KELLEY SCHOOL OF BUSINESS
INDIANA UNIVERSITY
Indiana Business Research Center

The Indiana Leading Economic Index: Indicators of a Changing Economy

The Green Economy: What Does Green Mean?

demographic and economic perspectives, insights, and analysis since 1926

INDIANA BUSINESS REVIEW

Fall 2009
Volume 84, No. 3

Fall 2009
Volume 84, No. 3

IBRC
www.ibrc.indiana.edu

Table of Contents

From the Editor

Three powerfully informative articles are yours to read and share in this issue of the IBR. The first article unveils a first—the first leading index of economic indicators for Indiana. Authors Slaper and Cohen have designed what I like to call an early warning system, a data-driven model that may help Hoosiers be a bit more prepared when things get better or worse in the Indiana economy. The second article, by labor economist Andy Zehner, reveals some hard facts about the continuing decline of Hoosier incomes relative to the U.S. And last (certainly not least) economist Tim Slaper gives direction on defining "green jobs" and recommends ways to ensure we can measure the influence of greening on the economy in Indiana and at large.

Did you know that the IBR has been in continuous publication for eighty-four years, covering fifteen recessions? As one of the longest running print publications in the state, we wanted to digitize those treasures that have monitored the economy and population trends of Hoosiers before, during and after fifteen economic recessions. Currently, we have scanned back to 1987 and will keep adding to those archives . You can currently view over twenty years of the IBR at **www.ibrc.indiana.edu/ibr** (click on Archives) where we all may learn that the more things change in our economy, the more they stay the same.

The Indiana Leading Economic Index: Indicators of a Changing Economy

Timothy F. Slaper, Ph.D.: **Director of Economic Analysis**, Indiana Business Research Center, Kelley School of Business, Indiana University
Alex Willey Cohen: Research Assistant, Indiana Business Research Center, Kelley School of Business, Indiana University

Prediction is very difficult, the Danish physicist Niels Bohr said, especially regarding the future.

Even so, economists and market watchers are often asked what the economic future holds. Businesses want to plan purchases and hiring and make projections about revenues and earnings. Government officials want to know how well tax revenues will match expenditures on programs. Everyone wants to know about, and make adjustments for, dramatic economic downturns such as the current recession.

Economists and market analysts have developed indexes to help anticipate the future direction of the economy in the short-run. The index with the greatest notoriety is probably the Leading Economic Index produced by The Conference Board. The Leading Economic Index represents years of research and analysis but, as robust as it may be, the index is national in scope. It doesn't necessarily reflect the regional dynamics and particular structure of the Indiana economy.

As a result, the Indiana Business Research Center recently developed an Indiana-specific index of leading economic indicators. This article briefly describes the Leading Index for Indiana (LII).

Developing the Index

The IBRC took four steps to develop a leading economic index for Indiana:

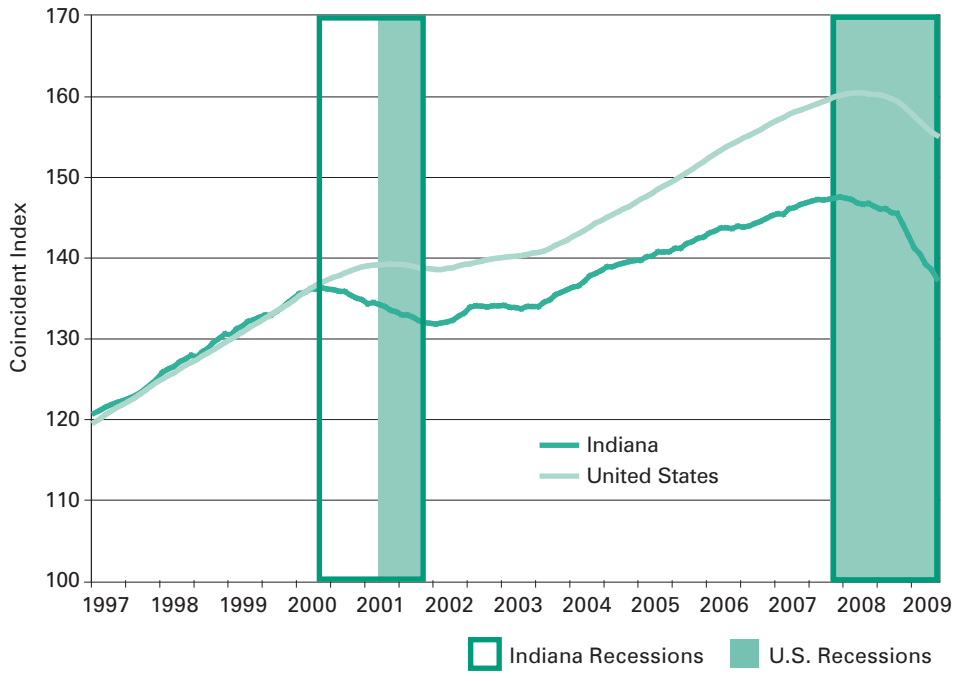
1. Create an index of current economic activity and, in contrast to national recessions and expansions, use it to identify Indiana economic activity.
2. Identify key sectors that tend to guide economic activity in Indiana.
3. Find measures of economic activity at either the national level or state-specific level that predict movements in those key Indiana sectors.
4. Combine these indicators to produce a leading index for economic activity in Indiana.

In order to predict recessions, we must be able to identify the beginning and the end of recessions. This is done using a coincident index. A coincident index measures current economic activity. Several other states have developed indexes of leading economic indicators—Iowa, Oregon, Nevada and Ohio—and used total nonfarm employment as their coincident index.

The National Bureau of Economic Research (NBER) defines recession, however, based on the significant decline in a collection of economic indicators. As a result, the IBRC sought a broader set of measures to create a coincident index. The Philadelphia Federal Reserve produces coincident indexes for individual states. Following their lead, the IBRC used nonfarm employment plus the average hours worked in manufacturing, the unemployment rate, and wages and salaries (adjusted for inflation).

