Iowa Leading Indicators Index: Seventh 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 Web site (http://www.state.ia.us/tax/taxlaw/econindicators.html). During FY 2013, the ILII exhibited seven positive changes and five months with no change. Employment increased throughout the year, with the gains bouncing around the average 0.11 increase, ranging from 0.08 to 0.16 percent changes. Consistent with the generally positive ILII results, State receipts increased 7.7 percent during FY 2013.

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 seventh 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 2013

During FY 2013, the ILII rose from 105.4 in July 2012 to 106.5 in June 2013 (see Figure 1). The ILII experienced positive changes during the first four months of the year, followed by

two flat months, a small increase followed by three flat months, and ended the year with two more months of positive changes. The annualized six-month percent change peaked at 2.1 percent in October, slipped to 0.2 percent in April, and then rose to 1.0 percent by June. Strength in the index was fairly widespread, with the six-month diffusion index remaining near 75 most of the first half of the year, dipping to 56.3 in April, but again reaching 75 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 33 consecutive months. Since 1999, the index has signaled a recession twice, from December 2000 through September 2001 and from August 2008 through November 2009, followed by declines in employment stretching from July 2001 through December 2003 and November 2008 through October 2010, respectively.

During 2012, Iowa gross domestic product (GDP) rose along with Iowa personal income and State revenues. Iowa GDP grew an estimated 2.4 percent in 2012, slightly above the revised 2.2 percent growth measured for 2011 (see Figure 2). Real personal income in Iowa grew 2.1 percent in 2012 after an estimated 5.1 percent growth in 2011 (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, corporate, inheritance, insurance

premium, cigarette and tobacco, and franchise receipts, all adjusted using the Consumer Price Index (CPI) to 2012 dollars. Receipts grew throughout FY 2013 with individual income and corporate income experiencing gains throughout the year. However, sales and use tax receipts' growth slowed each quarter with negative year-over-year growth in the final quarter while the index was stalling.

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 revenues. Net individual income tax revenues are a 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 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. Individual income tax receipts shot above pre-recession levels during fiscal year 2013 since bottoming out in May 2010 as the ILII increased over the last year.

The main goal for the Iowa Leading Indicators Index is to serve as an additional tool in 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, 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 during the beginning of the year were matched with continued gains in employment. The nearly six months of no changes in the index suggested that employment growth could soon flatten, but the six-month change remained positive and employment gains continued. The year closed with two months of positive changes in the index which increased the six-month positive change, signaling that employment gains should persist through summer and into the fall. Overall, results over the past six 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 Table 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 2013, the LEI demonstrated slightly stronger gains in many months of the year, although

those gains were offset by two negative months. Recall the ILII remained positive or unchanged throughout the year.

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 6.7 percent of Iowa GDP in 2012, 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 16.7 percent of GDP and 14.3 percent of total non-farm employment in 2012, 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 finance sector accounted for 12.7 percent of GDP and 6.9 percent of non-farm employment in 2012. The 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 2013 the ILII continued to exhibit all of these attributes. As noted in the introduction, the index reasonably matched the path of employment during 2013, which demonstrated conformity and consistency. During FY 2013, six of eight components experienced gains (see Table 1). The largest positive contribution was made by building permits which added 0.71 points to the index between June 2012 and June 2013 which was a positive contributor in eight months during fiscal year 2013. Other strong positive contributors were the Iowa stock market index, the national yield spread, and diesel fuel consumption. Signs of national economic strength pushed up stock prices as well as long-term interest rates. The Agricultural Futures Profits Index and average manufacturing hours were the two negative contributors as hours dropped … and grain prices dropped as yields in 2012 were stronger than expected despite the drought and 2013 crop conditions have been generally positive. Although the components moved in different

directions, the individual signals representing different sectors of the economy appeared to conform to the current stage of the business cycle – recovery and stabilization. Likewise, 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 future growth in Iowa employment which started in October 2010 and has continued through June 2013.

