Iowa Leading Indicators Index after Two Years: An Annual Assessment and Update
Tax Research and Program Analysis Section
Iowa Department of Revenue
August 2008

During the summer of 2006, the Iowa Department of Revenue developed the Iowa Leading Indicators

Index (ILII) to serve as another tool for forecasting State revenue. Monthly reports on changes in the

ILII have been issued since July 2006 and are available on the Department web site

(http://www.state.ia.us/tax/taxlaw/econindicators.html).

Annually the Department steps back and assesses how well the ILII has met the goals behind its

development, gauges the validity of the existing components, considers additional components that

have been suggested along the way, and carries out the annual updates necessary for such an index.

This paper documents these steps.

Assessment of the Iowa Leading Indicators Index for Fiscal Year 2008

The ILII increased for much of fiscal year 2008, starting at 105.7 in July 2007 and reaching 107.8 in

March (see Figure 1). However, beginning in April the ILII started to fall, slipping to 107.0 by June

2008, helped in part by the floods that ravaged much of Iowa during that month. Throughout most of

fiscal year 2008, the non-farm employment coincident index, a 12-month moving average of non-

seasonally adjusted employment, has been increasing at an average rate of 0.06 percent each month

(the average rate of increase was slightly higher until Bureau of Labor Statistics data revisions

conducted at the start of the 2008 reduced employment levels for the last half of calendar 2007).

Although still growing, the growth rate had slowed from the pace seen between January 2004 and

February 2007. In June 2008, the employment index increased only 0.02 percent, the slowest growth

in 54 months. Likewise, gross domestic product for Iowa has experienced slow but steady growth the

last two years, increasing a real 2.2 percent in 2006 and 3.1 percent in 2007 (see Figure 2). State revenues, measured using 12-month moving averages and adjusted using CPI-U to 1999 dollars, increased sharply throughout fiscal year 2008, in large part because of the cigarette and tobacco tax increases effective March 2007 (see Figure 3). In order to remove the impact of these recent tax law changes and focus on a net revenue stream that more directly relates to Iowa economic activity, the ILII is plotted against net individual income tax revenues (see Figure 4). Net tax revenues are a 12-month moving average of withholding plus estimates plus final return payments minus refunds, all adjusted to 1999 dollars using the CPI. Note that individual income taxes comprise over 50 percent of total State revenues. The initial drop in individual income tax revenues in 1999 reflects the individual income tax cut implemented during the 1998 tax year. The revenue increase in 2000 was an April surprise abruptly followed by the recession of 2001 and 2002 that caused real net revenues to fall. Revenues began to rise again in 2004 and have remained relatively strong since then, with a slight dip in 2005 and 2006. In May and June 2008, following the ILII drop starting in April, net individual income tax revenues turned down.

The main goal for the Iowa Leading Indicators Index was to serve as an additional tool in predicting the future direction of the State economy. As the national economy flirts with an economic slowdown and possible recession, it is reasonable to believe that Iowa economic activity is likely to follow. Despite this view, the ILII continued to show growth through March 2008 with 14 months of consecutive increases. However, the ILII showed signs of slowdown during the last three months of the fiscal year, echoing national indicators. The economic shock caused by the floods of 2008 pushed the index down sharply in June 2008. It is not clear how much of this drop will translate into slower economic activity six to nine months later and how much will quickly be reversed as clean-up continues and rebuilding begins. Results over the past year suggest that the ILII can provide some

guidance in predicting the direction of Iowa non-farm employment, it is likely that the first part of fiscal year 2009 will be the first test of whether the ILII can predict a turning point in Iowa's economic activity.

Validity of Existing Components

When the leading indicators index was established in 2006, one method for choosing economic series to serve as components was to identify Iowa equivalent series to those used as leading economic indicators by other states and regions. A second method for choosing economic series was identifying those that predicted economic activity in the key sectors of the Iowa economy: agriculture, manufacturing and finance. Those sectors continue to stand out as the most important in terms of employment and economic activity in the State. Agriculture comprised 6.0 percent of Iowa gross domestic product (GDP) in 2007, bolstered by the growing bio-energy sector and increases in commodity prices. Manufacturing accounted for 20.2 percent of GDP and 15.1 percent of non-farm employment while the finance sector accounted for 10.7 percent of GDP and 5.9 percent of non-farm employment in 2007.

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. After a second year of computing and reporting the ILII, it is useful to consider if the index and all of the individual components working continue to display these same attributes:

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.

Iowa economic activity was fairly strong during fiscal year 2008, with a large shock to end the year due to nearly state-wide flooding. The ILII signaled this strength with increases over the first nine months of the fiscal year in contrast to slowing signals at the national level. Indeed, State revenues grew 9.6 percent in FY 2008 over FY 2007. Around 1.6 percentage points of that revenue growth can be attributed to the cigarette and tobacco tax increases that were passed at the end of FY 2007, however, even 8.0 percent growth is quite strong. The ILII's dip during the last three months of the fiscal year suggests that economic activity should slow in fall 2008, although it is unclear how the flood impacts will alter that prediction. In July 2008, revenues were flat, although part of that reflected Department adjustments. It is likely another part of the slow receipt growth reflected withholding and sales tax payments not made by flood victims, where deadlines were extended until late August. However, slowing corporate payments and a slowdown in individual estimate payments suggests that some taxpayers anticipate lower tax bills in 2009 due to slower economic activity as suggested by the ILII. As was noted in the last assessment, additional time is needed to further assess the conformity of the index.

A similar conclusion must be drawn regarding the consistent timing of the components and index. The additional year of data did not contradict prior views that the components and index exhibit a consistent timing pattern as a leading indicator of future economic activity. However, with no distinct

down turn observed since July 2006, the period over which the ILII has been followed monthly, no firm conclusion is possible. The flood impacts may skew this analysis some, as the sharp drop in the new orders index and unemployment claims during June 2008 were a reaction to the flood rather than a leading signal of a normal slowdown in the business cycle. Therefore, the index may appear more as a coincident indicator in June, reflecting the flood impacts at the same time they shocked the economy. However, it is not possible for any economic indicator to accurately predict a natural disaster.

Currency of the ILII's components proved to be very reliable during FY 2008. All data series 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 annual benchmarking. During FY 2008, only two months, August 2007 and March 2008, experienced any revision to the level of the index, both a 0.1 percent drop. These revisions were caused by updates to average manufacturing hours data in the following month. In addition, as part of the BLS benchmarking of average manufacturing hours for calendar years 2006 and 2007, there was a significant historical revision to the series and the ILII itself that was incorporated at the time of the ILII January 2008 Report. A few minor revisions occurred in the Iowa stock market index caused by late data on shares outstanding, which are collected from SEC quarterly 10Q and 10K reports and used to weight share prices for the following quarter.

Nothing in the past twelve months has changed previously stated opinions about the economic significance of all the eight components. Nearly all of the indicators remained positive through the first half of FY 2008 as the Iowa economy continued to grow, but in the second half, nearly all started to weaken in line with rising concerns about the possibility that the Iowa economy will start to slow.