The Philadelphia Fed also provides rules for identifying state recessions, based roughly on rules for identifying a recession at the national level. A recession is deemed to occur when the state coincident index falls,

Figure 1: Coincident Indexes of the Indiana and U.S. Economies



Note: Hash marks indicate January and July of each year except 2009.
Source: Philadelphia Federal Reserve (www.philadelphiafed.org/research-and-data/regional-economy/indexes/coincident)

from peak to trough for at least three months and by at least 0.5 percent.

Individual state recessions typically occur in conjunction with national recessions, but the duration can be different. The peak before the millennial recession occurred in May 2000 in Indiana, with the trough in January 2002. Like the national recession, the current Indiana recession began in December 2007. **Figure 1** graphically depicts the behavior of the Indiana and U.S. economies from 1997 through July 2009. The green boxes show the Indiana recessions and the shaded areas show the U.S. recessions.

Key Sectors in Indiana

Leading indicators must satisfy two basic criteria. They must be economically reasonable and empirically demonstrable. To develop specific leading indicators for Indiana, one can take one of two approaches. The first option is to use time series data at the state level that have been shown to lead economic activity in Indiana. Unfortunately, the scarcity of state-level data poses a significant challenge in terms of developing measures that are Indiana specific. Option two is to use national time series data concerning sectors in which Indiana has a particular interest.

Data on Indiana's economic output suggest the following three supersectors significantly affect economic activity in the state. In 2007, manufacturing contributed 29 percent to private GDP. Transportation and trade contributed another 17 percent. The third supersector—finance, insurance and real estate—also contributed 17 percent to private GDP. An effective leading indicator should portend economic activity in these sectors.

Table 1 presents the five indicators that compose the LII. Because Indiana-specific data were not available for the length of time needed to analyze the relationship between the data and the Indiana coincident index, all series are national level data.

Given that manufacturing is such a predominate share of the Indiana economy, it should come as no surprise that both the Institute for Supply Management Purchasing Managers Index (PMI) for manufacturing and the U.S. Census Bureau data on motor vehicles and parts (unfilled orders) would be included in the LII. The PMI is commonly used as a national leading indicator (see **Figure 2**). Based on a national survey of supply and purchasing managers, the PMI measures month-to-month changes in business sentiment. The PMI measures changes, positive or negative, in expectations for business in the present and coming months.

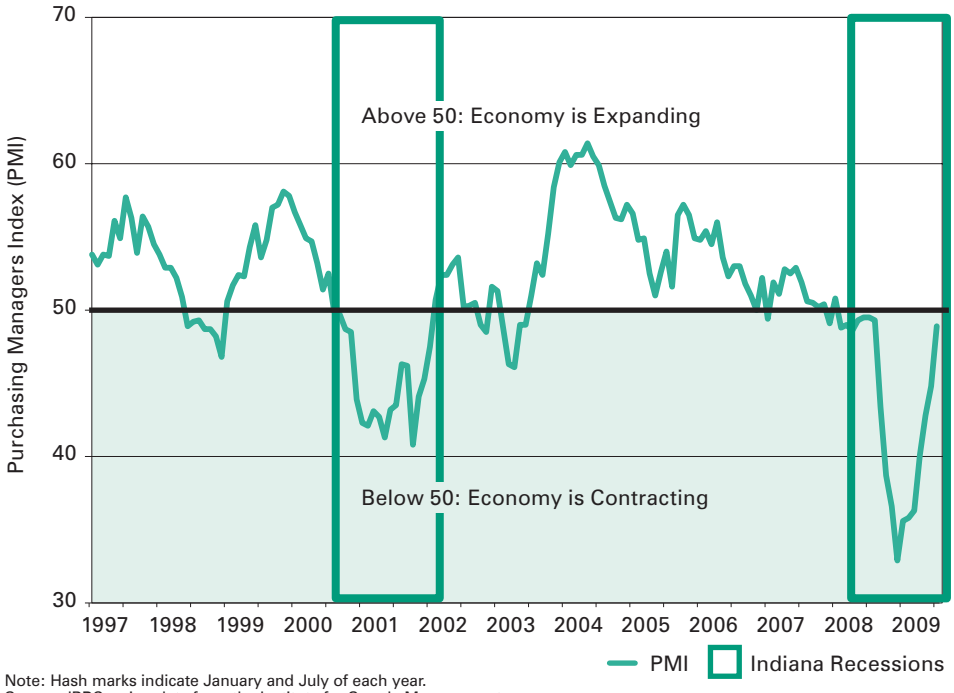
Unfilled orders of motor vehicles and parts monthly data is published by the U.S. Census Bureau. The rationale for including this measure is that unfilled orders tend to decline before recessions. Given that Indiana's economy is so heavily

Table 1: Five Indicators that Make Up the LII and Their Associated Supersectors

Indicator	Associated Supersector
Manufacturing Purchasing Mangers Index	Manufacturing
Unfilled orders for motor vehicles and parts	Manufacturing
Dow Jones Transportation Index	Transportation and trade
Housing Market Index	Finance, real estate and insurance (also predicts construction activity)
Interest rate spread	Finance, real estate and insurance (also predicts business investment)

Source: Indiana Business Research Center

Figure 2: Purchasing Managers Index for Manufacturing in the United States



Note: Hash marks indicate January and July of each year.
Source: IBRC, using data from the Institute for Supply Management

automobile dependent, big drops in unfilled orders for motor vehicles and parts lead to big drops in automotive manufacturing activity. Declines in this data series have led the past two recessions by six months and ten months, respectively. **Figure 3** shows how the decline in unfilled orders of motor vehicles and parts predates downturns in Indiana (boxes outlined in green). The graph also shows the desired behavior of the indicators that compose a leading index.

