

Iowa Leading Indicators Index: Sixth 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 and posted the reports on the IDR Web site (<http://www.state.ia.us/tax/taxlaw/econindicators.html>). The ILII, signaling the start of the recovery in December 2009, successfully forecasted the expansion in Iowa employment that started in October 2010. During FY 2012, the ILII exhibited seven positive and five negative monthly changes. Employment slowly increased throughout the year, with the gains jumping in February as the annualized six-month change in the index moved into positive territory. Despite the mixed ILII results, State revenues increased 5.0 percent during FY 2012.

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 sixth 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 2012

During FY 2012, the ILII rose from 104.8 in July 2011 to 105.0 in June 2012 (see Figure 1). The ILII experienced a positive change in the first month of the year, followed by four negative changes that pushed the annualized six-month percent change down to -1.3 percent in October. Then strength

returned in several components, leading to four months of positive changes that raised the annualized six-month change to 1.0 percent in March. The change was negative in April, with two positive changes finishing the year. Strength in the index was never widespread, with the six-month diffusion index remaining near 50 all year. Despite the overall weak positive signal 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 from October 2010 through June 2012. 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 2011, Iowa gross domestic product (GDP) rose along with Iowa personal income and State revenues. After dropping in 2008 (-2.5%) and 2009 (-2.9%), GDP grew an estimated 5.1 percent in 2010 and 1.9 percent in 2011 (see Figure 2). Real personal income in Iowa also grew in 2010 and 2011, 3.9 percent and 2.5 percent, respectively, after declining 3.5 percent during 2009 (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 revenues 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 2011 dollars. While total receipts showed steady growth from in FY 2007 through FY 2009, partly a result of law changes during that time, receipts dropped in most months of FY 2010. Receipts grew throughout FY 2011 and 2012 with all major sources of General Fund revenue, including individual income, sales and use, and corporate income, experiencing gains.

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. 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 2011 dollars using the CPI (see Figure 4). Note that individual income taxes comprise over 50 percent of State General Fund revenues. 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 have nearly recovered to near pre-recession levels, since bottoming out in May 2010. The ILII has leveled off over the last year, while revenues continue to increase.

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 recent stall in the index suggests that employment growth will remain weak, and possibly stall during the next year as well. Overall, results over the past four years demonstrate that the ILII is a helpful tool in predicting turning points in Iowa non-farm employment.

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 6.6 percent of Iowa GDP in 2011. 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 18.6 percent of GDP and 14.0 percent of non-farm employment in 2011. 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 12.6 percent of GDP and 6.8 percent of non-farm employment in 2011. 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 five years, during fiscal year 2012 the ILII continued to exhibit all of these attributes. As noted in the introduction, the index reasonably matched the path of employment during 2012, which demonstrated conformity and consistency, although not as clear as in recent years. During FY 2012, five of eight components experienced gains (see Table 1). The largest positive contribution was made by average weekly unemployment claims which added 0.54 points to the index between June 2011 and June 2012 as unemployment claims were a positive contributor every month in fiscal year 2012. Another positive contributor was building permits, which was one of only two negative contributors last year. The national yield spread, the new orders index, and the Agricultural Futures Profits Index were the three negative contributors, reflecting the continued efforts of the Federal Reserve to hold down interest rates, a decrease in new manufacturing orders, and an emerging weakness in the ag sector due to high grain prices pushing up breakeven costs for livestock and grain prices were low relative to the prior 12 months. 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. 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 2012.

Currency of the ILII's components proved to be very reliable during FY 2012. All 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. There were a few months at the beginning of calendar year 2012 when there was a delay in the release of breakeven prices for livestock from Iowa State University, but the delay did not cause any revision to the level of the ILII. The cattle and hog cost of production data are going through a revision with the changes expected to be completely implemented in 2013. During FY 2012, the level of the index for October 2011 was revised in November 2011, due to a change in shares outstanding for several large companies. The level of the index was also revised in June 2012 because of an update that reduced the grain breakeven prices.

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 2012 suggest the factors for all components will not change much. Three components will experience small declines, with the largest decline being 2.7 percent for building permits. The other five components will experience small positive increases.

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 2012 independent of the signal from any given component. While the ILII did not signal contraction at any point during FY 2012, regardless of whether any one component was removed from the ILII calculation, it also did not show any great signal toward expansion. Throughout the year, the six-month diffusion index remained near 50, suggesting limited strength across the indicators.

Revisions to the U.S. Leading Economic Index

In 2012, the Conference Board made a significant revision to the United States Leading Economic Index (LEI), the first major revision since 1996. Between 1996 and 2011, the national index, which was a reference during the development of the ILII, was composed of ten components including:

1. Average weekly initial unemployment claims for the nation;
2. National residential housing permits;
3. S&P 500;
4. Average weekly manufacturing hours;
5. Yield spread;
6. Consumer goods orders;
7. Capital goods orders;
8. Supplier delivery;
9. Real M2; and
10. Michigan consumer expectations index.

The ILII includes Iowa versions of the first four components. The ILII also includes the yield spread, although the Conference Board uses the cumulative sum of the yield spread while the ILII uses the

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.

yield spread itself. The LEI includes two measures of goods orders to reflect manufacturing demand in the U.S. There is no monthly measure of goods orders in Iowa, so the ILII uses diesel fuel consumption as a proxy for manufacturing intermediate and final goods orders being shipped within and across Iowa. Another indicator that measures the future demand for output at manufacturers across Iowa included in the ILII is the Iowa new orders index from the Business Conditions Index produced by Dr. Ernest Goss at Creighton University. The LEI also includes a component from the Institute of Supply Management's Purchasing Managers' Index (PMI), the national equivalent of the index produced by Dr. Goss. The final two components of the LEI are a measure of the money supply, which is not as relevant for a state index, and an index capturing national consumer expectations, for which no Iowa-specific equivalent exists.