The only exceptions were building permits which have remained in negative territory for two years, matching the national housing slowdown, and the Agricultural Futures Price Index which remained in strong positive territory for the last year as corn and soybean markets soared due to increased demand for these crops. In the assessment last year, some questions were raised about the yield spread. During FY 2007, the yield spread was negative for ten months. Historically, a negative yield spread which results from an inverted yield curve has signaled a recession. However, economic activity continued apace despite the negative signal from this component. During FY 2008, the yield spread actually rose dramatically as the Federal Reserve cut short term rates in an attempt to avert a recession. It appears the national slowdown during FY 2008 will continue the strong record of the yield spread in predicting sluggish economic activity although it is still not clear whether a national recession will ever be officially declared.

Views about the statistical adequacy of the data are likewise unchanged for most of the components as all sources for the data continue to be reliable. This year, as in last, there is some concern about how quickly to update the Iowa stock market index in the face of mergers between companies. During the last twelve months, two of the Iowa-based companies (MidWest One Bank and Smithway Motors Express Corporation) merged with other companies not previously in the index. The former merged with another Iowa bank and remained publicly-traded, only changing its NYSE symbol. Thus it was possible to easily incorporate the change for MidWest One by using prices and shares outstanding for the merged company from the merger date going forward. The latter merged with a privately-traded company, thus it was no longer possible to collect daily share prices or shares outstanding. It was not straightforward how to adjust the stock index to account for the Smithway Motors merger. Although the ultimate solution is to remove the company from the index, that would require an update to the entire series of the Iowa stock market index. A decision was made to use the share price and shares

outstanding at the date of the merger and hold those fixed until the annual update. This allowed the historical stock index to remain unchanged until the update and did not alter the monthly changes in the index. This was possible because Smithway Motors was a minor part of the index, representing just 1.4 percent of the total value. As assessment of the index revealed that just ten of the 37 shares individually represent more than two percent of the index. If one of these larger companies were to no longer trade publicly, a decision was made that the entire index should be updated at the time of that event rather than waiting until the annual update.

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 for all but the yield spread using 12-month moving averages) increased for five components and fell for the remaining three components (see Table 1). The largest increase, 9.1 percent, was observed for the AFPI reflecting swings in the distribution of cash farm income for 2007 (data that were incorporated as part of the FY 2009 annual update) and repeated, large increases in the index's value as the bio-energy boom drives corn and soybean prices up. The next largest change was 4.0 percent observed for average manufacturing hours which experienced a few swings in the past year, although the series still remains the least volatile in the index. The largest drop in volatility, -4.0 percent, was experienced by the Iowa stock market index. Recall that the ILII is computed by weighting changes in the individual series by the standardization factors presented in Table 1. A discussion about the impacts on the index from the updates to the standardization factors appears in the following section.

Another method for assessing the ILII and its components is to consider the sensitivity of the overall index to the exclusion of each separate component (see Figures 5 and 5b). Each panel in the figures presents the non-farm employment coincident index and ILII as seen in Figure 1, with an additional

series, the dotted line, showing what the path of the ILII would have been if the listed component were not included in the index. For example, Panel A indicates that the ILII would have had much lower values in the last year if the AFPI were not one of the components, although the rise and fall would persist. Conversely, Panel D indicates that the ILII would have had much higher values over the last year if building permits were not one of the components, although, again, the most recent rise and fall would persist. The impacts of the AFPI and building permits on the ILII are expected, but less obvious are the large impacts from average manufacturing hours, Panel F, and diesel fuel consumption, Panel H. Although these indicators did have a distinct and consistent impact on the index over the past year, pulling down the index in the case of manufacturing hours and pushing up the index in the case of diesel fuel, the large change in the level of the index when either indicator is dropped reflects their high standardization weights. Because both of the series have relatively low volatility, their standardization weight, which is based on the inverse of the series' historical standard deviation, is larger. Removing either indicator shifts a share of its large weight onto the remaining indicators (the sum of the standardization weights must equal one), thus having a significant impact on the level of the index.

An additional way to consider sensitivity is to focus on six-month percentage changes in the index and six-month diffusion index values (see Table 2). The Conference Board, using these two metrics, identifies a recession signal as the point when the annualized six-month percentage change declines by over two percent and the six-month diffusion index falls below 50.0. The Board does not specify the converse as necessarily identifying an expansion signal, most likely because that turning point is less crucial to capture. In January through April, no single component was responsible for keeping the annualized percentage change in positive territory or the diffusion index above 50, suggesting widespread strength across the indicators for much of FY 2008. In May, dropping the AFPI would

8

have pushed the percentage change from 0.7 percent to -0.3 percent, although the diffusion index would maintain a 57.1 value. With the drag from the flood in June, the overall index moved into negative territory for the annualized percentage change and the six-month diffusion fell to 43.8. Note that because only one of the above conditions is met, the ILII is not yet signaling a recession. However, if the AFPI were excluded both conditions would be met. This indicates that the agricultural sector is currently holding up the Iowa economy, although it is important to remember that much of the weakness reflected the natural disaster that occurred in the State and not necessarily a long-lasting change in economic activity.

Additional Series as Potential ILII Component

During the past year, IDR did not receive any suggestions for potential additional leading indicators. However, work continued throughout the year to evaluate a series first considered during the update last summer, new retail business starts.

Last year, analysis suggested that new retail business starts could serve as a possible leading indicator based on the economic significance of the series and conformity seen since 1998. However, in discussion with those at the Iowa Department of Revenue responsible for the data, it was determined that revisions are potentially substantial. Each month it is possible that data as far back as three years could be revised, which raised concerns about the statistical adequacy and currency of the series. Additional work during the year with the data corrected some of the artificial spikes in the historical data. After this correction in the fall, at attempt was made to track the extent of revisions to monthly start data. Unfortunately, an error in the data set creation occurred in the middle of the year which interrupted these attempts. For consecutive months with good data, it was determined that the current month's starts count is revised upwards 12.9 percent on average the following month, while the previous month's starts count is revised upwards 4.5 percent on average. When considered in terms of

12-month moving averages, the average revisions are smaller, 2.9 percent for the current month and 1.4 percent for the previous month, but still systematic. Although it might be possible to build in those expected revisions to the data such that on average the revision would be zero, with just six clean points of observation for the past year due to changes in the data series and the noted data error, it was decided an additional year of data collection is needed before the series is again considered as a possible new indicator.

Updates for the Third Year

Given that the original eight components continue to meet the Moore-Shiskin criteria while no new series did, the ILII did not undergo major revisions this July. The updates to the index that were needed included adjustments to the stocks included in the Iowa stock market index to account for recent mergers, reweighting of the agricultural futures price index using newly released cash income data for 2007, and recalculation of standardization factors based on observed volatility through June 2008.

