Iowa Leading Indicators Index: Eighth Annual Assessment and Update

Tax Research and Program Analysis Section
Iowa Department of Revenue
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In 2006, the Iowa Department of Revenue (IDR) created the Iowa Leading Indicators Index (ILII) as a tool to predict turning points in Iowa employment. By foreshadowing changes in the level of employment, which is closely linked to the level of individual income tax and sales tax receipts, the ILII also provides a signal of changes in these major revenue sources for the State. IDR has issued monthly ILII reports since the start of fiscal year (FY) 2007 with recent reports posted on the IDR website. During FY 2014, the ILII exhibited eleven positive changes and one month with no change. Employment increased throughout the year, with the gains bouncing around the average 0.14 increase, ranging from 0.11 to 0.18 percent changes. However, despite the generally positive ILII results, State receipts decreased 1.8 percent during FY 2014.

Annually, the Department assesses how well the ILII has met the goals underlying its development, gauges the validity of the existing components, considers any additional components that may have been suggested in the past year, and carries out the necessary annual updates. This paper documents the eighth annual assessment and update to the index. A step-by-step presentation of how the ILII is computed can be found in appendix A. The calculation of the diffusion index is discussed in appendix B.

Assessment of the Iowa Leading Indicators Index for Fiscal Year 2014

During FY 2014, the ILII rose from 106.4 in July 2013 to 109.2 in June 2014 (see Figure 1). The ILII experienced positive changes during the first two months of the year followed by one

month of no change, then experienced 9 consecutive months of positive changes during the remainder of the year. The annualized six-month percent change began the fiscal year at a low of 1.0 percent in July, saw significant increases to 2.8 percent in November and December, and then fluctuated slightly until finishing the fiscal year at 2.9 percent in June. Strength in the index was fairly widespread, with the six-month diffusion index remaining near 87.5 for the entire first half of the year, dipping to 75.0 in March, rebounding to 87.5 in April before again settling at 75.0 in June. Consistent with the positive or flat signals from the index, the non-farm employment coincident index, the 12-month moving average of non-seasonally adjusted, non-farm employment, experienced increasing growth each month during the year, extending its positive streak that started October 2010 to 45 consecutive months.

Since 1999, the index has signaled a recession twice, from December 2000 through September 2001 and from August 2008 through November 2009. Those signals were followed by declines in employment stretching from July 2001 through December 2003 and November 2008 through October 2010, respectively.

During 2013, Iowa gross domestic product (GDP) rose along with Iowa personal income. However, State revenues experienced a decrease from 2013. Iowa GDP grew an estimated 2.9 percent in 2013, slightly above the revised 2.5 percent growth measured for 2012 (see Figure 2). Real personal income in Iowa grew only 0.7 percent in 2013 after an estimated 5.9 percent growth in 2012 (see Figure 2). It is difficult to gauge the ability of the monthly ILII to signal changes in either state GDP or state personal income because these series are released infrequently, annually and quarterly respectively, and are subject to major revisions.

Therefore the ILII is compared, on a monthly basis, to non-farm employment in Iowa, as reported by the Bureau of Labor Statistics. However, another test of the usefulness of the ILII is to compare movements in the index to the level of State General Fund revenues (see Figure 3). Iowa real receipts are measured using 12-month moving average of individual, sales and use, corporation, inheritance, insurance premium, and franchise receipts, all adjusted using the Consumer Price Index (CPI) to 2012 dollars. Receipts increased slightly during the first half of FY 2014. However, dramatic decreases in revenue were realized in the second half of the fiscal year reflected two expected changes and two unexpected changes. All cigarette and tobacco receipts were diverted out of the General Fund, reducing receipts over $100 million during the second half of the fiscal year. The larger expected change was a drop in individual income tax estimate payments in January and final returns realized in the spring after federal tax law changes in 2013 considerably pushed up tax year 2012 receipts one year ago. Unexpected changes were weaknesses in corporate receipts during the last four months of the fiscal year and drops in tax year 2014 individual income tax estimate payments in the spring and summer, showing an inconsistency with the ILII.

Although the Department forecasts all sources of revenue for the State, the ILII is best suited to signal the future direction of taxes on employment and wages, or individual income tax revenues. Individual income taxes comprise over 50 percent of State General Fund receipts. Net individual income tax revenues are measured as the 12-month moving average of withholding plus estimate payments plus final return payments minus refunds, all adjusted to 2012 dollars using the CPI (see Figure 4). The initial drop in individual income tax revenues in 1999 reflects the individual income tax cut implemented during the 1998 tax year. Individual income tax revenues were strong in the spring of 2000, but fell in 2001 and 2002

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with the national recession. Revenues began to rise again in 2004 and remained relatively strong through 2008, with a slight dip in 2005 and 2006. Net individual income tax revenues turned down in February 2009, following the ILII drop that started in April 2008. Revenues began to rise steadily in 2012 with a sharp jump in April reflecting behavioral changes pushing income into tax year 2012 resulting from federal tax law effective in tax year 2013. As expected, revenues reversed one year later, but the weakness continued through the end of fiscal year 2014.

The main goal for the Iowa Leading Indicators Index is to serve as an additional tool for predicting the direction of the State economy. Indeed, the ILII began to decline in April 2008 and showed a contraction signal in August 2008. Three months later, the Iowa non-farm employment index began to show declines, following the path of the slowing national economy. The index reached a bottom in September 2009, and then moved out of recession signal territory in November 2009, suggesting that the Iowa economy would see employment gains by mid to late summer. Those gains did not materialize until fall 2010, but employment has continued to creep up since October 2010, following the positive changes in the index. The gains in the index throughout the year were matched with continued gains in employment. The nine months of consecutive gains at the end of the year signals that employment gains should persist into the fall. Overall, results over the past eight years demonstrate that the ILII is a helpful tool in predicting the direction and turning points in Iowa non-farm employment.

A final comparison between the ILII and another index is the National Leading Economic Indicators (LEI) produced by The Conference Board (see Figure 5). The two series moved

similarly between 1999 and 2005, the ILII dipped during the middle of the 2000's while the LEI bounced between positive and negative changes. The two series dived prior to the Great Recession, although the LEI started its drop in April 2007 (with the national recession starting in late 2007) while the ILII started to drop in February 2008 (with Iowa employment dropping in late 2008). Both series signaled a recovery, with the LEI logging strong positive gains beginning in April 2009 and the ILII in October 2009. While the ILII continued to post strong increases through April 2011, the LEI had more muted changes in April 2010. During FY 2014, the LEI demonstrated increases in eleven months of the year, with only one negative month, matching the count of positive and negative changes seen in the ILII.

