three destinations for out-migrants. The East North Central Region is the most common destination for Michigan's young educated population, due largely to its proximity and the draw of the Chicago area.

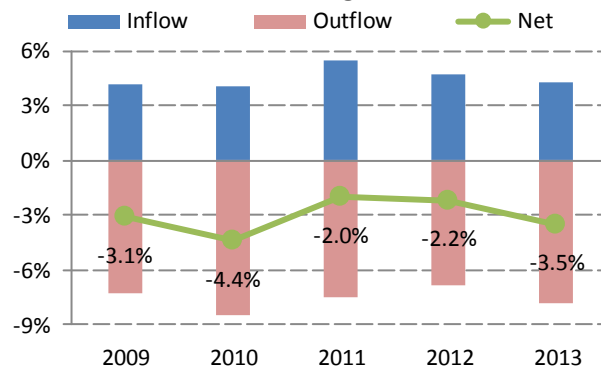
- Interestingly, the data show that the single state most likely to produce an in-migrant to Michigan is Michigan itself. Nearly 37 percent of in-migrants over the 2009-2013 period were born in Michigan. For example, over two thirds of in-migrants from Illinois were actually born in Michigan.

- While the Pacific and South Atlantic Regions account for shares of the net-migration that are nearly equal to that of the East North Central Region, each only attracts about half as many out-migrants from Michigan. This is due to the relatively few in-migrants that are being attracted from these regions.

- The New England Region is the only region that sends migrants to Michigan on a net basis. The overall net in-migration is small, but the direction is unique among the regions.

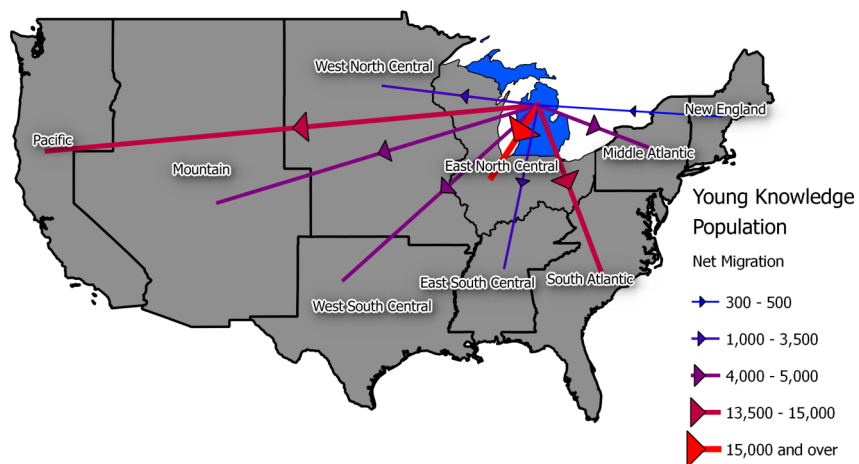
- The young knowledge population tends to favor metropolitan areas when making the decision to relocate to Michigan. Migration to the state's metro regions accounts for over three quarters of all in-migration.

**Young Knowledge Population
Interstate Migration**



Source: 2009, 2010, 2011, 2012, and 2013
ACS 1-year estimates

Note: Rates differ slightly from rates published in previous years due to modified methodology for accounting for group quarters populations.



Source: 2009, 2010, 2011, 2012, and 2013 ACS 1-year estimates

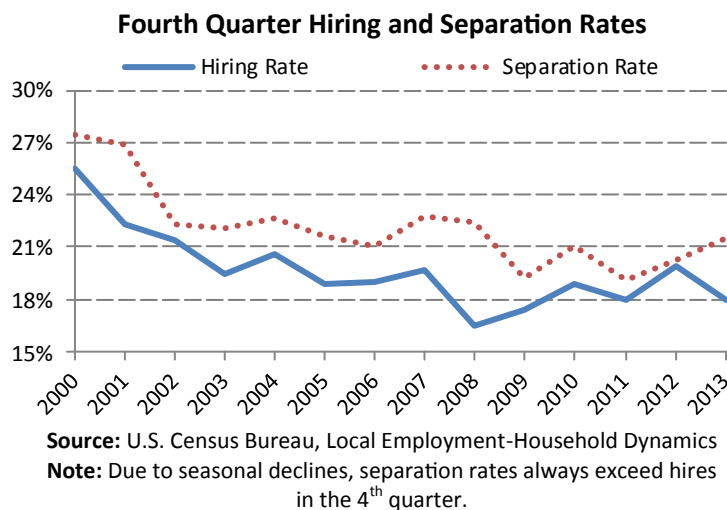
- The most popular metropolitan regions continue to be, in order: Detroit, Ann Arbor, Grand Rapids, and Lansing/East Lansing. These account for over 85 percent of metro area in-migration and over two-thirds of overall in-migration.

Household Employment Dynamics: Hires and Separations

Aneesa Rashid, PhD

The labor market is a dynamic place where workers are constantly moving between jobs. High levels of worker reallocation activity (hiring and separations) is associated with economic growth as skills and resources move to their most productive use. Data on hires and separations for the state are now available through the Local Employment Dynamics (LED) program. This is a federal-state partnership that combines data from state wage records, the Quarterly Census of Employment and Wages, and U.S. Census Bureau survey data.