Currency of the ILII's components proved to be reliable for almost all components during FY 2013. 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. The agricultural futures profits index (AFPI) also experienced some currency issues when there was a delay in the release of breakeven prices for livestock from Iowa State University. The cattle and hog cost of production data went through a revision with the changes completed in early 2013. Since that time, several months the reporting of the break-evens has been delayed, requiring the Department to contact ISU and request that the data be posted so it can be incorporated in the report. During FY 2013, the level of the index for December 2012 was revised in January 2013, due to a revision in manufacturing hours, and a revision to diesel fuel consumption for June 2013 would have resulted in a small increase in the index.

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 all of the eight components except building permits (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 2013 suggest the factors for all components will not change much. Four components will experience small declines, with the largest decline being 3.9 percent for building permits. 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 2013 independent of the signal from most components. In April, when the index six-month annualized change dropped to 0.2 percent, without building permits, the Iowa stock market index, and diesel fuel

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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.

consumption, the change would have been negative. In February and March, the strength of building permits kept the index in positive territory. However, all of the negatives were close to zero and far from a contraction signal level of -2.0 percent. Removing the AFPI and manufacturing hours would have greatly strengthened the expansion signals. Throughout the year, the six-month diffusion index remained at 50 or above, suggesting reasonable strength across the indicators.

Updates for the Seventh Year

Given that the original eight components continue to meet the Moore-Shiskin criteria and no new series were added, the steps required to prepare the ILII for FY 2014 were an update to the Iowa stock market index to account for business changes that occurred during the last year and an update to the Agricultural Futures Profits Index incorporating updated grain break-evens for the 2012 crop year and the most recent data on annual cash receipts. 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 Iowa Stock Market Index

During fiscal year 2013, one company in the Iowa stock market index merged with a foreign entity. Danfoss A/S, one of the largest industrial companies in Denmark, merged with Sauer-Danfoss (SHS), Inc., which has a presence in Ames, effective April 12, 2013. At the time, the valuation for the company was held constant at its last sale price. However, as part of the annual update, the company was removed from the index.

A second company has been undergoing ownership and structural changes for the last 18 months, coinciding with very low market prices. At the end of 2011, Cycle Country Accessories Corporation (ATC) sold its ATV accessories product line to another company and a major brand line to the former owner. The subsidiary located in Spencer was renamed Simonsen Iron Works, Inc. In October 2012, the company was warned that its price was too low and it was at risk of delisting. In December 2012, the company now named ATC Venture Group, Inc., moved its listing to the OTC market which results in very sporadic trading. In May 2013, Simonsen Iron Works was purchased by a Nebraska company. Therefore, ATC was removed from the index.

A third company was identified with a growing Iowa presence which warranted inclusion in the index. Polaris Industries, Inc., (PII) headquartered in Minnesota, has over 800 employees in Iowa. The company recently expanded its operations in northwest Iowa with 160 hires and a new motorcycle product line. The manufacturing company has been publicly traded since at least 1995.

The Iowa stock market index now contains values for 33 Iowa-based or companies with a significant Iowa presence. Eleven of those companies are in the finance and insurance sector, seven are durable manufacturers, and two are nondurable manufacturers. The others include three utilities (electricity and telecommunications), three energy companies (gas stations and ethanol production facilities), two publishers, two chemical companies, one fertilizer company, one biopharmaceutical company, and one transportation company.

Dropping ATC and SHS from the Iowa Stock Market Index and adding PII increased the value of the index less than one point on average in recent years. The stock market index is standardized to an average value of 100 for the 1984-1986 period; with the elimination of the two stocks and addition of one, the total valuation for that period decreased slightly. When the value for that period falls through the elimination of stocks, the entire index rises. However, the increases in the recent months reflect the growth in the PII capitalization value more than the change to the valuation during the 1984-1986 period. The impact on the ILII of the update to the stock market index rounded to zero in most months.

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 were incorporated.