The publicly-traded companies included in the Iowa stock market index were based on several lists of publicly-traded Iowa companies found in the Des Moines Register. Initially, the index included 29 companies, 19 based in Iowa and 10 with large Iowa interests. During fiscal year 2007, two of the Iowa companies (AmerUs and Bandag) were bought out by international companies (AVIVA of England and Bridgestone of Japan) whom do not trade on the U.S. stock markets and do not file regular 10Q/10K reports with the SEC. As part of the updates in 2007, those two companies were dropped from the index. In turn, ten additional Iowa companies were added including Art's Way Manufacturing, a truck and agricultural equipment manufacturing company, First Federal Bank headquartered in Sioux City, First Federal Savings Bank headquartered in Fort Dodge, Meta Financial

Group headquartered in Storm Lake, MidWestOne Bank headquartered in Oskaloosa, Green Plains Renewable Energy, an ethanol production company located in Shenandoah, Flexsteel, an outdoor/RV furniture manufacturing company located in Dubuque, Smithway Motors Express Corporation, a truckline headquartered in Fort Dodge, Cycle Country Accessories Company, an ATV parts/golf cart hub cap manufacturer in Milford, and MACC Private Equities, a small business investment company headquartered in Cedar Rapids.

During fiscal year 2008, two mergers occurred that involved two of the recently added companies. In October 2007, Smithway Motors Express Corporation (SMX) merged with the private company Western Express headquartered in Nashville, TN. Therefore that stock was removed from the index in the update (as noted above during the interim, the stock price and shares outstanding were held fixed at the last observed values prior to the merger). In March 2008, MidWestOne Bank (OSKY) merged with Iowa State Bank & Trust in Iowa City to form MidWestOne Finanical Group, Inc trading under the symbol (MOFG). This merger was recognized at the time it occurred, so no additional change was needed in the update. In addition, MACC Private Equities moved its headquarters to California during FY 2008, prompting its removal from the Iowa index.

Although several more publicly-traded companies in Iowa were identified during FY 2008, only one was added to the index for FY 2009. Sauer-Danfoss is a worldwide manufacturer of hydraulic pumps, motors and related equipment headquartered in Ames. Although most production and sales occur outside of the State, it seemed reasonable to include the company based on the location of its headquarters. The addition of this stock will increase the manufacturing share in the stock market index. Several other Iowa companies that are publicly-traded were not added to the index because they trade only on the over-the-counter markets. An exception was Terra Nitrogen LP. The company is

headquartered in Sioux City, a partner company to Terra Industries Inc. which is one of the existing companies in the index. Although Terra Nitrogen LP shares are traded on the NYSE, its structure as a partnership did not make it comparable to the other corporations in the index as far as measuring shares outstanding and thus the computation of total value.

Both stocks that were dropped from the index had small historical valuations relative to the stock, SHS, that was added to the index. Thus the base value for the index was increased which pushed down the value of the index each month by 0.18 points. Changes to the monthly values of the Iowa stock market index increased the value of the ILII series slightly, at most 0.1 percent in any month.

Although not directly related to the update of the stock market index, it is of value to note the deterioration of finance companies value as a share of the index that occurred during FY 2008. In June 2007, the fifteen financial companies comprised 45.3 percent of the index's value. In June 2008, those same fifteen companies comprised just 35.3 percent of the index's value. This reflects the general weakness during the last year in the housing market and credit markets that have weighed down the financial sector. At the same time of this deterioration in the financials share, the share of the index represented by durable manufacturing companies increased from 12.8 percent to 14.3 percent. Therefore, it is reasonable to view the Iowa stock market index as an indicator capturing changes in both the financial and manufacturing sectors in the State.

Second, the annual update to the AFPI was completed. 2007 cash farm income by commodities was taken from the Iowa Agricultural Statistics Bulletin produced by the Iowa office of the National Agricultural Statistics Service. The distribution of total farm income credited to the four commodities included in the AFPI is used to weight the four commodity prices or profits. Current practice is to use

the most recent data on cash farm income shares, which had been 2006, to weight the index

components for all months in that year and later. Therefore, the receipt of new data for 2007

precipitated revisions in all AFPI values for January 2007 and later. These changes were significant as

the income share of corn rose from 31.8 percent to 37.6, becoming an even more dominant commodity

in the state. The income share of hogs fell from 29.5 to 25.7 percent, the soybeans income share rose

slightly from 20.4 to 20.8 percent, and the cattle income share fell from 18.4 to 15.9 percent. The

significant drop in the hog share between 2006 and 2007 pushed down the AFPI values for the all of

2007 and the first five months in 2008, despite the increase in the corn and soybean shares. Only in

June did the increased weights on corn and soybeans raise the AFPI. In addition, the USDA revised

2006 numbers, causing minor revisions to the AFPI values for January 2006 through December 2006.[1]

Altogether, the changes in the AFPI did have an impact on the ILII series. These changes increased

the ILII series value an average of 0.03 points for the entire historical period and 0.2 points for FY

2008. The large impacts only begin to appear in late 2006, reflecting where the majority of the updates

on the AFPI are concentrated.

The third update needed was the recalculation of each series' standardization factor. These factors,

computed as the inverse of the standard deviation of the changes in the series normalized across all

series, attempt to equalize the volatility of each component in the index. As noted above, accounting

for changes observed over the 12 months between July 2007 and June 2008 lead to volatility increases

for some series and decreases for others (see Table 1). These changes did push up the ILII series value

an average of 0.1 points for the entire historical period and 0.3 points for FY 2008. The higher recent

---

[1] 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 series, decreased for corn and hogs and rose for soybeans 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.

values reflect a shift in the weighting of gains versus losses during 2005 and 2006. Under the FY 2007 standardization weights, the index value fell 0.1 points more during FY 2005 than under the FY 2008 standardization weights. Likewise, during FY 2006, the index fell 0.08 points more using the FY 2007 compared to the FY 2008 standardization weights. For the most part, the difference reflects the higher FY 2008 standardization weights on the Iowa stock market index and diesel fuel consumption where both were growing strongly during FY 2005 and 2006. However, with the recent weakness in the stock market and a slowdown diesel fuel consumption, the impact of the different standardization weights on the change in the index during FY 2008 is only 0.008. Because of the differential changes in earlier years, the change in standardization weights pushes up the FY 2008 level of the index by an additional 0.3 each month.

As a result of the various updates, the historical values of the ILII and several of the components will change in the July 2008 report. These changes can be seen by comparing the index levels, percentage changes, and diffusion index values shown in Tables 3 and 5. The only significant change in the index is the change in its level. In January, the index is 0.5 points higher after the update, while February and later values are 0.6 points higher. Of that large change, half reflects the updates to the monthly changes in the Iowa stock market index and the AFPI while the other half reflects the update to the standardization factors used to weight those monthly changes across the eight components. Despite the noticeable level shift, the percentage point changes in the index are unchanged except for May when, due to rounding, the change fell from a 0.2 percentage point drop to just a 0.1 percentage point drop. Because it is the movements in the index that provide the signals for future economic activity, a level shift in the value of the index does not suggest any change in the interpretation of the ILII's signals over the last six months.