The Dow Jones Transportation Index tracks twenty transportation and logistics companies. Indiana, as the crossroads of America, has a relatively large transportation and logistics sector. Since stock prices tend to be forward looking, it stands to reason that it would be a component in Indiana's leading index.

The Housing Market Index (HMI) is published monthly and uses surveys of home builders to gauge the level of confidence in the real estate and construction industry. Since 1990, the HMI has led Indiana construction employment movements by roughly six months.

The interest rate spread measures the extent to which investors anticipate a recession in the near future. The spread, the yield on ten-year Treasury bonds minus the Federal Funds Rate, has become negative before all recessions since 1970.

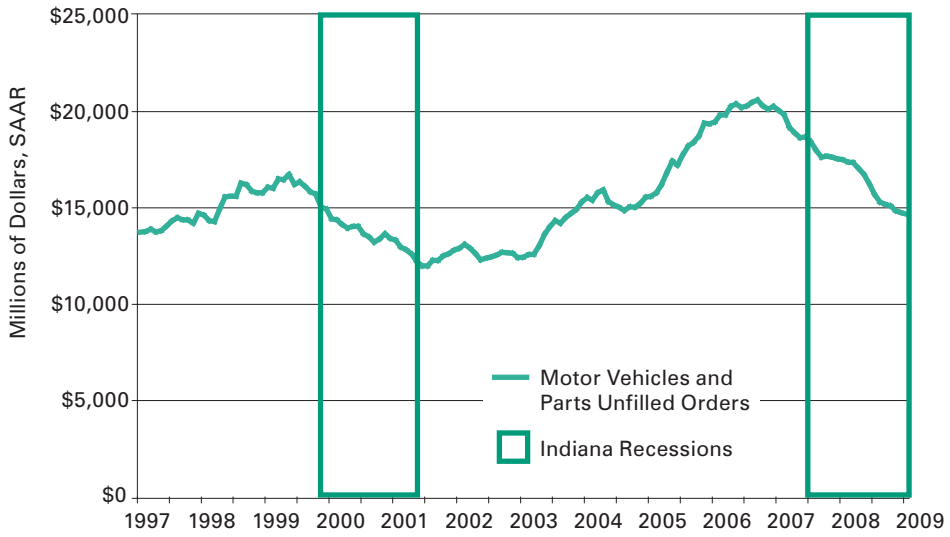
Putting the Index Together

There are a few more steps before the five data series become an index. Several measures are noisy and, as a result, the series is smoothed by using moving averages. Then, monthly changes are calculated for each indicator. These changes are statistically standardized to ensure that each indicator receives equal weighting. At this point, the indicators are combined by summing the standardized monthly changes. Finally, a base year is selected and the index is calibrated to that year. The LII is based in 1997, the first year for which data for all five data series are available.

As **Figure 4** shows, the leading index began a steady decline well before both of the recessions since 1997.

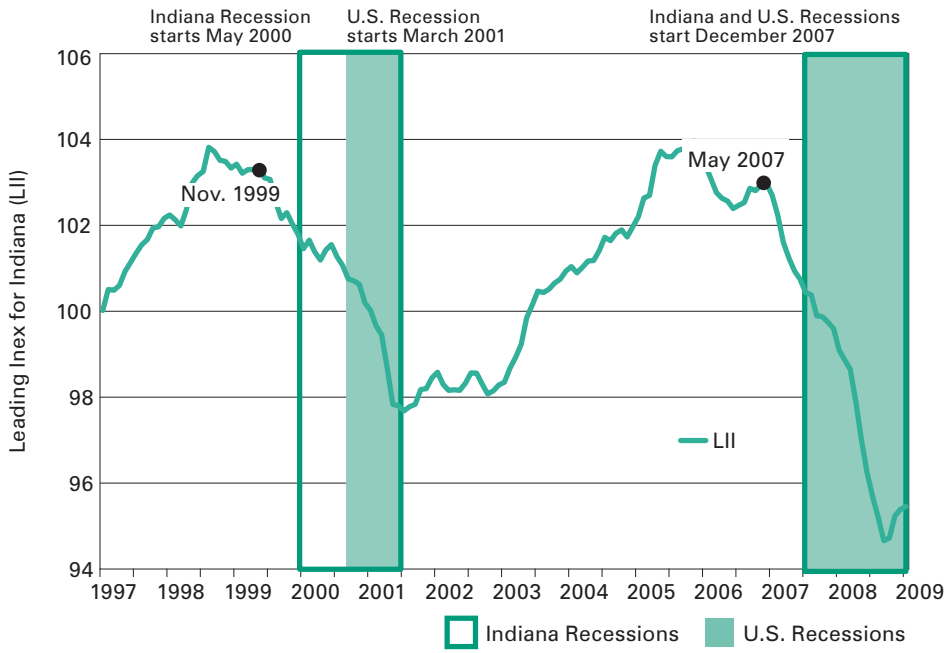
Warning signs of an impending recession—when at least three out of the five indicators turn negative—occurred six months before both the 2000 and current recessions.[1] These warning signs can provide state government officials an indicator of the coming economic storm and that additional burdens are likely for economic relief programs (e.g., unemployment insurance) and social

Figure 3: Unfilled Orders for Vehicles and Parts in the United States



Note: Hash marks indicate June and December of each year except 2009.
Source: IBRC, using data from the U.S. Census Bureau

Figure 4: The Leading Index for Indiana since 1997



Note: Hash marks indicate June and December of each year except 2009.
Source: Indiana Business Research Center

welfare programs (e.g., food stamps and Medicaid). **Figure 5** shows that the LII gave definitive signals—several months of warning signs—of an impending recession in November 1999 and June 2007.

How Well Does It Work?