- The chart shows hiring and separation trends for the 4th quarter of the years 2000 through 2013. Hiring as a percent of employment has steadily declined from 25 percent to 18 percent. Separations as a percent of employment have also dropped from 28 percent to 22 percent. This shows that worker flows have declined steadily over this period.

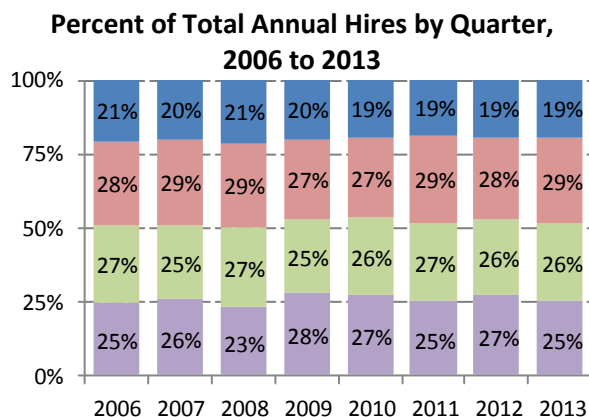


- Hiring activity in Michigan remained flat prior to the recession (December 2007), then dropped by 137,323 in 2008, while separations increased in 2007 and then were stable for a year. Between 2008 and 2010, hiring picked up slowly by 54,797 while separations increased due to the auto industry restructuring. Since 2011, total hiring has exceeded total separations by 5 percent.

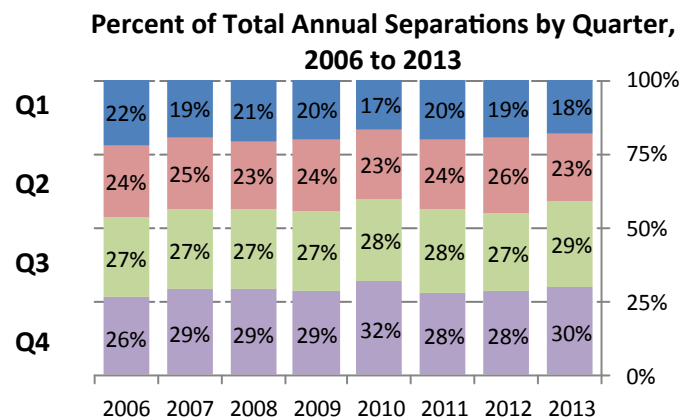
- The majority of Michigan industries follow the declining trend in worker flows with hiring and separation rates below 2006 rates, the year prior to the

2007 recession. Five sectors that had an increase in worker reallocation activity were: *Construction, Wholesale trade, Information, Administrative and support services* and *Arts, entertainment, and recreation*.

- Another insight from the quarterly LED data is that nearly 30 percent of the hiring activity in Michigan tends to take place in the second quarter (average 2006-2013), followed by the third quarter (27 percent). The sectors registering a high percentage of hiring in the second quarter are: *Arts, entertainment, and recreation* (52 percent), *Manufacturing* (39 percent), *Accommodation and food services* (32 percent), and *Professional and business services* (30 percent).



Source: DTMB/U.S. Census Bureau, Local Employment-Household Dynamics



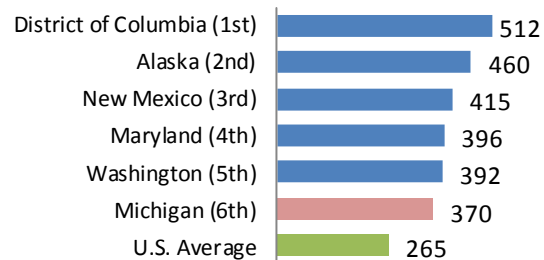
Scientists and Engineers

Leonidas Murembya, PhD and Robert Walkowicz

In this analysis, engineers are broadly defined to include not only engineers and engineering technicians of all types, but also architects, drafters and cartographers, as well as surveyors. Scientists are professionals engaged in life, physical, and social science research. Examples include microbiologists, chemists, economists, and statisticians. The number and trends of jobs in this category serves as one barometer of the skills of the Michigan workforce, and provides clues to the potential for innovation and technological development.

