University of Wisconsin-Stevens Point
Central Wisconsin Economic Research Bureau

Economic Indicators Report

Third Quarter 2015: Stevens Point Area

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Special Report:
Robot Monsters? Automation and the Evolution of Employment
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Overview of the Economy

Gross Domestic Product (GDP) is the dollar amount of final goods and services produced in a year. This is an important measure used in evaluating the overall health of a geographic area. The GDP for the U.S. in current dollars was $17,600 billion or $17.6 trillion in 2014. Moreover, the U.S. economy expanded at a modest 2.2 percent rate in 2014.

According to the U.S. Bureau of Economic Analysis (BEA), Wisconsin's Real GDP was $269 billion in 2014. The term real GDP refers to GDP that has been adjusted for inflation. The BEA statistics indicate that Wisconsin's economy grew by just 1.0 percent last year. Needless to say this is a very disappointing result.

There were only 16 states that grew more slowly than Wisconsin: Alabama, Alaska, Arkansas, Connecticut, Indiana, Hawaii, Iowa, Maine, Maryland, Mississippi, Missouri, Nebraska, New Jersey, South Dakota, Vermont, and Virginia. Further, there are 3 states growing at the same 1.0 percent rate as Wisconsin: Kentucky, New Mexico, and Nevada. This means 30 of the 50 states grew more rapidly than what Wisconsin did in 2014.

Why is an expanding state GDP important? Most obviously, good jobs and higher income levels are tied to economic growth. Less obvious, is that slow GDP growth means a state will have fewer resources available to deal with its problems. Funding for education, healthcare, transportation, environmental initiatives, etc. are much more difficult to address when you have a stagnant, slow growing economy. Fewer resources mean that a state will have to make some hard decisions like cutting valuable programs, raising tax rates and user fees, and borrowing more money to pay for programs. Therefore, economic growth, or the lack thereof, should be a concern for all citizens.

Employment statistics also suggests that Wisconsin trailed much of the U.S. in terms of the economic recovery. The U.S. Bureau of Labor Statistics reports that Wisconsin finally surpassed its prerecession employment level. In June 2007 total nonfarm employment in Wisconsin was 2,887,000; in March of 2015 it finally reached 2,890,000. Taking approximately eight years to get back to the prerecession level of employment ranks this recovery as one of the slowest in the state's history.

According to the U.S. Bureau of Labor Statistics, the unemployment rate in the state peaked at 9.2 percent in December 2009. This is shortly after the start of the Great Recession. However, it was not until April 2015 the rate came back down to 4.4 percent, the same unemployment rate that existed in April 2008. Thus, it took approximately seven years to bring the unemployment rate down to prerecession levels.

Real median household income (RMHI) data for Wisconsin is calculated by the U.S. Bureau of the Census. Inflation adjusted data is a better indicator of household well-being because they take into account price level changes. The RMHI in our state topped out in 1999 at an inflation adjusted $63,844. By the start of the Great Recession in 2008, the RMHI had already declined to $53,934. In 2013 (the most recent data available), the estimated Wisconsin's RMHI rose to $55,258. Thus, over the past 14 years real household income in the state has declined by 13 percent. The state's anemic economic performance has created a great deal of financial hardship for Wisconsin families and state finances.

To understand why real incomes have declined, we need to take a look at manufacturing employment in Wisconsin. The U.S. Bureau of Labor Statistics data indicates that Wisconsin manufacturing employment peaked in February 2000 at 598 thousand jobs. A downward trend in this sector was well underway even before the Great Recession started. In January 2008, just before the start of the recession, employment in this relatively high paying sector was already down to 499 thousand. Once the recession took hold, manufacturing employment plunged and bottomed out in July 2009 at 425 thousand.

From the peak in 2000 to the trough in 2009, manufacturing employment in Wisconsin declined by approximately 30 percent! If we look at May 2015 data we see that manufacturing has made a comeback of sorts rising to 472,600 jobs, but it is still 21 percent below peak employment. Moreover, few analysts think that this sector will ever be as important as is once was to the state economy.

The decline of the manufacturing sector and other factors have impacted the middle class in our state. For example, the Pew Charitable Trusts performed a state by state study on the middle class. From 2000 to 2013 Wisconsin's middle class contracted more than any other state in the nation! The middle class in Wisconsin contracted from 54.6 percent of Wisconsin households to 48.9 percent of state households, a decline of 14 percent. The decline of

the manufacturing sector, the lingering effects of the recession, overseas competition, automation, the decline of labor unions, and ineffectual government policies have all played a role in this disturbing trend and contributed to the financial hardship of Wisconsin families.

How has the national economy performed? The employment data cited for the U.S. is from the U. S. Bureau of Labor Statistics and compares seasonally adjusted data from mid- 2009 (the deepest part of the Great Recession) to today (August 2015).

The U.S. civilian labor force has expanded from about 155 million to 157 million during this period, a 1.3 percent increase. Also, total employment in the U.S. has expanded from about 140 million to 148 million over the same time span, a 5.7 percent increase. Moreover, the employment to population ratio was about 58 percent at the worst part of the recession and now stands at about 59.5 percent. There has been improvement in these numbers, but the pace of the national recovery has been slow by historic standards.

In addition, nonagricultural wage and salary employment grew from 129 million to about 137 million over the same period (or by only 5.8 percent). Further, the ratio of part time workers to total employment has dropped from approximately 20 percent to 18 percent. For comparison purposes before the recession started in late 2007, the ratio stood at 17 percent. Moreover, the number of people employed on a part time basis for economic reasons was 9 million at the end of the recession; now that figure stands at 6.5 million. To put this in perspective please consider that just before the recession started, there were 4.5 million people employed on a part time basis for economic reasons.

To summarize, Wisconsin's economic performance has trailed that of most other states. Further, the U.S. economic recovery has been one of the slowest on record. The last recession was unique because the financial crisis precipitated economic distress. Recessions caused by irregularities in the financial system create conditions that make robust recoveries very difficult. Fierce international competition, the revolution in automation & technology, and ineffectual government policies have created strong head winds that have diminished employment and income growth in the state and nation. Table 1 gives the most current national economic statistics.

TABLE 1 NATIONAL ECONOMIC STATISTICS	2014 Third Quarter	2015 Third Quarter	Percent Change
Nominal Gross Domestic Product (Billions)	$17,535.4	$18,034.8	+2.8
Real Gross Domestic Product (Billions of 2000 $)	$16,150.6	$16,394.2	+1.5
Industrial Production (2002 = 100)	105.1	107.1	+1.9
Three Month U.S. Treasury Bill Rate	0.02%	0.02%	0
Consumer Price Index(1982-84 = 100)	238.0	237.9	-0.0

Central Wisconsin

The unemployment rate in each county is displayed in Table 2. Marathon, Portage, and Wood County all experienced decline in their unemployment rates' from a year ago. The respective September rates for Portage, Marathon, and Wood are now down to 3.4, 3.2, and 4.1 percent in September 2015. The labor force weighted unemployment rate for Central Wisconsin also contracted, and is now 3.5 percent. Meanwhile, Wisconsin's unemployment rate declined from 4.7 to 3.6 percent since September 2014. Thus, the unemployment rates were much improved throughout the region and state. The United States unemployment rate also fell from 5.7 percent to 4.9 percent over the past 12 months.

TABLE 2 UNEMPLOYMENT RATE CENTRAL WISCONSIN	Unemployment Rate September 2014	Unemployment Rate September 2015	Percent Change
Portage County	4.4%	3.4%	-23.2
City of Stevens Point	4.3%	3.5%	-18.6
Marathon County	4.3%	3.2%	-25.4
Wood County	4.9%	4.1%	-15.5
Central Wisconsin	4.5%	3.5%	-22.2
Wisconsin	4.7%	3.6%	-22.8
United States	5.7%	4.9%	-15.3

Employment figures in Table 3 are based on the government's survey of households. Portage County's total employment figure rose by 300 positions and total employment in Wood County fell by about 4,400 jobs over the past year. Meanwhile, Marathon County payrolls are estimated to have grown by 300 positions over the past twelve months. Central Wisconsin as a whole experienced an employment decline of about 4,000 positions. Jobs in the region contracted from 144.2 to 140.4 thousand (or by 2.7 percent). This survey of households also shows that Wisconsin's

TABLE 3 EMPLOYMENT CENTRAL WISCONSIN	Total Employment September 2014 (Thousands)	Total Employment September 2015 (Thousands)	Percent Change
Portage County	37.7	38.0	+0.8
City of Stevens Point	14.4	14.1	-2.0
Marathon County	69.7	70.0	+0.4
Wood County	38.8	32.4	-12.0
Central Wisconsin	144.2	140.4	-2.7
Wisconsin	2,952.4	2,967.2	+0.5
United States	146,941	148,979	+1.4

* Percent change figures reflect data before rounding

payrolls increased by just 0.5 percent. The nation gained 1.4 percent or about 2.03 million jobs over the same period.

Table 4 gives the most recent employer-based payroll numbers for Wisconsin. Economists believe that nonfarm employment numbers, which are based on employer-provided data, give a more accurate assessment of the labor market conditions than household survey data. From September 2014 to September 2015, Wisconsin's total nonfarm employment expanded from 2.87 million to 2.92 million; a gain of 50 thousand jobs (or 1.8 percent). Unlike a year ago when only handful of the state's industrial sectors expanded, almost all sectors recorded gains in employment over the last year. Data shows that the rate of job generation continues to be very modest in our state, and lacks the job growth rates of our neighbor states.