The index generated warnings in the right places, but it also generated a few false alarms (warning signs that do not precede a recession). False alarms are a concern, but one way to identify false alarms is to supplement the index with other indicators of economic activity. For example, one could link the Leading Index for Indiana with other economic dashboard indicators for gauging Indiana's economic activity. Such a dashboard may include: The Conference Board's Leading Economic Index; The Architectural Billings Index; Indiana initial unemployment insurance claims; help-wanted ads in Indiana newspapers; an Indiana stock index and Indiana manufacturing hours worked.

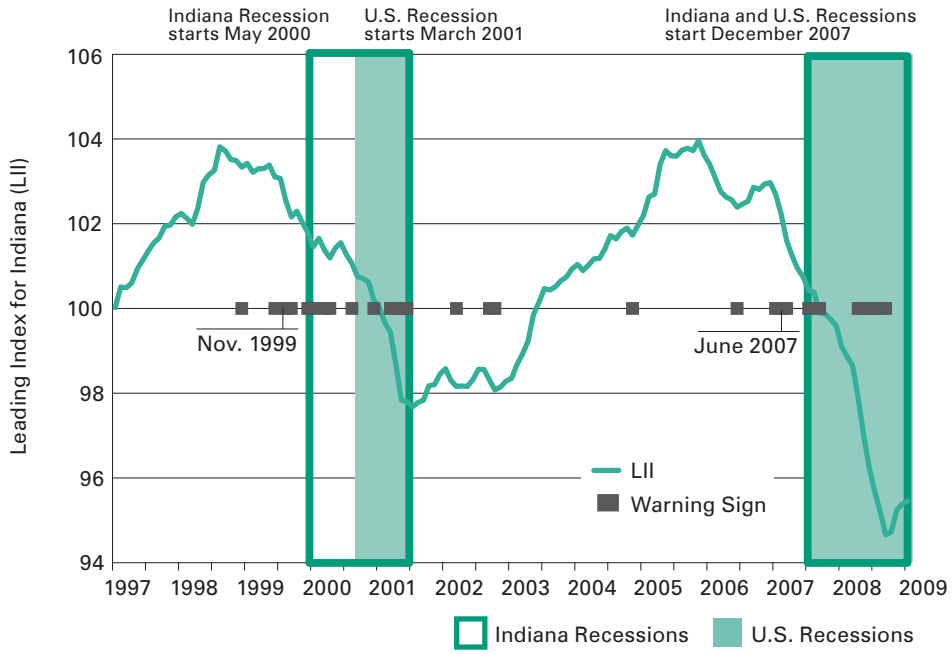
Another more expensive, but potentially more useful gauge for the dynamics of the Indiana economy would be an Indiana specific PMI-like indicator. An "Indiana PMI" would require surveying Indiana businesses and collecting and analyzing the movements in the expectations of Indiana managers. The work on the LII was made possible by funding by the Indiana Department of Workforce Development. The IBRC is hopeful that there will be additional opportunities to explore better ways to monitor and report the state of the Hoosier economy in the coming months and year.

Find the LII online at www.stats.indiana.edu/lii.

Notes

1. It is important to recognize, however, that the data comprising the complete leading index are released with a six-week lag. A preliminary index that uses four of the five components is available a week after the end of the month.

FIGURE 5: The LII and Warning Signs of Impending Recessions

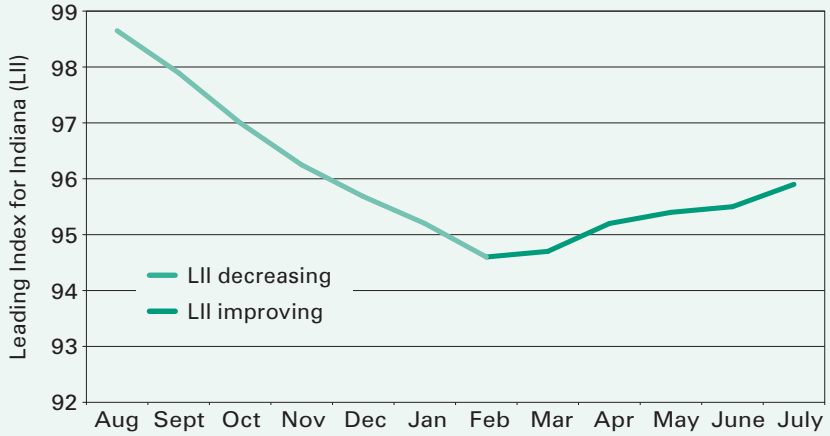


Note: Hash marks indicate June and December of each year except 2009.
Source: Indiana Business Research Center

Economic Green Shoots

Earlier this spring, when the economic news was the grimmest, there was talk about economic green shoots for the U.S. economy. This metaphor symbolizes the beginnings of economic growth. As new growth begins to occur, these shoots would be evident in the LII. The figure to the right shows the movement in the LII from August 2008 through July 2009, and according to the LII, there has been encouraging news about the Indiana economy in recent months. The index hit a low of 94.7 in February and has been on the rise since then.

LEADING INDEX FOR INDIANA, AUGUST 2008 TO JULY 2009



Source: Indiana Business Research Center

Five Hundred Reasons Hoosier Incomes Trail the Nation

Andy Zehner: Independent Workforce Analyst

In 2008, Indiana's per capita income of $34,103 was $5,648 below the national average of $39,751. This announcement from the U.S. Bureau of Economic Analysis was hardly news. Indiana has lagged the United States in personal income for years. Incomes rose from 2007 to 2008 in Indiana by 2.7 percent, but by 2.9 percent across the United States.

Personal income is the basis for private consumption and government revenue, so slow growth in personal income inhibits growth in Indiana's economy. It makes other objectives (improved education and infrastructure, debt reduction, moderate tax burden, etc.) harder to attain. Indiana's relative decline in per capita personal income can't continue without consequences for Indiana's public sector financing, private sector competitiveness or Hoosier quality of life.