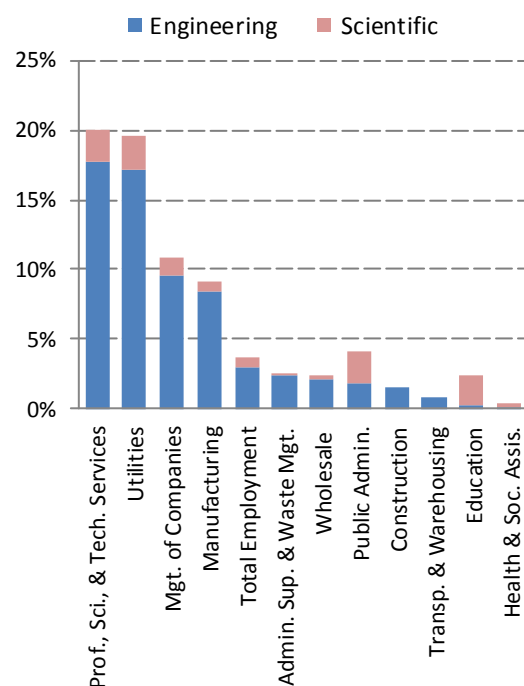
- In 2013, Michigan recorded about 148,100 Scientific and Engineering (S&E) jobs, up about 3,000, or 2.1 percent, from 2012. The state remained 4th largest in terms of the number of S&E occupations in the U.S., behind only California, Texas, and New York.
- Despite the over-the-year S&E employment growth, Michigan's share of S&E jobs per 10,000 positions remained flat at 370 (same as Massachusetts), giving the state a rank of 6th out of the 50 states and the District of Columbia.
- In Michigan, the share of Engineering in all S&E jobs has always hovered around 81 percent. *Mechanical* and *Industrial engineers*, *Industrial technicians*, and *Civil engineers* are the most prominent occupations in this category.
- In Michigan, two industries, *Manufacturing* and *Professional, scientific, and technical services*, employ about 76 percent of all engineering occupations. Scientific occupations are more spread out across industries, with *Education* recording the largest share of about 27 percent of all scientific jobs.
- Scientific and engineering positions make up about 20 percent of all jobs in the *Professional, scientific, and technical services* and in the *Utilities* industries. S&E occupations also add up to about 10 percent of total jobs in *Management of companies*, and in the *Manufacturing* sector. Overall, in Michigan, S&E occupations account for 3.7 percent of all-occupation employment.
- Jobs in S&E occupations offer above-average wages at every level of work experience. These jobs are also expected to grow at (engineering) or above (scientific) the all-occupation average growth rate, through 2020.
- According to the Conference Board's Help Wanted Online Data Series®, there were about 14,300 S&E job ads in October 2014, up 2.4 percent from September. About 91 percent of these job ads were in engineering. The top S&E detailed job ads were for *Industrial*, *Mechanical*, *Electrical*, and *Civil engineers*, as well as for *Medical scientists, except epidemiologists*.

Scientists and Engineers Per 10,000 Positions, May 2013



Source: DTMB, Occupational Employment Statistics, May 2013 Panel

S&E Jobs as a Percentage of Total Employment in the Industry, May 2013



Source: DTMB, Occupational Employment Statistics

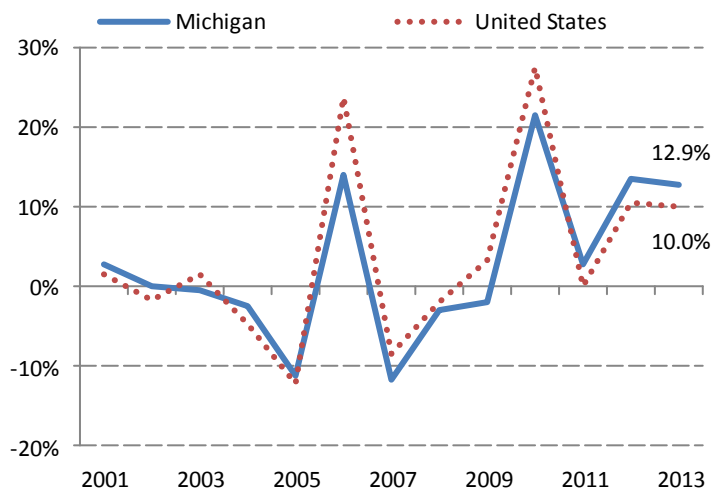
Patents

Kevin Doyle and Luke Bunge

The number of patents issued is an important indicator of innovation and economic vitality. Through data made available by the U.S. Patent and Trademark Office (USPTO), patent information is available by state, county, and metro area as well as by company of origin. This analysis provides an overview of patents issued in Michigan in 2013 and some insights into the concentration of certain patent classes in Michigan.

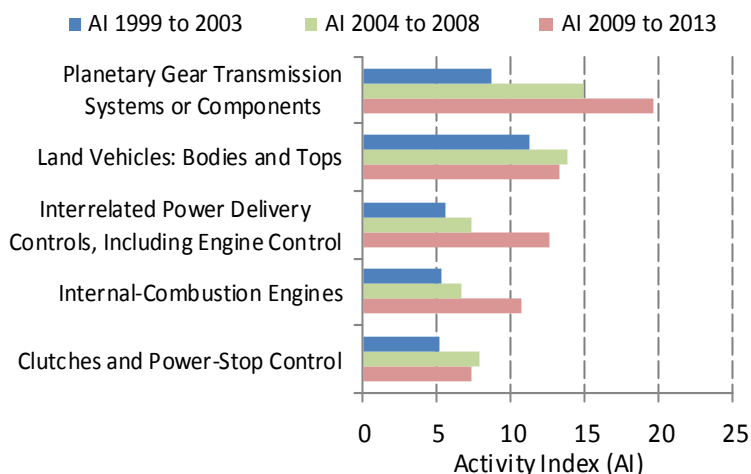
- There were 5,640 patents granted in Michigan in 2013, representing an increase of 640 patents, or 12.9 percent over the 2012 total. Michigan ranked 6th among all states in the number of patents granted in 2013, overtaking Illinois, which held the position in 2012. Patents grew by 10.0 percent in the U.S. as a whole, as Michigan outpaced the national average growth rate for the fourth consecutive year.