After reviewing the composition of the LEI, the Conference Board decided to replace four indicators with new measures.² Capital goods orders was replaced with a similar series that excludes aircraft to reduce volatility and better reflect orders related to near term production activity. Supplier delivery from the PMI was replaced with the new orders index from the PMI after determining the latter series better signaled turning points than the former. This change matches a component that is in the ILII. The Michigan consumer expectations index was replaced with a combination of consumer expectations of the economic outlook produced by the University of Michigan and consumer expectations of business conditions produced by the Conference Board. Finally, the basic measure of money supply was replaced with the Leading Credit Index that offers a much broader indicator of financial conditions.

The changes had a dramatic impact on the path of the LEI during the recent recession (see Figure 5). After moving similarly to the ILII since 1999, the two diverged when the 2011 version of the LEI

² Levanon, Gad, Ataman Ozyildirim, Brian Schaitkin, and Justyna Zabinska, *Comprehensive Benchmark Revisions for The Conference Board Leading Economic Index for the United States*, Economics Program Working Paper Series, The Conference Board, December 2011, accessed at: <http://www.conference-board.org/publications/publicationdetail.cfm?publicationid=2066>

dropped much slower and then started showing gains while the ILII fell steeply. Under the new composition of the LEI, a similar steep drop is seen, although the LEI has had weaker gains in the past two years than the ILII.

Updates for the Fifth 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 2013 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 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 2012, one company in the Iowa stock market index was purchased by an existing private out-of-state company. 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. Two other Iowa-based companies began trading during FY 2012 so as part of the annual update two companies are being added to the stock market index.

North Central Bank, the parent company of First Federal Savings Bank (FFFD), was acquired by Great Western Bank, which is headquartered in Sioux Falls, South Dakota. FFFD stopped being traded effective May 31, 2012 therefore, the final sale price was used for the index for the month of June, but will be removed from the index in FY 2013.

NewLink Genetics Corporation (NLNK) is a biopharmaceutical company based in Ames, Iowa, that began being publicly trading on November 14, 2011. Renewable Energy Group, Inc. (REGI) is a

biodiesel producer that is also based in Ames. REGI's initial public offering was made on January 19, 2012.

Adding NLNK and REGI and dropping FFFD from the Iowa Stock Market Index decreased the value of the index between fifteen to twenty points in recent years. The stock market index is standardized to an average value of 100 for the 1984-1986 period; if the total valuation for that period rises, the entire index falls. However, the impact on the ILII, which captures changes in the components, and not levels, was an average increase of 0.2 points per month during the last two years, with smaller increases of 0.1 point per month in the 2002 through 2008 period.

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 2011 cash receipts, all AFPI values for January 2011 and later were updated to reflect the distribution of farm cash receipts for calendar year 2011. In 2011, total farm cash receipts for Iowa rose 24.4 percent with total corn receipts rising 38.4 percent, soybean receipts growing 9.9 percent, hog receipts jumping 24.7 percent, and cattle receipts increasing 17.0 percent compared to 2010. In response to these changes, the distribution of receipts between the four commodities changed. The corn share of cash receipts between the four commodities rose from 38.2 percent to 42.2 and the soybeans share dropped from 23.9 to 21.0. The

hog share fell from 24.6 to 24.4 percent and the cattle share fell from 13.3 to 12.5 percent. In addition, the USDA made minor revisions to 2009 and 2010 income numbers.³

Assessment of Update Impacts on the ILII

After updates to the Iowa stock market index and AFPI for 2013 were completed, the standardization factors were finalized (see Table 2). The updates to the AFPI had very little impact on the index. As a result of the updates, the historical values of the ILII changed with the July 2012 report. The changes are small in most months, and can really only be noticed in the last year (see Figure 6). For the January 2012 through June 2012 period, the changes are minor (see Tables 4 and 5). The level of the index is higher in the months shown. The monthly and six-month annualized percentage changes remained unchanged in January through June. The six-month diffusion index in June also remained at 50.

For the values of the components themselves, the AFPI remained largely unchanged but did experience minor decreases in February and June (see Tables 7 and 8). The Iowa stock market index values are lower, a result of adding two companies and recalibrating the index to account for the removal of another.

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.

³ 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.

Figure 1. Iowa Leading Indicators Index and Iowa Non-Farm Employment Coincident Index: January 1999-June 2012