Indiana's low ranking in per capita personal income is usually attributed to the long-term decline in manufacturing employment. As one newspaper report on the BEA announcement explained: "The loss of 178,000 manufacturing positions since 1999, particularly in steel, automotive and electrical industries, largely has eroded any gains."[1]

This article disputes that common explanation and offers an alternative. Instead of a single cause, there are nearly 500 reasons why Indiana lags the nation in personal income. While more complicated, this alternative view suggests that reversing the decline is possible.

Table 1: Hourly Mean Wage by Major Occupational Groups, Indiana and the United States, 2008

Occupation	Hourly Mean Wage	
	Indiana	United States
All occupations	$18.16	$20.32
Management occupations	$42.69	$48.23
Legal occupations	$32.88	$44.36
Health care practitioners and technical occupations	$30.06	$32.64
Computer and mathematical science occupations	$30.04	$35.82
Architecture and engineering occupations	$30.04	$34.34
Business and financial operations occupations	$27.47	$31.12
Life, physical, and social science occupations	$24.93	$30.90
Construction and extraction occupations	$20.93	$20.36
Education, training, and library occupations	$20.92	$23.30
Installation, maintenance, and repair occupations	$19.73	$19.82
Arts, design, entertainment, sports, and media occupations	$18.92	$24.36
Community and social services occupations	$18.29	$20.09
Protective service occupations	$16.49	$19.33
Production occupations	$16.29	$15.54
Sales and related occupations	$16.04	$17.35
Transportation and material moving occupations	$14.97	$15.12
Office and administrative support occupations	$14.45	$15.49
Farming, fishing, and forestry occupations	$13.33	$11.32
Health care support occupations	$12.35	$12.66
Building and grounds cleaning and maintenance occupations	$11.20	$11.72
Personal care and service occupations	$10.86	$11.59
Food preparation and serving related occupations	$8.88	$9.72

Note: Shaded cells indicate that the Indiana wage for the occupation exceeds the U.S. wage.
Source: Occupational Employment Statistics

Manufacturing Didn't Cause It

It is true that Indiana PCPI declined over a period when Indiana's manufacturing sector was shedding jobs. But it is wrong to single out manufacturing as the cause of the decline. Complex outcomes seldom are determined by a single cause. If the Indiana Pacers' Danny Granger scored thirty points in a game and the Pacers lost by nine points, it would be correct to say they lost because he didn't score forty. But a serious effort to improve the team would look beyond Granger to see what his teammates did or failed to do. Thirty points is about as much as a single player can contribute, and expecting Granger to do more may be impractical. Indiana needs to take that same broader approach to explaining and reversing its slow growth in per capita personal income.

Decline in manufacturing employment is a national phenomenon, yet many states have passed Indiana on the national ranking for PCPI since 1965 when Indiana last equaled the national rate. Those states improved without expanding their manufacturing sectors. Indeed, the rest of the

country has shed manufacturing jobs faster than Indiana while achieving faster growth in incomes. These states have succeeded despite manufacturing losses. Just as the outcome of a basketball game reflects what every player does, Indiana's PCPI performance derives from many factors.

TABLE 2: Share of Total Employment by Major Occupational Groups, Indiana and the United States, 2008

Occupation	Indiana		United States	
	Employment	Percent Share of Jobs	Employment	Percent Share of Jobs
All occupations	2,927,620	100%	135,185,230	100%
Office and administrative support occupations	450,530	15.4%	23,231,750	17.2%
Production occupations	374,060	12.8%	9,919,120	7.3%
Sales and related occupations	298,630	10.2%	14,336,430	10.6%
Food preparation and serving related occupations	264,460	9%	11,438,550	8.5%
Transportation and material moving occupations	262,990	9%	9,508,750	7%
Health care practitioners and technical occupations	162,990	5.6%	7,076,800	5.2%
Education, training, and library occupations	162,970	5.6%	8,451,250	6.3%
Construction and extraction occupations	139,150	4.8%	6,548,760	4.8%
Installation, maintenance, and repair occupations	131,970	4.5%	5,374,850	4%
Management occupations	108,520	3.7%	6,152,650	4.6%
Building and grounds cleaning and maintenance occupations	91,470	3.1%	4,429,870	3.3%
Business and financial operations occupations	90,600	3.1%	6,135,520	4.5%
Health care support occupations	75,250	2.6%	3,779,280	2.8%
Personal care and service occupations	63,400	2.2%	3,437,520	2.5%
Protective service occupations	57,010	1.9%	3,128,960	2.3%
Architecture and engineering occupations	47,260	1.6%	2,521,630	1.9%
Computer and mathematical science occupations	45,020	1.5%	3,308,260	2.4%
Community and social services occupations	32,480	1.1%	1,861,750	1.4%
Arts, design, entertainment, sports, and media occupations	31,850	1.1%	1,804,940	1.3%
Life, physical, and social science occupations	20,060	0.7%	1,296,840	1%
Legal occupations	14,000	0.5%	1,003,270	0.7%
Farming, fishing, and forestry occupations	2,950	0.1%	438,490	0.3%

Note: Shaded cells indicate that the Indiana percent share of jobs exceeds the U.S. percent share.
Source: Occupational Employment Statistics

The solution to problems caused by the loss of one industry need not be a recovery of that same industry. Massachusetts' PCPI has stayed high despite losses as great as those Indiana has suffered. Whaling and shipping made Massachusetts a national economic powerhouse in the late 1800s. Those industries declined and Massachusetts sank with them, but rose again in the early 1900s by growth in textile manufacturing. When textiles began moving to the South or overseas, Massachusetts adapted again by capturing a share of the new biotechnology sector. West Virginia, by contrast, has never found anything to replace coal mining as the engine of its economy.