TABLE 4: WISCONSIN EMPLOYMENT CHANGE BY SECTOR	Employment September 2014 (Thousands)	Employment September 2015 (Thousands)	Percent Change
Total Nonfarm	2868.0	2919.9	+1.8
Total Private	2459.6	2505.7	+1.9
Natural Resources and Mining	4.4	4.3	-2.3
Construction	112.7	114.6	+1.7
Manufacturing	473.8	473.5	-0.1
Trade, Transportation, and Utilities	523.0	531.2	+1.6
Information	47.8	50.7	+6.1
Financial Activities	150.7	155.5	+3.2
Professional and Business Services	311.0	317.2	+2.0
Educational and Health Services	431.0	442.0	+2.6
Leisure and Hospitality	272.6	280.7	+3.0
Other Services, exc. Public	138.4	136.0	-1.7
Government	408.4	414.2	+1.4

In Table 5, Portage County sales tax distributions were stronger this year than last, rising from $1,479 thousand in 2014 to $1,614 thousand in 2015, an increase of 9.1 percent. Marathon also experienced an increase in sales tax distributions from the state. Marathon rose from $2,962 thousand to $3,101 thousand (or by 4.7 percent). Unfortunately, Wood County collections contracted from $1,988 to $1,516 thousand (or by about 24 percent) over the course of the past year. The retail data shows an improvement in business activity for most of Central Wisconsin.

TABLE 5 COUNTY SALES TAX DISTRIBUTION	2014 Third Quarter (Thousands)	2015 Third Quarter (Thousands)	Percent Change
Portage County	$1,479.8	$1,614.7	+9.1
Marathon County	$2,962.1	$3,101.7	+4.7
Wood County	$1,988.1	$1,516.3	-23.7

* Percent change figures reflect data before rounding

The CWERB's survey of area business executives is reported in Table 6. The mark of 53 means this group believes that recent events at the national level have led to almost no improvement in the country's economic condition. More importantly, they believe the local business climate has improved over the past twelve months, i.e. a response level of 65. When they were asked to forecast economic conditions at the national level, they were more optimistic about the future of the economy than in the recent past. They expressed similar levels of optimism for the local economy, and for their particular industry, (i.e. marks in the 65 to 70 range). Overall, Table 6 also shows that the level of optimism expressed about the economy was mixed when we compare September 2015 to September 2014.

TABLE 6 BUSINESS CONFIDENCE	Index Value September 2014	Index Value September 2015
Recent Change in National Economic Conditions	61	53
Recent Change in Local Economic Conditions	61	58
Expected Change in National Economic Conditions	61	63
Expected Change in Local Economic Conditions	64	65
Expected Change in Industry Conditions	64	70

100 = Substantially Better 50 = Same 0 = Substantially Worse

Figures 1 thru 7 give a historic overview of how the economy in Wisconsin has performed during the 2010-2015 time period. For example, Figure 1 shows the track record of Wisconsin total employment growth and the rebound that has taken place since 2010. In 2010, about 2.75 million people were employed and by mid-2015 the number of jobs reached to 2.9 million. The gain, while disappointing, represents an increase of approximately 150,000 jobs over the last five years, representing an average annual growth rate of about 1 percent.

Figure 1: Employment Level: WI

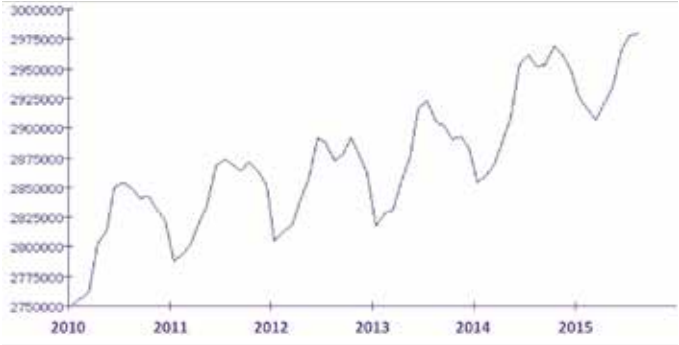


Figure 2: Unemployment Level: WI

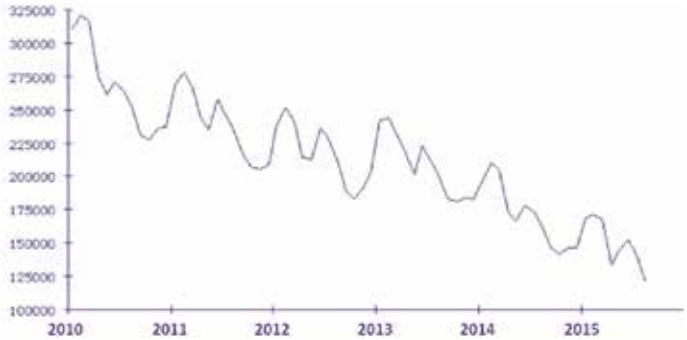


Figure 3: Unemployment Rate: WI

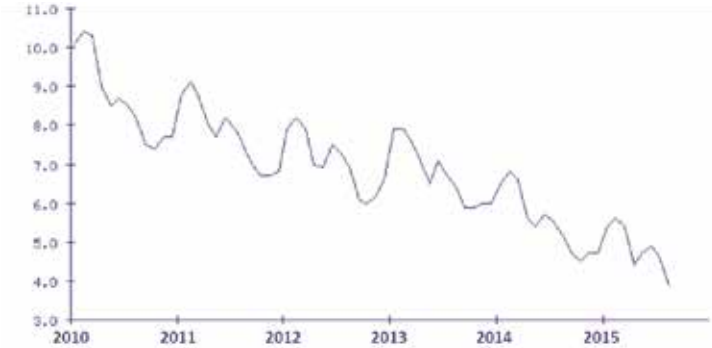


Figure 4: Labor Force: WI

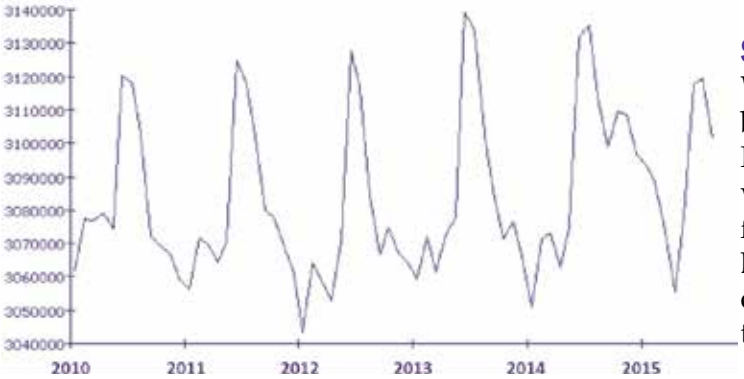


Figure 5: Manufacturing: WI

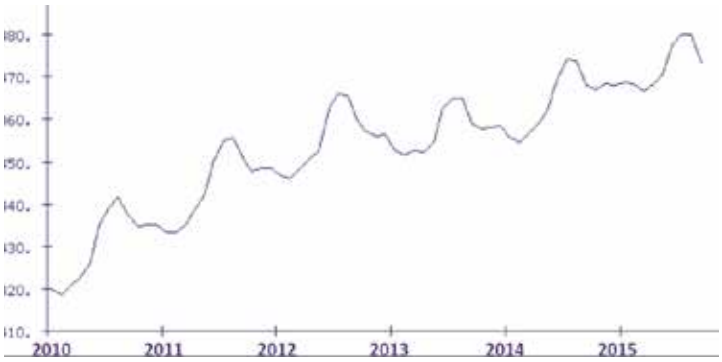


Figure 6: Education and Health Services: WI

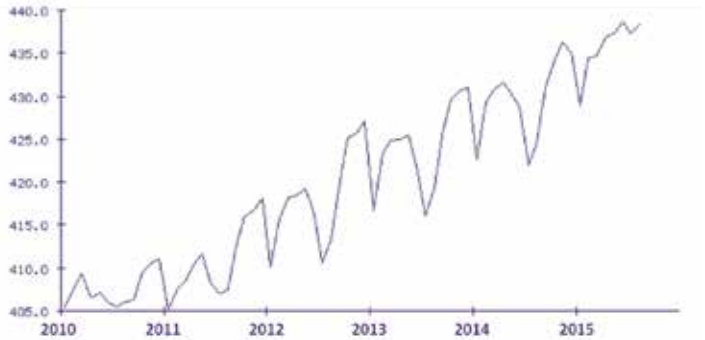


Figure 7: Leisure and Hospitality: WI, In Thousands

Stevens Point – Plover Area

We usually include Table 7, which gives employer based estimates of industrial sector employment in Portage County. However, at the time the report was written, the data for September was not available from the Wisconsin Department of Workforce Development. Hopefully these data will be available on a timely basis in the future and will be included in the next report.

In Table 8, the CWERB's retailer confidence survey mark of 75 means that merchants feel that store sales are much higher than they were one year ago. This is welcome news for the local economy. When it comes to expectations about the future, the September 2015 assessment of retail activity was higher than it was

TABLE 8 RETAILER CONFIDENCE STEVENS POINT - PLOVER AREA	Index Value September 2014	 September 2015
Total Sales Compared to Previous Year	65	75
Store Traffic Compared to Previous Year	63	66
Expected Sales Three Months From Now	65	72
Expected Store Traffic Three Months From Now	63	69

100 = Substantially Better 50 = Same 0 = Substantially Worse

in September 2014. Also, this group feels that retail activity for Christmas will be above 2014 numbers. The overall significance of the survey is that local merchants are seeing noticeable improvements in the local retail sector.

Table 9 Help Wanted Advertising is a barometer of local labor market conditions and the indexes are based on job advertising on the internet for Stevens Point, Wausau, Marshfield, and Wisconsin Rapids. The index for Stevens Point and Wisconsin Rapids rose by 20 percent and by 38 percent respectively when compared to a year ago. Marshfield's help wanted index rose by approximately 20 percent. Further, Wausau experienced a significant increase in the amount of advertising, rising by 51 percent. The data taken together suggests that advertising growth has increased in the area, and should lead to an improvement in the job market numbers. However, there is a caveat to the robust results. Table 9 numbers are most likely inflated because of a necessitated change in our data sources.

TABLE 9 HELP WANTED ADVERTISING	Index Value Third Quarter 2014	Third Quarter 2015	Percent Change
Stevens Point	962.33	1150.00	19.5%
Wausau	794.00	1195.75	50.6%
Marshfield	720.50	865.00	20.1%
Wisconsin Rapids	770.50	1062.00	37.8%
Lincoln County	759.83	1146.25	50.9%
Adams County	784.67	972.25	23.9%

For this report we have a new Table 10 and Table 11. The information contained in these tables comes from the U.S. Census Bureau. Table 10 contains a wide variety of economic and demographic data for Portage County and Wisconsin. Table 11 presents Portage County and Wisconsin business and geographic information. Together these tables give valuable insight into the economic and demographic structure of our county and state.