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. With the release of the 2012 cash receipts, all AFPI values for January 2012 and later were updated to reflect the distribution of farm cash receipts for calendar year 2012. In 2012, total farm cash receipts for Iowa rose 11.6 percent with total corn receipts rising 11.0 percent, soybean receipts growing 22.7 percent, hog receipts jumping 3.9 percent, and cattle receipts increasing 12.6 percent compared to revised numbers for 2011. In response to these changes, the distribution of receipts between the four

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commodities changed. The corn share of cash receipts between the four commodities rose from 42.2 percent to 43.1 and the soybeans share dropped from 21.0 to 20.1. The hog share fell from 24.4 to 23.7 percent and the cattle share rose from 12.5 to 13.1 percent. In addition, the USDA made revisions to corn, soybean, and hog 2011 income numbers.[2]

Iowa State University extension service prepares break-even costs for Iowa farmers. In July 2013, the 2013 crop year numbers were released and the 2012 crop year numbers were updated. The 2012 costs used in the index increased significantly as a result of the drought. Break-even costs used in the AFPI are measured per bushel. ISU noted that 2012 total input costs for corn and soybeans were effectively unchanged, but the reduced yield resulted in the increase in measured costs per bushel.   The break-even series are also no longer provided as a weighted average of renter and landowner. Based on the weights calculated using the historic weighted average series, the 2012 and 2013 break-evens for renters and landowners were combined to continue the series for the index. The significant increase in costs per bushel resulted in a significant drop in estimated profits per bushel for the 2012 crop year (June 2012-May 2013). Because the corn and soybean profit numbers are presented as 12 month moving averages, even June 2013 numbers dropped.

During the update, it was determined that the methods used to backcast corn and soybean break-even series for 1998-2000 were inconsistent (the ISU series begins in September 2000). The corn series method was matched to the soybean method; the change to the

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[2] The AFPI also uses standardization factors to equalize the volatility among the four commodities. The standardization factors, computed as the inverse of the standard deviation of the monthly changes in each of the four profit series, increased for corn and decreased for soybeans, hogs, and cattle. Because only one set of factors is used to calculate the full history of the series, this update caused small changes in all AFPI values.

history of the corn series impacts the entire AFPI series through the standardization of the index.

The update to the AFPI had a noticeable impact on the ILII series beginning in November 2012, pulling down the index values between 0.1 and 0.3 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 Iowa stock market index and AFPI for 2014 were completed, the standardization factors were finalized (see Table 2). The updates to the AFPI had very little impact on the index prior to November 2012 (see Figure 6). However, as a result of the updates the last eight months historical values of the ILII are lower. For the January 2012 through June 2012 period, the index is 0.2 to 0.3 points lower each month (see Tables 4 and 5). The monthly percentage changes remained unchanged in January through April, but were slightly lower in May and higher in June. The level of the six-month annualized percentage change was 0.4 percentage points lower during the first five months such that the low point in April is now negative. The gap between the values narrowed in June. The six-month diffusion index was unchanged, but the monthly diffusion index was higher in June as the AFPI became a positive contributor as a result of the revisions.
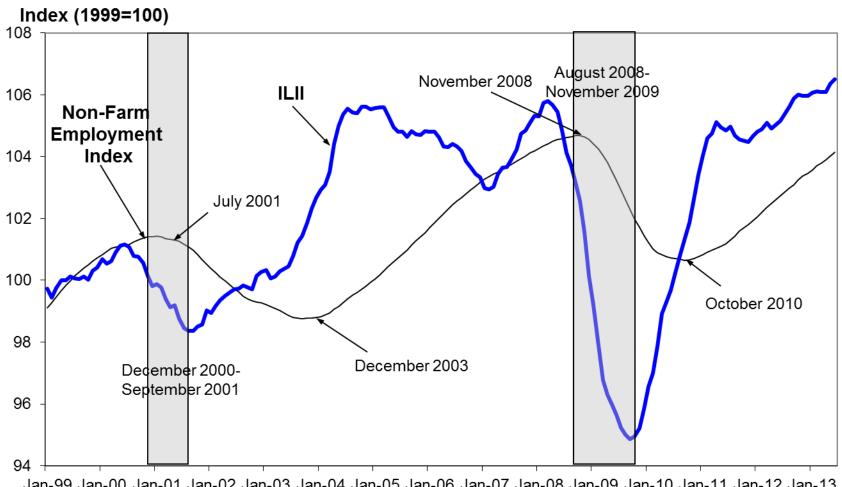
For the values of the components themselves, the AFPI fell significantly for January through May, reflecting the increased corn and soybean break-evens for the 2012 crop year, but rose for June, reflecting a recalculation of the 2013 crop year break-evens using a weighted