Validity of Existing Components
When the Iowa Leading Indicators Index was established in 2006, one method used to select components was to identify series of Iowa data that were equivalent to those used as leading economic indicators by other states and regions. This method resulted in the selection of Iowa unemployment insurance claims, average manufacturing hours in Iowa, and the new orders index for Iowa manufacturers. A second method used to select components was to identify series that predicted economic activity in the key sectors of the Iowa economy: agriculture, manufacturing, and finance. Agriculture comprised 9.7 percent of Iowa GDP in 2013, according to the Bureau of Economic Analysis. To capture the agriculture sector, an index of expected profits for producers of the four leading commodities in the state, corn, hogs, soybeans, and cattle was created. Manufacturing accounted for 17.2 percent of GDP and 14.3 percent of total non-farm employment in 2013, according to the Quarterly Census of Employment and Wage conducted by the Bureau of Labor Statistics. Along with average manufacturing hours and the new orders index, diesel fuel consumption was added to the

index to measure demand for the transport of manufacturing inputs and final products within and through the state. Diesel fuel consumption also indicates demand for the production and transport of agricultural commodities. The insurance and finance sector accounted for 10.2 percent of GDP and 6.9 percent of non-farm employment in 2013. The insurance and finance sector is heavily represented in the Iowa stock market index, created as another component for the index.

During the development of the ILII, all potential indicators were weighed against six desired attributes of leading indicators that are known as the Moore-Shiskin criteria:

1. conformity – series must conform well to the business cycle

2. consistent timing – series must exhibit a consistent timing pattern over time as a leading indicator

3. currency – series must be published on a reasonably prompt schedule and not be subject to major revisions

4. economic significance – cyclical timing of the series must be economically logical

5. statistical adequacy – data must be collected and processed in a statistically reliable way

6. smoothness – month-to-month movements in the series must not be too erratic.

Continuing the success of the prior six years, during fiscal year 2014 the ILII continued to exhibit all of these attributes. As noted in the introduction, the index reasonably matched the path of employment during 2014, which demonstrated conformity and consistency.

During FY 2014, all of eight components experienced gains (see Table 1). The largest positive contribution was made by diesel fuel consumption which added 1.02 points to the index between June 2013 and June 2014 which was a positive contributor in ten months during FY 2014. Other strong positive contributors were average weekly manufacturing hours, building permits, and the Iowa stock market index. Signs of national economic strength pushed up stock prices. The Agricultural Futures Profits Index was the weakest positive contributor to the index in 2014 despite a tremendous increase in hog profits due to an epidemic affecting much of the market, and an increase in cattle profits due to lower supplies resulting from the 2012 drought. The AFPI was dragged down by dramatic declines in corn and soybean expected profits. The components and index exhibited a consistent timing pattern as a leading indicator of future economic activity, where the positive changes in the indicators signaled continued growth in Iowa employment which started in October 2010 and has continued through June 2014.

Currency of the ILII's components proved to be reliable for almost all components during FY 2014. Seven of the eight components were available within four weeks after the close of the month for all months except January. In that month, labor force data including average manufacturing hours and non-farm employment were delayed by several weeks because the Bureau of Labor Statistics (BLS) was undertaking its annual benchmarking. Nothing in the past twelve months has changed opinions about the economic significance of the eight components as all continue to logically lead the economic cycle. Similarly, views about the statistical adequacy of the data are also unchanged as sources for all the data series continue to be reliable.

Assessments of the components' smoothness did not change with the additional 12 months of data. The standard deviation of month-to-month changes in the components (measured using 12-month moving averages for all but the yield spread and stock market index) decreased for five of the eight components excluding agricultural future profits index, building permits, and diesel fuel consumption (see Table 2). The ILII is computed by weighting changes in the individual series by the standardization factors, calculated as the inverse of the standard deviation, normalized across all the components to one (see Appendix A). Updates to the standardization factors accounting for the observed volatility during FY 2014 suggest the factors for all components will not change much. Four components will experience small declines, with the largest decline being 4.4 percent for AFPI. The other four components will experience small positive increases. The ranking of the standardization factors among the components will not change.

An additional way to consider sensitivity is to focus on six-month percentage changes in the index and six-month diffusion index values under various modified versions of the index where, in each case, one of the eight components is excluded (see Table 3). Following the Conference Board, who publishes the national Leading Economic Indicators after which the ILII was modeled, a contraction signal is the point when the annualized six-month percentage change declines by over two percent and the six-month diffusion index falls below 50.0.[1] The six month changes to the ILII remained in positive territory throughout FY 2014 independent of the signal from most components. The Index showed reasonable strength across all indicators without a single component contributing a bulk of the influence to the index.

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[1] The -2.0 percent annualized decline was the threshold for a recession signal prior to the 2001 revisions to the National Leading Indicators Index. At that time, The Conference Board moved to forecasting several of the components in the index, those not available until more than three weeks after the close of a month. With those revisions, the threshold for a recession signal was lowered to -3.5 percent. However, because the ILII relies on actual data series, the -2.0 percent threshold is still used.

However, it is worth noting that without the Agricultural Future Profits Index during the first seven months of the fiscal year, the diffusion index would have been 100.0 for the entire first half of the fiscal year. Throughout the year, the six-month diffusion index remained at 50 or above, suggesting reasonable strength across the indicators.

Updates for the Eighth Year

Given that the original eight components continue to meet the Moore-Shiskin criteria, no new components were added, and no changes occurred among the 33 Iowa stocks, the only step required to prepare the ILII for FY 2015 was an update to the Agricultural Futures Profits Index incorporating updated grain break-evens for the 2013 crop year. In addition, the annual update to the standardization factors for the ILII was completed, causing a revision to the entire history of the ILII.

Updates to the Agricultural Futures Profits Index

The AFPI requires annual updates to the index to account for newly available data on the distribution of annual cash receipts among the four commodities in the index and to incorporate the last 12 months of data in the standardization factors used to weight the index. Additionally, updated historical break-even costs for corn and soybeans are incorporated.

Traditionally, each fall annual cash receipts for various farm commodities in Iowa for the previous calendar year are released by the Economic Research Service of the U.S. Department of Agriculture. The distribution of cash receipts between the four commodities included in the AFPI is used to weight the four profits series in the index. Unfortunately, the 2013 cash receipts data are not yet available for incorporation to the Index. The USDA

indicated a reevaluation of the 2012 Census of Agriculture data has delayed the release date for this information until November. Once the 2013 cash receipts are released, the AFPI will be updated to reflect the distribution of farm cash receipts for 2013 and any revised values for prior years.

Iowa State University extension service prepares break-even costs for Iowa farmers. In June 2014, the 2014 crop year costs were released and the 2013 crop year costs were updated. The changes were incorporated with the May 2014 report, so no additional changes were necessary during this update. The update to the AFPI had a noticeable impact on the ILII series beginning in March 2013, lifting up the index values between 0.1 and 0.2 percentage points in the monthly index values. However, the pattern and magnitude of changes between months was mostly unchanged.