Table 10 Portage County and Wisconsin Demographics	Portage County	Wisconsin
Population, 2014 estimate	70,482	5,757,564
Population, 2010 (April 1)	70,019	5,687,289
Population, percent change- April 1, 2010 to July 1, 2014	0.7%	1.2%
Population, 2010	70,019	5,686,986
Persons under 5 years, 2014	5.0%	5.9%
Persons under 18 years, 2014	19.7%	22.6%
Persons 65 years and over, 2014	14.6%	15.2%
Female persons, 2014	49.8%	50.3%
White, 2014	94.6%	87.8%
African American, 2014	0.8%	6.6%
American Indian and Alaska Native, 2014	0.5%	1.1%
Asian, 2014	2.9%	2.6%
Two or more Races, 2014	1.3%	1.8%
Hispanic or Latino, 2014	3.0%	6.5%
Foreign born persons, 2009-2013	2.8%	4.7%
Language other than English spoken at home, pct age 5+, 2009-2013	6.2%	8.6%
High school graduate or higher, percent of persons age 25+, 2009-2013	92.1%	90.4%
Bachelor's degree or higher, percent of persons age 25+, 2009-2013	27.5%	26.8%
Veterans, 2009-2013	4,757	408,870
Mean time to work (minutes) 2009-2013	18.9	21.7
Housing units, 2014	30,363	2,648,317
Homeownership rate, 2009-2013	68.6%	68.1%
Housing units in multi-unit structures, 2009-2013	22.8%	25.4%
Mean value of owner-occupied housing units, 2009-2013	$145,600	$167,100
Households, 2009-2013	$27,975	$2,288,332
Persons per household, 2009-2013	2.38	2.43
Per capita money income, 2009-2013	$24,972	$27,523
Median household income, 2009-2013	$50,996	$52,413
Persons below poverty level, 2009-2013	13.7%	13.0%

Source: U.S. Census Bureau

Table 11 Portage County and Wisconsin Business and Geographic Data	Portage County	Wisconsin
Private nonfarm establishments, 2013	1,615	137,983
Private nonfarm employment, 2013	28,001	2,401,032
Private nonfarm employment, percent change, 2012-2013	-0.3%	0.5%
Nonemployer establishments, 2013	3,647	335,177
Total number of firms, 2007	5,022	433,797
Black-owned firms, 2007	2.0%	2.6%
American Indian and Alaska Native-owned firms, 2007	N/A	0.6%
Asian-owned firms, 2007	N/A	1.6%
Hispanic-owned firms, 2007	N/A	1.3%
Women-owned firms, 2007	25.8%	25.9%
Manufacurers shipments, 2007 ($1000)	$1,449,500	$163,563,195
Retail sales, 2007 ($1000)	$937,882	$72,283,321
Retail sales per capita, 2007	$13,685	$12,904
Accommodation and food services sales, 2007 ($1000)	97,014	9,247,311
Building permits, 2014	122	14,622
Land area in square miles, 2010	800.68	54,157.80
Persons per square mile, 2010	87.4	105.0
Metropolitan or Micropolitan Statistical Area	Stevens Point, WI Micro Area	

Source: U.S. Census Bureau

Another measure of the local economy is presented in Table 12. It shows that new unemployment claims contracted from 96 to 78 (or by 19 percent) over the year. Moreover, total unemployment claims dropped from 638 to 484 (or by 24 percent) in our year over comparison. This signals that the local economy may be gaining strength.

TABLE 12 UNEMPLOYMENT CLAIMS PORTAGE COUNTY	2014 Third Quarter (Weekly Avg.)	2015 Third Quarter (Weekly Avg.)	Percent Change
New Claims	96	78	-19.2
Total Claims	638	484	-24.2

Table 13 presents the residential construction numbers for the Stevens Point-Plover area. In our yearly comparison, the number of permits issued in Third Quarter was 29, slightly lower than the number of permits issued last year. The 2015 estimated value of the construction was $2.9 million and represents 15 housing units. When comparing Third Quarter 2014 to that of 2015, residential alteration activity expanded from 190 to 263 permits. Further, the estimated value of this type of activity went up from $1,607 thousand to $1,991 thousand. Overall, the 2015 construction data is off to a decent start when compared to last year's totals. The historically bad winter weather of 2014 surely played a role in suppressing last year's residential construction activity.

TABLE 13 RESIDENTIAL CONSTRUCTION STEVENS POINT - PLOVER AREA	2014 Third Quarter	2015 Third Quarter	Percent Change
Residential Permits Issued	32	29	-9.4
Estimated Value of New Homes	$8,448.2 (thousands)	$2,954.0 (thousands)	-65.0
Number of Housing Units	37	15	-59.5
Residential Alteration Permits Issued	190	263	+38.4
Estimated Value of Alterations	$1,607.3 (thousands)	$1,991.6 (thousands)	+23.9

The nonresidential construction figures in Table 14 are as follows for the Third Quarter 2015. The number of permits issued was 12 and the estimated value of this activity was $8 million, compared to $1.8 million in 2014. The number of business alteration permits was 65 in 2015 and was 81 in 2014. The estimated value of alteration activity was $1.3 million in 2015; contrast that with the 2014 figure of $2.9 million. In sum, the differing paces of activity in this table paint a mixed picture of the area.

TABLE 14 NONRESIDENTIAL CONSTRUCTION STEVENS POINT - PLOVER AREA	2014 Third Quarter	2015 Third Quarter
Number of Permits Issued	4	12
Estimated Value of New Structures	$1,810.5 (thousands)	$8,081.2 (thousands)
Number of Business Alteration Permits	81	65
Estimated Value of Business Alterations	$2,937.8 (thousands)	$1,295.0 (thousands)

* Includes Stevens Point, Village of Plover, and the Towns of Hull, Stockton, Sharon, and Plover.

Figures 8 thru 11 on the following page give an economic history lesson as to how the employment level, the unemployment level, the unemployment rate, and the labor force have trended over the past five and a half years in Portage County. Please note the data for the charts range from January 2010 to mid-2015. The figures clearly show the influence of the great recession on the area local economy, and supplement the report's year over year comparisons. This allows the short-term fluctuations in the economy to be judged more properly.

Figure 8: Employment Level: Portage

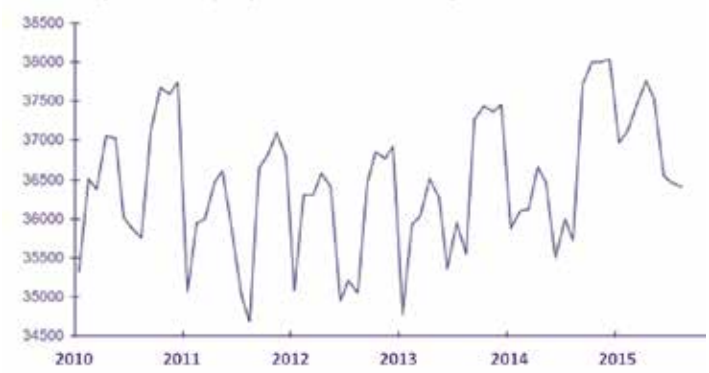


Figure 9: Unemployment Level: Portage

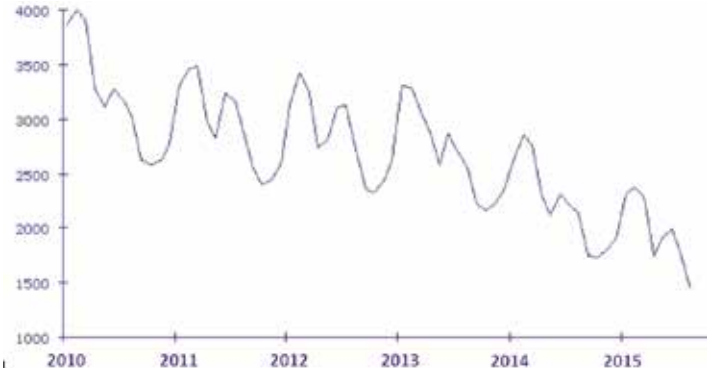


Figure 10: Unemployment Rate: Portage

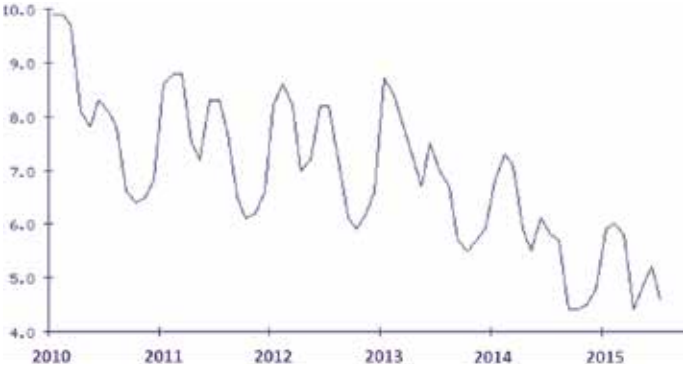
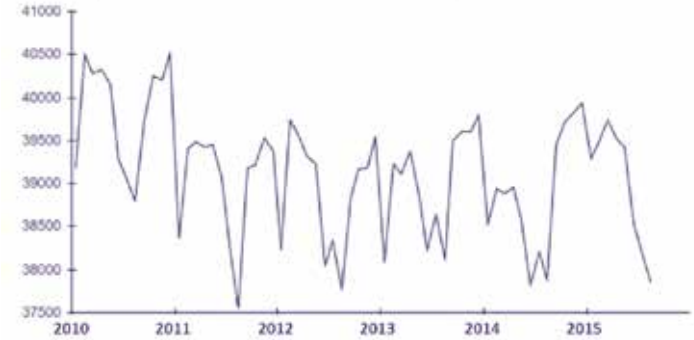


Figure 11: Civilian Labor Force: Portage



Housing Market Information

The following seven tables contain information on the national, regional, and local housing market. Housing activity is an incredibly important aspect of the economy. We believe this section of the report will give the reader valuable insight into housing markets conditions, and into the local economy.