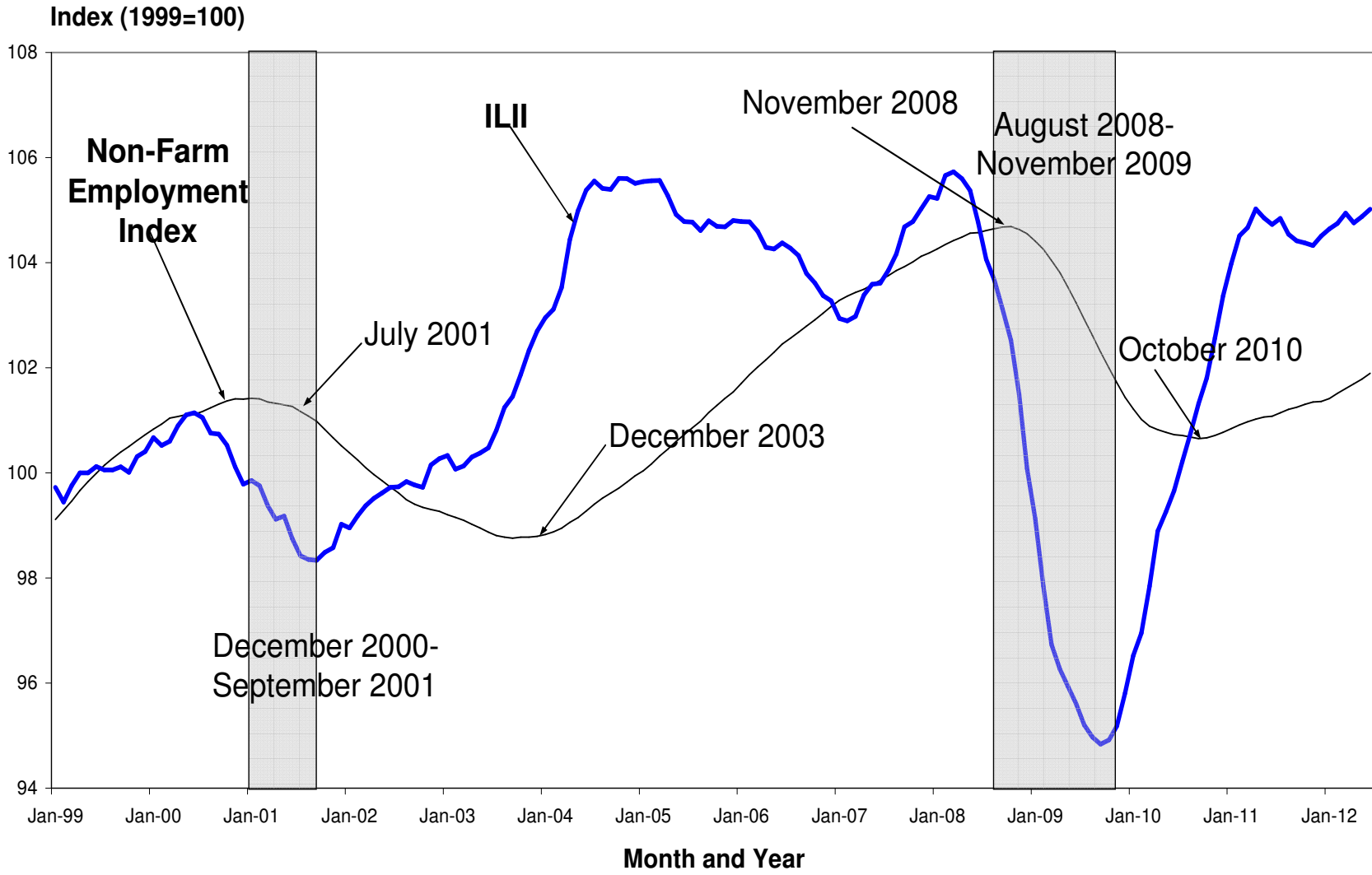
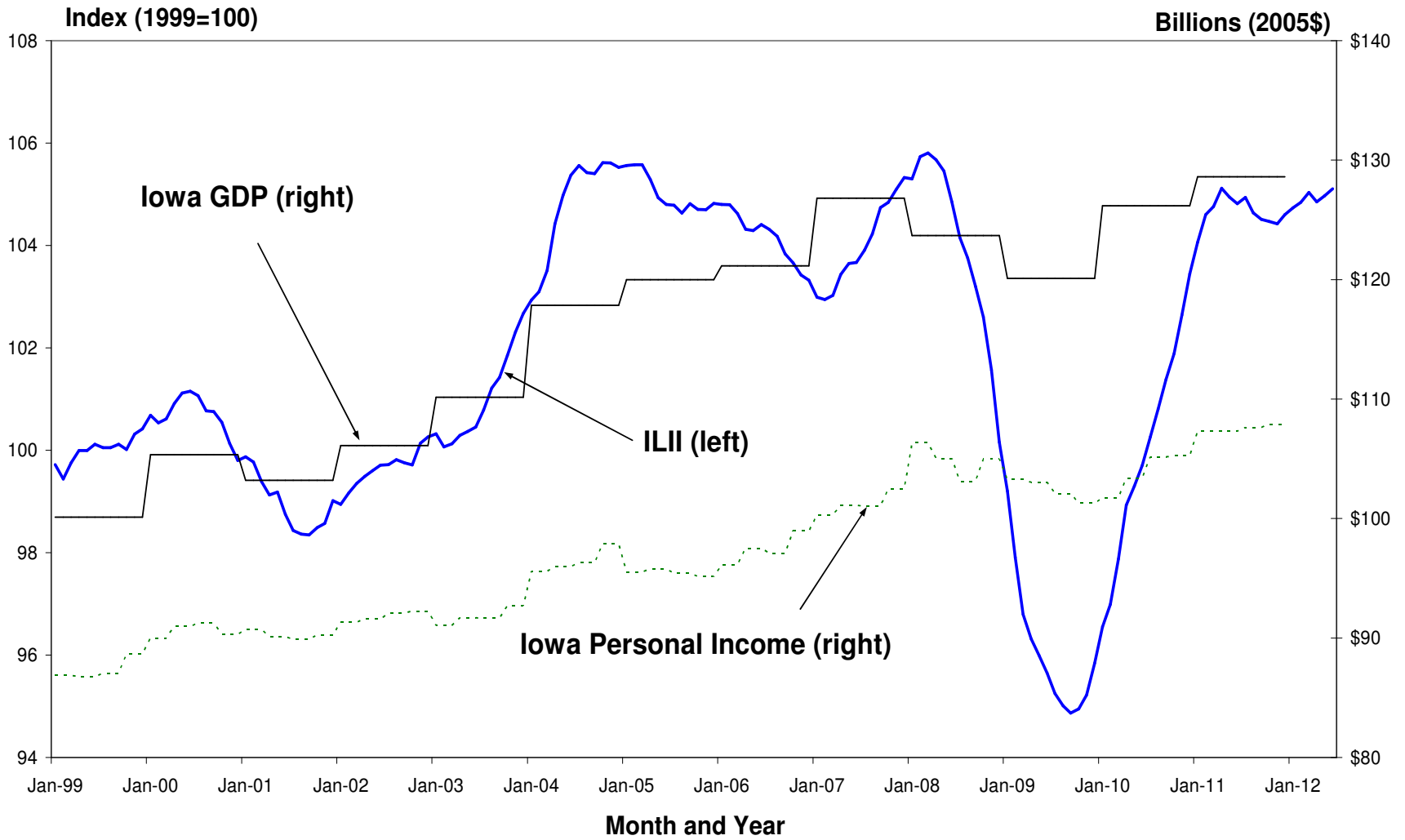