Since most people derive the majority of their income from wages earned at work, comparing wages for occupations, rather than industrial change, is a more pertinent tool for determining where Indiana's PCPI falls below the U.S. level.

Most Jobs Pay Less in Indiana

Hoosier workers earn less than similar workers in other states for hundreds of occupations. Indiana mean wages are lower in nineteen of twenty-two major occupational groups (see **Table 1**). The only major job types for which Indiana incomes exceed the U.S. rates are construction and extraction jobs, manufacturing production jobs, and the very small farming, fishing and forestry group.

Table 2 shows the relative size of occupational groups in Indiana and the United States. Indiana has relatively more jobs in five groups. These include high-wage health care professions and low-wage food service jobs, as well as installation, maintenance and repair, production, and transportation and material-moving occupations. A larger share of total jobs means those occupational groups could be especially significant in helping to boost Indiana's PCPI. But, as **Table 1** shows, Indiana pays less to workers in all but the

production jobs category. Therefore, rather than being the cause of Indiana's income deficit, production jobs in manufacturing keep us as close to the national average PCPI as we are.

Digging Deeper

The U.S. Bureau of Labor Statistics' Occupational Employment Statistics (OES) survey is the most detailed and complete survey of wages in the country. Current OES data include the hourly wage rates and the number of jobs for 657 occupations encompassing 93 percent of all Indiana jobs.[2]

Indiana pays a lower average hourly wage for 505 of the 657 occupations in the OES survey. Of the 2.7 million Hoosier workers accounted for at this level of detail, almost 2.2 million workers are in occupations for which Indiana pays lower mean hourly wages than workers in the rest of the country earn for similar work. About 80 percent of the workers accounted for in this survey work in these lower-paying occupations. Many of these occupations pay good wages. But even high-wage Hoosier jobs such as engineering manager ($46.74 per hour) put us further behind as long as the rest of the country pays them better ($57.97 per hour) and employs more of them.

Indiana pays more than the U.S. mean hourly wage for 152 occupations. Of these, Indiana has fewer jobs, relative to its total, for most occupations. There are, in fact, only 81 occupations out of 657 for which Indiana pays a premium and employs a relatively large number. Thirty-four of these are manufacturing production occupations (see **Table 3**).

The occupations most detrimental to Indiana's goal of earnings parity are those that pay lower wages and have more jobs. That combination occurs in 176 occupations. **Table 4** shows ten of these occupations using examples from several of the major groups and both high- and low-wage jobs.

The differences between the United States and Indiana are small in several cases, but the margin in mean hourly wage is very great for some occupations. Human resources managers earn $11.03 less per hour in Indiana, on average, and computer hardware engineers make $13.38 less per hour.

These deficiencies are hard to explain. Why, for instance, do Hoosier cashiers earn $0.60 less per hour than cashiers in New Mexico? Why do corrections officers and jailers in Indiana make nearly $10 less per hour in Indiana than in Illinois? Why do forty-five other states pay more to retail clerks than Indiana?

Of course, not all occupations pay less in Indiana. The mean hourly wage of $32.90 for airfield operations specialists in Indiana is highest of all states in the survey and $12.44 more per hour than the U.S. average. The $19.66 that surveillance officers at gaming establishments earn in Indiana is more than in any other state but Pennsylvania. But these examples are few in number and do not come close to offsetting the occupations for which Indiana pays less.

Economists typically explain prices in terms of the costs of inputs and the value of outputs. But among workers doing the same job in different states, the value of output is very similar

Table 3: Number of Occupations for Which Indiana Has More Jobs or Pays Better

Occupational Group	Indiana Has More	Indiana Pays More	Indiana Has and Pays More
All occupations	257	152	81
Production occupations	68	45	34
Installation, maintenance, and repair occupations	28	19	11
Construction and extraction occupations	20	22	10
Transportation and material moving occupations	19	13	9
Health care practitioners and technical occupations	26	11	5
Personal care and service occupations	5	6	3
Office and administrative support occupations	15	8	3
Management occupations	9	1	1
Business and financial operations occupations	7	2	1
Life, physical, and social science occupations	5	3	1
Health care support occupations	8	4	1
Protective service occupations	4	1	1
Building and grounds cleaning and maintenance occupations	4	3	1
Computer and mathematical science occupations	1	1	0
Architecture and engineering occupations	8	1	0
Community and social services occupations	4	2	0
Legal occupations	1	1	0
Education, training, and library occupations	2	0	0
Arts, design, entertainment, sports, and media occupations	8	1	0
Food preparation and serving related occupations	7	0	0
Sales and related occupations	7	4	0
Farming, fishing, and forestry occupations	1	4	0

Source: Occupational Employment Statistics

> *Our economic development policies are successful if measured against Indiana only. But by the more important yardstick of U.S. PCPI, Indiana fails to keep pace.*

for most jobs. A counter clerk at a video-rental store does the same job in Maine, Mississippi or Muncie, and differences in their value of output is a minor factor in their wage differences.

Cost of Living Doesn't Explain It

Indiana's cost of living is lower than that of most other states, and some readers will no doubt suppose Hoosier workers are better off despite lower incomes. The data do not support this notion, however. While energy and housing cost less in Indiana, other items are not much cheaper here than elsewhere in the country.

Overall, Hoosier costs are about 92.8 percent of the U.S. average cost of living.[3] But Hoosier incomes are only 85.8 percent of the U.S. PCPI. The deficit in incomes more than offsets the savings from living in Indiana. If Hoosier incomes were in proportion to our cost of living, PCPI would be 92.8 percent of the United States, or $2,786 per person higher than it is.

Steady Growth Is Not Enough

Indiana PCPI equaled the nation in 1965. **Figure 1** shows the trend since then with Indiana and U.S. incomes rising over time, but Indiana falling further below the U.S. PCPI.