For the values of the components themselves, only the Iowa stock market index and the AFPI change (see Tables 4 and 6). In order to present some of the impact of the updates to the AFPI, the series itself was added to the first row of the components table; however, differences in the series' values only reflect the update of the cash farm income shares. The updates to the commodity standardization weights impact only computations of changes in the AFPI, an update that altered the component's values over the entire history of the series.
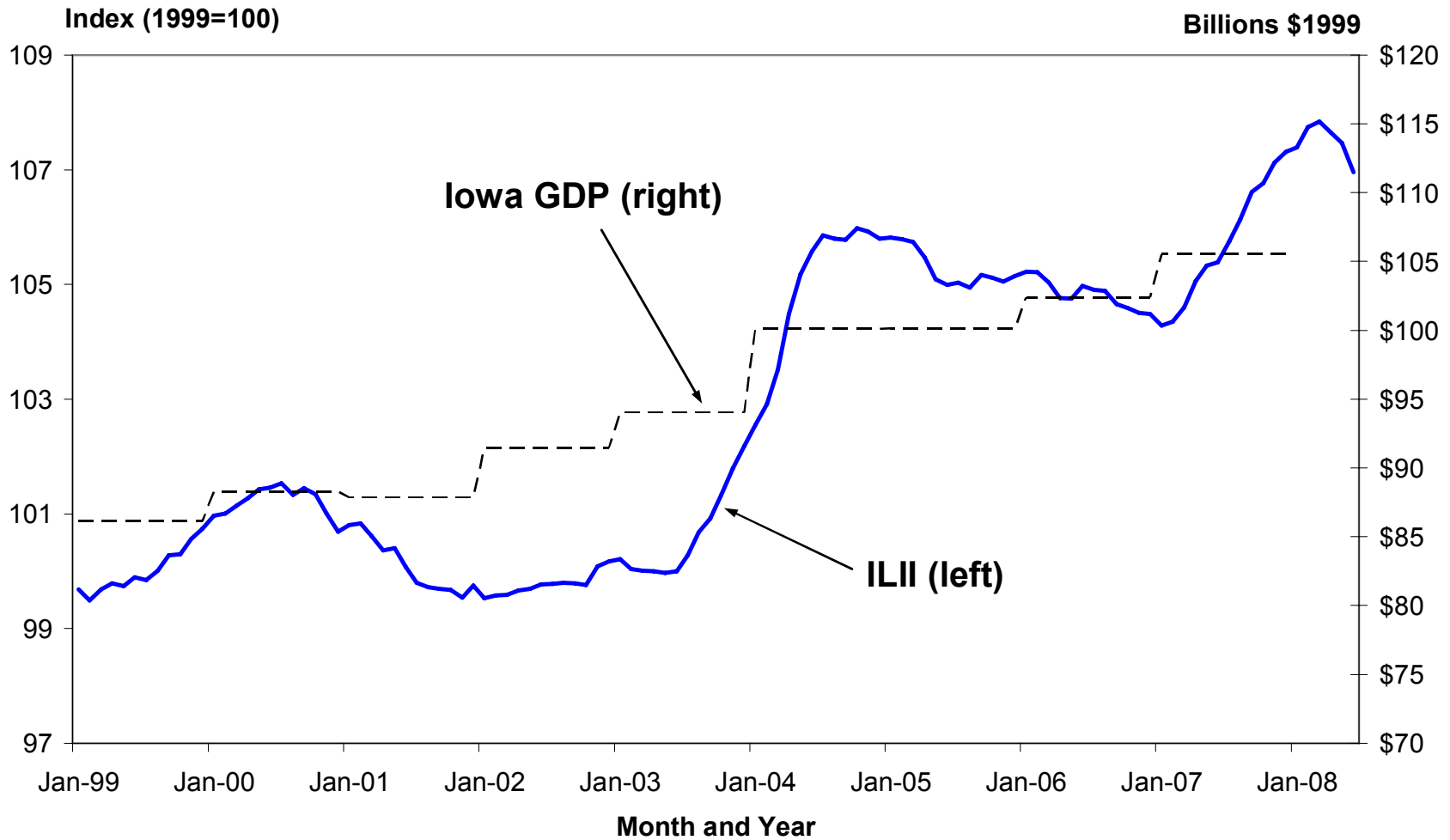
Conclusions

The Iowa Leading Indicators Index is a work in progress. The limited historical period over which the index can be calculated restricts the analysis of its effectiveness at predicting changes in economic activity. The results after two years suggest that the ILII can provide some guidance in predicting the direction of Iowa non-farm employment. The additional year of data and close observations of the eight component series did not suggest major changes were needed. The minor updates to the Iowa stock market index had little impact on the component. The update to the AFPI caused more noticeable changes, although the changes to that one component did not have a large impact on the ILII. The change to the standardization factors had the biggest impact on the level of the ILII in FY 2008 of the three updates, but did not change the recent movements in the ILII that suggest Iowa economic activity will slow in FY 2009 after a strong period of growth throughout FY 2008. The Department will continue to closely monitor the signals from the ILII with the hope they will correctly inform policy makers about the direction of future economic activity in the State.

Figure 1. Iowa Leading Indicators Index and Iowa Non-Farm Employment Coincident Index: January 1999-June 2008

Index (1999=100)
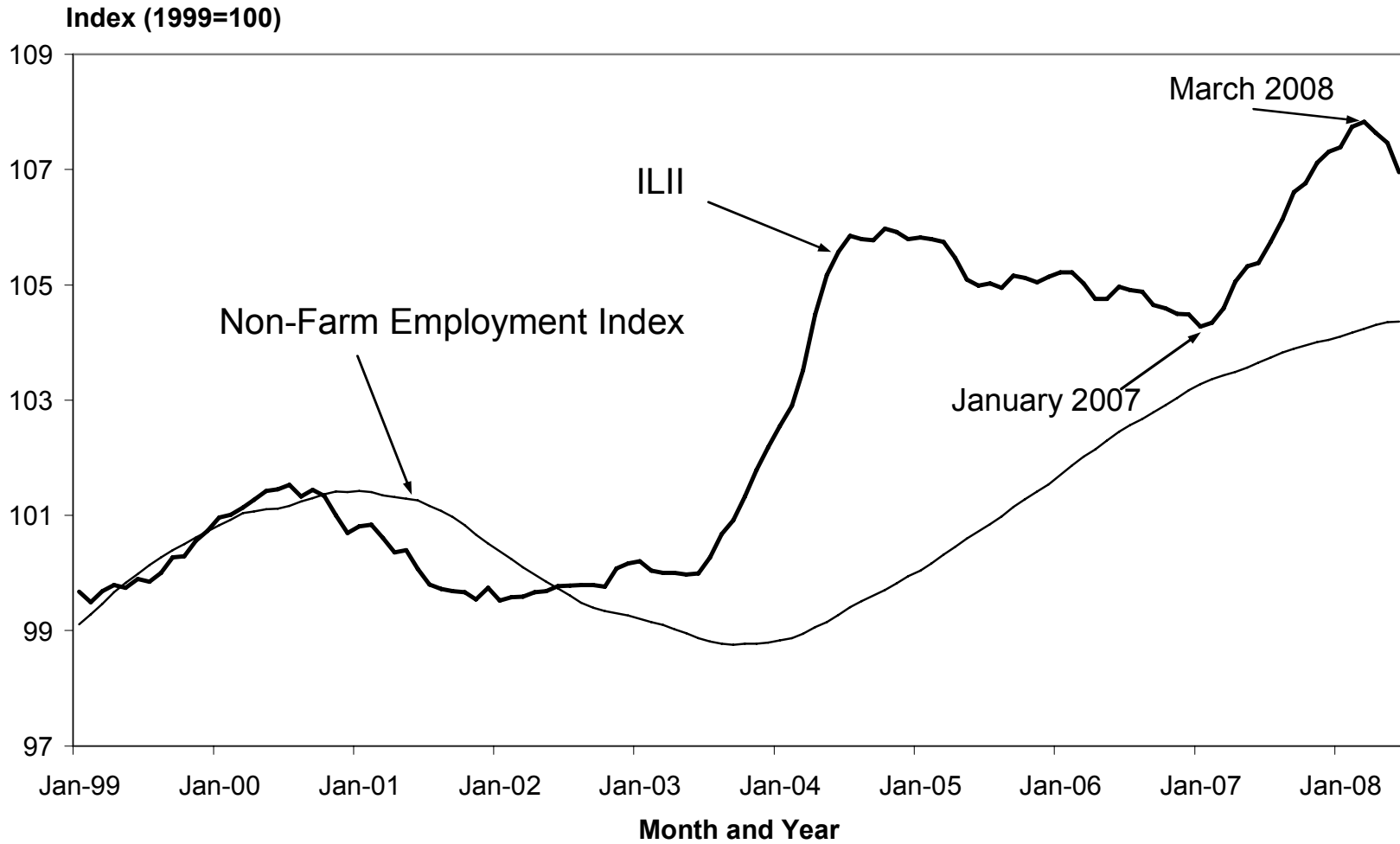
Figure 2. Iowa Leading Indicators Index and Iowa GDP: January 1999-June 2008