Figure 2. Iowa Leading Indicators Index, Iowa GDP, and Iowa Personal Income: January 1999-June 2012



**Figure 3. Iowa Leading Indicators Index and Iowa Real Tax Revenues:
January 1999-June 2012**

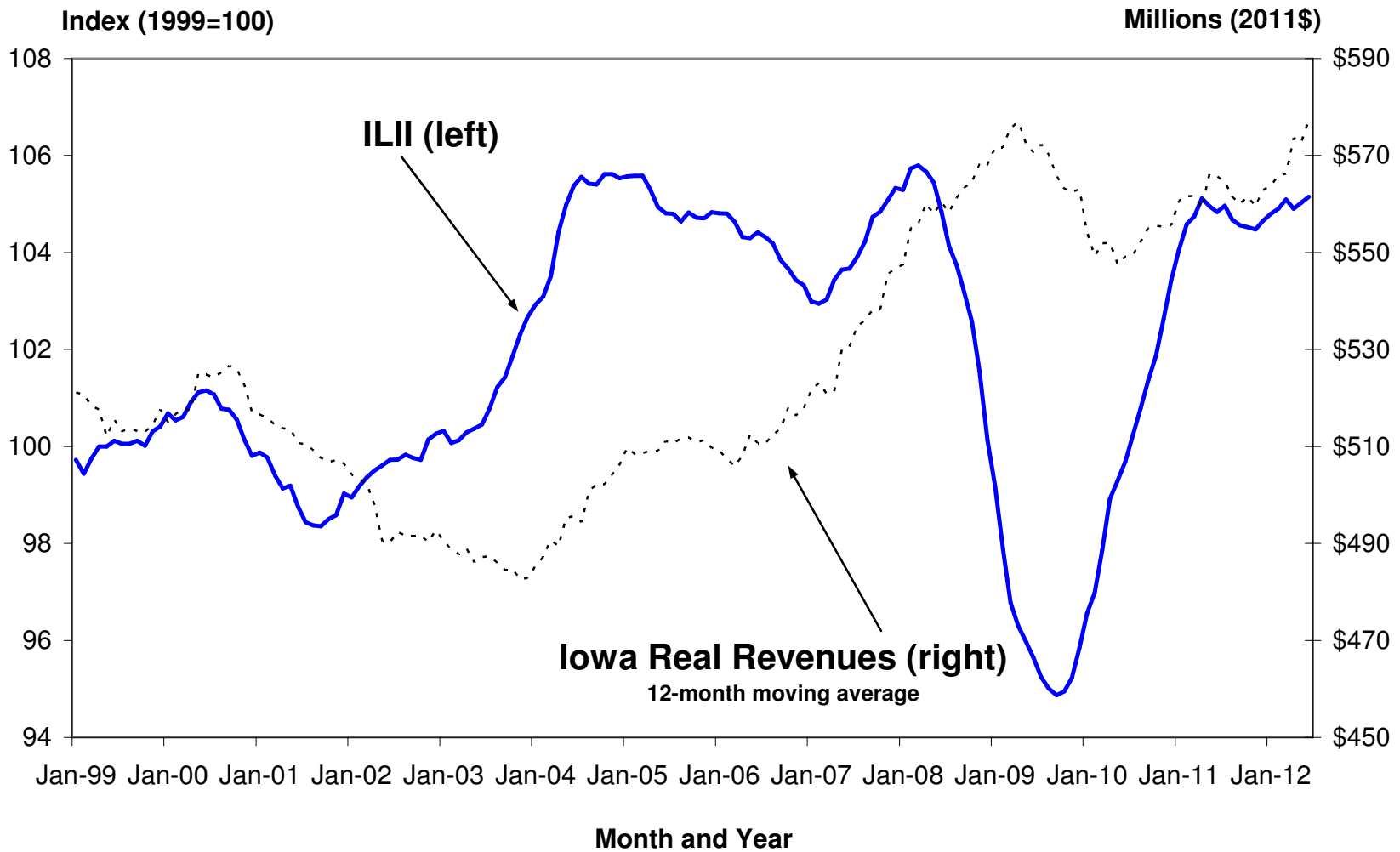


Figure 4. Iowa Leading Indicators Index and Iowa Real Net Individual Income Tax Revenues Index: January 1999-June 2012