average of the renter and landowner costs rather than a straight average (see Tables 7 and 8). The Iowa stock market index values are higher, a result of adding one company with a larger current valuation than the two companies that were removed. The only other change was for June diesel fuel consumption which reflects a data revision for that month.

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 2013

Index (1999=100)

ILII

Non-Farm Employment Index

July 2001

November 2008

August 2008-November 2009

December 2003

December 2000-September 2001

October 2010

Month and Year

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Figure 2. Iowa Leading Indicators Index, Iowa GDP, and Iowa Personal Income: January 1999-June 2013

Index (1999=100)

Billions (2005$)

Iowa GDP (right)

ILII (left)

Iowa Personal Income (right)

Month and Year

Figure 3. Iowa Leading Indicators Index and Iowa Real Tax Receipts: January 1999-June 2013

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 2013

Index (1999=100)

Millions (2012$)

ILII (left)

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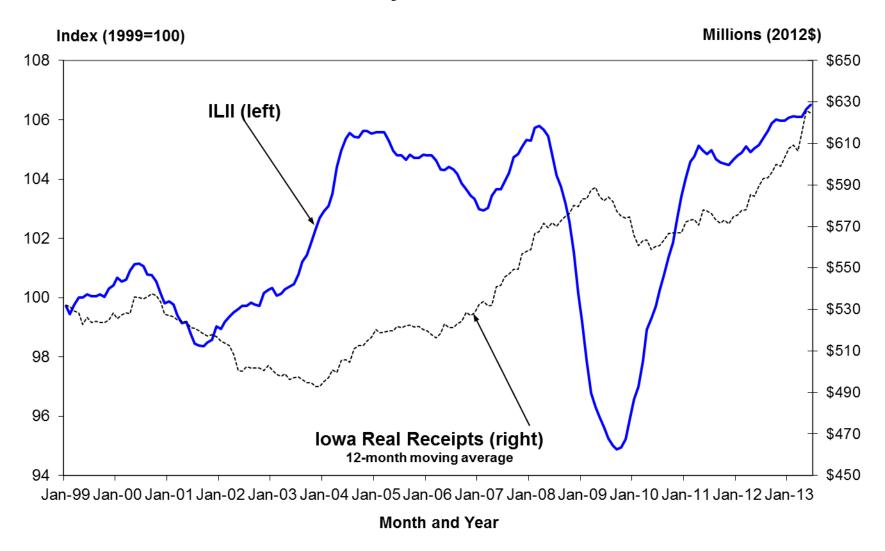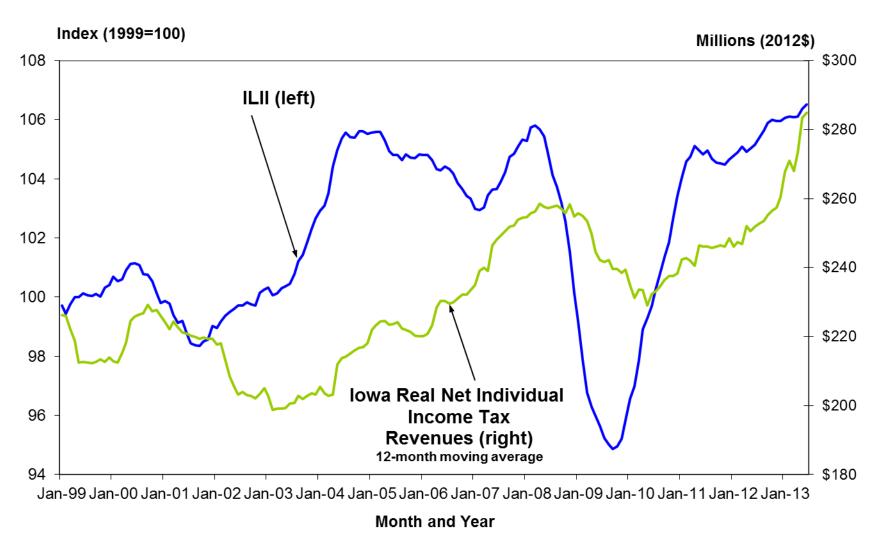
12-month moving average