Assessment of Update Impacts on the ILII

After updates to the AFPI for 2015 were completed, the standardization factors were finalized (see Table 2). The updates to the AFPI had very little impact on the index prior to July 2012 (see Figure 6). However, as a result of the updates, historical values of the ILII for the last sixteen months are lower. For the January 2014 through June 2014 period, the index is 0.1 to 0.2 points lower each month (see Tables 4 and 5). However, the monthly percentage changes remained unchanged during those months. The level of the six-month annualized percentage change was 0.1 percentage points lower during January and May. The six-month and one-month diffusion indexes were unchanged as a result of the revisions.

For the values of the component itself, the AFPI values dropped as a result of the updated standardization factors, yet the percent change month to month remained fairly constant throughout the last six months (see Tables 7 and 8).

Conclusions

The Iowa Leading Indicators Index has established a good record during the recent recession and recovery. With the success of the ILII in providing leading signals, the Department will continue to closely monitor the ILII with the hope that it will continue to inform policy makers about the direction of future economic activity and revenues in the State.

Figure 1. Iowa Leading Indicators Index and Iowa Non-Farm Employment Coincident Index: January 1999-June 2014

Index (1999=100)

December 2000-
September 2001

August 2008-
November 2009

ILII

November 2008

July 2001

Non-Farm
Employment
Index

October 2010

December 2003

Month and Year
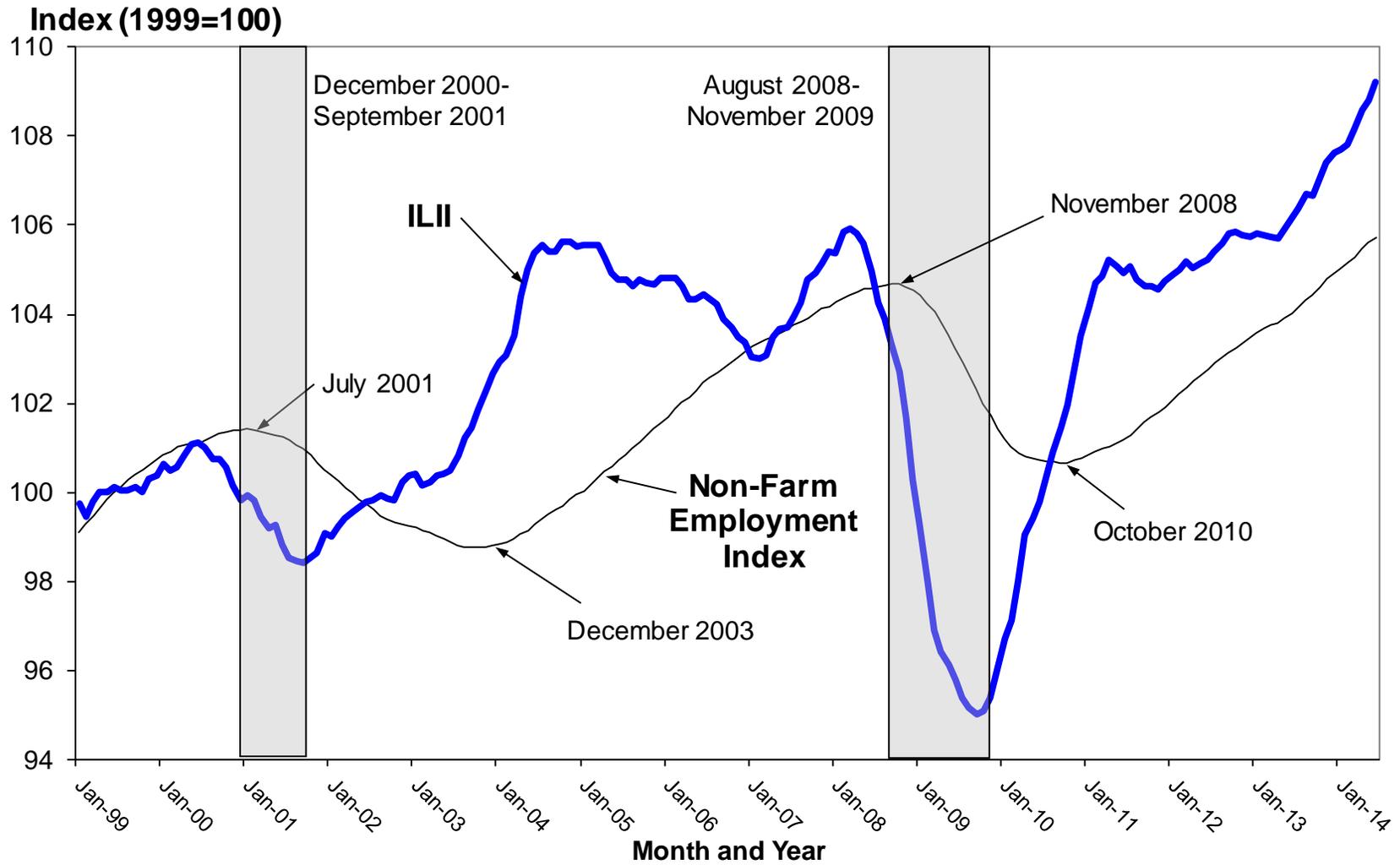
Figure 2. Iowa Leading Indicators Index, Iowa GDP, and Iowa Personal Income: January 1999-June 2014
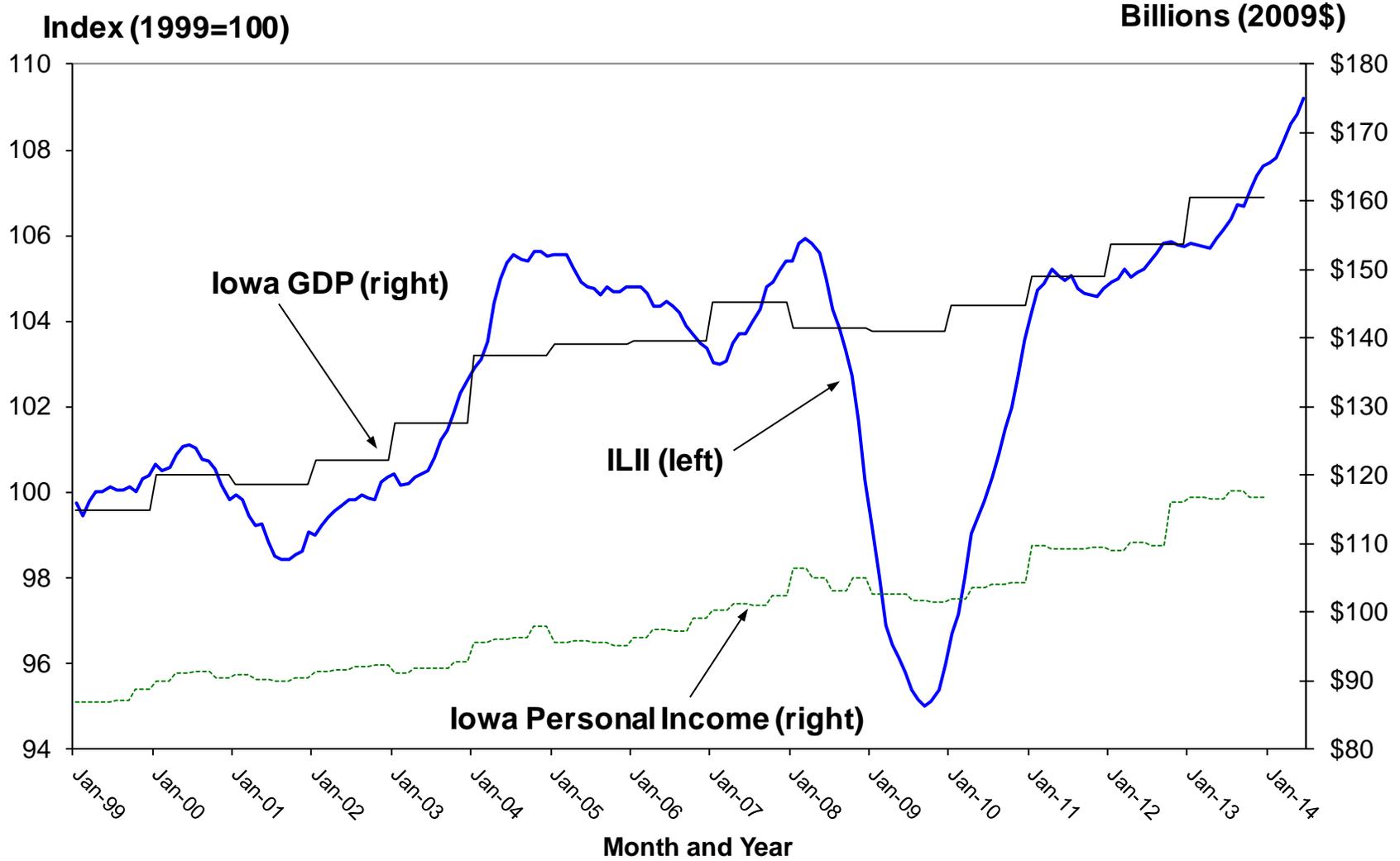
Figure 3. Iowa Leading Indicators Index and Iowa Real Tax Receipts: January 1999-June 2014