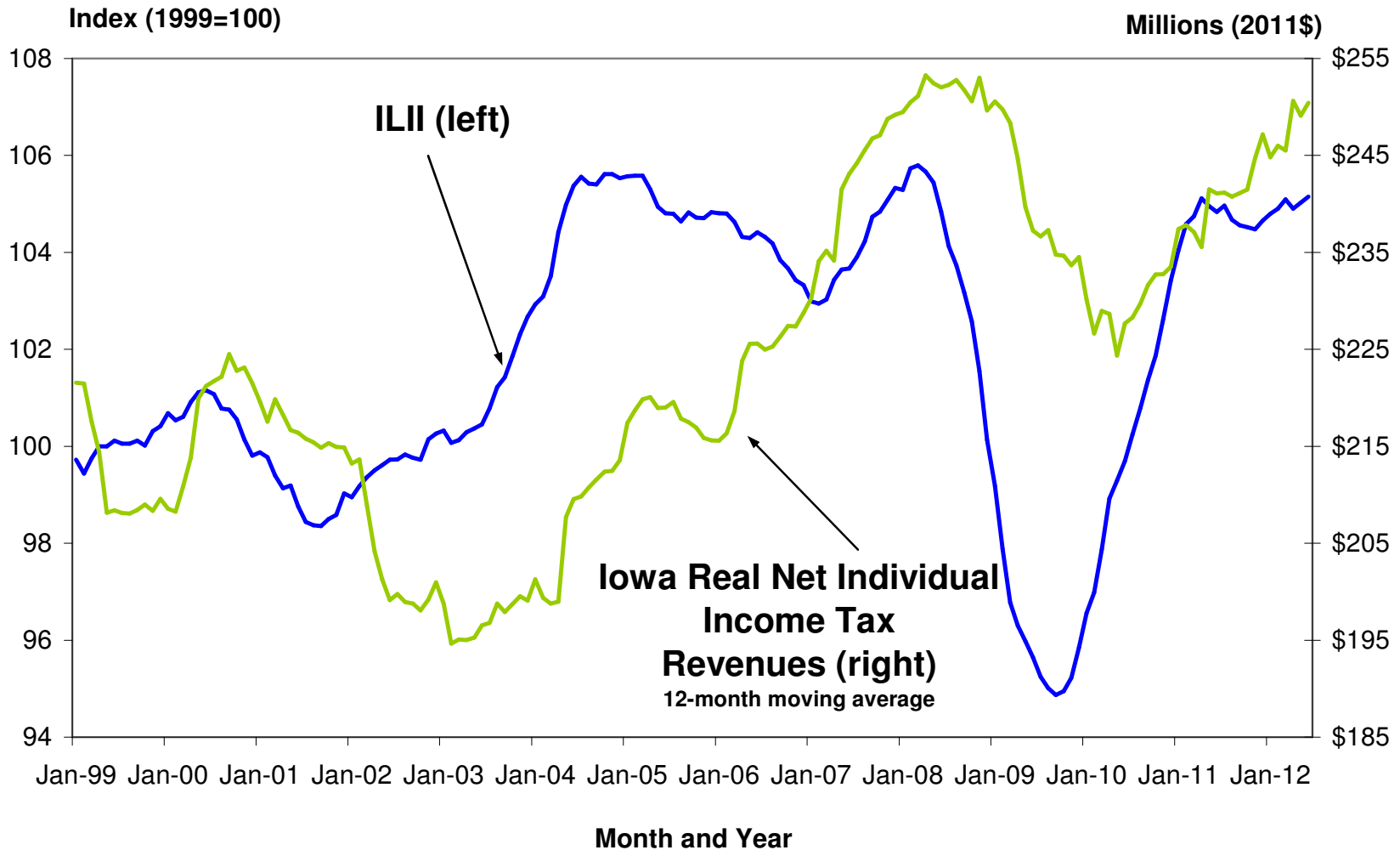


Table 1. Iowa Leading Indicators Index Components: Annual Overview

Component Series Monthly Values ^a	2011 June	2012 June	Contribution to ILII Change
AFPI ^b			-0.08
Corn Profits (cents per bushel)	275.8	291.0	
Soybean Profits (cents per bushel)	521.1	491.9	
Hog Profits (cents per pound)	22.1	24.4	
Cattle Profits (cents per pound)	4.2	-4.5	
Iowa Stock Market Index (10=1984-86)	66.89	71.02	0.11
Yield Spread (10-year less 3-month)	2.96	1.53	-0.47
Building Permits	622	679	0.33
Average Weekly Unemployment Claims ^d	4,080	3,460	0.54
Average Weekly Manufacturing Hours	40.7	40.9	0.19
New Orders Index (percent)	70.6	65.0	-0.35
Diesel Fuel Consumption (mil gallons)	54.94	55.00	0.02

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced August 20, 2012

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 31, 2010).