Month and Year

Figure 5. Iowa Leading Indicators Index Compared to U.S. Leading Economic Indicators: January 1999-June 2013

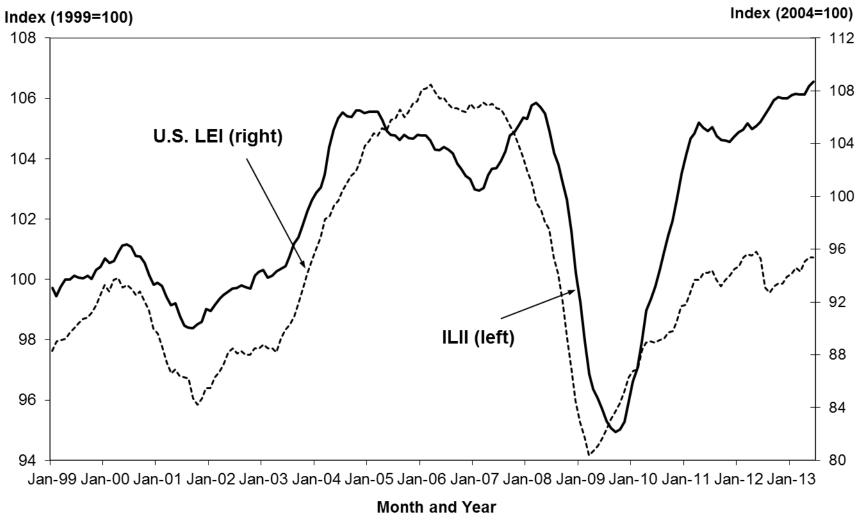## Table 1. Iowa Leading Indicators Index Components: Annual Overview

Component Series Monthly Values[a]		2012 June	2013 June	Contribution to ILII Change
AFPI[b]	↓[c]			-0.34
Corn Profits (cents per bushel)		291.0	329.6	
Soybean Profits (cents per bushel)		491.9	607.4	
Hog Profits (cents per pound)		24.1	14.5	
Cattle Profits (cents per pound)		-4.5	-16.6	
Iowa Stock Market Index (10=1984-86)	↑	70.99	85.98	0.34
Yield Spread (10-year less 3-month)	↑	1.53	2.25	0.24
Building Permits	↑	679	830	0.73
Average Weekly Unemployment Claims[d]	↑	3,460	3,284	0.17
Average Weekly Manufacturing Hours	↓	40.9	40.7	-0.16
New Orders Index (percent)	↑	65.0	66.1	0.07
Diesel Fuel Consumption (mil gallons)	↑	55.00	55.68	0.23

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced August 22, 2013

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, 2012).