Table 15 gives national median home prices for the U.S. and major regions in the U.S. The median home price in the U.S. rose to $221,100 in September 2015. Housing prices in the Midwest, as always, are the lowest in the nation. The median home price in our part of the country rose from the $163,200 in 2014, to $174,400 in 2015. In general, housing prices are rising in all geographic regions. The West has the highest median home prices at $318,100.

TABLE 15 NATIONAL MEDIAN HOME PRICES	THIRD QUARTER 2015				
	U.S	NORTHEAST	MIDWEST	SOUTH	WEST
2010	$173,000	$243,500	$141,699	$150,100	$215,100
2011	166,100	237,500	135,400	144,200	201,300
2012	176,800	237,700	142,700	154,000	230,100
2013	197,100	249,100	154,600	170,700	273,100
2014	208,300	252,700	163,200	179,300	291,800
September 2015	221,900	256,500	174,400	191,500	318,100

Table 16 National and the Midwest existing home sales data shows a noticeable increase in sales activity over the past year. In the Midwest, 1.3 million homes are forecasted to be sold in 2015. For the Midwest, the preliminary estimate for 2015 is that about 170 thousand more homes will be sold than in 2014. In 2014 the number of home sold in the Midwest bottomed out at 1.14 million units.

TABLE 16 NATIONAL EXISTING HOME SALES	THIRD QUARTER 2015				
	U.S	NORTHEAST	MIDWEST	SOUTH	WEST
2010	4,908,000	817,000	1,076,000	1,861,000	1,154,000
2011	4,260,000	540,000	910,000	1,680,000	1,130,000
2012	4,660,000	590,000	1,070,000	1,840,000	1,160,000
2013	5,090,000	660,000	1,200,000	2,050,000	1,190,000
2014	4,940,000	640,000	1,140,000	2,050,000	1,100,000
September 2015p *Annualized Basis	5,550,000	760,000	1,310,000	2,210,000	1,270,000

The national inventory of homes is given in Table 17. As of September 2015, the inventory backlog is estimated to be 4.8 months. In 2010 the national supply of homes was 9.4 months. Thus, a great deal of improvement has taken place in reducing the housing inventory number. The statistics indicate that the backlog of unsold houses has been reduced almost in half.

TABLE 17 NATIONAL INVENTORY	THIRD QUARTER 2015	
	INVENTORY	MONTH SUPPLY
2010	3,560,000	9.4
2011	2,320,000	8.3
2012	1,830,000	5.9
2013	1,860,000	4.9
2014	1,860,000	5.2
September 2015p	2,210,000	4.8

Table 18 presents the national affordability index. Over the years, very low interest rates and falling home prices have greatly improved the affordability of homes. However, in 2013 housing prices and interest rates started to trend upwards and reduced the affordability of homes. Although the index has been declining, the preliminary estimate for the

TABLE 18 NATIONAL AFFORDABILITY INDEX	THIRD QUARTER 2015						
	MEDIAN PRICED EXISTING SINGLE FAMILY HOME	MORTGAGE RATE	MONTHLY P & I PAYMENT	PAYMENT AS A % OF INCOME	MEDIAN FAMILY INCOME	QUALIFYING INCOME	COMPOSITE
2011	168,200	4.67	687	13.6	60,831	32,976	184.5
2012	177,200	3.83	663	12.7	62,527	31,824	196.5
2013	197,400	4.00	754	14.1	64,030	36,192	179.9
2014	208,900	4.31	828	15.2	65,321	39,744	164.4
August 2015p	230,200	4.15	896	15.9	67,752	42,960	157.7

P&I = Principal and interest

Composite = measures affordability. For example for the year 2011, the index of 184.5 means a family earning the median family income has 184.5 percent of the income necessary to qualify for a conventional loan covering 80 percent of a median-priced existing single-family home.

affordability index in 2015 is still at a very good 157.7. The higher the index, the more affordable housing is for the typical family. This means that in 2015, a household earning at the median household income level has 157 percent of the income necessary to qualify for a conventional loan covering 80 percent of a medium-priced existing single-family home.

Table 19 displays data on state and local area median prices. In general, Wisconsin and local area home prices have been more stable than the national average. In Central Wisconsin, the lowest median home prices are found in Wood County at $101,200. Portage County has the highest median price at $139,900, and Marathon falls somewhere in between the other two counties, with a median home price of $135,900. By comparison, the median price of a home in Wisconsin is about $157,000 and $221,000 nationally. In addition, the preliminary data for 2015 suggests that the median price for a home in the local area and state are rising.

TABLE 19 LOCAL AREA MEDIAN PRICE	WISCONSIN	MARATHON	PORTAGE	WOOD
2012	$134,000	$115,550	$129,750	$94,000
2013	143,500	120,000	138,250	95,500
2014	148,000	125,000	137,500	96,200
2015r	157,000	135,900	139,900	101,200

Table 20 gives the number of local housing units sold from 2012 to 2015. The counties in our region have all experienced some stagnation in the number of units sold over this time period. Please note, the listed number of homes sold in 2015 only represents the January to September activity.

TABLE 20 LOCAL UNITS SOLD	WISCONSIN	MARATHON	PORTAGE	WOOD
2012	62,804	1,248	560	671
2013	69,744	1,424	618	726
2014	68,858	1,408	623	662
2015r	59,602	1,293	593	652

Tables 21 and 22 present the changes that have taken place in the local median prices and units sold, and compares Third Quarter 2014 to Third Quarter 2015. In Table 21 we see an increase in local median home prices has taken place in Marathon and Wood Counties. A slight decline was registered in Portage County home prices. In Table 22, the number of housing units sold in Wood County increased by 37 percent over the year, while Marathon and Portage experienced home sales increases of 36 percent and 5.5 percent respectively.

TABLE 21 LOCAL MEDIAN PRICE	Third QUARTER 2015		
	MARATHON	PORTAGE	WOOD
Third Quarter 2014	129,133	145,458	98,450
Third Quarter 2015	140,000	143,367	103,900
Percent Change	8.4%	-1.4%	5.5%

TABLE 22 NUMBER OF HOME SALES	Third Quarter 2015		
	MARATHON	PORTAGE	WOOD
September 2014	107	59	52
September 2015	146	62	71
Percent Change	36.4%	5.1%	36.5%

What's New in Regional and Wisconsin Entrepreneurship?

UWSP Small Business Development Center
Vicki Lobermeier, SBDC Director of Entrepreneurship Activities
Mary Wescott, SBDC Counseling Manager

Do you know any companies who are considering government procurement? It is an option for some companies. The WI SBDC network has an advisor who can help. If you currently sell to a government entity and want to increase those sales, or if you think your business is a good candidate for procurement, contact the SBDC at UW Stevens Point.

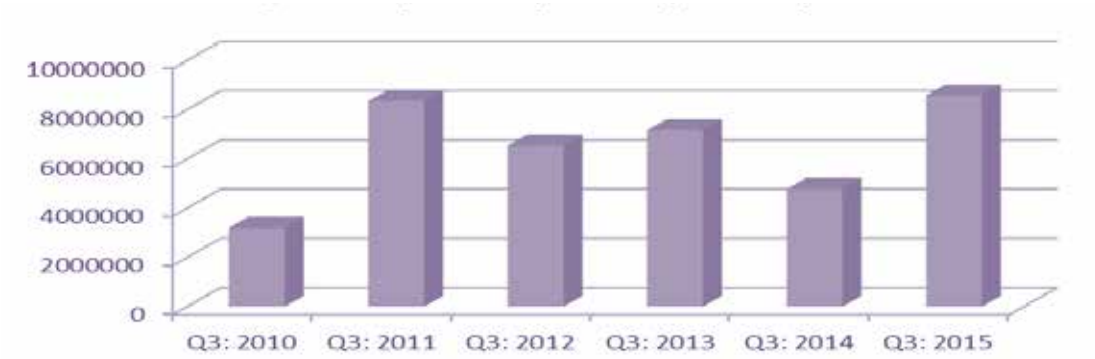
The state of Wisconsin recently launched an easy step-through process where Wisconsin's businesses can find the requirements and tools they need to start a business in Wisconsin. Wisconsin One Stop Business Portal https://uatapp.wi.gov/OSB/Home. Before beginning the registration process, entrepreneurs will need to have made decisions on legal entity, insurance, and have a solid business plan. The SBDC has the resources to assist with business planning and decision-making.

Centergy, the Central Wisconsin Alliance for Economic Development, recently hosted a legislative listening session at the Central Wisconsin Airport for economic development stakeholders including municipal leaders, chambers of commerce, and individuals interested in business development. The area was well represented, and legislators interacted with the audience on a variety of economic issues including transportation, work force readiness, tourism, and many more issues affecting the region's economy.

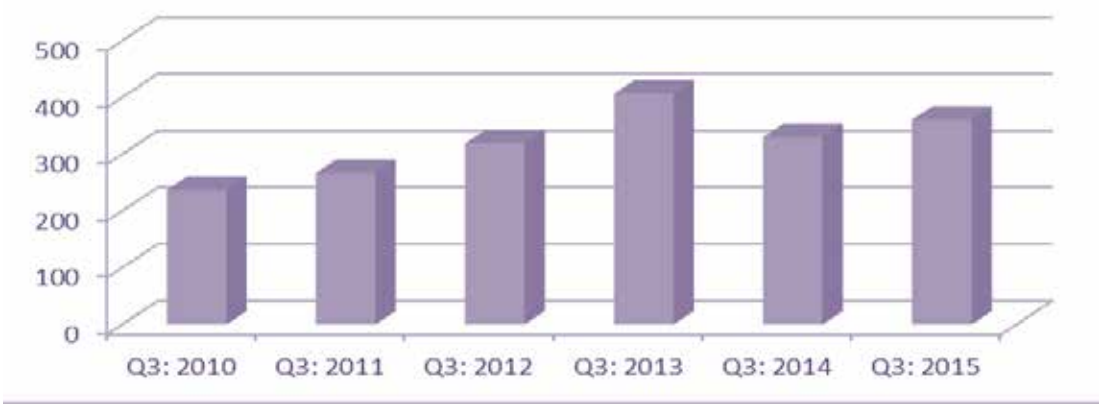
This fall the Wisconsin Institute for Sustainable Technology held its annual conference at UW Stevens Point, and hosted paper and packaging professionals from throughout the United States. Presenters talked about the leading trends in consumer awareness for sustainability in packaging for a variety of food businesses. Presenters discussed technical innovations in packaging, the value of sustainable packaging, and other sought-after consumer trends including authenticity, convenience, and simplicity.