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 2012 Data

Leading Indicator	Jul-2011 Standard Deviation	Jul-2012 Standard Deviation	Percent Change in Standard Deviation	Jul-2011 Standardization Factor	Rank	Jul-2012 Standardization Factor	Rank	Percent Change in Standardization Factor
Agricultural Futures Profits Index	1.817	1.794	-1.3%	0.050	5	0.050	5	0.2%
Iowa Stock Market Index	4.994	4.971	-0.5%	0.018	8	0.018	8	-0.7%
Yield Spread	0.272	0.271	-0.3%	0.331	1	0.328	1	-0.8%
Building Permits	2.403	2.441	1.6%	0.037	6	0.036	6	-2.7%
Average Weekly Unemployment Claims	2.749	2.685	-2.3%	0.033	7	0.033	7	1.2%
Average Weekly Manufacturing Hours	0.318	0.314	-1.3%	0.283	2	0.284	2	0.2%
New Orders Index	1.446	1.419	-1.9%	0.062	4	0.063	4	0.8%
Diesel Fuel Consumption	0.485	0.474	-2.4%	0.186	3	0.188	3	1.3%

Each data series considers month-to-month changes over January 1999 to June 2011 for July 2011 values and January 1999 to June 2012 for July 2012 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)	1.7%	0.1%	-0.5%	-1.2%	-1.0%	-0.4%	-0.4%	0.4%	1.0%	0.7%	1.0%	1.0%
Diffusion Index	37.5	50.0	50.0	50.0	50.0	50.0	50.0	50.0	62.5	37.5	50.0	50.0
ILII without AFPI												
Percentage Change (Annualized)	-0.4%	-1.9%	-2.1%	-2.5%	-2.0%	-1.1%	-0.8%	0.4%	1.2%	1.2%	1.8%	1.9%
Diffusion Index	28.6	42.9	42.9	42.9	42.9	42.9	42.9	42.9	71.4	42.9	57.1	57.1
ILII without Iowa Stock Market												
Percentage Change (Annualized)	1.8%	0.7%	0.1%	-0.7%	-0.6%	-0.3%	-0.4%	-0.1%	0.3%	0.1%	0.6%	0.6%
Diffusion Index	42.9	57.1	57.1	57.1	57.1	57.1	42.9	42.9	57.1	28.6	42.9	42.9
ILII without Average Manufacturing Hours												
Percentage Change (Annualized)	3.8%	1.4%	0.7%	-0.5%	-0.3%	0.1%	-0.2%	0.7%	1.3%	0.3%	0.5%	0.2%
Diffusion Index	42.9	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	28.6	42.9	42.9
ILII without Yield Spread												
Percentage Change (Annualized)	2.8%	1.2%	0.6%	-0.6%	-0.4%	0.4%	0.4%	1.0%	1.4%	1.2%	1.8%	1.9%
Diffusion Index	42.9	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	42.9	57.1	57.1
ILII without Diesel Fuel												
Percentage Change (Annualized)	1.5%	-0.1%	-0.9%	-1.6%	-1.6%	-0.7%	-0.2%	0.7%	1.5%	1.1%	1.5%	1.4%
Diffusion Index	28.6	42.9	42.9	42.9	42.9	42.9	57.1	57.1	71.4	42.9	57.1	57.1
ILII without New Orders Index												
Percentage Change (Annualized)	2.2%	1.0%	0.6%	-0.1%	0.0%	0.2%	0.1%	0.7%	1.3%	1.0%	1.3%	1.1%
Diffusion Index	42.9	57.1	57.1	57.1	57.1	57.1	57.1	57.1	71.4	42.9	57.1	57.1
ILII without Unemployment Claims												
Percentage Change (Annualized)	0.8%	-0.7%	-1.2%	-1.9%	-1.6%	-1.0%	-1.0%	-0.2%	0.4%	0.1%	0.4%	0.5%
Diffusion Index	28.6	42.9	42.9	42.9	42.9	42.9	42.9	42.9	57.1	28.6	42.9	42.9
ILII without Building Permits												
Percentage Change (Annualized)	1.9%	-0.3%	-1.0%	-1.5%	-1.1%	-0.5%	-0.7%	0.4%	0.9%	0.9%	0.6%	0.4%
Diffusion Index	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9	85.7	42.9	42.9	42.9

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced August 28, 2012 using updated standardization factors through June 2012.

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 5. Iowa Leading Indicators Index Compared to Prior and Revised U.S. Leading Economic Indicators:
January 1999-June 2012**