Annual Percentage Change in Patents Granted, 2001-2013



Source: U.S. Patent and Trademark Office

Top Patent Classes by Activity Index (AI) Growth, 1999-2013



Source: U.S. Patent and Trademark Office

- There were 5.7 patents filed for every 10,000 Michigan residents in 2013, landing it in 12th place and above the U.S. average of 4.7 patents per 10,000 residents. Michigan ranked 13th in 2012. California, Massachusetts, and Washington led the nation in this measure, with around 10 patents per 10,000 residents in 2013.

- USPTO publishes an Activity Index (AI) for utility patents granted (patents for inventions), which, like a location quotient in economic parlance, is a measure of relative concentration in a region. In fact, patent classes with high Activity Index concentrations are closely related to industries with high location quotients in Michigan, such as Motor vehicle manufacturing.

- Of the top 15 patent classes by AI during the 2009 to 2013 period, 13 are related to Michigan's auto industry, exemplifying the importance of the auto industry to the Michigan economy.

- Michigan's Activity Index ranking is improving in several patent areas. For example, the Refrigeration class increased its AI from 1.36 to 2.05 between 2003 and 2013. Though still low in the overall Michigan AI rankings, Apparel increased its AI from 0.68 in 2003 to 1.18 in 2013 and had 1,030 patents approved from 2009 to 2013.

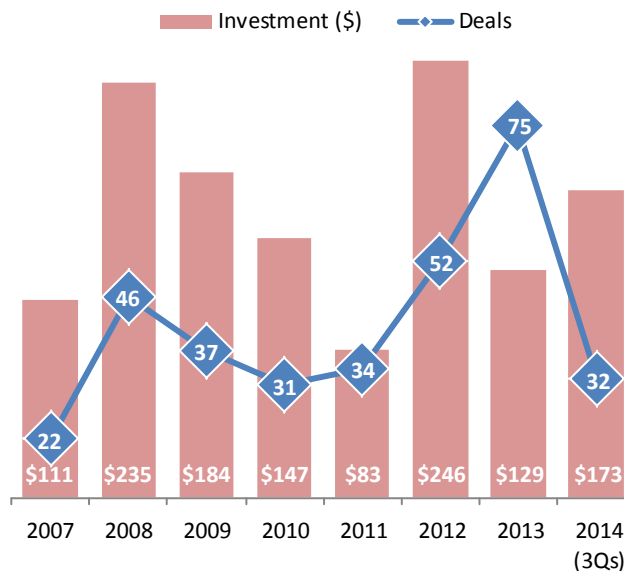
Venture Capital

Ryan J. Gimarc and Luke Bunge

Venture capital (VC) is money invested into early stage companies or products in which there is risk. Venture capitalists invest in these companies or products in exchange for a percentage of future profits and often a seat on the company's board of directors. Information on these investments provides researchers an idea which companies and industries in the state are receiving capital investments. The amount venture capitalists invest into companies statewide varies greatly from quarter to quarter and year to year.

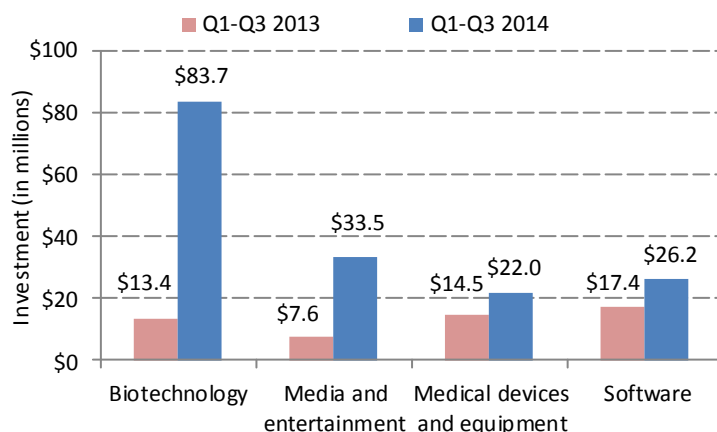
- Total investment in the first nine months of 2014 has now reached \$173.5 million from 32 deals, which exceeds total money invested in Michigan companies for all of 2013 (\$129 million on 75 deals). However, total venture capital investment in 2012 totaled \$246.5 million (from 52 deals).
- In the 3rd quarter of 2014, Michigan companies received investments totaling \$14.5 million in 7 deals. This was a substantial decrease from the \$114.9 million investments total made during the 2nd quarter of 2014 from 11 deals (the highest level of investment since the dot-com bubble). Also, investments have decreased from the \$29.0 million put into Michigan companies during the 3rd quarter of the previous year (2013).
- Biotechnology continues to be the leading industry in Michigan in terms of attracting overall amounts of venture capital. So far in 2014, Biotechnology has accounted for approximately 48 percent of total venture capital investment, or \$83.7 million.