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 2013 Data

Leading Indicator	Jul-2012 Standard Deviation	Jul-2013 Standard Deviation	Percent Change in Standard Deviation	Jul-2012 Standardization Factor	Rank	Jul-2013 Standardization Factor	Rank	Percent Change in Standardization Factor
Agricultural Futures Profits Index	1.810	1.763	-2.6%	0.049	5	0.049	5	-0.1%
Iowa Stock Market Index	4.966	4.844	-2.5%	0.018	8	0.018	8	-0.2%
Yield Spread	0.271	0.265	-2.4%	0.328	1	0.328	1	-0.2%
Building Permits	2.441	2.473	1.3%	0.036	6	0.035	6	-3.9%
Average Weekly Unemployment Claims	2.685	2.597	-3.3%	0.033	7	0.033	7	0.7%
Average Weekly Manufacturing Hours	0.314	0.304	-3.1%	0.284	2	0.285	2	0.5%
New Orders Index	1.419	1.379	-2.8%	0.063	4	0.063	4	0.2%
Diesel Fuel Consumption	0.474	0.460	-2.9%	0.188	3	0.188	3	0.3%

Each data series considers month-to-month changes over January 1999 to June 2012 for July 2012 values and January 1999 to June 2013 for July 2013 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%	1.4%	1.5%	2.0%	1.7%	1.5%	1.2%	0.9%	0.4%	0.2%	0.8%	1.0%
Diffusion Index	62.5	75.0	75.0	75.0	56.3	75.0	75.0	62.5	62.5	56.3	62.5	75.0
ILII without AFPI												
Percentage Change (Annualized)	1.9%	2.2%	2.3%	2.6%	2.1%	1.8%	1.6%	1.3%	0.7%	0.7%	1.3%	1.6%
Diffusion Index	71.4	85.7	85.7	85.7	64.3	85.7	85.7	71.4	71.4	64.3	71.4	85.7
ILII without Iowa Stock Market												
Percentage Change (Annualized)	0.9%	1.2%	1.4%	2.0%	1.7%	1.3%	1.0%	0.7%	0.2%	-0.1%	0.2%	0.5%
Diffusion Index	57.1	71.4	71.4	71.4	50.0	71.4	71.4	57.1	57.1	50.0	57.1	71.4
ILII without Average Manufacturing Hours												
Percentage Change (Annualized)	0.5%	1.1%	1.4%	2.6%	2.5%	2.6%	2.2%	1.7%	0.9%	0.5%	1.2%	1.4%
Diffusion Index	57.1	71.4	71.4	71.4	64.3	85.7	85.7	71.4	71.4	64.3	71.4	71.4
ILII without Yield Spread												
Percentage Change (Annualized)	2.2%	2.3%	2.7%	3.3%	2.7%	2.1%	1.5%	1.0%	0.3%	0.2%	0.8%	0.9%
Diffusion Index	71.4	85.7	85.7	85.7	64.3	71.4	71.4	57.1	57.1	57.1	57.1	71.4
ILII without Diesel Fuel												
Percentage Change (Annualized)	1.3%	1.5%	1.6%	2.4%	2.1%	1.8%	1.5%	0.9%	0.2%	-0.1%	0.4%	0.7%
Diffusion Index	57.1	71.4	71.4	71.4	57.1	71.4	71.4	57.1	57.1	50.0	57.1	71.4
ILII without New Orders Index												
Percentage Change (Annualized)	1.2%	1.2%	1.2%	1.7%	1.4%	1.4%	1.3%	1.2%	0.7%	0.5%	1.0%	1.1%
Diffusion Index	71.4	71.4	71.4	71.4	50.0	71.4	71.4	71.4	71.4	64.3	71.4	85.7
ILII without Unemployment Claims												
Percentage Change (Annualized)	0.7%	0.9%	1.1%	1.8%	1.5%	1.3%	1.1%	0.7%	0.2%	0.0%	0.7%	0.9%
Diffusion Index	57.1	71.4	71.4	71.4	50.0	71.4	71.4	57.1	57.1	50.0	57.1	71.4
ILII without Building Permits												
Percentage Change (Annualized)	0.5%	0.7%	0.5%	0.4%	0.3%	0.1%	0.1%	-0.1%	-0.3%	-0.2%	0.7%	1.0%
Diffusion Index	57.1	71.4	71.4	71.4	50.0	71.4	71.4	57.1	85.7	50.0	57.1	71.4

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced August 22, 2013 using updated standardization factors through June 2013.