According to the Kauffman Foundation's 2015 report on startup activity in the U.S., people ages 45-64 are becoming entrepreneurs at a faster rate than those ages 20-34. Other interesting data tracked by the foundation includes the number of entrepreneurs who say they started their business because they saw market opportunity. These entrepreneurs were not unemployed at the time of the business startup. In Wisconsin, in the 2015 report, 71.2% of entrepreneurs say they started their business because they saw opportunity, and not because it was an option to unemployment. Details on the Wisconsin report can be found here www.kauffman.org/microsites/kauffman-index/profiles/state?State=Wisconsin.

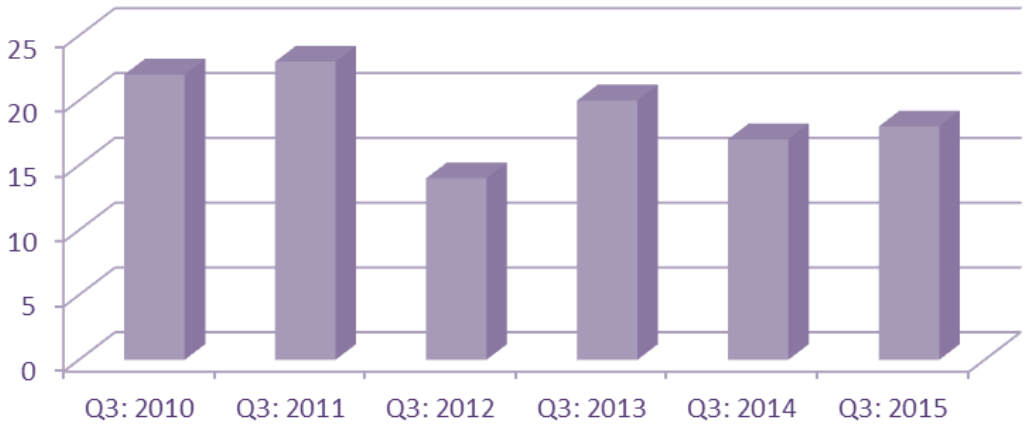
Total SBA Loan Amount Compared Q1 2010, 2011, 2012, 2013, 2014, 2015



Total Business Starts Compared Q1 2010, 2011, 2012, 2013, 2014, 2015



Total Number of SBA Loans Compared Q1 2010, 2011, 2012, 2013, 2014, 2015



Robot Monsters?
Automation and the Evolution of Employment

by Professor Scott Wallace, Ph.D. and Professor Jerome Segura III, Ph.D.
UW-Stevens Point School of Business and Economics

Introduction

Automation is defined as "the use of largely automatic equipment in a system of manufacturing or other production process" (Google.com, 2015). Automation, by definition, implies a reduced role for human beings in the production process. Academics, authors, and futurists have famously speculated on the long-term economic and social impacts of automation. Writing during the depths of the Great Depression, John Maynard Keynes presented an optimistic view, predicting that technical improvements in production would lead to a significant rise in standards of living over the next one-hundred years. In addition, Keynes conjectured that most laborers would work only fifteen hours per week and that the main societal challenge would be how to make the best use of the extra leisure time (Keynes, 1930). In the novel, Player Piano, Kurt Vonnegut portrayed a future where engineers and managers dominate political and economic life after mechanization replaced the need for most workers. In his critique of modern industrial life, Vonnegut pointed to the sense of purposelessness and alienation resulting from an absence of a work life (Vonnegut, 1952). Karl Marx theorized that laborsaving technical change would create a "reserved army of the unemployed," thereby leading to the increasing immiseration of the working class. Only after an overthrow of the capitalist system would workers be able to share in the fruits of the technological advances implemented by capitalists (Mokyr, et al., 2015, 32).

As the late, great Yogi Berra once said, "the future ain't what it used to be." History is usually unkind to prognosticators and the above examples are no exception. While Keynes was "spot on" regarding rising standards of living, his prediction of three hour workdays certainly wasn't. Marx's prophetic claims of chronic unemployment because of automation were spectacularly wrong. It seems that Kurt Vonnegut's fears of a world without work were unfounded after all. The historical record indicates that the widespread adoption of laborsaving technology has actually increased aggregate employment in the long-run. What these new technologies do is displace workers, forcing them to find alternative ways to make a living, often at lower pay. The human costs of these disruptions are often quite significant.

This report summarizes the impact of automation on the composition of occupational employment in the United States over the last three decades. Automation over this period consisted largely of computer-based information and communication technologies (ICT) and robotics. Investments in these technologies have increased significantly over the last half-century. "The share of information processing equipment and software in private, non-residential investment rose from approximately 8 percent to more than 30 percent between 1950 and 2012, with the largest leap occurring between 1990 and 2000" (Autor, 2014, 1). We begin by looking at the historical record in assessing the effects of automation on aggregate employment. Next, we examine how automation has contributed to job polarization in the United States over the last 35 years. Specifically, automation has reduced the number of "middle skill" jobs while bolstering the number of both low- and high-skilled jobs. Then we compare and contrast the evolving employment situation in both Wisconsin and Central Wisconsin to national trends. In addition, we speculate on the potential impact of recent automation and more sophisticated forms of artificial intelligence. Lastly, we conclude with a discussion about the societal challenges and policy implications posed by automation of the manufacturing sector.

Automation and Technological Unemployment

In describing the economic effects of automation on the labor force, social commentators tend to focus on how technologies take over tasks traditionally performed by workers. While the adoption of these devices displaces certain kinds of workers, understanding their impact on aggregate employment requires a more robust economic analysis. Economic historians have shown that, in prior eras, automation has contributed to long-term increases in employment and higher standards of living. Here, we take a brief look at the historical experience of the textile industry during the British industrial revolution in the 19th century.

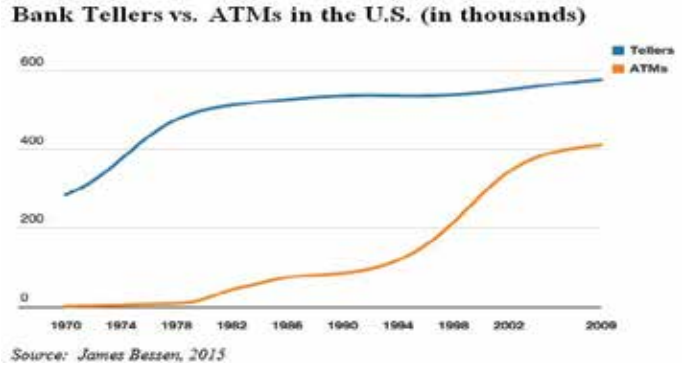
Innovations such as the power loom and spinning jenny in the 18th century transformed the production of textiles, ultimately leading to the relocation of production from households to factories. By doing tasks normally done by weavers, the power loom effectively reduced 98 percent of the labor needed in weaving a yard of cloth (Bessen, 2015). The "invention of the power loom in 1787 increased productivity over the hand loom not only because it could weave faster (by the mid-1820s, at any rate) but because a single person, who was no longer providing the motive power, could operate more than one loom" (Langlois, 2003, 175). The Luddites, a group of handloom weavers, famously destroyed a number of these machines to protest the increased use of the power loom.

While Karl Marx focused on the dislocation of weavers and spinners during this period, he failed to appreciate the impact of automation on the demand for other activities connected with the production of cloth. In other words, automation substitutes for work performed by some laborers and simultaneously complements the skills of others. The introduction of the power loom and spinning jenny, for example, spurred an increase in the demand for labor, particularly for "mechanics to fix new machines . . . supervisors to oversee the new factory system and accountants to manage enterprises operating on an unprecedented scale" (Mokyr et al., 2015, 36). In addition, automation led to labor shortages of highly skilled workers needed to operate these new machines. Workers responsible for tending the power loom, for example, performed a greater number of tasks than workers operating handlooms (Langlois, 2003, 175). In the event that newly created occupations are novel and more complex, then labor markets will likely lack the appropriately skilled workers required to fill these positions. This certainly was true when power looms were initially introduced in the 1800s (Bessen, 2015, 19).

Economic historians have identified a number of secondary effects of technological innovation on employment. The productivity gains in the production of textiles ultimately translated into lower cloth prices for consumers. The increase in purchasing power attributed to lower prices allowed consumers to purchase, among other products, more clothes, and subsequently bolstered employment not only in the textile industry but also in the aggregate economy (Bessen, 2015). Machine shops that initially specialized in the production and repair of textile equipment eventually evolved into a machine tool sector that further supported growth in other emerging industries like firearms, locomotives, farm machinery, and sewing machines (Rosenberg, 1963). "[T]echnological progress also took the form of product innovation and thus created entirely new sectors for the economy…"(Mokyr, et al., 2015, 36).

Alternatively, suppose we look at the growth of automated teller machines (ATMs) and changes in the number of bank tellers over the last forty years. At first, one might expect that the automation of bank transactions would have a direct and negative effect on the number of bank tellers. The figure below tells a different story: observe that both the number of ATMs and the number of bank tellers have increased during the period.