Index (1999=100)

Millions (2012$)

ILII (left)

Iowa Real Receipts (right)
12-month moving average

Month and Year
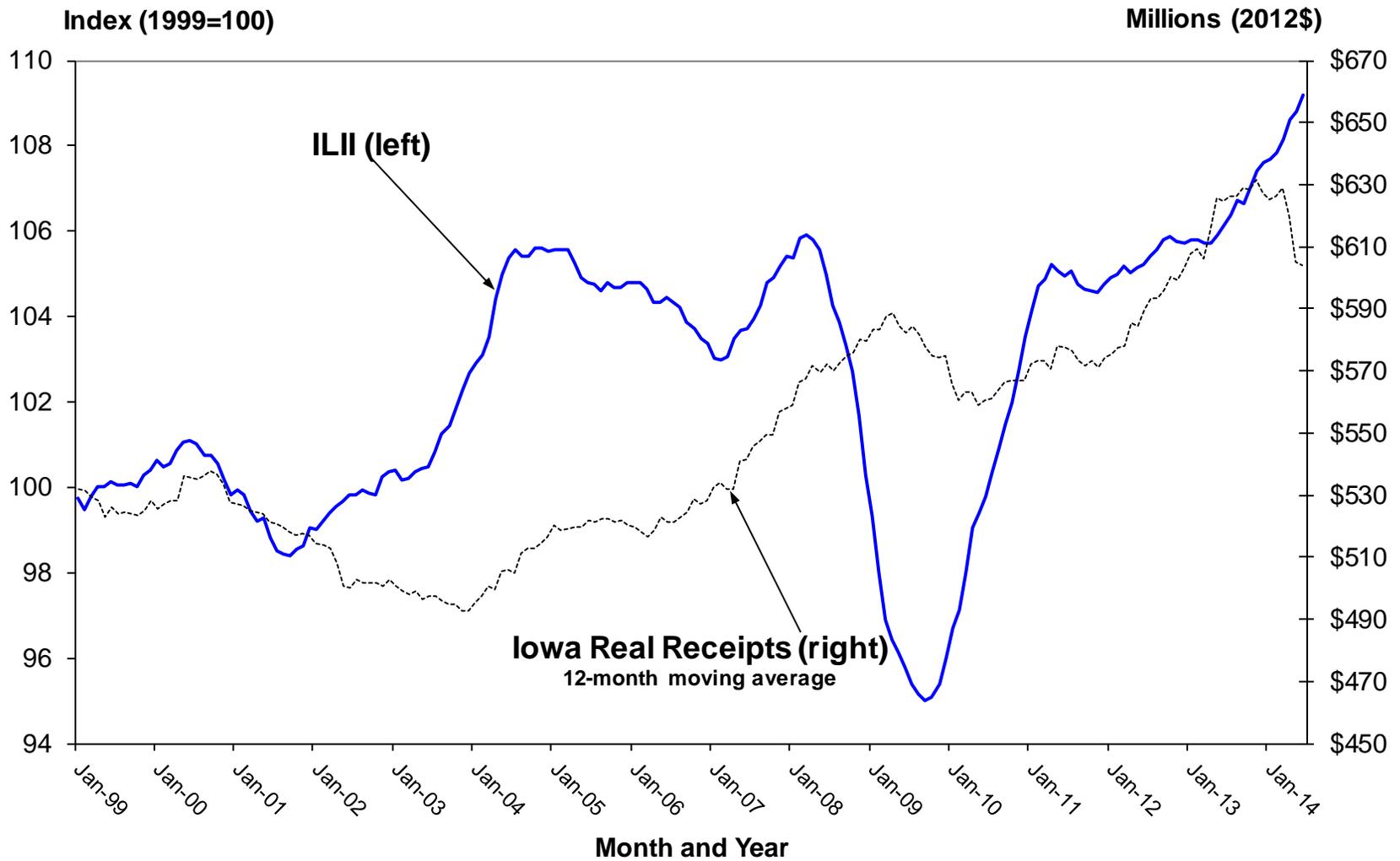
Figure 4. Iowa Leading Indicators Index and Iowa Real Net Individual Income Tax Revenues Index: January 1999-June 2014

Index (1999=100)

Millions (2012$)

ILII (left)