Index (1999=100)

Billions $1999

Iowa GDP (right)

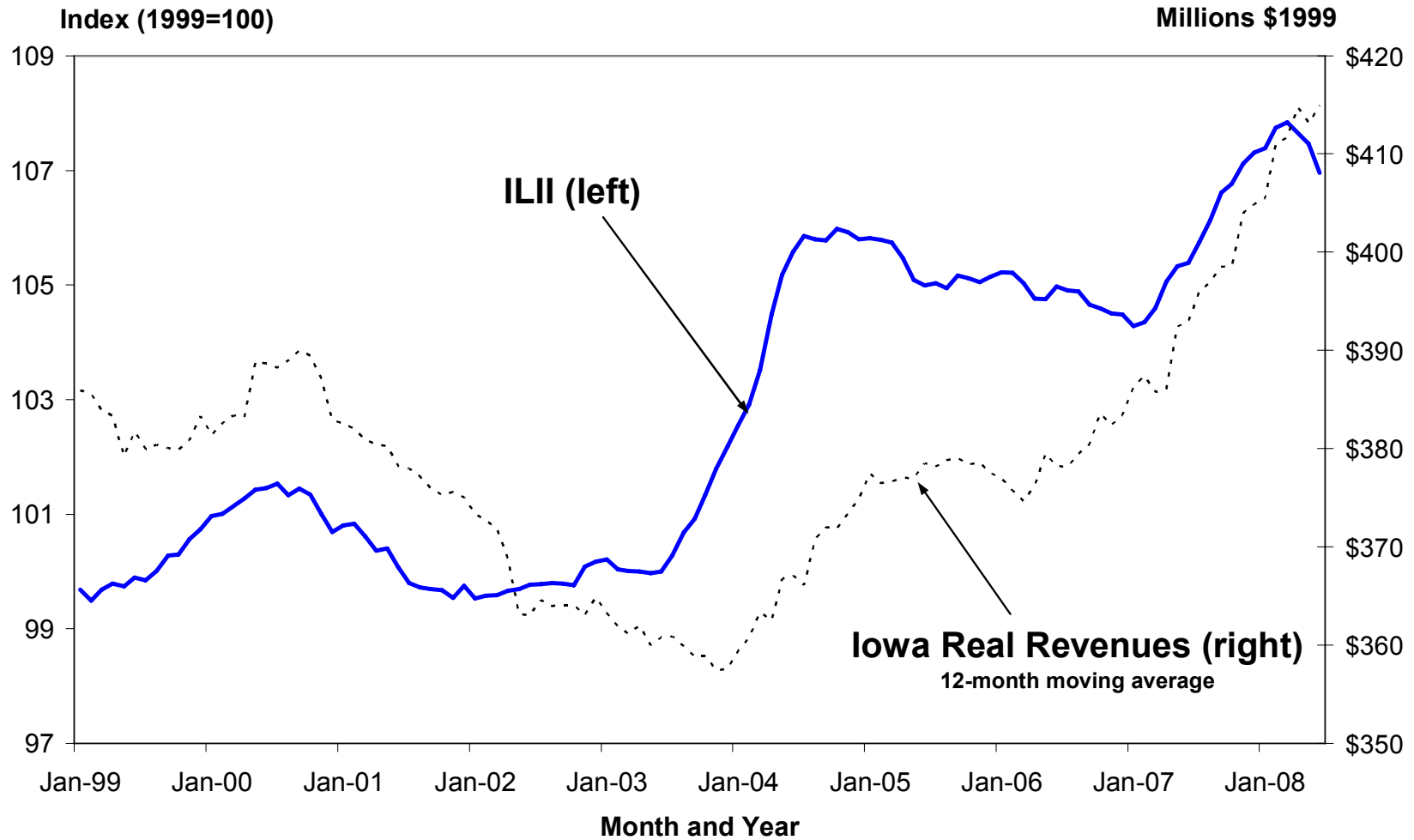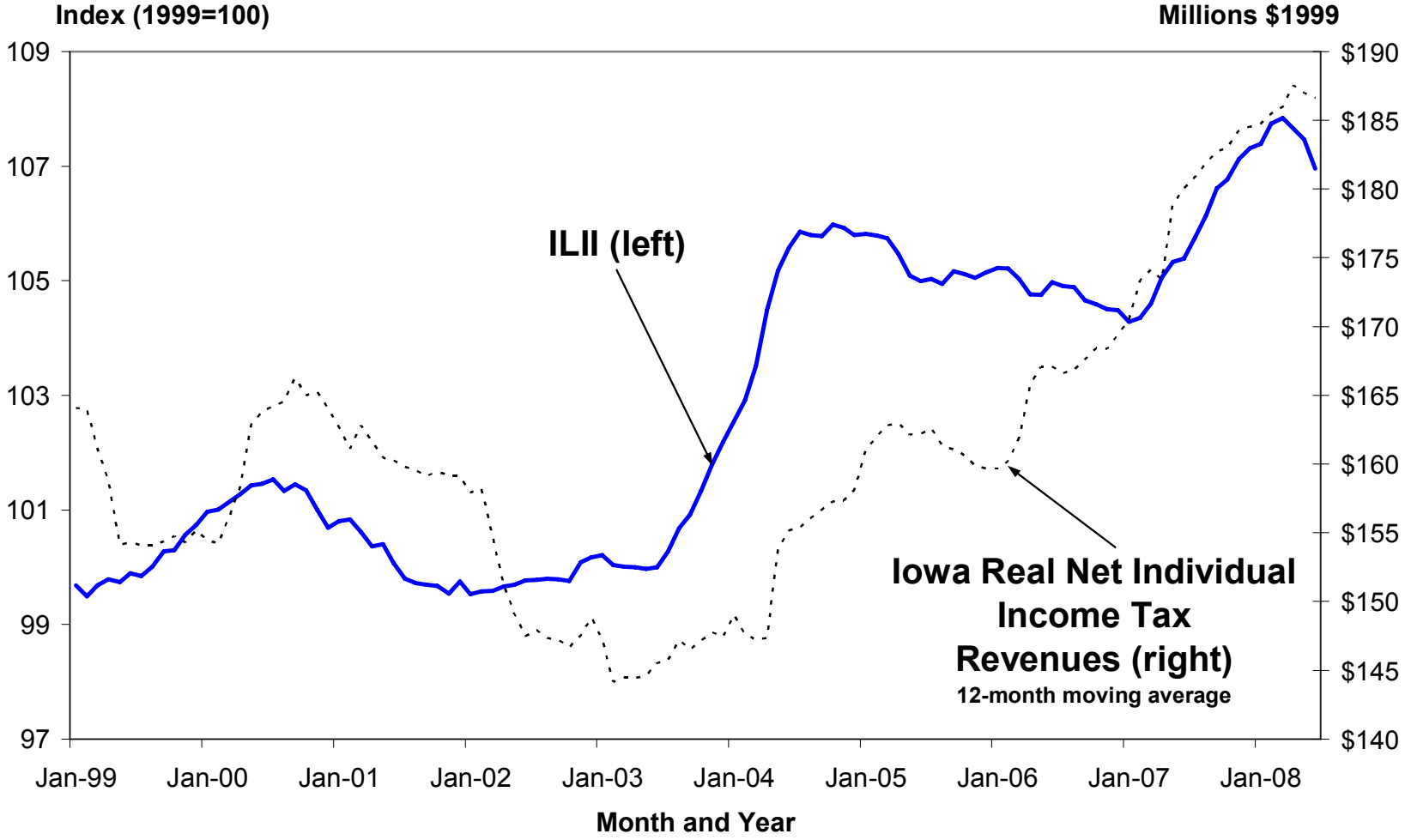ILII (left)