Figure 1



Given the similarities between the services provided by ATMs and bank tellers, this result seems paradoxical. There are however a number of explanations as to why ATMs failed to reduce the number of bank tellers. ATMs, for example, are unable to handle certain small business transactions that often entail large amounts of cash so there is still a need for bank tellers. ATMs, however, have effectively reduced the number of employees needed to operate a branch. With ATMs freeing up labor, banks have increasingly involved their tellers in tasks that go beyond just processing transactions; tellers as part of a bank's customer service team, are now actively involved in sale activities (Bessen, 2015, 107). Therefore, ATMs incentivized banks to open more branches by reducing branch-banking costs. Largely because ATMS increased the demand for other branch services, this period witnessed a dramatic expansion in the number of bank branches. In the long-run, "[t]he number of urban commercial bank branches increased 43 percent between 1988 and 2004, offsetting the decrease in employees per branch" (Bessen, 2015, 107).

The belief that technological progress leads to a

reduction in aggregate employment is known to economists as the "lump of labor" fallacy. This kind of thinking presumes that the amount of work is fixed and therefore, in terms of its effect on employment, technological progress is essentially a zero sum game (Autor, 2014, 2). In this sense it is important to remember that we live in a dynamic and innovative society wherein many of today's products (smartphones, electric cars, & Facebook) and jobs (mobile app developer, social media manager, admissions consultant, & market researcher data miner) simply did not exist fifteen years ago (Casserly, 2012).

Automation and Labor Market Polarization

In this section, we evaluate the impact of technological investments on occupational employment. As shown below, the amount of investment in information technologies and software (as measured as the percent of GDP) dramatically increased during the last half of 20th century, peaking at the height of the dot.com bubble in 2000.

Figure 2

Private Fixed Investment in Information Processing Equipment and Software as a Percentage of Gross Domestic Product, 1949–2014

Source: FRED, Federal Bank of St. Louis. http://research.stlouisfed.org/fred2/graph/?g=GXc (accessed 8/3/2014).

However, history indicates that automation has not reduced overall employment, but rather, by substituting for some workers' tasks and by complementing other workers' tasks, it has altered the composition of employment. In evaluating the changing division of work between machines and humans, it is important "to understand the different cognitive structures of humans and machines (including computers)"(Langlois, 2003, 167). Humans have a comparative advantage over machines in the "exercise of judgment in situations of ambiguity and surprise to more mundane abilities in spatio-temporal perception and locomotion." (Langlois, 2003, 167). Advances in computers and robotics have led to the creation of machines that have a comparative advantage in completing explicit and well-defined, sequential tasks. In other words, computers excel at following rules or algorithms. Economist David Autor describes the combined effects of these comparative advantages on labor markets.

> Human tasks that have proved most amenable to computerization are those that follow explicit, codifiable procedures – such as multiplication – where computers now vastly exceed human labor in speed, quality, accuracy, and cost efficiencies. Tasks that have proved most vexing to automate are those that demand flexibility, judgment, and common sense – skills that we understand only tacitly – for example developing a hypothesis or organizing a closet. The interplay between machine and human comparative advantage allows computers to substitute for workers in performing routine, codifiable tasks while amplifying the comparative advantage of workers in supplying problem solving skills, adaptability, and creativity. Understanding the interplay is central to interpreting and forecasting the changing structure of employment in the U.S. and other industrialized countries (Autor, 2014, 1).

In empirically testing the effects of automation on the occupational structure of the US labor market, David Autor (2015) uses Census data in tracking the percent change in employment for ten major occupational categories by decade. On the chart below, the ten occupational groups are located on the horizontal axis with low-skilled occupations on the left (personal care, food/cleaning, protective services), middle-skilled occupations (operators/laborers, production, office/administrative, & sales) in the middle, and high-skilled occupations on the right (technicians, professionals, & managers). The vertical axis shows the percent change in employment for each occupational group for the periods 1979-89, 1989-99, 1999-2007, and 2007-12. (Taking the log change in employment and multiplying by 100 is a method economists employ in estimating percentage changes).

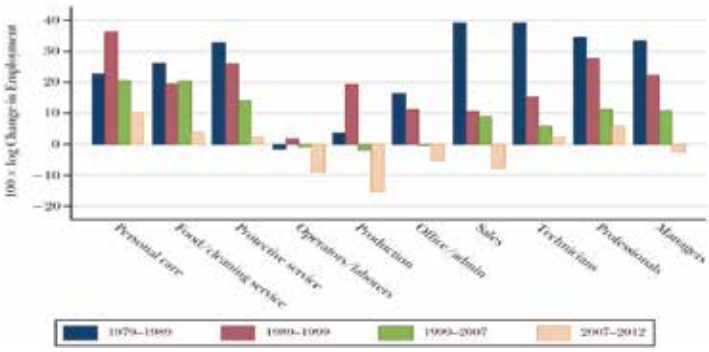
The following chart indicates that "the rapid employment growth in both high- and low-education jobs has substantially reduced the share of employment accounted for by 'middle-skill' jobs. In 1979, the four middle-skilled occupations accounted for 60 percent of employment. In 2007, this number was 49 percent, and in 2012, it was 46 percent" (Autor, 2015, 14). Other industrialized nations also

experienced a similar degree of job polarization over the period.

Figure 3

Change in Employment by Major Occupational Category, 1979–2012

(the y-axis plots 100 times log changes in employment, which is nearly equivalent to percentage points for small changes)



The growth of both high- and low-skilled jobs combined with the relative decline of middle-skilled jobs reflects the disparate impact of automation on employment. Low-skilled manual jobs that comprise food preparation, cleaning services, security guards, and personal care occupations require "situational adaptability, visual, and language recognition, and in-person interactions" and are therefore hard to automate (Autor, 2015, 12). Technicians, professionals and managers are high-skilled occupations that require communication skills, creativity, critical reasoning, and problem-solving capabilities. The abstract tasks required in these occupations are, thus far, difficult to automate.

As the costs of computing have declined over time, information and communication technologies increasingly have been substituted for labor in "performing routine tasks – such as bookkeeping, clerical work, and repetitive production and monitoring activities – which are readily computerized because they follow precise, well-defined procedures in the middle of the occupation skill and wage distribution" (Autor and Dorn, 2013, 1559). As shown in the previous chart, these middle-skilled occupations faced relative declines in employment over the last 35 years.

Information technology complemented workers who perform abstract tasks thereby increasing the growth of high-skill jobs, especially between 1979 and 1999. "By dramatically lowering the cost and increasing the scope of information and analysis available to them, computerization enables workers performing abstract tasks to further specialize in their area of comparative advantage, with less time spent on acquiring and crunching information, and more time spent on interpreting and applying it" (Autor, 2015, 15). These complementarities, however, were not responsible for the significant growth of low-skill, labor-intensive jobs whose share of total labor hours increased by 30 percent between 1980 and 2005. Computer-based technologies have had little impact, positive or negative, on the tasks associated with these kinds of positions. The growth in low-skill jobs is largely attributed to displaced workers moving from middle-income manufacturing to low-income service occupations. The manual tasks of service occupations require a high degree of physical flexibility and are therefore less amenable to computerization (Autor and Dorn, 2013).

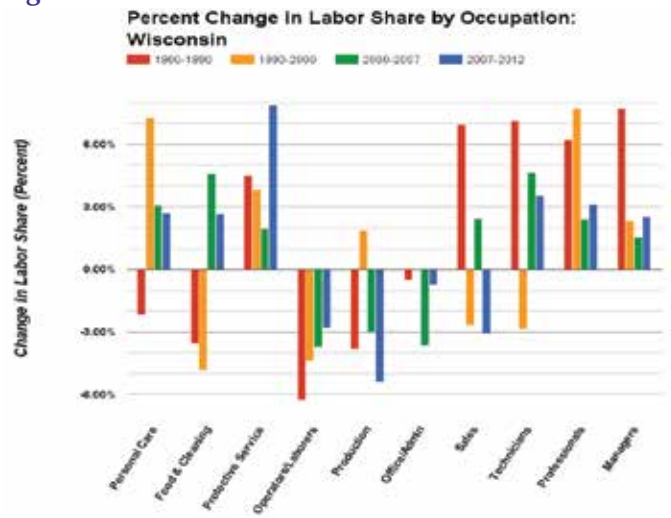
The figure above shows that the growth in high-skilled positions fell dramatically since 2000. MIT economist, David Autor, largely attributes this slowdown to the parallel decline in investment in computer technologies following the bursting of the dot.com bubble in 2000 and the financial crisis in 2008. Autor also points to rapid globalization and the emergence of China's manufacturing sector as economic factors that have contributed to job polarization, recognizing that advances in automation and information technologies have made it easier for firms to outsource production to other nations (Autor, 2015, 22).

The Wisconsin Experience

In contrast to the previous section, we evaluate the impact of automation on the relative changes in occupational employment measured as a share of total nonagricultural employment. Within a region, the occupational share of employment equals the ratio of the job count in a specific occupation to the aggregate number of jobs. In other words, our approach studies the occupational mix of the Wisconsin and Central Wisconsin labor sheds while internalizing the random fluctuations in the size of the labor sheds. The occupational employment procedures are otherwise identical to Autor (2015).

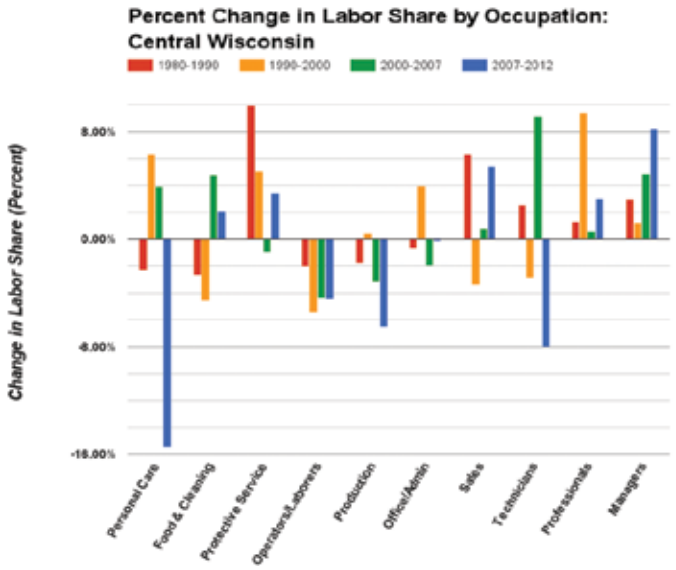
Figure 4 plots the percent change in the occupational shares of total non-farm employment approximated by the log difference times 100. Again, this is a method to estimate percentage changes. The three left columns are low-skill and low-pay occupations whereas the right three columns are the high-skill and high-pay occupations. Lastly, the middle four columns are middle-skill and subsequently middle-pay jobs. The figure below illustrates a pattern, similar to the national trend, of labor market polarization for the state of Wisconsin.