Iowa Real Net Individual Income Tax Revenues (right)
12-month moving average

Month and Year

15
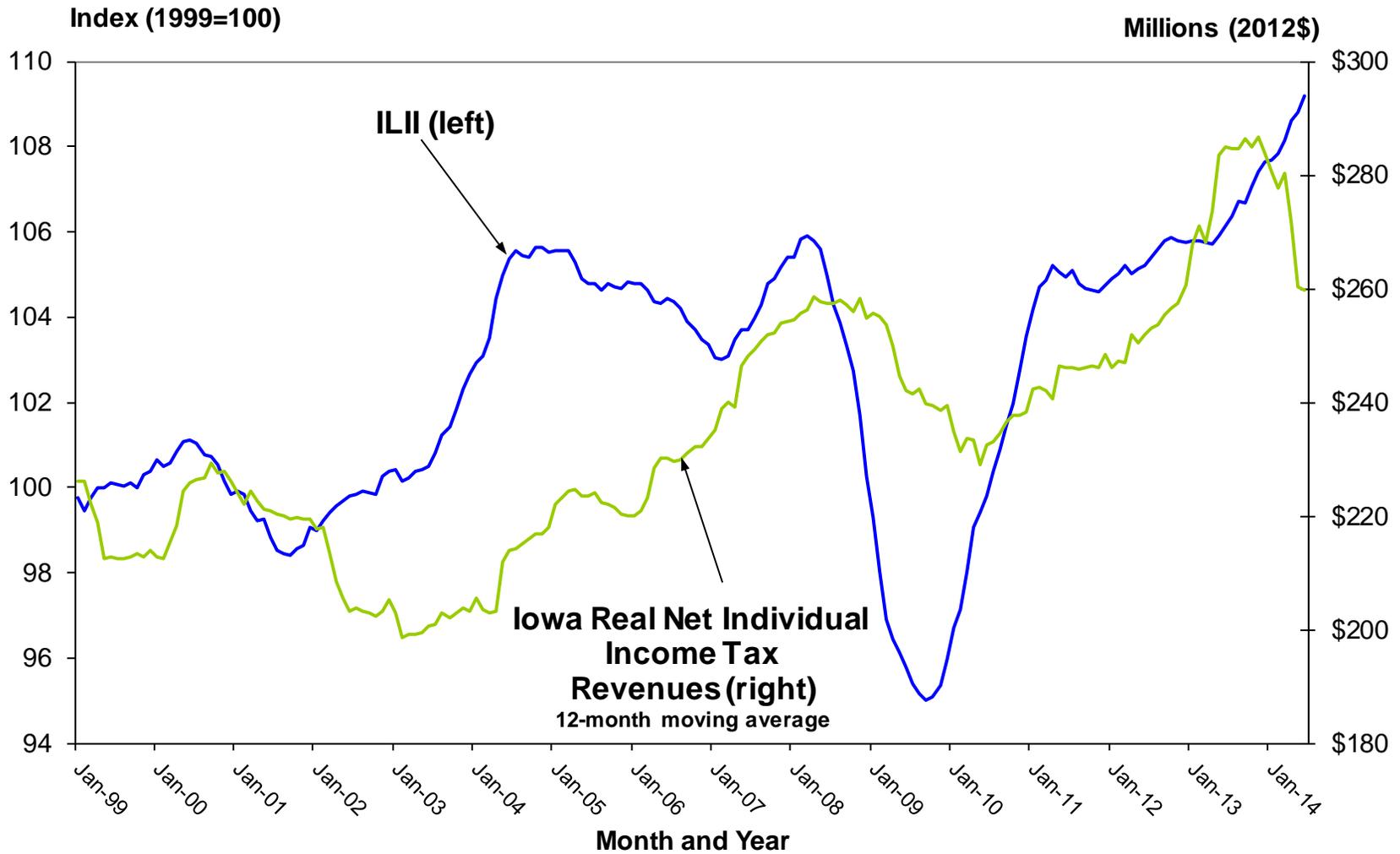
Figure 5. Iowa Leading Indicators Index Compared to U.S. Leading Economic Indicators: January 1999-June 2014
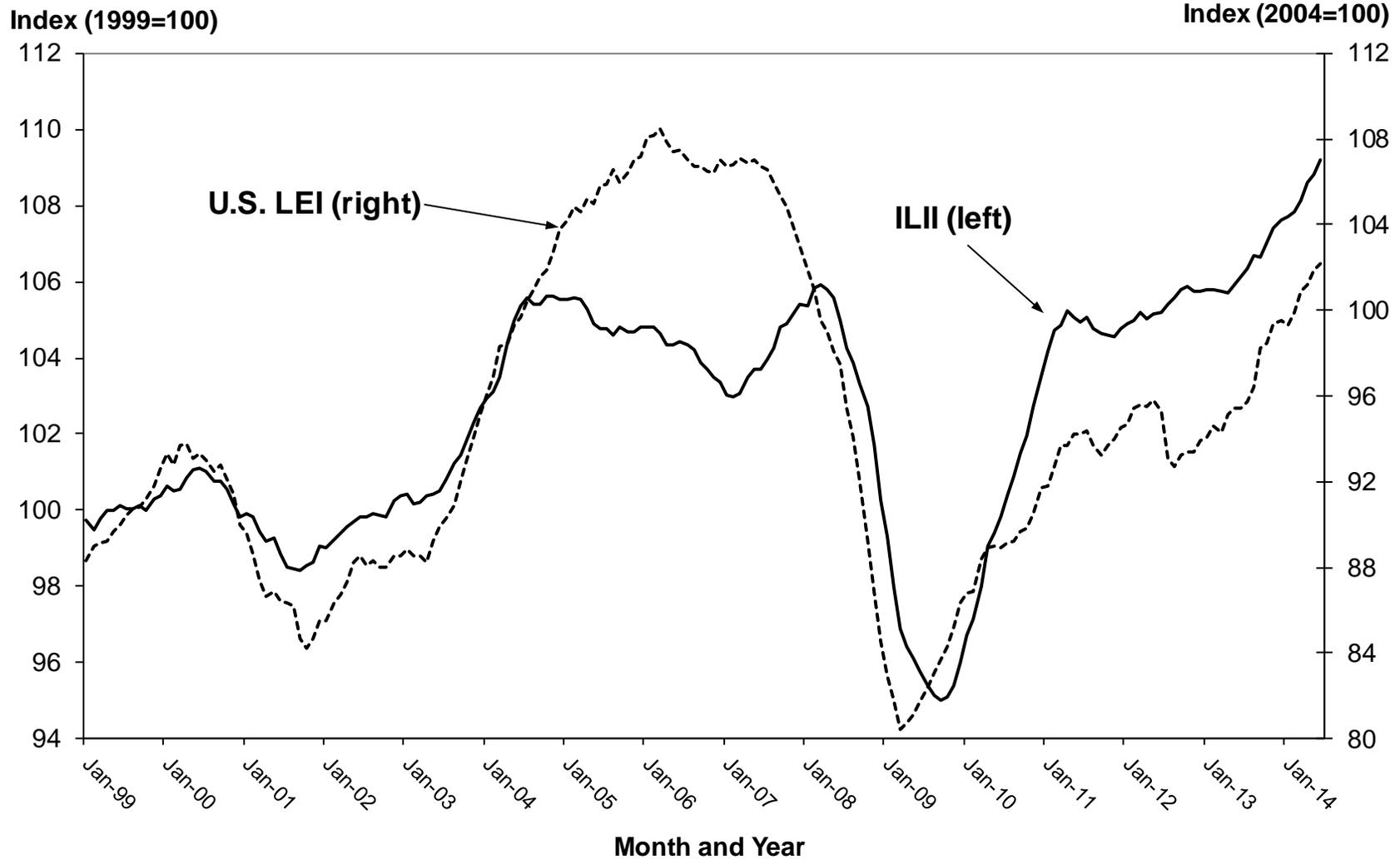
## Table 1. Iowa Leading Indicators Index Components: Annual Overview

