

Worcester Economic Indicators

Fourth Quarter 2013

This report can be accessed online at:

<http://www1.assumption.edu/worcester-economic-indicators-project/>

*Local Economy Experiences Modest Growth in Fourth Quarter
Growth expected to pick up during first half of 2014*

Worcester Economic Index

The Worcester Economic Index (WEI) is an index of economic indicators that measures the performance of the Worcester area economy. Three local employment variables are used to estimate the WEI: nonfarm payroll employment, household employment and the unemployment rateⁱ. These variables are combined to form an estimate of the underlying path of the local economy.ⁱⁱ

Figure 1 shows the estimated WEI going back to 1990.ⁱⁱⁱ The figure shows a consistently growing economy during most of the 1990s, the relatively shallow recession in the early 2000's, and the more significant fall-off during the Great Recession of 2008-09. Since that time the WEI shows an economy experiencing a slow recovery.

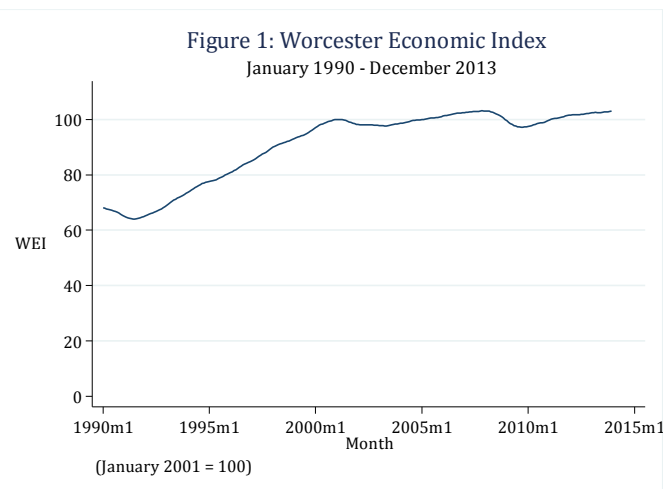


Table 1 shows the Worcester Economic Index over the past 13 months, its month-to-month change, and quarterly growth rate. While the WEI is calculated on a monthly basis it is best not to read too much into changes in any single month, but rather examine how the index has changed over the past 3-6 months. As the table shows, the WEI has been growing at about a 1% rate over most of the past year, with the exception being the second quarter of 2013 when the local economy was essentially flat. The lackluster performance during the second quarter caused the WEI to increase only 0.7% over the course of 2013.

Worcester Economic Outlook

Table 1
Worcester Economic Index (WEI)
December 2012 – December 2013

The Worcester Economic Index is based on employment and unemployment data for the local economy. Of course, the Worcester region does not exist in isolation but is part of the state, regional, and national economy. In order to incorporate both

Month	Worcester Economic Index	Change from previous month	Quarterly Growth Rate, Annualized
December 2012	102.3	0.1	1.0%
January 2013	102.4	0.1	
February 2013	102.5	0.1	
March 2013	102.5	0.0	1.0%
April 2013	102.5	0.0	
May 2013	102.5	0.0	
June 2013	102.5	0.0	0.0%
July 2013	102.6	0.1	
August 2013	102.7	0.1	
September 2013	102.8	0.1	1.1%
October 2013	102.8	0.0	
November 2013	102.9	0.1	
December 2013	103.0	0.1	0.9%

national and local economic trends, an analysis of the future direction of the Worcester economy is completed in two parts. First, an estimate of the expected growth rate of the WEI is found using past estimates of the index as well as several national leading economic indicators. Second, a group of local leading indicators is examined in an effort to pick up differences between local and national economic trends.

In order to predict the future direction of the index a variety of leading economic indicators are used. Leading indicators are variables that often act as signals for changes in other variables. For example, since the WEI is based on local employment an increase in the amount of help wanted advertising may be an indicator that employment (and the WEI) will increase in the near future.