Figure 4



In evaluating the scope of labor market polarization, our analysis now shifts its focus to the employment situation in Central Wisconsin. The Central Wisconsin region includes the following counties: most notably Portage, Marathon, and Wood as well as Juneau and Adams to the south and Forest, Langlade, Lincoln, Oneida, and Vilas to the north. The construction of Figure 5 is identical to the previous figure.

Figure 5



The figure above continues to depict a pattern of labor market polarization in Central Wisconsin that is similar to the state and national trends. However, the growth rates appear to be increasingly volatile as the geographic scope of the analysis narrows. This is consistent with the notion that local market outcomes are, perhaps, more sensitive to randomness attributed to factors such as industry mix, public policy, and the regional economic environment.

In summary, both Figure 4 and Figure 5 suggest the share of middle-skill jobs is contracting while the low-skill and high-skill occupations account for larger shares of those employed. The most striking difference between the experiences in Wisconsin and Central Wisconsin relative to the national trend is significant reduction in certain occupations related to the manufacturing sector such as Operators, Laborers, and Production. This significant change in the composition of the state and regional employment base is almost certainly tied to the initial high concentration of manufacturing in the region relative to the national average.

Algorithm and Blues?

In his 1960 essay "The Corporation: Will It Be Managed by Machines?," Nobel-prize winning economist, Herbert Simon, boldly predicted that, in addition to replacing clerical and blue-collar jobs, automation would eventually substitute for higher-skilled, managerial jobs (Simon, 1960). Fifty five years later, the exponential growth in computation power, digitization, data storage, and computer performance is spawning innovations that can perform the abstract tasks of many high-skilled workers and the manual, sensimotor tasks of many low-skilled workers (Brynjolfsson and McAfee, 2015). Unlike traditional computer-based technologies, these new machines are capable of learning. Economists Carl Frey and Michael Osborne explain:

> While computerization has been historically confined to routine tasks involving explicit rule-based activities, algorithms for big data are now entering domains reliant upon pattern recognition and can readily substitute for labor in a wide range of non-routine cognitive tasks. In addition, advanced robots are gaining enhanced senses and dexterity, allowing them to perform a broader scope of manual tasks. This is likely to change the nature of work across industries and occupations (Frey and Osborne, 2013, 44).

IBM's Watson, which defeated human rivals in Jeopardy, and Google's autonomous, self-driving cars are perhaps the most famous examples of these new machines. There are, however, other examples of practical business applications being employed today. Below are just a few.

- "On-line investment services that provide automated, algorithm-based portfolio management advice have attracted millions

of investors over the past few years with low fees and minimum requirements. The so-called robo-advisors had an estimated $8 billion in assets under management as of July, a 34 percent increase from last year" (Anderson, 2015, 1)

- The company, Narrative Science, has created software capable of writing stories based upon data and other objective information. Their StatsMonkey program, for example, can produce short articles covering sporting events, using statistics as their source material. Forbes currently uses Narrative Science's technology to compose articles covering business, political, and sports topics (Ford, 2015, 84).
- Aethon, Inc. leases mobile robots to hospitals for delivery purposes. These machines "cruise the hallways in huge medical complexes delivering drugs, lab samples, patient meals, or fresh linens. The robots can navigate around obstacles and use elevators" (Ford, 2015, 154). By leasing 19 delivery robots in lieu of hiring workers, a California hospital estimated that it saves over $650,000 annually (Ford, 2015, 154).

Frey and Osborne (2013) estimate the probability of computerization of tasks for 702 occupation categories for the near future. The authors predict that 47% of job categories will be highly susceptible to automation over the next two decades. They stress that their analysis is based solely on the capabilities of computer-based technologies with respect to the tasks they are expected to perform; they do not predict which occupations will be automated (Frey and Osborne, 2013, 44). The decision to automate is an economic one based on numerous factors including relative labor and capital costs and the availability of complementary inputs and services.

According to Frey and Osborne, the jobs most susceptible to automation include transportation, logistics, construction, office, administrative support and labor in production occupations. In addition, robots with enhanced capabilities in mobility and dexterity will increasingly replace human workers in low-skill, service occupations, which had experienced the greatest amount of job growth over the last several decades (Frey and Osborne, 2013). Occupations least likely to be automated are ones requiring high levels of social intelligence, education, creativity, and are generalist in nature. These characteristics define most occupations in management, education, healthcare, science, engineering, and the arts. The authors find that "both wages and educational attainment exhibit a strong negative relationship with the probability of computerization" (Frey and Osborne, 2013).

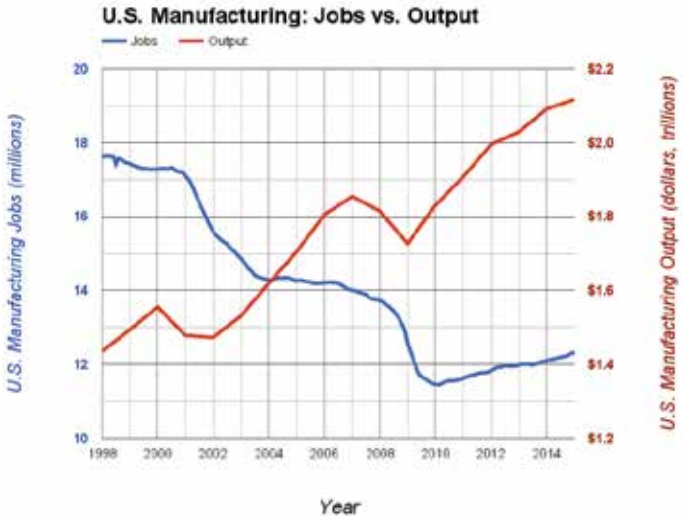
Frey and Osborne (2013) and Autor (2015) see our current era of labor polarization coming to an end. Middle skill jobs like nurse technicians, electricians, plumbers, and automotive mechanics that require problem-solving, interpersonal interaction, common sense, and adaptability will likely persist and not be affected negatively by automation (Autor, 2015, 25-6). Low-wage service workers will likely bear the brunt of automation with robots increasingly substituting for low-skill, manual occupations during the next few decades (Autor, 2013).

The sobering predictions of Frey and Osborne (2013) imply rising technological unemployment, especially for low-skill service workers. In terms of the overall impact on employment, their analysis is incomplete since it focuses solely on how automation substitutes for tasks performed in these occupations. The authors do not assess how these technologies complement the skills of workers in other occupations. Unfortunately, the effects of automation on complementary tasks are harder to predict (Autor, 2015, 26). If history is any guide, technological progress will continue to increase the demand for laborers who can work in tandem with these machines. It is also hard to predict the impact of technological progress in creating new industries and jobs that currently do not exist. In their book, *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*, Economists Erik Brynjolfsson and Andrew McAfee believe that the current wave of technological advances will significantly increase the variety, quality, and quantity of goods and services, all of which will be produced at rapidly falling cost (Brynjolfsson and McAfee, 2015, 12). This economic bounty, in the long-run, will generate a dramatic expansion of employment opportunities. The challenge will be in providing displaced workers with the appropriate skills to take full advantage of these opportunities so that they are both contributing to and sharing in the economic bounty.

Automation and Employment in the Manufacturing Sector

Perhaps no sector of the economy better illustrates the impact of automation on employment than the manufacturing sector. The graph below shows the number of manufacturing jobs and the dollar value of manufacturing output in the United States from 1998 to 2014.

Figure 6



Despite manufacturing jobs declining by about a third over that time period, output increased in value from 12.5 to 19.0 trillion dollars. The productivity gains from automation mean that a lot more output can be produced with far fewer workers. The above graph clearly demonstrates how automation substitutes for the tasks of some production workers.

Another statistic reveals the impact of automation on the changing nature of work in manufacturing. According to Manpower, there were approximately 600,000 unfilled US manufacturing jobs in 2013. "Most of these jobs are for skilled production workers in roles like machinists, craft workers, distributors and technicians. These jobs require extensive training and are difficult to fill" (Davenport, 2013, 2). The high number of unfilled jobs demonstrates how automation can increase the demand for skilled workers who complement these new technologies.

In Wisconsin, the manufacturing sector employs more people than any other sector. Wisconsin "is home to 9,400 manufacturers employing over 450,000 workers, which is nearly 17% of the state's workforce" (Schmid, 2014). The graph below shows the number of jobs and manufacturing output from 1998 to 2014 for the state of Wisconsin. Like the nation, the state has experienced a dramatic decline in the number of manufacturing jobs, though there has been a modest rebound since 2010. Except for the sharp decline in output during the great recession, manufacturing output has continued to rise despite the decrease in the number of workers.

Figure 7

Wisconsin manufacturers similarly have had difficulty finding qualified people to fill vacancies for high-skilled positions. For 2013, Wisconsin manufacturers "posted 891 openings for mechanical engineers ... compared to 780 openings for software developers" (Schmid, 2013).

The confluence of technological unemployment and job vacancies in the manufacturing sector poses challenges for policymakers in addressing skill mismatches. As David Autor has observed, "human capital investment must be at the heart of any long-term strategy for producing skills that are complemented by rather than substituted for technological change" (Autor, 2015, 27). Time is a major obstacle to meeting the new skill needs. There is often a significant lag between the introduction of a new technology and its widespread application. Economist James Bessen explains that "[i]t takes time for technical knowledge to be developed, longer for it to spread, and even longer for institutions to emerged, such as labor markets that allow ordinary workers to benefit from their knowledge. Such learning on a mass scale was and is a difficult problem for society" (2015, 18).