Venture Capital Investment and Deals with Michigan Companies



Source: Pricewaterhouse Coopers (PWC)

Venture Capital Investment in Michigan by Industry*



Source: Pricewaterhouse Coopers (PWC)

*PWC Industry Classification <http://www.pwcmoneytree.com/>

- Out of the seven venture capital deals made in Michigan in the 3rd quarter of 2014, four occurred in Media and Entertainment industries, totaling nearly \$2 million. In the previous quarter, however, one venture capital deal in Media and Entertainment raised \$23.0 million, which accounted for fifteen percent of venture capital investment in that industry nationwide.
- In the first three quarters of this year, eight of Michigan's 32 venture capital deals have been made with Software companies, totaling \$26.2 million of investment and 15 percent of total investment. In the first three quarters of 2013, 14 of the 47 deals made were also with Michigan Software companies for an industry investment total of \$17.4 million during that timeframe.

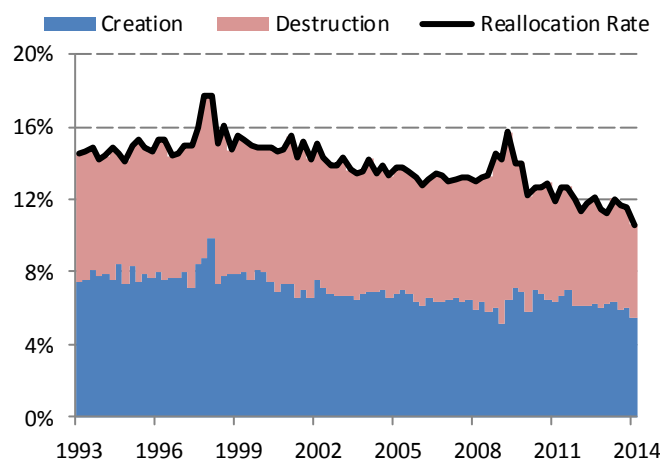
Business Dynamics: Job Creation and Job Destruction

Aneesa Rashid, PhD

Businesses constantly create and destroy jobs through hires and layoffs, which occur when companies expand or contract; and/or when new businesses open and others close. The Business Employment Dynamics (BED) data series, maintained by the Bureau of Labor Statistics, captures this process. The data series is created using administrative records on business employment and wages from the states' unemployment insurance agencies, through the Quarterly Census of Employment and Wages (QCEW) program.

- A job reallocation rate is given by the ratio of the sum of total job creation and total job destruction over total employment. The rate shows a steady decline in Michigan (March 1993 to March 2014) with a drop of 3.9 percent, matching the national decline of 3.8 percent. Michigan had a slightly larger decline in its job destruction rate (-2.0 percent) compared to the nation (-1.9 percent). Businesses are not creating as many new positions as before for new people to be hired.
- Job flows were stable during the recession (December 2007 to June 2009) but spiked up in the second quarter 2009 with jobs destroyed at their highest level (9.3 percent), suggesting that in Michigan, the recession lasted longer than in the nation due to the automotive industry bankruptcy. Since 2011 job creation through business expansions and openings is stable averaging at 6.2 percent, with job destruction averaging at 5.6 percent.
- Selected industry sectors that are contributing to the decline in Michigan's trend in job flows (March 2000-2014) are: *Construction* (-7.8 percent), *Leisure and hospitality* (-6.7 percent) and *Professional and business services* (-6.5 percent).
- Interestingly, job flows have remained stable in *Manufacturing* (-1.4 percent) and *Transportation and warehousing* (-0.4 percent) over this period other than the outlier in 2009.

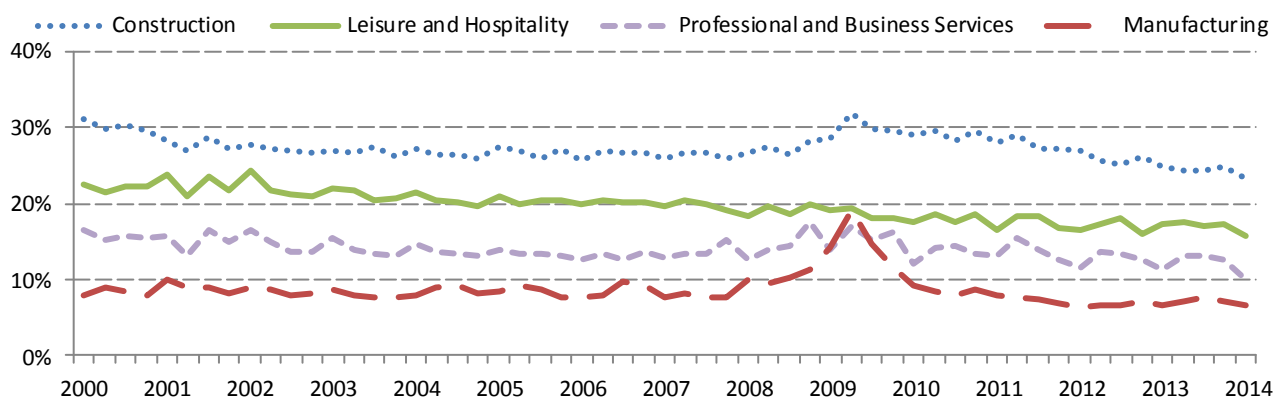
Michigan Job Flows, Job Creation and Destruction, Percent of Total Employment