Component Series Monthly Values[a]		2013 June	2014 June	Contribution to ILII Change
AFPI[b]	↓[c]			-0.08
Corn Profits (cents per bushel)		249.4	71.2	
Soybean Profits (cents per bushel)		427.4	301.8	
Hog Profits (cents per pound)		14.5	37.0	
Cattle Profits (cents per pound)		-16.6	2.0	
Iowa Stock Market Index (10=1984-86)	↑	86.76	105.55	0.36
Yield Spread (10-year less 3-month)	↑	2.25	2.56	0.22
Building Permits	↑	830	939	0.40
Average Weekly Unemployment Claims[d]	↑	3,284	3,121	0.19
Average Weekly Manufacturing Hours	↑	40.7	41.9	0.81
New Orders Index (percent)	↑	66.1	68.2	0.16
Diesel Fuel Consumption (mil gallons)	↑	55.73	58.67	1.01

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced August 29, 2014

a. For all component series except for the yield spread (the only national series) the values represent 12-month backward moving averages.

b. The agricultural futures profits index is computed as the sum of the standardized symmetric percent changes in the four series each weighted by the commodity's annual share of Iowa cash farm income (updated August 28, 2013).

c. Arrows indicate the direction of the series' contribution to the ILII over the last 12 months

d. Changes in unemployment claims are inverted when added to the ILII, thus a negative change in the series contributes positively to the index.

Table 2. Changes in ILII Standardization Factors Accounting for FY 2014 Data

Leading Indicator	Jul-2013 Standard Deviation	Jul-2014 Standard Deviation	Percent Change in Standard Deviation	Jul-2013 Standardization Factor	Rank	Jul-2014 Standardization Factor	Rank	Percent Change in Standardization Factor
Agricultural Futures Profits Index	1.818	1.882	3.5%	0.048	5	0.046	5	-4.4%
Iowa Stock Market Index	4.843	4.709	-2.8%	0.018	8	0.018	8	1.8%
Yield Spread	0.265	0.258	-2.3%	0.328	1	0.332	1	1.3%
Building Permits	2.473	2.483	0.4%	0.035	6	0.035	6	-1.4%
Average Weekly Unemployment Claims	2.597	2.521	-2.9%	0.033	7	0.034	7	1.9%
Average Weekly Manufacturing Hours	0.304	0.301	-0.8%	0.286	2	0.285	2	-0.3%
New Orders Index	1.379	1.339	-2.9%	0.063	4	0.064	4	1.8%
Diesel Fuel Consumption	0.460	0.462	0.4%	0.189	3	0.186	3	-1.5%

Each data series considers month-to-month changes over January 1999 to June 2013 for July 2013 values and January 1999 to June 2014 for July 2014 values. For all series except for the yield spread and the Iowa stock market index, the changes are based on 12-month backward moving averages. The yield spread and new orders index changes are simple arithmetic changes; changes for the other six components are computed as symmetric percentage changes.

Table 3. Iowa Leading Indicators Index Component Sensitivity

Six-Month Values	Jan to July	Feb to August	Mar to September	Apr to October	May to November	June to December	July to January	Aug to February	Sept to March	Oct to April	Nov to May	Dec to June
ILII												
Percentage Change (Annualized)	1.1%	1.7%	1.8%	2.5%	2.8%	2.8%	2.5%	2.1%	2.8%	2.9%	2.6%	2.9%
Diffusion Index	87.5	87.5	87.5	87.5	87.5	87.5	87.5	81.3	75.0	87.5	75.0	75.0
ILII without AFPI												
Percentage Change (Annualized)	2.1%	2.9%	2.9%	3.6%	3.8%	3.9%	3.4%	2.7%	3.1%	2.8%	2.2%	2.3%
Diffusion Index	100.0	100.0	100.0	100.0	100.0	100.0	100.0	92.9	85.7	85.7	71.4	71.4
ILII without Iowa Stock Market												
Percentage Change (Annualized)	0.6%	1.3%	1.4%	2.3%	2.6%	2.5%	2.3%	1.9%	2.4%	2.5%	2.3%	2.6%
Diffusion Index	85.7	85.7	85.7	85.7	85.7	85.7	85.7	78.6	71.4	85.7	71.4	71.4
ILII without Average Manufacturing Hours												
Percentage Change (Annualized)	1.3%	1.8%	1.7%	2.5%	2.7%	2.6%	2.3%	1.5%	2.6%	3.1%	2.7%	3.2%
Diffusion Index	85.7	85.7	85.7	85.7	85.7	85.7	85.7	78.6	71.4	85.7	71.4	71.4
ILII without Yield Spread												
Percentage Change (Annualized)	0.9%	1.8%	1.7%	2.9%	3.5%	3.6%	3.5%	3.2%	4.3%	4.3%	4.1%	4.7%
Diffusion Index	85.7	85.7	85.7	85.7	85.7	85.7	85.7	85.7	85.7	85.7	85.7	85.7
ILII without Diesel Fuel												
Percentage Change (Annualized)	0.8%	1.3%	1.6%	2.2%	2.4%	2.3%	1.7%	1.5%	2.0%	2.2%	1.9%	2.4%
Diffusion Index	85.7	85.7	85.7	85.7	85.7	85.7	85.7	78.6	71.4	85.7	71.4	71.4
ILII without New Orders Index												
Percentage Change (Annualized)	1.0%	1.5%	1.4%	2.3%	2.6%	2.5%	2.4%	2.1%	2.9%	3.1%	2.9%	3.3%
Diffusion Index	85.7	85.7	85.7	85.7	85.7	85.7	85.7	78.6	71.4	100.0	85.7	85.7
ILII without Unemployment Claims												
Percentage Change (Annualized)	1.0%	1.7%	1.7%	2.5%	2.7%	2.8%	2.5%	2.0%	2.8%	2.9%	2.6%	2.8%
Diffusion Index	85.7	85.7	85.7	85.7	85.7	85.7	85.7	78.6	71.4	85.7	71.4	71.4
ILII without Building Permits												
Percentage Change (Annualized)	0.8%	1.5%	1.6%	2.2%	2.3%	2.3%	2.2%	2.0%	2.5%	2.7%	2.7%	2.7%
Diffusion Index	85.7	85.7	85.7	85.7	85.7	85.7	85.7	78.6	85.7	85.7	71.4	71.4

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced August 14, 2014 using updated standardization factors through June 2014.