In the manufacturing sector, new technologies like computer-aided design and manufacturing (CAD/CAM), computer numerical control (CNC), and robotics are highly complex. Workers require significant amounts of training before they are able to use these technologies (Davenport, 2013a). The skills are often highly specific to a particular industry (or firm). The lack of standardization across industries has slowed the development of educational institutions that can provide comprehensive training. Businesses have taken a more fragmented approach, relying on "a combination of publicly available education (typically in community colleges or technical schools), vendor-based education and on-the-job training" (Davenport, 2013b, 2-3).

The lack of appropriate training opportunities at the technical and community college levels has forced businesses to be creative in developing their own training programs. In the Houston area, a business association backed by like Exxon, Mobil, Shell, and Chevron Phillips is training local workers technical skills for local jobs in the oil industry. Dow Chemical has implemented an apprenticeship program to train workers to run its facilities. The program costs Dow a $100,000 a participant. Over 100 firms along the Ohio-Pennsylvania border established the Oh-Penn Manufacturing Collaborative which sponsors training programs for jobs in the area's machine-building industry (Campoy, 2015). Private efforts in addressing skilled labor shortages are often necessary given the obstacles in creating training programs on a mass scale.

In Manpower's report, The Future of the Manufacturing Workforce, Tom Davenport describes several policy proposals designed to help fill the skills gap in manufacturing.

- Institutionalized Funding at Many Levels: "Federal funding, whether in the U.S. or Canada, is not going to meet all needs for manufacturing-oriented education. There will have to be locally-driven stable funding for community and junior colleges and specific manufacturing programs within them if these institutions are to turn out the requisite number of trained students (Davenport, 2013c, 2-3).
- A Greater Degree of Sharing and Coordination: Manufacturing "education programs need a better ability to share and coordinate their content – not only with each other, but vendors of manufacturing technology and the companies that apply it" (Davenport, 2013c, 3). A clearinghouse that can centralize content used in instruction would facilitate the diffusion of knowledge and help expand the number of qualified faculty.
- Certification Programs: In addition to established programs for plumbers and electricians, there is a need for the ability to certify the skills of workers in other areas. These include "personal effectiveness competencies (showing up on time, working in teams), academic competencies (reading, writing, math), manufacturing competencies (safety, quality management) and industry-wide technical competencies (welding, machining, CNC)" (Davenport, 2013c. 3). The goal is to have community colleges and technical schools house these programs in the near future.

Conclusion

The current pace and scope of technological change implies a need for workers at all skill levels to update their skills throughout their working years. Unfortunately, the United States badly trails other developed economies in providing opportunities for job retraining. The United States "spends barely more than 0.1% of GDP on 'active labor market policies' to get the less skilled back to work, one-fifth of the OECD average" (The Economist, 2012, 24). As described in the previous section, greater support for technical and community colleges that possess specialized knowledge of the needs of local businesses can help provide workers with the appropriate training to meet those needs. As the capabilities of machines encroach on more abstract tasks, higher-skilled workers may find the need to update their skills as well. Economists Raghuram Rajan and Luigi Zingales believe that we "need more modular degrees and lifelong admission to a university (at least for the general programs) – so that the student can pick and choose what she wants and when she needs it" (Rajan and Zingales, 2003, 304).

The United States in the past has shown the willingness to make the necessary public investments to address skill shortages resulting from technological change. David Autor describes how our country responded to the human capital challenges of industrialization.

> In 1900, the typical young, native-born American had only a common school education, about the equivalent of sixth to eighth grades. By the late 19th century many Americans realized that this level of schooling was inadequate: farm employment was declining, industry was rising, and their children would need additional skills to earn a living. The United States responded to the challenge over the first four decades of the 20th century by becoming the first nation in the world to deliver universal high school education to its citizens. Tellingly the high school movement was led by the farm states. Societal adjustments to earlier waves of technological development were neither rapid, automatic, nor cheap. But they did pay off handsomely (Autor, 2015, 27).

The challenges Central Wisconsin, Wisconsin, and the United States face today call for a similar kind of commitment to ensure the economic well-being of our fellow citizens.

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ABOUT THE CENTRAL WISCONSIN ECONOMIC RESEARCH BUREAU

MISSION AND VISION

The mission of the UWSP Central Wisconsin Economic Research Bureau is to foster economic development by bringing timely economic analysis to our region, focusing on Marathon, Portage and Wood counties.

The mission has been accomplished through the publication of Economic Indicator Reports. These reports are compiled and released for each county in Central Wisconsin.

The CWERB aspires to be Wisconsin's premier research center focused on regional economic development.

HISTORY

The CWERB is a nonprofit organization founded in October 1983. Its operating budget comes from the private sector and the UWSP School of Business and Economics. The CWERB also represents an important part of the outreach efforts of the UWSP School of Business and Economics.

SOURCES OF FUNDING

- UWSP School of Business and Economics
- BMO Harris Bank of Stevens Point
- BMO Harris Bank of Marshfield
- BMO Harris Bank of Wausau
- Centergy Inc. of Wausau
- Community Foundation of Greater South Wood County - Wisconsin Rapids

SCHOOL OF BUSINESS & ECONOMICS

- Enrollment of 1,000 students; More than 30% of our students come from Marathon, Portage and Wood counties; approximately 50% of our graduates stay in the three-county area

- The SBE is in the pre-accreditation phase by the Association to Advance Collegiate Schools of Business (AACSB), once completed, SBE will be among the top 18% of all business schools in the world.

CWERB CLIENTELE

- Central Wisconsin business firms are the most crucial component in the economic development of our region. Business firms are keenly aware of the important role that informed decision making plays in any developmental strategy.

- Private sector organizations devoted to economic development in Central Wisconsin, such as area chambers of commerce and their affiliated economic development agencies.

- Public sector organizations devoted to economic development in Central Wisconsin.

- The general public, in order to make informed decisions, take advantage of the unbiased information and analysis about the economy.

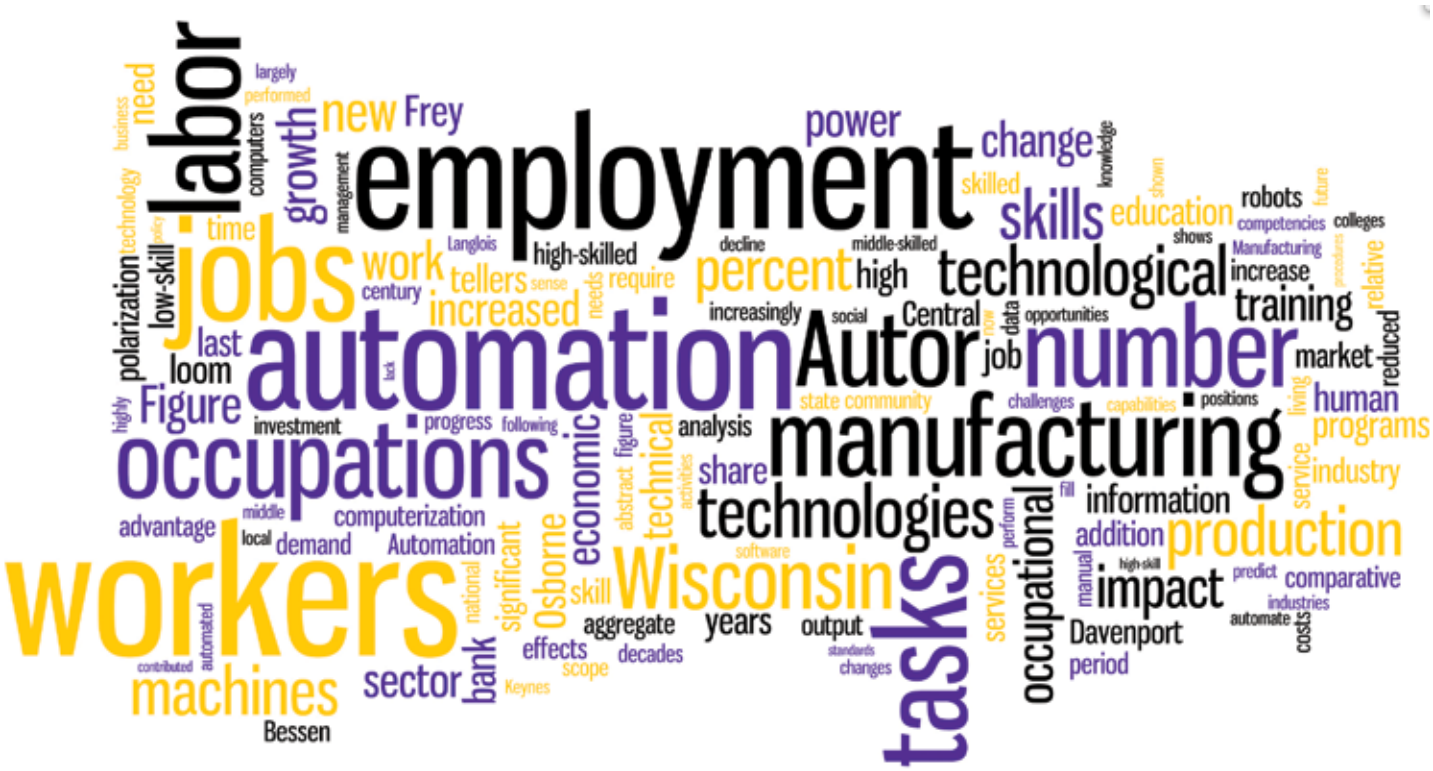
- The CWERB employs student research assistants which provides an excellent educational setting while also providing the opportunity for students to earn funds toward education. Faculty, staff and students at UWSP utilize the reports and resources of the CWERB.

CWERB ACTIVITIES

The dissemination of the CWERB research takes place through various hard copy publications, electronic media reports and presentations. For example, the Economic Indicator Reports are presented in Marshfield, Stevens Point, Wausau and Wisconsin Rapids. The audiences consist of business, political and educational leaders.

The Economic Indicator Reports also contain a special report section that is devoted to a current issue in economics. These special reports are usually presented by UWSP faculty.

Substantial newspaper, radio and television coverage of the publications and presentations have been instrumental in focusing attention on the School of Business and Economics. Chief Economist Randy Cray has been interviewed by the local media as well as the Chicago Tribune and CNN Radio on a variety of economic matters.



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