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

Note: Job Reallocation = Job Creation + Job Destruction

Trends in Selected Industry Sector Job Flows



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

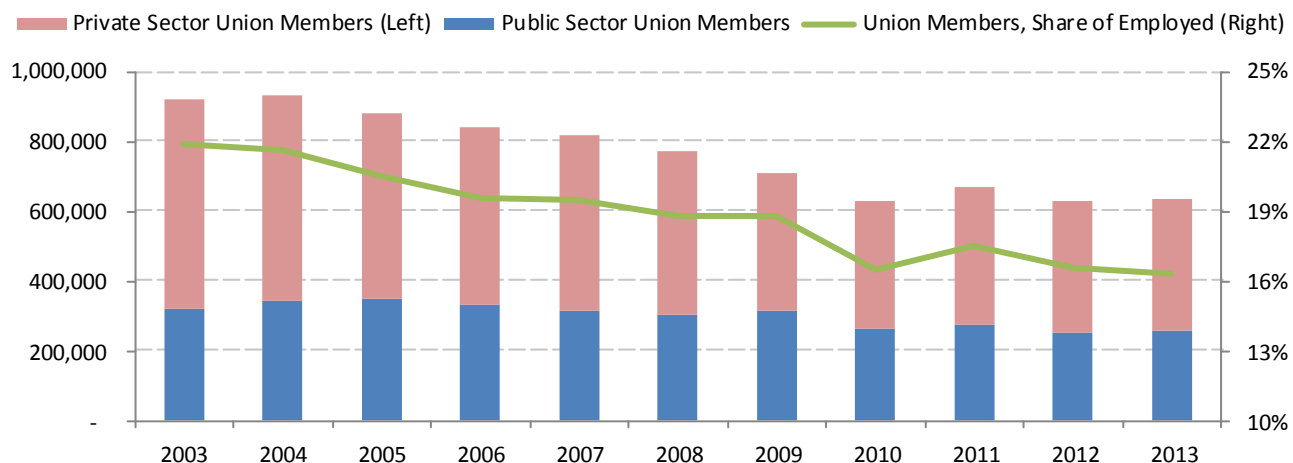
Union Membership in Michigan

Myles Fowler-Quick

Union membership is defined by the Bureau of Labor Statistics as the number of wage and salary workers who report membership in a labor union or a similar employee association. These data are collected as a part of the Current Population Survey, a monthly survey of households conducted by the U.S. Census Bureau. Union membership data can offer valuable insight into many aspects of the make-up of a state's economy.

- Michigan's 633,000 union members accounted for 16.3 percent of the total employed population in 2013. Despite total membership increasing slightly over the year, the share of unionized jobs was down from 2012 (16.6 percent). This means Michigan in 2013 registered the lowest unionized share of total employment within the last decade. In 2013, about 40 percent of union members (255,900) were employed within the public sector while the remaining 377,100, or 60 percent, were found in the private sector.
- Michigan's union members and share of employment declined for eight consecutive years between 2003 and 2010, sliding from 919,000 total members to the most recent low of 627,000 in 2010. Over that span, the percent of Michigan's wage and salary workers who were members of a union dropped from 4th highest in the nation at 21.9 percent to 8th highest in the nation at 16.5 percent. Although union membership showed a modest rebound in total membership numbers from 2010 to 2013, percent share continued to decline. Yet, despite this decrease, Michigan remained in the top ten nationally in share of total employment with union membership.
- The leading states in share of union membership include New York (24.4 percent), Alaska (23.1 percent), Hawaii (22.1 percent), Washington (18.9 percent), and Rhode Island (16.9 percent). The states with the lowest shares were Mississippi (3.7 percent), South Carolina (3.7 percent), Arkansas (3.5 percent), and North Carolina with just 3.0 percent of its employed population belonging to a union.
- In 2013, the public sector led all industries in rate of unionization with over half of all employees belonging to a union (54.8 percent), compared to only 11.0 percent of those employed in the private sector. Among other industries, the highest rates of unionization were found in the state's *Transportation and utilities* (28.8 percent), *Construction* (18.3 percent), and *Manufacturing* (17.8 percent) industry groups. *Manufacturing* in Michigan led the private sector in the overall number of union members, largely due to the presence of the automotive sector's significant representation by the United Automobile, Aerospace and Agricultural Implement Workers of America (UAW). The lowest unionization rates were found in *Leisure and hospitality* (4.7 percent) *Professional and business services* (2.5 percent), and *Financial activities* (2.0 percent).