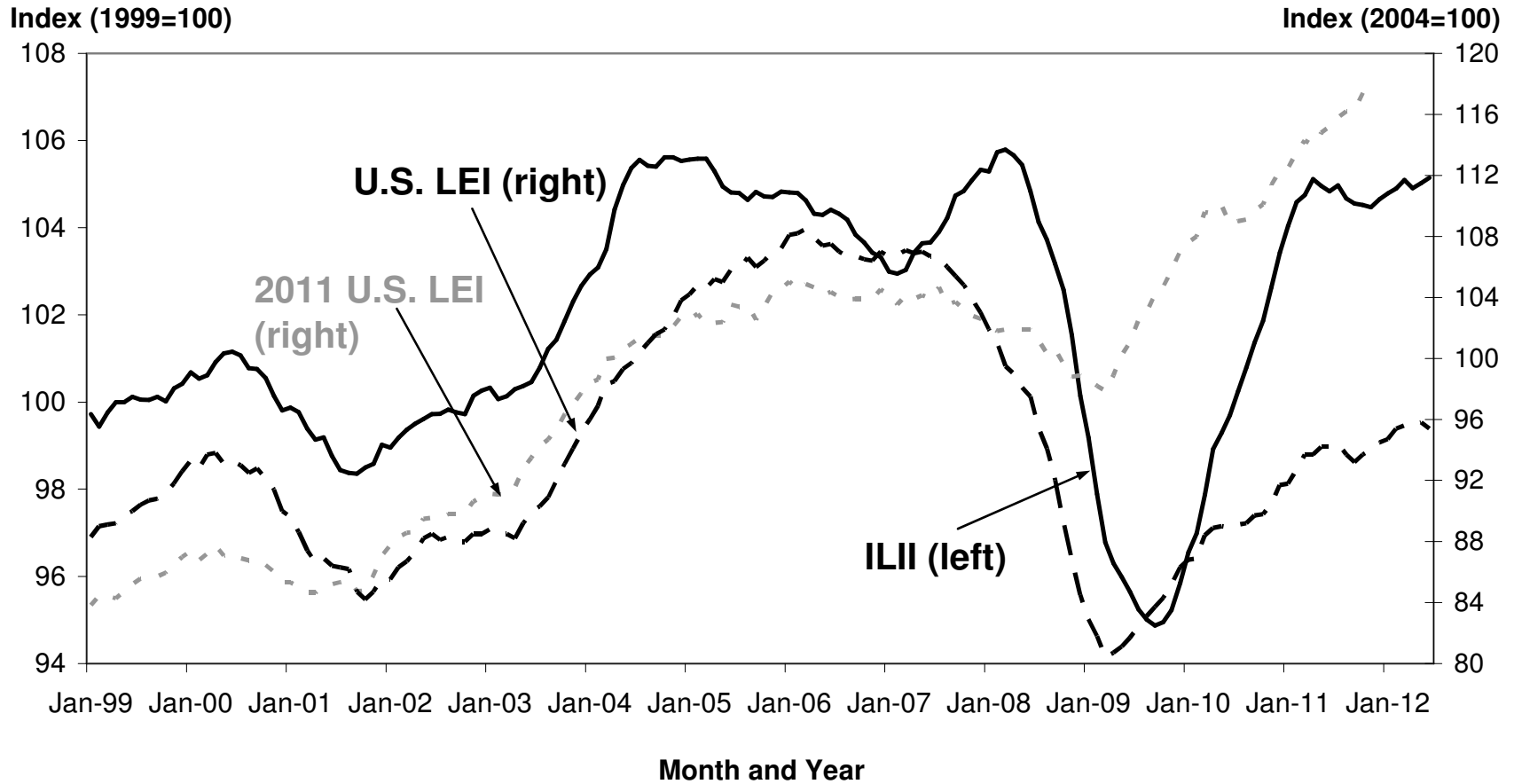
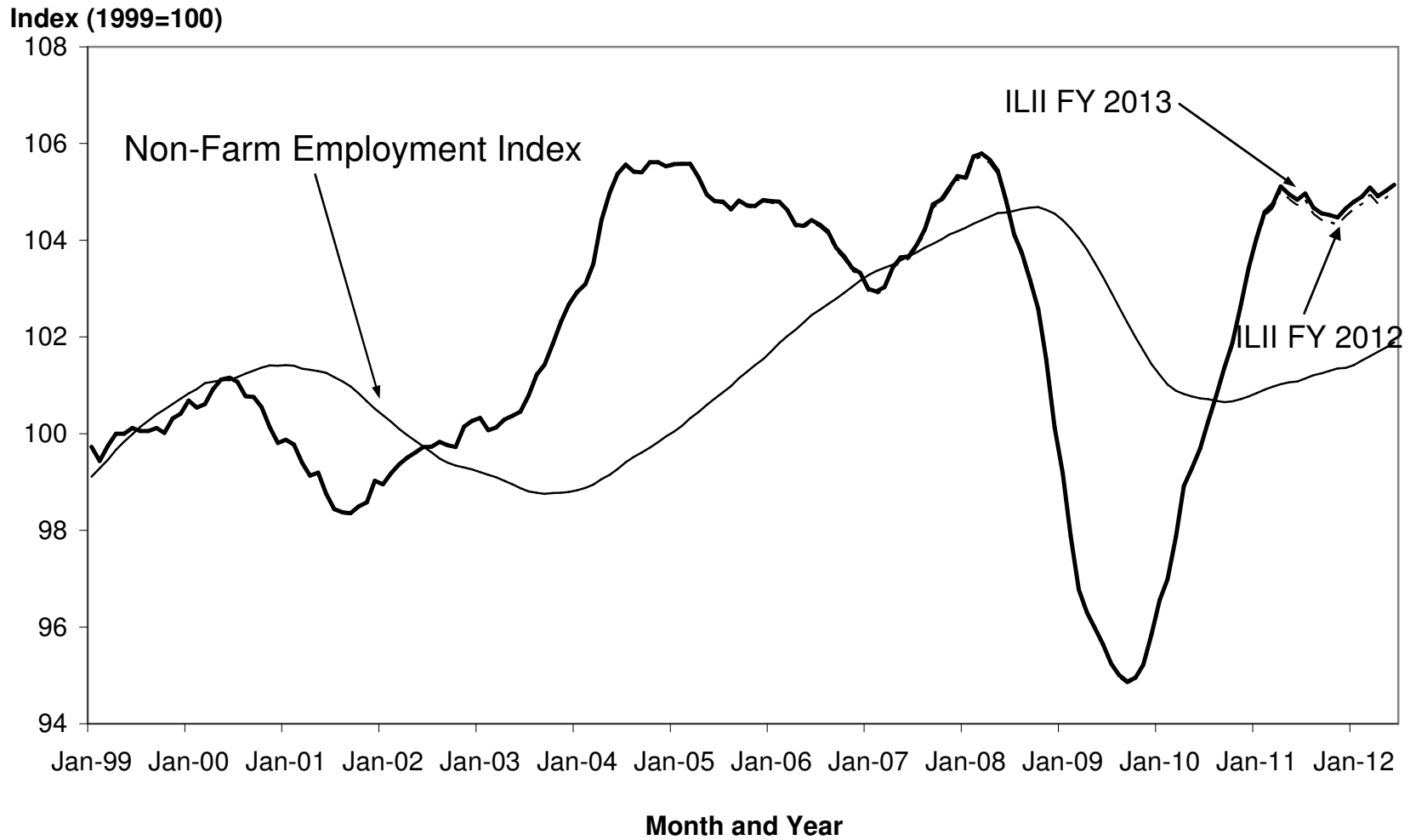