Projecting WEI Growth

In order to forecast growth in the Worcester economy over the next 6 months the recent growth rate of the WEI is combined with four leading economic indicators of the national economy^{iv}. The first such indicator is changes in consumer expectations^v. When consumers are optimistic about future economic conditions, they are likely to spend and therefore positive changes in consumer expectations are taken as a sign that economic activity will be picking up in the future. The second leading indicator is changes in the S&P 500 index^{vi}, which reflects investor attitudes toward future business conditions. An increase in the S&P 500 may precede an improving economy. The third leading indicator is the interest rate spread which is the difference between the yield on a 10-year treasury bond and the federal funds rate^{vii}. A larger interest rate spread indicates an expansionary monetary policy and therefore would predict a growing economy. The final leading indicator used is the Leading Credit Index^{TMviii}, which is a composite of several financial sector variables that are meant to capture credit market conditions. An increase in the Leading Credit IndexTM indicates financial conditions are less conducive to economic growth and may therefore lead an economic downturn.

The four national leading indicators discussed above are used in combination with past growth of the WEI to forecast a six-month growth rate for the Worcester Economic Index. For the first six months of 2014, the model predicts growth of 1.5% to 1.7% on an

annualized basis. This estimate is somewhat higher than the growth over the latter half of 2013 which hovered around 1.0%. Following the format used by *MassBenchmarks*^{ix} in reporting their leading economic index for Massachusetts, the projected rate of growth is broken down according to how much the leading indicators contribute to the index being above or below its long-term trend. As Table 2 shows; the above trend growth forecast for the next 3-6 months is a result of favorable credit market conditions as measured by the Leading Credit Index, as well as the interest rate spread, while recent below trend growth in the WEI has a dampening effect on the forecast. Table 2 shows both the most recent growth forecast (1.7%) and the average for the prior three months (1.5%). The former is of course more timely, but may be sensitive to short-term changes in the leading indicators. Finding the three month average reduces the volatility of the forecast.

Table 2
Breakdown of Projected Growth of WEI
6-month growth forecast, annualized basis

Component	December 2013	Quarter 4 Average
Trend	1.2%	1.2%
Consumer Expectations	0.0%	-0.1%
S&P 500	-0.1%	0.1%
Interest Rate Spread	0.2%	0.2%
Leading Credit Index™	0.6%	0.5%
WEI	-0.1%	-0.3%
Total	1.7%	1.5%

Components may not add to total due to rounding.

Local Leading Indicators

As a complement to the forecast growth of the WEI, four other leading indicators are considered in order to further gauge the direction of the Worcester economy. Unlike the leading indicators utilized in the forecast of the WEI, each of these four indicators is specific to the local economy. The first local leading indicator is initial unemployment claims^x for the Worcester region, an increase in which signals a drop off in economic activity. The second indicator is the amount of online help-wanted advertising for the Worcester area^{xi}. An increase in help-wanted ads should be a precursor to increased hiring and employment. The third leading indicator is the number of new business incorporations in the local area^{xii}. An increase in incorporations may lead new hiring by those firms. Finally, since building permits^{xiii} are required before new residential construction can take place, an increase in building permits would foreshadow increases in future employment.

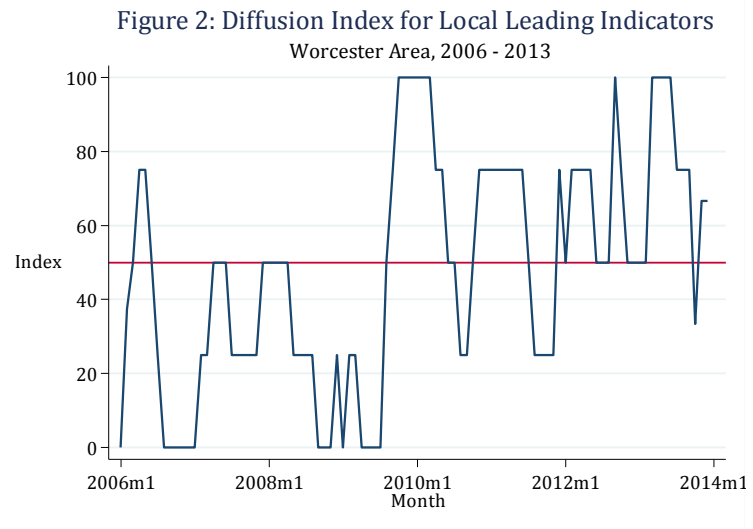
In order to summarize the information provided by the local leading indicators a diffusion index is calculated. A diffusion index summarizes how many of the leading indicators are providing positive signals of the direction of the economy.^{xiv} Table 3 shows the six-month diffusion index found using the four local leading indicators discussed above. The maximum value that a diffusion index can take on is 100. A diffusion index above 50 suggests a growing economy, while an index of less than 50 indicates the leading indicators are on balance pessimistic. During the past year the diffusion index for the Worcester area has been at or above 50 in all but one month. Because there is a lot of variation in the underlying leading indicators several months or quarters should be