Month and Year

Figure 3. Iowa Leading Indicators Index and Iowa Real Tax Revenues: January 1999-June 2008

Figure 4. Iowa Leading Indicators Index and Iowa Real Net Individual Income Tax Revenues Index: January 1999-June 2008
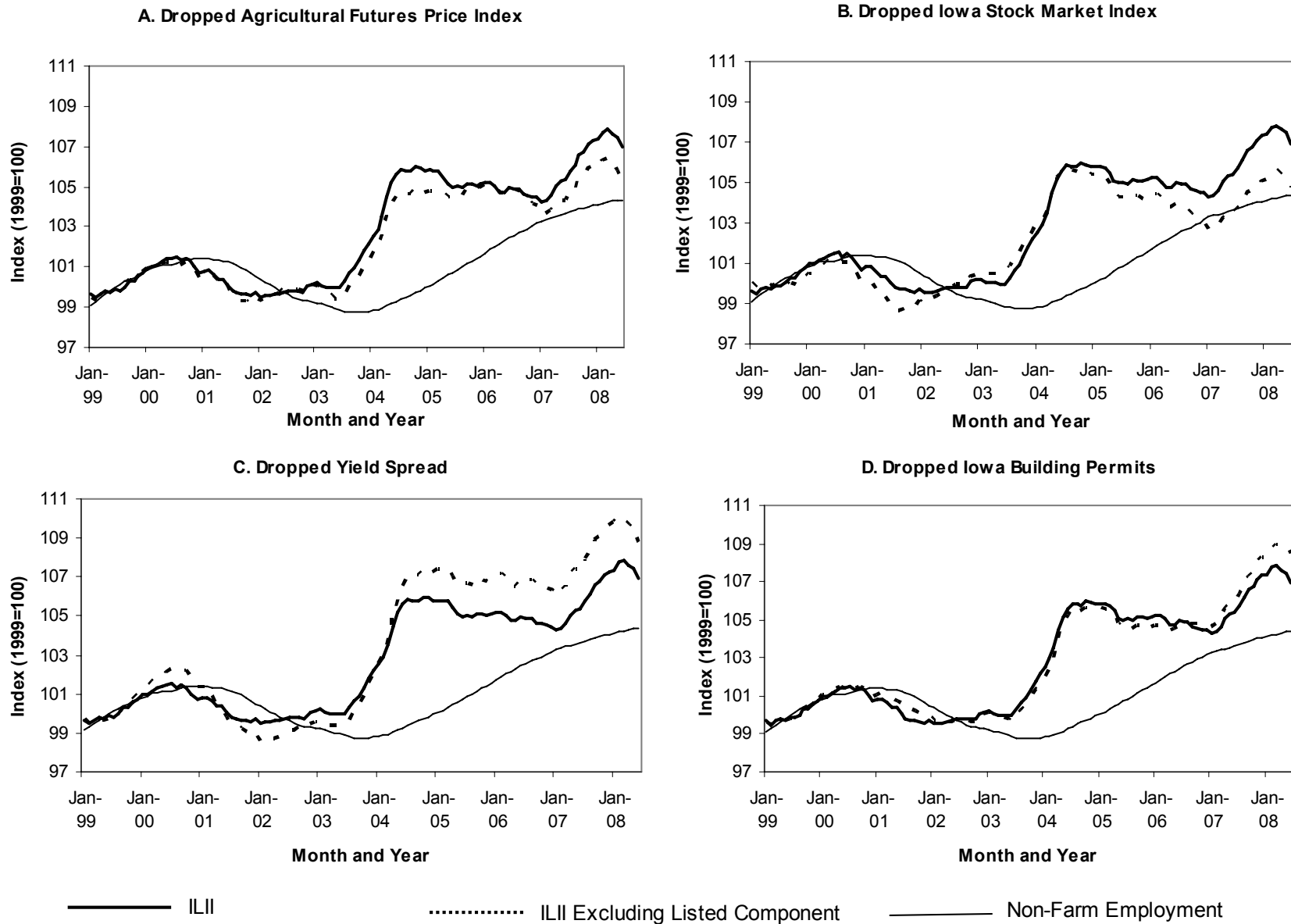
Table 1. Changes in ILII Standardization Factors Accounting for FY 2008 Data