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.

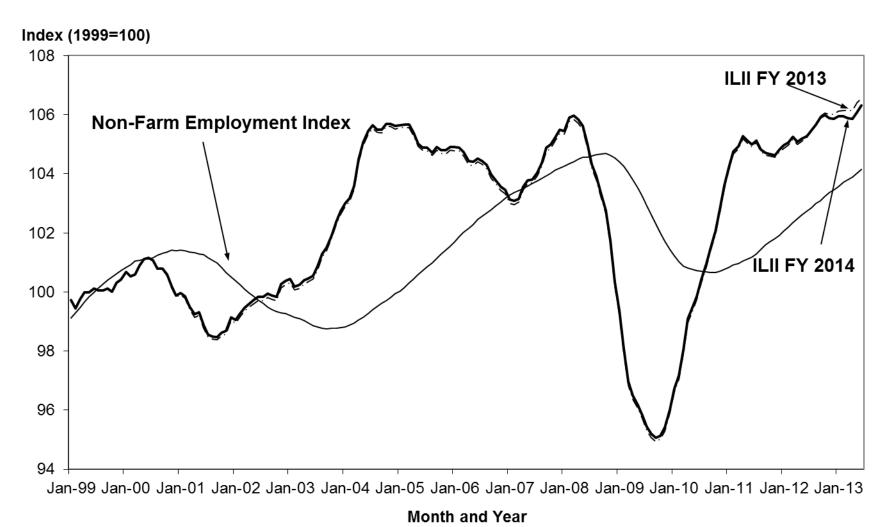# Figure 6. Comparison of Iowa Leading Indicators Index in FY 2013 and Update for FY 2014: January 1999-June 2013

Index (1999=100)

Non-Farm Employment Index

ILII FY 2013

ILII FY 2014

Month and Year

Table 4. Iowa Leading Indicators Index: Six Month Overview for June 2013 Prior to the FY 2014 Annual Update

Monthly Values	2013 January	February	March	April	May	June
ILII	106.1	106.1	106.1	106.1	106.4	106.6
Percentage Change[a]	0.1%	0.0%	0.0%	0.0%	0.3%	0.1%
Diffusion Index[b]	62.5	56.3	56.3	62.5	62.5	68.8

Six-Month Values	July to January	August to February	Sept to March	Oct to April	Nov to May	Dec to June
ILII						
Percentage Change	0.6%	0.5%	0.2%	0.1%	0.4%	0.5%
Annualized Percentage Change	1.3%	0.9%	0.4%	0.2%	0.8%	1.0%
Diffusion Index	75.0	62.5	62.5	56.3	62.5	75.0

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced July 31, 2013.
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 2013 After the FY 2013 Annual Update

Monthly Values	2013 January	February	March	April	May	June
ILII	105.9	105.9	105.9	105.9	106.1	106.3
Percentage Change[a]	0.1%	0.0%	0.0%	0.0%	0.2%	0.2%
Diffusion Index[b]	62.5	56.3	56.3	62.5	62.5	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	0.4%	0.3%	0.0%	-0.1%	0.2%	0.4%
Annualized Percentage Change	0.9%	0.5%	0.0%	-0.2%	0.3%	0.8%
Diffusion Index	75.0	62.5	62.5	56.3	62.5	75.0

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced August 28, 2013.
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 2013 Prior to the FY 2014 Annual Update