A diffusion index measures the proportion of components that are rising based on the actual changes (not the standardized contributions to the ILII). Components experiencing increases greater than 0.05 percent are assigned a value of 1.0, components that experience changes less than an absolute value of 0.05 percent are assigned a value of 0.5, and components experiencing decreases greater than 0.05 percent are assigned a value of 0.0. The Conference Board considers a contraction signal reliable when the index declines by at least two percent over a six-month period (using an annualized rate) and a majority of the individual components also decline over those six months measured as a six-month diffusion index value below 50.

Figure 6. Comparison of Iowa Leading Indicators Index in FY 2014 and Update for FY 2015: January 1999-June 2014

Index (1999=100)

Non-Farm Employment Index

ILII FY 2014

ILII FY 2015

Month and Year
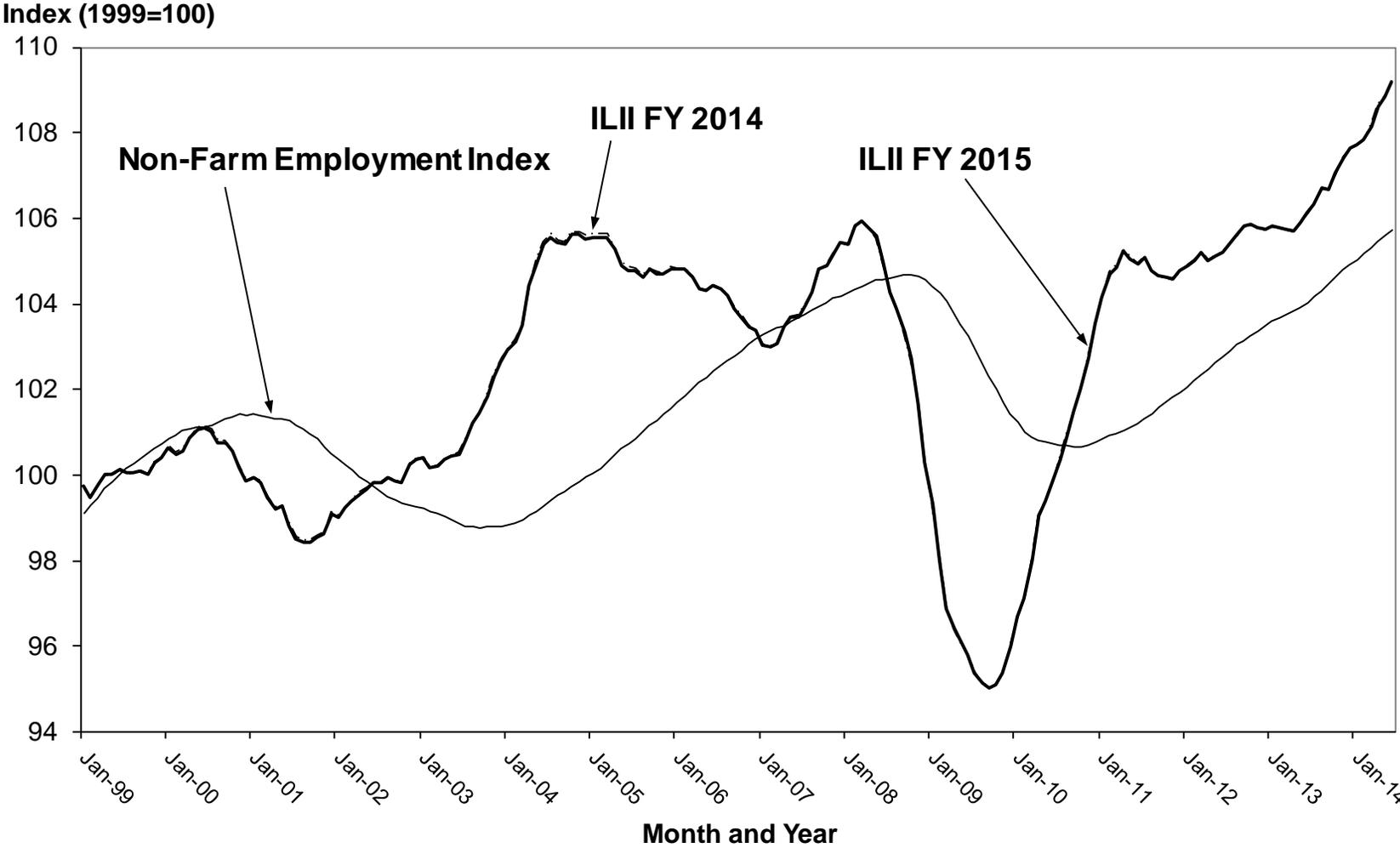
Table 4. Iowa Leading Indicators Index: Six Month Overview for June 2014 Prior to the FY 2015 Annual Update

Monthly Values	2014 January	February	March	April	May	June
ILII	107.8	107.9	108.2	108.7	108.9	109.3
Percentage Change[a]	0.1%	0.1%	0.3%	0.4%	0.2%	0.4%
Diffusion Index[b]	62.5	37.5	75.0	75.0	68.8	87.5

Six-Month Values	July to January	August to February	Sept to March	Oct to April	Nov to May	Dec to June
ILII						
Percentage Change	1.3%	1.1%	1.5%	1.5%	1.4%	1.5%
Annualized Percentage Change	2.6%	2.2%	2.9%	3.0%	2.8%	3.1%
Diffusion Index	87.5	81.3	75.0	87.5	75.0	75.0

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced July 28, 2014.
a. Percentage changes in the ILII do not always equal changes in the level of the ILII due to rounding.
b. A diffusion index measures the proportion of components that are rising based on the actual changes (not the standardized contributions to the ILII). Components experiencing increases greater than 0.05 percent are assigned a value of 1.0, components that experience changes less than an absolute value of 0.05 percent are assigned a value of 0.5, and components experiencing decreases greater than 0.05 percent are assigned a value of 0.0.

Table 5. Iowa Leading Indicators Index: Six Month Overview for June 2014 After the FY 2015 Annual Update

Monthly Values	2014 January	February	March	April	May	June
ILII	107.7	107.8	108.2	108.6	108.8	109.2
Percentage Change[a]	0.1%	0.1%	0.3%	0.4%	0.2%	0.4%
Diffusion Index[b]	62.5	37.5	75.0	75.0	68.8	87.5

Six-Month Values	July to January	August to February	Sept to March	Oct to April	Nov to May	Dec to June
ILII						
Percentage Change	1.3%	1.1%	1.4%	1.5%	1.3%	1.5%
Annualized Percentage Change	2.5%	2.1%	2.8%	2.9%	2.6%	2.9%
Diffusion Index	87.5	81.3	75.0	87.5	75.0	75.0

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced September 3, 2014.
a. Percentage changes in the ILII do not always equal changes in the level of the ILII due to rounding.
b. A diffusion index measures the proportion of components that are rising based on the actual changes (not the standardized contributions to the ILII). Components experiencing increases greater than 0.05 percent are assigned a value of 1.0, components that experience changes less than an absolute value of 0.05 percent are assigned a value of 0.5, and components experiencing decreases greater than 0.05 percent are assigned a value of 0.0.