Figure 6. Comparison of Iowa Leading Indicators Index in FY 2012 and Update for FY 2013: January 1999-June 2012



**Table 4. Iowa Leading Indicators Index: Six Month Overview for June 2012
Prior to the FY 2013 Annual Update**

Monthly Values	2012					
	January	February	March	April	May	June
ILII	104.6	104.7	104.9	104.8	104.9	105.0
Percentage Change ^a	0.1%	0.1%	0.2%	-0.2%	0.1%	0.1%
Diffusion Index ^b	56.3	50.0	68.8	37.5	62.5	62.5
Six-Month Values	Jul to January	Aug to February	Sep to March	Oct to April	Nov to May	Dec to June
ILII						
Percentage Change	-0.2%	0.2%	0.5%	0.4%	0.5%	0.5%
Annualized Percentage Change	-0.4%	0.4%	1.0%	0.7%	1.1%	1.0%
Diffusion Index	50.0	50.0	62.5	37.5	50.0	50.0

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced July 30, 2012.

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 2012
After the FY 2013 Annual Update**

Monthly Values	2012					
	January	February	March	April	May	June
ILII	104.8	104.9	105.1	104.9	105.0	105.1
Percentage Change ^a	0.1%	0.1%	0.2%	-0.2%	0.1%	0.1%
Diffusion Index ^b	56.3	50.0	68.8	37.5	62.5	62.5
Six-Month Values	Jul to January	Aug to February	Sep to March	Oct to April	Nov to May	Dec to June
ILII						
Percentage Change	-0.2%	0.2%	0.5%	0.4%	0.5%	0.5%
Annualized Percentage Change	-0.3%	0.4%	1.0%	0.7%	1.1%	0.9%
Diffusion Index	50.0	50.0	62.5	37.5	50.0	50.0

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced August 28, 2012.

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 2012 Prior to the FY 2013 Annual Update

Component Series Monthly Values ^a	2012						
	January	February	March	April	May	June	
AFPI ^b	↓ ^c	-0.7	-0.8	-0.9	-2.3	-1.8	-1.5
Corn Profits (cents per bushel)		342.0	335.3	329.5	316.2	304.1	291.0
Soybean Profits (cents per bushel)		525.1	511.3	502.9	501.2	498.9	491.9
Hog Profits (cents per pound)		24.6	25.0	25.1	24.5	24.0	24.4
Cattle Profits (cents per pound)		-1.9	-1.9	-2.4	-3.4	-3.9	-4.5
Iowa Stock Market Index (10=1984-86)	↓	69.98	72.02	74.20	74.48	71.72	71.02
Yield Spread (10-year less 3-month)	↓	1.94	1.88	2.09	1.97	1.71	1.53
Building Permits	↑	637	650	657	633	671	679
Average Weekly Unemployment Claims ^d	↑	3,673	3,640	3,573	3,521	3,469	3,460
Average Weekly Manufacturing Hours	↑	40.4	40.5	40.5	40.7	40.8	40.9
New Orders Index (percent)	↑	65.4	65.0	64.6	63.7	63.8	65.0
Diesel Fuel Consumption (mil gallons)	↑	54.93	54.88	54.90	54.84	54.88	55.00

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced July 30, 2012.

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 30, 2011).

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 2012 After the FY 2013 Annual Update

Component Series Monthly Values ^a	2012						
	January	February	March	April	May	June	
AFPI ^b	↓ ^c	-0.7	-0.9	-0.9	-2.3	-1.8	-1.7
Corn Profits (cents per bushel)		342.0	335.3	329.5	316.2	304.1	291.0
Soybean Profits (cents per bushel)		525.1	511.3	502.9	501.2	498.9	491.9
Hog Profits (cents per pound)		24.6	25.0	25.1	24.5	24.0	24.1
Cattle Profits (cents per pound)		-1.9	-1.9	-2.4	-3.4	-3.9	-4.5
Iowa Stock Market Index (10=1984-86)	↓	69.84	71.88	74.07	74.35	71.59	70.91
Yield Spread (10-year less 3-month)	↓	1.94	1.88	2.09	1.97	1.71	1.53
Building Permits	↑	637	650	657	633	671	679
Average Weekly Unemployment Claims ^d	↑	3,673	3,640	3,573	3,521	3,469	3,460
Average Weekly Manufacturing Hours	↑	40.4	40.5	40.5	40.7	40.8	40.9
New Orders Index (percent)	↑	65.4	65.0	64.6	63.7	63.8	65.0
Diesel Fuel Consumption (mil gallons)	↑	54.93	54.88	54.90	54.84	54.88	55.00

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced August 28, 2012.

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.

$$= 200 * (\text{current month value} - \text{last month value}) / (\text{current month value} + \text{last month value})$$

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 2011