Indiana incomes grew in nominal terms in every year from 1965 to 2008 and in inflation-adjusted terms in thirty-one of those years. But Indiana grew more slowly than the United States in twenty-seven of those forty-three years. Our economic development policies are successful if measured against Indiana only. But by the more important yardstick of U.S. PCPI, Indiana fails to keep pace.

Economic Development Can't Fix It

The state's leaders are right to invest in high-skill, high-growth, and high-tech companies; but the PCPI gap isn't going to be closed through economic development. Indiana pays less than the United States average for high-tech occupations, just as for unskilled jobs, and their effect on the PCPI gap is the same. Industrial engineers make $3.04 less per hour here, on average, than in the rest of the country. Chemists make $6.19 an hour less. Computer software engineers make $8.22 less per hour here. Far from being the solution, the high-tech industries help to keep the income gap wide.

The gap won't be closed by attracting one firm at a time, even if that firm pays very high wages.

TABLE 4: Selected Occupations Where Indiana Employs More, but Pays Less than the U.S. Average

Occupation	Indiana			United States	
	Employment	Mean Hourly Wage	Share of Jobs	Mean Hourly Wage	Share of Jobs
Combined food preparation and serving workers, including fast food	78,540	$7.61	2.87	$8.36	2.16
Registered nurses	56,500	$27.48	2.06	$31.31	2.03
Janitors and cleaners, except maids and housekeeping cleaners	49,480	$10.92	1.81	$11.30	1.71
Secretaries, except legal, medical, and executive	41,380	$13.72	1.51	$14.42	1.49
Bookkeeping, accounting, and auditing clerks	41,330	$15.47	1.51	$16.25	1.48
First-line supervisors/managers of retail sales workers	26,470	$18.79	0.97	$19.19	0.95
First-line supervisors/managers of production and operating workers	24,760	$25.70	0.90	$25.72	0.53
Carpenters	22,160	$19.26	0.81	$20.64	0.72
Mechanical engineers	7,770	$33.15	0.28	$37.59	0.19
Industrial production managers	6,240	$41.34	0.23	$43.85	0.12

Source: Occupational Employment Statistics

Suppose a new business that will employ 1,000 aerospace engineers is attracted to Indiana. Suppose the company will pay a rate that only the top 10 percent of all aerospace engineers get. In Indiana, that's $49.35. Nationwide, the top 10 percent earns $64.70. Assuming the national rate and 2,080 hours of pay, those 1,000 engineers would earn a combined $134.6 million in a year. It sounds like a marvelous boost to state incomes, but it would raise the annual PCPI of all Hoosiers by no more than $21.10. The PCPI deficit of $5,648 would barely change.

There's another point to make about the hypothetical aerospace firm. Those 1,000 engineers wouldn't make their own coffee, clean their offices or manage their computer network. The firm would employ hundreds more people as secretaries, janitors, etc. If those support workers earned the sub-standard wages that are typical in Indiana for their occupations, they would offset the engineers' higher earnings. The firm's overall effect on state PCPI could be negligible despite the engineers.

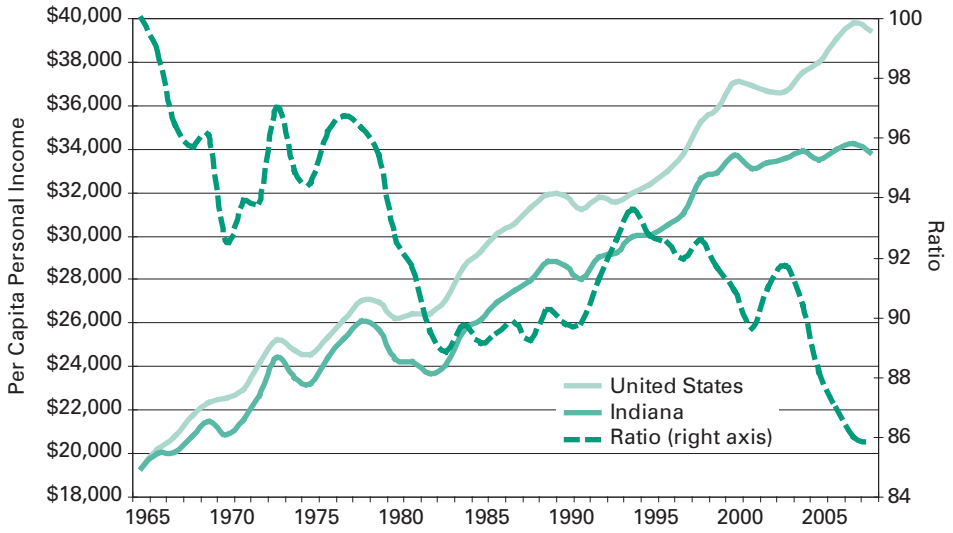
Any new business that comes to Indiana and pays its employees more than the current statewide average helps to raise Hoosier incomes. But it doesn't help Indiana gain ground on the United States unless it pays more than the national rate.

Earnings Can't Do It All

This article discusses how Indiana's mix of jobs and its lower hourly wages contribute to the gap in per capita personal income relative to the United States. These two factors explain most of the difference, but there are other factors besides jobs and wages.

Annual earnings are affected by the number of hours for which a worker gets paid during the year. Spells of unemployment or shortened work weeks can diminish incomes in one place relative to another even when hourly wages are equal.

FIGURE 1: Per Capita Personal Income, 1965-2008



Source: Bureau of Economic Analysis

Also, earnings from work account for only about 69 percent of total personal income. The rest comes from dividends, interest and rents, and from transfer receipts. Since Hoosiers earn less from investments and receive less welfare, even if Indiana achieved parity in earnings from jobs, a deficit in PCPI would still exist.