Union Members and Share, Michigan (2003-2013)



Source: U.S. Census Bureau, Current Population Survey

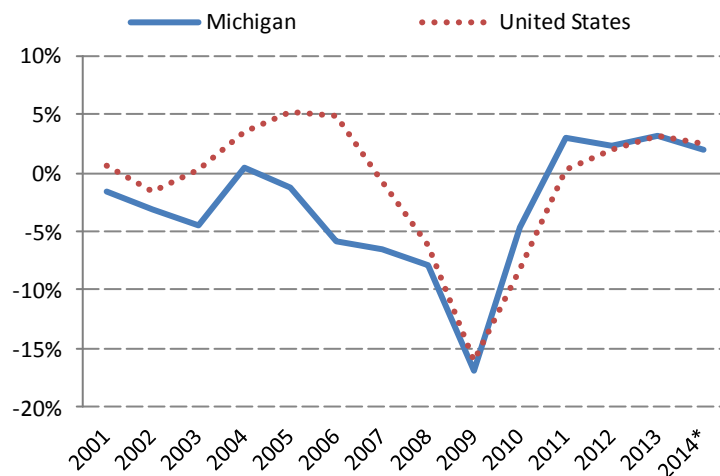
Industry Highlight: Construction

Leonidas Murembya, PhD

The collapse of the housing market at the end of 2007 marked the start of the Great Recession of 2008-2009, which greatly and negatively impacted the *Construction* industry and the majority of industry sectors in Michigan and the nation. However, unlike the nation, the decline in Michigan *Construction* employment began much earlier, with the 2000 economic recession, and has not yet fully recovered.

- According to data from the Current Employment Statistics (CES) program, Michigan *Construction* jobs fell very sharply by 77,300 (-36.9 percent) from 209,700 in 2000 to 132,400 in 2013.
- Between 2000 and 2007, while *Construction* employment was improving nationally (843,000 or 12.4 percent), jobs in Michigan's *Construction* sector fell by 43,000 (-20.5 percent).
- During the recent Great Recession, *Construction* jobs in Michigan and the nation fell at similar rates of -27.1 and -27.7 percent, respectively. However, Michigan has recorded a slightly faster job recovery rate since the end of the recession (29.7 percent vs. 21.6 percent nationwide). In fact, a shift-share analysis shows that overall, Michigan has been losing market share in *Construction* employment over the 2000-2013 period to other areas of the nation. Yet, during the current recovery, local factors reflect a stronger *Construction* sector in Michigan than in the rest of the country.
- Among the three *Construction* subsectors of *Buildings*, *Heavy and civil engineering*, and *Specialty trade contractors*, the latter registered the largest job cut since 2000, accounting for about 3 of every 4 construction positions lost. Employment in *Specialty trade contractors* has recorded the lowest job recovery rate since the end of the Great Recession at 17.9 percent (compared to 29.7 percent employment growth for the entire industry).
- Based on data from the U.S. Census Bureau, Local Employment Dynamics (LED), small businesses (between 0 and 19 employees) accounted for over half (51.7 percent) of total employment in the *Construction* sector as of the third quarter 2013. The share was only 20.8 percent for all industries in Michigan. On the other end, larger firms of 500+ employees were responsible for only 10.6 percent of *Construction* jobs, while this same category of businesses employed over 46 percent of workers in all industries combined.
- Skilled trade occupations in *Construction* require many years of on-the-job experience, which can partially explain the higher-than-average percentage of workers in the 35 to 54 age groups in the sector. LED data show that the share of workers in the 35-44 and 45-54 age groups is respectively 4.4 and 3.5 percentage points higher in *Construction* compared to the all-industry average.
- According to data from the U.S. Census Bureau's American Community Survey (ACS) 2012, 1-year estimates, *Construction* has the highest percentage of self-employment in both Michigan (10.5 percent) and the U.S. (8.4 percent). In Michigan, *Construction* is followed by *Agriculture* (9.5 percent) and *Professional, scientific, and technical services* (7.0 percent).

Construction Employment, Annual Percentage Change (2000 - 2014)



Source: U.S. Bureau of Labor Statistics, Current Employment Statistics
 *2014 is a moving average from Sept. 2013 - Aug. 2014

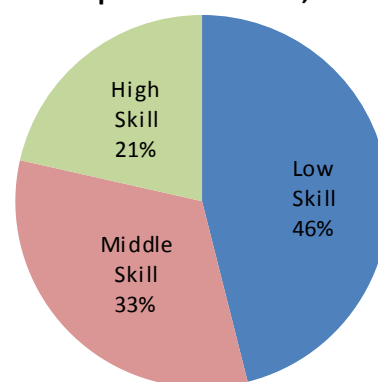
Middle-Skill Jobs

Kevin Doyle

In this indicator, the popular topic of employment in middle-skill jobs is discussed. While definitions of middle-skill jobs vary depending on the source, this analysis defines such jobs in a similar manner to that used by the Brookings Institution. Specifically, a middle-skill job is defined as one that requires at least a high school education and moderate on-the-job training (more than one month) but requires less than a bachelor's degree.