Table 3
Diffusion Index for Four Leading
Indicators
December 2012 - December 2013

Month	Diffusion Index
December 2012	50.0
January 2013	50.0
February 2013	50.0
March 2013	100.0
April 2013	100.0
May 2013	100.0
June 2013	100.0
July 2013	75.0
August 2013	75.0
September 2013	75.0
October 2013	33.3
November 2013	66.7
December 2013	66.7

considered when interpreting a diffusion index. Since October when the index fell to 33 it has rebounded to provide a positive signal during each of the last two months.^{xv}

Figure 2 shows the pattern for the six-month diffusion index for the Worcester region since 2006. As you can see, the diffusion index was below 50 for much of 2006 and 2007, rose quickly in late 2009 and has been mostly above 50 since that time.



To sum up, following a weak second quarter the Worcester Economic Index increased at approximately a 1.0% rate during the final two quarters of 2013. For the next 3-6 months, the WEI is projected to grow at about 1.5% based on a model that uses four national leading indicators and the WEI to forecast changes from trend growth. An analysis of the local leading indicators also point toward a growing economy in the coming year.

The next Worcester Economic Indicators report will be issued in early May 2014. Additional information about this project is available at:

<http://www1.assumption.edu/worcester-economic-indicators-project/>.

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ⁱ Bureau of Labor Statistics. Payroll employment is obtained from the State and Area Employment Database (SAE) of the BLS. Household employment and unemployment rate is obtained from the Local Area Unemployment Database (LAU) of the BLS. All employment data is for the Worcester NECTA which consists of the city of Worcester and 39 surrounding towns in south central Massachusetts and northeaster Connecticut.

ⁱⁱ Uses the methodology developed by Stock & Watson (1989), and employed by Clayton-Matthews & Stock (1998/99), Crone & Clayton-Matthews (2005), and Tebaldi & Kelley (2012) to estimate an index of the underlying economy using a state-space model. An explanation of how these methods were utilized for this project is available www.assumption.edu/economic-indicators-project.html.

ⁱⁱⁱ The WEI is scaled so that it tracks the growth of real GDP for the local economy over two time periods 1990-2000 and 2000-2013.

^{iv} The four indicators were selected from a set of eight indicators that are part of the Index of Leading Indicators produced monthly by The Conference Board. The indicators that were not included because they did not

contribute to predicting the growth of the WEI are: average weekly hours in manufacturing, consumer goods orders, capital goods orders, and ISM new orders.

^v Reuters/University of Michigan Index of Consumer Sentiment, retrieved from The Conference Board, Business Cycle Indicators database.

^{vi} The Conference Board, Business Cycle Indicators database.

^{vii} The Conference Board, Business Cycle Indicators database.

^{viii} The Leading Credit Index is a composite of 6 financial sector variables. Retrieved from The Conference Board, Business Cycle Indicators database.

^{ix} <http://www.massbenchmarks.org/indices/indices.htm>

^x Massachusetts Department of Employment and Training

^{xi} The Conference Board Help Wanted Online® (HWOL)

^{xii} Secretary of the Commonwealth of Massachusetts

^{xiii} U.S. Census Bureau, Building Permits Survey

^{xiv} For a description of the methodology used to calculate a diffusion index go to: <http://www.conference-board.org/data/bci/index.cfm?id=2180>

^{xv} Due to changes in the way the Massachusetts Department of Employment and Training releases initial claims data to the public this data series has been unavailable over the latter part of 2013. Once this data is again available the diffusion index will be revised to take into account initial claims for the Worcester area.