Table 6. Iowa Leading Indicators Index Components: Six Month Overview for June 2014 Prior to the FY 2015 Annual Update

Component Series Monthly Values[a]		2014 January	February	March	April	May	June
AFPI[b]	↑[c]	*-0.4*	*-0.1*	*2.1*	*3.2*	*1.8*	*2.0*
Corn Profits (cents per bushel)		116.8	102.8	91.1	86.5	78.6	71.2
Soybean Profits (cents per bushel)		294.3	285.6	284.0	293.6	298.0	301.8
Hog Profits (cents per pound)		22.9	24.3	28.2	32.0	34.6	37.0
Cattle Profits (cents per pound)		-8.3	-6.5	-4.6	-2.5	-0.6	2.0
Iowa Stock Market Index (10=1984-86)	↑	96.38	95.57	100.33	101.25	102.43	105.55
Yield Spread (10-year less 3-month)	↑	2.82	2.66	2.67	2.68	2.53	2.56
Building Permits	↑	898	886	893	934	914	939
Average Weekly Unemployment Claims[d]	↑	3,236	3,204	3,214	3,196	3,161	3,121
Average Weekly Manufacturing Hours	↑	41.4	41.6	41.7	41.7	41.8	41.9
New Orders Index (percent)	↓	69.09	68.74	68.73	68.26	68.21	68.18
Diesel Fuel Consumption (mil gallons)	↑	57.36	57.67	57.86	58.17	58.59	58.67

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced July 28, 2014.
a. For all component series except for the yield spread and the Iowa stock market index, the values represent 12-month backward moving averages.
b. The agricultural futures profits index is computed as the sum of the standardized symmetric percent changes in the four series, each weighted by the commodity's annual share of Iowa cash farm income (updated August 28, 2013).
c. Arrows indicate the direction of the series' contribution to the ILII for the latest month.
d. Changes in unemployment claims are inverted when added to the ILII, thus a negative change in the series contributes positively to the index.

Table 7. Iowa Leading Indicators Index Components: Six Month Overview for June 2014 After the FY 2015 Annual Update

Component Series Monthly Values[a]		2014 January	February	March	April	May	June
AFPI[b]	↑[c]	*-0.6*	*-0.2*	*1.9*	*3.1*	*1.7*	*1.9*
Corn Profits (cents per bushel)		116.8	102.8	91.1	86.5	78.6	71.2
Soybean Profits (cents per bushel)		294.3	285.6	284.0	293.6	298.0	301.8
Hog Profits (cents per pound)		22.9	24.3	28.2	32.0	34.6	37.0
Cattle Profits (cents per pound)		-8.3	-6.5	-4.6	-2.5	-0.6	2.0
Iowa Stock Market Index (10=1984-86)	↑	96.38	95.57	100.33	101.25	102.43	105.55
Yield Spread (10-year less 3-month)	↑	2.82	2.66	2.67	2.68	2.53	2.56
Building Permits	↑	898	886	893	934	914	939
Average Weekly Unemployment Claims[d]	↑	3,236	3,204	3,214	3,196	3,161	3,121
Average Weekly Manufacturing Hours	↑	41.4	41.63	41.71	41.73	41.81	41.87
New Orders Index (percent)	↓	69.09	68.74	68.73	68.26	68.21	68.18
Diesel Fuel Consumption (mil gallons)	↑	57.36	57.67	57.86	58.17	58.59	58.67

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced September 3, 2014.
a. For all component series except for the yield spread and the Iowa stock market index, the values represent 12-month backward moving averages.
b. The agricultural futures profits index is computed as the sum of the standardized symmetric percent changes in the four series, each weighted by the commodity's annual share of Iowa cash farm income (Updated September 3, 2014).
c. Arrows indicate the direction of the series' contribution to the ILII for the latest month.
d. Changes in unemployment claims are inverted when added to the ILII, thus a negative change in the series contributes positively to the index.

Appendix A: Computation of the Iowa Leading Indicators Index

The ILII was computed following the five step process presented in the *Business Cycle Indicators Handbook* by The Conference Board.

1. Calculate month-to-month changes for each component. For the components already in percent form (including the yield spread and the new orders index) simple arithmetic differences are calculated. For the other components, a symmetric percent change formula is used because this formula will return the original value if equal positive and negative changes occur in consecutive months.

   = 200*(current month value – last month value)/(current month value + last month value)

2. Multiply each component's month-to-month changes by the standardization factor. Standardization factors, the inverse of the standard deviation of the changes in the series normalized across all series to sum to one, equalize the volatility of each component in the index (see Table 4 for the standardization factors currently being used).

3. Add the standardized month-to-month changes across all eight indicators to compute each monthly ILII change.

4. Compute preliminary values of the index using a cumulative symmetric percent change formula. The initial month's value is set to 100, then to compute the cumulative

change of the index, each of the index's value is multiplied by the following monthly change:

$ILII_0 = 100$

$ILII_1 = ILII_0 * (200 + \text{month one ILII change}) / (200 - \text{month one ILII change})$

5. Rebase the index to average 100 in the base year (1999). The preliminary levels are multiplied by 100 and divided by the average preliminary value over the 12 months in 1999.

Because many of the series are subject to a lot of seasonal variation, before calculating month-to-month changes all series except the yield spread and the Iowa stock market index are smoothed by taking 12-month backward moving averages.

The standardization factors are recalculated and any revisions to historical data (beyond the previous two months) are incorporated annually during the summer.

The Non-Farm Employment Coincident Index is computed following this same method; however, with only one component, steps 2 and 3 are unnecessary.

Appendix B: Computation of the Diffusion Index

A diffusion index measures the proportion of components rising in a given time period. Components experiencing an increase of more than 0.05 percent are assigned a value of 1.0; components experiencing a change in absolute value of 0.05 percent or less are assigned a value of 0.5; components experiencing a decrease of more than 0.05 percent are assigned a value of 0.0. These assigned values are then summed over all of the components. The sum is multiplied by 100 and divided by the number of components. Thus a value below 50 indicates more than half of the components declined in value during the period of interest.

The diffusion index is based on the actual changes in the components, not the standardized contributions used to compute the ILII. A diffusion index is computed for one-month and six-month symmetric percent changes in the components (see Figure B1).

Figure B1. Iowa Leading Indicators Index One-Month and Six-Month Diffusion Indexes: Jan. 1999-June 2014