Leading Indicator	Jul-2007 Standard Deviation	Jul-2008 Standard Deviation	Percent Change in Standard Deviation	Jul-2007 Standardization Factor	Rank	Jul-2008 Standardization Factor	Rank	Percent Change in Standardization Factor
Agricultural Futures Price Index	0.521	0.568	9.1%	0.121	4	0.114	4	-6.1%
Iowa Stock Market Index	1.112	1.068	-4.0%	0.057	5	0.060	5	6.6%
Yield Spread	0.261	0.269	3.0%	0.241	2	0.240	2	-0.5%
Building Permits	2.230	2.297	3.0%	0.028	8	0.028	8	-0.6%
Unemployment Claims	1.918	1.984	3.4%	0.033	7	0.033	7	-1.0%
Average Manufacturing Hours	0.206	0.214	4.0%	0.306	1	0.301	1	-1.5%
New Orders Index	1.164	1.158	-0.6%	0.054	6	0.056	6	3.0%
Diesel Fuel Consumption	0.392	0.382	-2.7%	0.161	3	0.169	3	5.2%

Each data series considers month-to-month changes over January 1999 to June 2007 for July 2007 values and January 1999 to June 2008 for July 2008 values. For all series except for the yield spread, which is the only national series, the changes are based on 12-month moving averages. The yield spread and new orders index changes are simple arithmetic changes, the rest are computed as symmetric percentage changes.

Figure 5. Iowa Leading Indicators Index: Sensitivity to Exclusion of Individual Components

A. Dropped Agricultural Futures Price Index

B. Dropped Iowa Stock Market Index

C. Dropped Yield Spread

D. Dropped Iowa Building Permits

Legend: ILII — ILII Excluding Listed Component — Non-Farm Employment
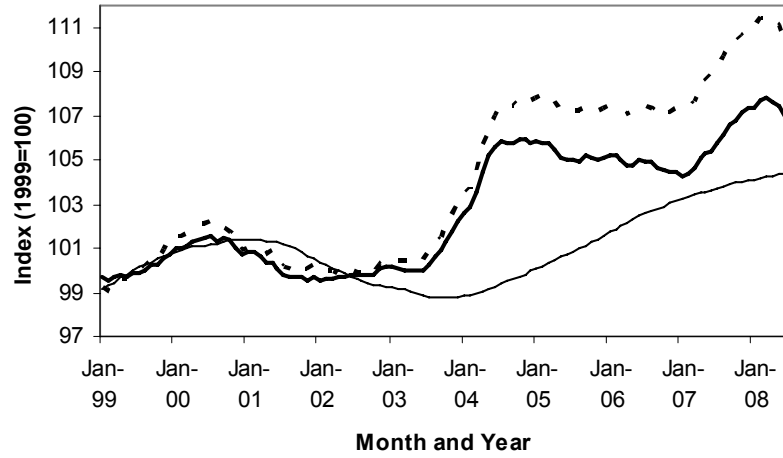
Figure 5b. Iowa Leading Indicators Index: Sensitivity to Exclusion of Individual Components
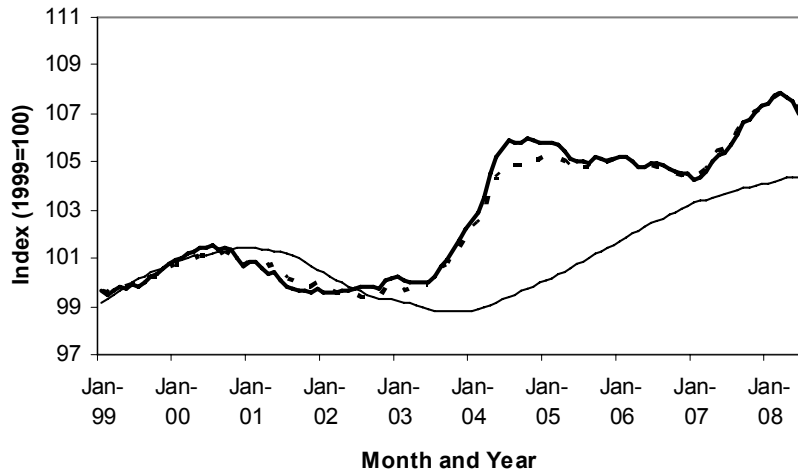
E. Dropped Unemployment Insurance Claims
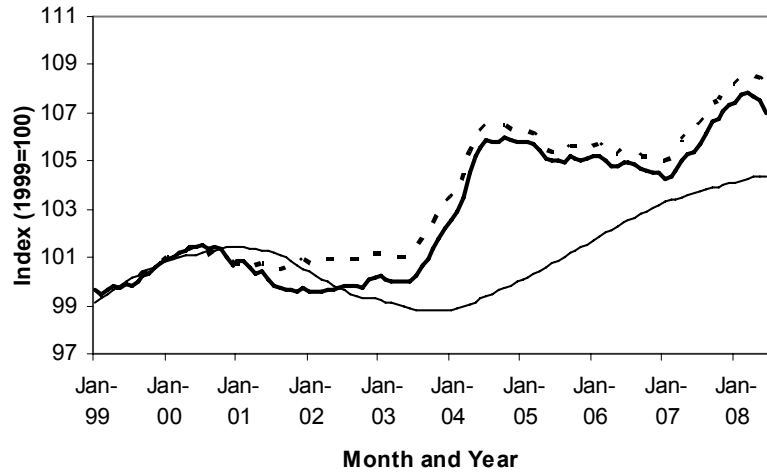
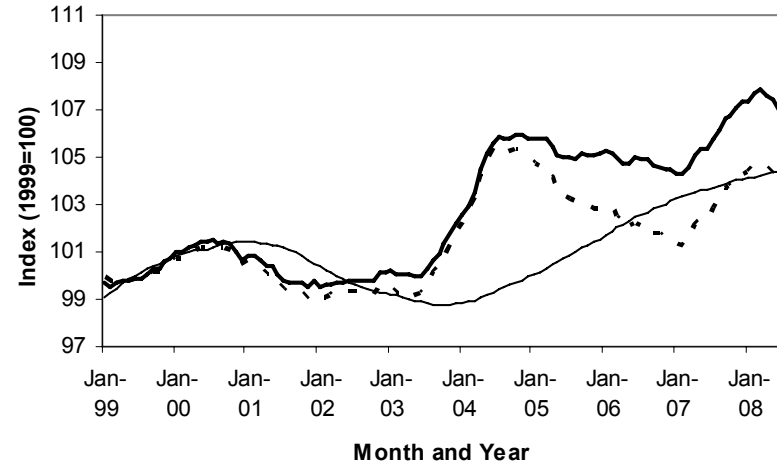**F. Dropped Average Manufacturing Hours**

G. Dropped New Orders Index

H. Dropped Diesel Fuel Consumption

———— ILII   ·············· ILII Excluding Listed Component   ———— Non-Farm Employment