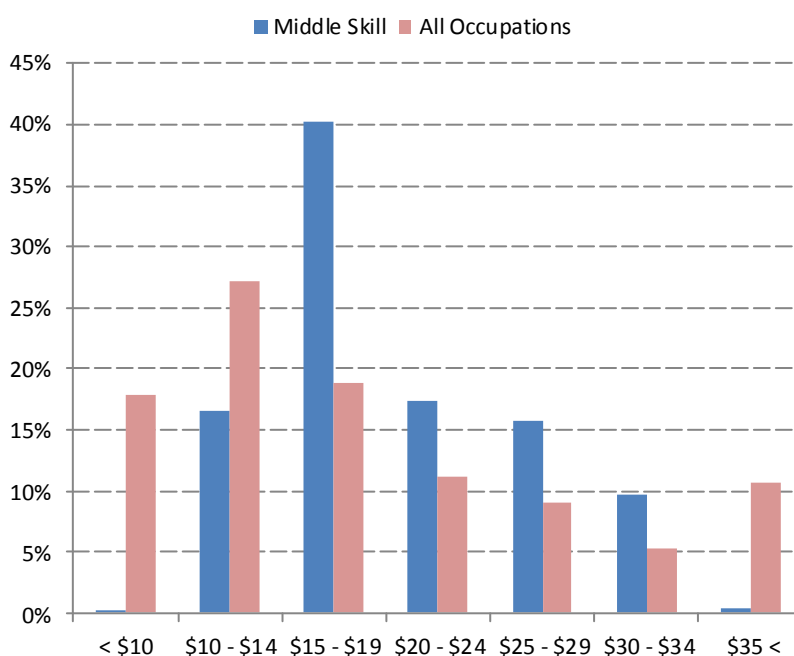
- Of the total 4.0 million employed in Michigan, 1.3 million—about one in three—are employed in a middle-skill job. These jobs cover a wide variety of occupations across numerous industries and include job titles such as *Web developers*, *Dental hygienists*, and even *Power plant operators*.
- Just over 40 percent of those employed in middle-skill occupations make a median wage between \$15 and \$19 per hour. One third of all those holding middle-skill jobs make between \$20 and \$30 per hour.
- Middle-skill job gains will be about equal to the expansion expected for all occupations from 2010-2020, with a projected growth rate of 8.4 percent versus the all-occupation average of 8.5 percent. Employment in middle-skill positions is projected to rise by 96,800 during this period. Each year between 2010 and 2020, projections indicate about 10,150 new middle-skill job openings due to economic growth. At the same time, there will be 28,800 job openings annually due to the replacement of workers who are permanently leaving an occupation.

Michigan's Employment by Occupation Skill Level, 2013



Source: U.S. Bureau of Labor Statistics

Percent of Total Employment by Median Earnings Range, 2013



Source: DTMB, Occupational Employment Statistics

- At publication, there were 58,100 Michigan online job ads for middle-skill positions according to the Conference Board's Help Wanted Online data series. Nearly half of these job ads were for *Healthcare practitioners*, *Production*, or *Transportation and material moving* occupations.
- Although middle-skill occupations were defined in this article as those requiring training beyond a high school education but less than a bachelor's degree, an upcoming LMIS middle skills job study may utilize a different definition. The working definition of "middle-skill" jobs will be carefully reviewed for the upcoming study.

What's New from LMISI?

The *Michigan Economic and Workforce Indicators and Insights* report is just one of many publications by the Bureau of Labor Market Information and Strategic Initiatives. Serving a diverse group of customers, our products range from workforce data to customized products and publications. Highlighted below are some of our more recent products. These and more can be found on our website at: www.michigan.gov/lmi.

West Michigan Talent Assessment and Outlook



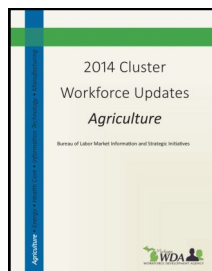
This innovative and visual presentation provides analysis and insight about the current state of the West Michigan labor market, and is the result of a collaboration between the Department of Technology, Management and Budget and Talent 2025 along with its network of West Michigan industry, education, and economic and workforce development leaders.

The Labor Market Information Wheel



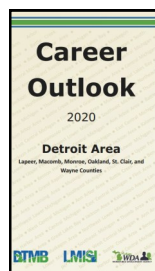
The Labor Market Information Wheel is an interactive medium which provides quick access to key labor market indicators including: population, labor force, unemployment, industry employment, wages, and wage trends for select Michigan industries and to support the ten regions in Michigan's Regional Prosperity Initiative.

2014 Cluster Workforce Updates



The 2014 Cluster Workforce Updates are intended to revise the key occupation tables found in the Cluster Workforce Analysis publications released in January 2013. With an emphasis on occupations, this report provides an analysis of important indicators, including employment, earnings, education and training requirements, and real-time and projected demand.

Career Outlook 2020 Brochures



Published for Michigan's 18 Economic Forecast Regions (EFRs), these Career Outlook Brochures use our long-term occupational forecasts to list the top 15 to 20 occupations in the region based on a variety of factors. The lists provided for each region are based on education, annual openings, and real-time demand using the data series from The Conference Board Help Wanted OnLine® (HWOL).

What's New from LMISI?

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