Component Series Monthly Values[a]		2013 January	February	March	April	May	June
AFPI[b]	↓[c]	-0.7	-0.8	-1.0	-1.5	-0.3	-0.8
Corn Profits (cents per bushel)		319.3	319.3	320.0	317.0	317.5	329.6
Soybean Profits (cents per bushel)		588.8	595.2	593.6	580.3	574.7	607.4
Hog Profits (cents per pound)		17.1	16.2	15.2	14.6	14.6	14.5
Cattle Profits (cents per pound)		-12.3	-13.1	-13.9	-14.9	-15.9	-16.6
Iowa Stock Market Index (10=1984-86)	↑	78.66	79.08	81.16	81.88	85.78	85.98
Yield Spread (10-year less 3-month)	↑	1.84	1.88	1.87	1.70	1.89	2.25
Building Permits	↓	826	832	824	840	837	830
Average Weekly Unemployment Claims[d]	↑	3,335	3,315	3,311	3,293	3,297	3,284
Average Weekly Manufacturing Hours	↑	40.7	40.6	40.7	40.7	40.7	40.7
New Orders Index (percent)	↑	65.5	65.0	64.5	65.3	65.7	66.1
Diesel Fuel Consumption (mil gallons)	↑	55.05	55.29	55.37	55.34	55.57	55.68

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced July 31, 2013.
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, 2012).
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 2013 After the FY 2014 Annual Update

Component Series Monthly Values[a]		2013 January	February	March	April	May	June
AFPI[b]	↑[c]	-1.4	-1.5	-1.7	-2.2	-1.2	0.3
Corn Profits (cents per bushel)		279.3	274.9	271.2	263.6	259.7	264.9
Soybean Profits (cents per bushel)		529.6	527.4	517.1	495.1	480.7	485.3
Hog Profits (cents per pound)		17.1	16.2	15.2	14.6	14.6	14.5
Cattle Profits (cents per pound)		-12.3	-13.1	-13.9	-14.9	-15.9	-16.6
Iowa Stock Market Index (10=1984-86)	↑	79.60	79.85	82.02	82.64	86.62	86.76
Yield Spread (10-year less 3-month)	↑	1.84	1.88	1.87	1.70	1.89	2.25
Building Permits	↓	826	832	824	840	837	830
Average Weekly Unemployment Claims[d]	↑	3,335	3,315	3,311	3,293	3,297	3,284
Average Weekly Manufacturing Hours	↑	40.7	40.63	40.66	40.65	40.69	40.72
New Orders Index (percent)	↑	65.5	65.0	64.5	65.3	65.7	66.1
Diesel Fuel Consumption (mil gallons)	↑	55.05	55.29	55.37	55.34	55.57	55.73

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced August 28, 2013.
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, 2012).
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.
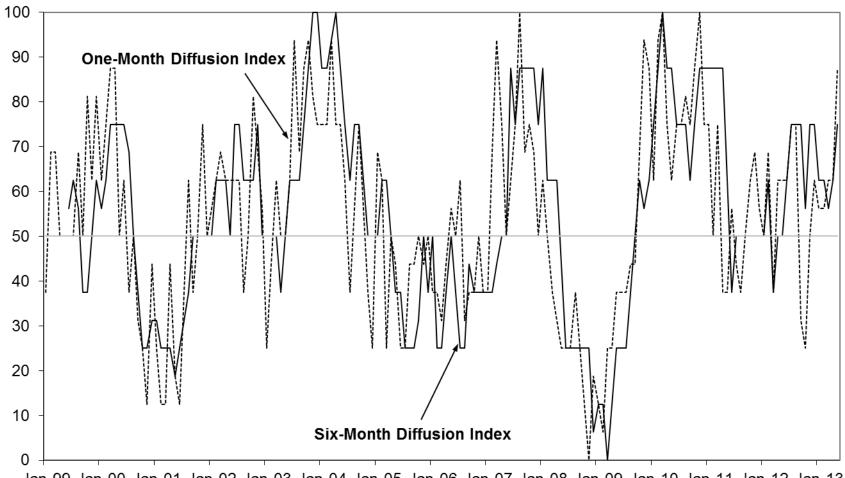
The Non-Farm Employment Coincident Index is computed following this same method; however, with only one component, steps 2 and 3 are unnecessary.

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 2013