22

Table 2. Iowa Leading Indicators Index Component Sensitivity

Six-Month Values	July to January	Aug to February	Sept to March	Oct to April	Nov to May	Dec to June
ILII						
Percentage Change (Annualized)	3.1%	3.0%	2.3%	1.7%	0.7%	-0.7%
Diffusion Index	87.5	87.5	75.0	75.0	62.5	43.8
ILII without AFPI						
Percentage Change (Annualized)	2.7%	2.7%	1.8%	1.0%	-0.3%	-2.0%
Diffusion Index	85.7	85.7	71.4	71.4	57.1	35.7
ILII without Yield Spread						
Percentage Change (Annualized)	3.5%	3.2%	1.9%	1.0%	0.0%	-1.6%
Diffusion Index	85.7	85.7	71.4	71.4	57.1	35.7
ILII without Diesel Fuel						
Percentage Change (Annualized)	3.0%	2.8%	1.9%	1.4%	0.3%	-1.0%
Diffusion Index	85.7	85.7	71.4	71.4	57.1	35.7
ILII without Average Manufacturing Hours						
Percentage Change (Annualized)	3.4%	3.3%	2.5%	1.9%	0.9%	-0.9%
Diffusion Index	85.7	85.7	71.4	71.4	57.1	42.9
ILII without Iowa Stock Market						
Percentage Change (Annualized)	2.7%	2.8%	2.1%	1.6%	0.6%	-0.6%
Diffusion Index	85.7	85.7	71.4	71.4	57.1	50.0
ILII without New Orders Index						
Percentage Change (Annualized)	2.8%	2.9%	2.2%	1.7%	0.8%	-0.1%
Diffusion Index	85.7	85.7	71.4	71.4	71.4	50.0
ILII without Unemployment Claims						
Percentage Change (Annualized)	3.1%	3.0%	2.4%	1.9%	1.2%	0.2%
Diffusion Index	85.7	85.7	85.7	85.7	71.4	50.0
ILII without Building Permits						
Percentage Change (Annualized)	3.7%	3.6%	3.2%	2.6%	1.6%	0.4%
Diffusion Index	100.0	100.0	85.7	85.7	71.4	50.0

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced August 14, 2008 using standardization factors through June 2007.

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 annual rate) and a majority of the individual components also decline over those six months (six-month diffusion index less than 50.0).

Table 3. Iowa Leading Indicators Index: Six Month Overview for June 2008 Prior to the FY 2009 Annual Update

Monthly Values	2008 January	February	March	April	May	June
ILII	107.4	107.7	107.8	107.6	107.5	107.0
Percentage Change[a]	0.1%	0.3%	0.1%	-0.2%	-0.2%	-0.5%
Diffusion Index[b]	62.5	56.3	56.3	37.5	25.0	25.0

Six-Month Values	July to January	Aug to February	Sept to March	Oct to April	Nov to May	Dec to June
ILII						
Percentage Change	1.6%	1.5%	1.1%	0.8%	0.3%	-0.3%
Diffusion Index	87.5	87.5	75.0	75.0	62.5	43.8

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced July 30, 2008.

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 4. Iowa Leading Indicators Index Components: Six Month Overview for June 2008 Prior to the FY 2009 Annual Update

Component Series Monthly Values[a]		2008 January	February	March	April	May	June
AFPI[b]	↑[c]	6.71	6.56	6.24	6.10	6.19	6.33
Corn (cents per bushel)		393.3	402.4	414.7	434.1	453.2	481.4
Hog Profits (cents per pound)		12.3	11.6	10.7	10.3	10.4	10.3
Soybeans (cents per bushel)		926.8	979.1	1028.9	1077.0	1123.6	1176.2
Cattle Profits (cents per pound)		-0.6	-1.0	-2.0	-3.0	-3.4	-3.6
Iowa Stock Market Index (10=1984-86)	↓	64.00	64.02	64.00	64.13	64.04	63.67
Yield Spread (10-year less 3-month)	↑	0.92	1.57	2.23	2.37	2.12	2.21
Building Permits	↓	896	890	844	813	785	747
Average Weekly Unemployment Claims[d]	↓	3,316	3,320	3,346	3,439	3,531	3,791
Average Weekly Manufacturing Hours	↓	41.4	41.4	41.5	41.4	41.4	41.3
New Orders Index (percent)	↓	60.9	60.7	60.3	59.5	58.7	56.0
Diesel Fuel Consumption (mil gallons)	↓	56.91	57.24	57.38	57.25	57.35	57.17

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced July 30, 2008.

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 price index is computed as the sum of the standardized symmetric percent changes in the four series, each weighted by the annual share of the commodity to Iowa cash farm income.

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 5. Iowa Leading Indicators Index: Six Month Overview for June 2008 After the FY 2009 Annual Update

Monthly Values	2008 January	February	March	April	May	June
ILII	107.9	108.3	108.4	108.2	108.1	107.6
Percentage Change[a]	0.1%	0.3%	0.1%	-0.2%	-0.1%	-0.5%
Diffusion Index[b]	62.5	56.3	56.3	37.5	25.0	25.0

Six-Month Values	July to January	Aug to February	Sept to March	Oct to April	Nov to May	Dec to June
ILII						
Percentage Change	1.6%	1.6%	1.2%	0.9%	0.4%	-0.2%
Diffusion Index	87.5	87.5	75.0	75.0	62.5	43.8

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced August 15, 2008.

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 2008 After the FY 2009 Annual Update

Component Series Monthly Values[a]		2008 January	February	March	April	May	June
AFPI[b]	↑[c]	6.48	6.38	6.14	6.06	6.18	6.34
Corn (cents per bushel)		393.3	402.4	414.7	434.1	453.2	481.4
Hog Profits (cents per pound)		12.3	11.6	10.7	10.3	10.4	10.3
Soybeans (cents per bushel)		926.8	979.1	1028.9	1077.0	1123.6	1176.2
Cattle Profits (cents per pound)		-0.6	-1.0	-2.0	-3.0	-3.4	-3.6
Iowa Stock Market Index (10=1984-86)	↓	63.83	63.84	63.81	63.94	63.85	63.49
Yield Spread (10-year less 3-month)	↑	0.92	1.57	2.23	2.37	2.12	2.21
Building Permits	↓	896	890	844	813	785	747
Average Weekly Unemployment Claims[d]	↓	3,316	3,320	3,346	3,439	3,531	3,791
Average Weekly Manufacturing Hours	↓	41.4	41.4	41.5	41.4	41.4	41.3
New Orders Index (percent)	↓	60.9	60.7	60.3	59.5	58.7	56.0
Diesel Fuel Consumption (mil gallons)	↓	56.91	57.24	57.38	57.25	57.35	57.17

Source: Tax Research and Program Analysis Section, Iowa Department of Revenue, produced August 15, 2008.

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 price index is computed as the sum of the standardized symmetric percent changes in the four series, each weighted by the annual share of the commodity to Iowa cash farm income.

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 1 for the standardization weights 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 the index's value is multiplied by the following monthly change:

   $ILII_0 = 100$

   $ILII_1 = ILII_0*(200 + \text{month 1 ILII change})/(200 - \text{month 1 ILII change})$

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 variation, before calculating month-to-month changes all series except the yield spread, the only national series, are smoothed by taking 12-month moving averages.

The standardization factors will be recalculated annually and any revisions to historical data (beyond the previous two months) will be 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 2008