Conclusion

The comedian Steve Martin disclosed a secret method by which a person could earn a million dollars and not pay taxes on it. "First, earn a million dollars," he said, "And then, don't pay taxes on it!"

Raising the personal incomes of Hoosiers will require a similar approach. It can only be done by raising the personal incomes of Hoosiers.[4] Effective policies need to be as broadly based as possible—not limited to preferred industries or targeted careers. Bio-technology, advanced manufacturing and logistics are industries that ought to be promoted, but those industries will never be big enough to erase the deficit in PCPI for Indiana's entire population. They won't even start to close the gap unless Hoosiers in those industries are earning more than their colleagues across the country.

Indiana shouldn't adopt policies just to move a few spots higher in PCPI than its current thirty-ninth rank among the states. Ranking low among the states doesn't cost Indiana anything. But a serious effort to raise PCPI would pay off in important ways. If Indiana wages were on par with the United States, higher incomes would lead to millions more dollars in consumer spending and government revenue.

Notes

1. Ted Evanoff, "Indiana Incomes: We're Stuck," *Indianapolis Star*, March 25, 2009, page A1.
2. Teachers are not included in the survey, nor are professional athletes and other professions for which Indiana has less than a significant number of survey responses.
3. Source: www.top50states.com/cost-of-living-by-state.html
4. Morton Marcus made the same point in "Dissecting Indiana's Decline in Personal Income," *Indiana Business Review*, Spring 2002: www.ibrc.indiana.edu/ibr/2002/spring02/spring02_art1.html.

The Green Economy: What Does Green Mean?

Timothy F. Slaper, Ph.D.: **Director of Economic Analysis**, Indiana Business Research Center, Kelley School of Business, Indiana University
Ryan A. Krause: Economic Research Assistant, Indiana Business Research Center, Kelley School of Business, Indiana University

Everyone is talking green these days. President Obama has made the green economy a pillar of his administration. In early August, the President announced that several Indiana companies were awarded federal grants to advance the development of green transportation. Several reports on the green economy and green jobs have surfaced in the last year. The studies all agreed—the green economy and green jobs will be integral to continued U.S. prosperity.

It's Not Easy Being Green

The trouble is that researchers, data collectors, and policy makers have yet to settle on a method for identifying what is green. Such a method would need to accurately gauge the green economy's size and rate of growth, and to identify the jobs associated with it. What is green and how do we measure it?

This definitional issue is not trivial. The industries that qualify as green serve as a benchmark for the size of the green economy today and a gauge to measure the rate by which the economy becomes greener. Getting the definition right helps to guide government policy, research funding, business investment, and hiring decisions.

Here are two definitions from reports that came out this year:

- From *The Clean Energy Economy* (The Pew Charitable Trusts):
  A clean energy economy generates jobs, businesses and investments while expanding clean energy production, increasing energy efficiency, reducing greenhouse gas emissions, waste and pollution, and conserving water and other natural resources.

- From the *Michigan Green Jobs Report* (Michigan Department of Energy, Labor & Economic Growth):
  Industries that provide products or services related to renewable energy, increased energy efficiency, clean transportation and fuels, agriculture and natural resource conservation, and pollution prevention or environmental cleanup.

The reader may have noticed a subtle shift from the first definition to the second. One moves from what the green economy is toward how the green economy is measured. Here is the first sticking point: Some business activities are unquestionably green, say low-input, organic farming. Others are obviously not green, say extracting oil from tar sands. But most green business activities are bundled with those that are not. So then, what is a green business? Who decides? The manner in which economic statisticians collect and categorize data isn't much help either. Organic food processors are no different from other food processors according to the economic accountants that collect and report production and employment data.

There is no green accounting standard when it comes to what to include as a green product or industry and what to exclude. A producer of citrus-based solvents may readily be classified as green. But what about the house painting company that uses the citrus-based solvents instead of mineral spirits?

Table 1: Comparison of Green Business and Occupation Categories

Michigan Green Jobs Report	The Greening of Oregon's Workforce	Washington State Green Economy Jobs
Renewable Energy	Renewable Energy	Renewable Energy
Energy Efficiency	Energy Efficiency	Energy Efficiency
Pollution Prevention and Environmental Cleanup	Preventing, Reducing, or Mitigating Environmental Degradation	Preventing and Reducing Pollution
	Cleaning Up and Restoring the Natural Environment	Mitigation or Cleanup of Pollution
	Services Supporting Other Categories	
Clean Transportation and Fuels		
Agriculture and Natural Resources Conservation		

Sources: Michigan Department of Energy, Labor, and Economic Growth; Oregon Employment Department; Washington State Employment Security Department

Is that company green? Some researchers and green economy watchers would say yes. Others might wonder whether that citrus-based solvent isn't somehow being double counted as green, once for the firm selling it and the second time for the painting company reselling it to the home owner.

Measuring green on the production side then, has at least two major weaknesses.

1. Most industries produce both green and non-green goods and services, so making distinctions is difficult.
2. It may be spurious to include industries that produce non-green products or services but use green inputs and processes in their production. For example, are a tailor's suits and shirts green if he makes them from organic cotton cloth? His production process is exactly the same irrespective of the type of cloth he uses to make his clothes.

> *"The industries that qualify as green serve as a benchmark for the size of the green economy today and a gauge to measure the rate by which the economy becomes greener."*

Measuring Green Jobs

There is another general approach to measuring green—the job side. Several states have conducted green jobs studies. These studies place clean/green economic activity into a few basic categories (see **Table 1**). There are some differences in their classification scheme, but overall, there is a general consensus reflected in these studies about what makes up a green economy. That said, there are different approaches to counting the jobs that make up the green economy.

There are at least two approaches to counting green jobs—an industry approach and an occupational approach. The industry approach counts the number of employees at a firm that, based on the firm's output, makes the economy greener. An approach that uses occupations counts the number of employees at all types of firms with work activities that contribute to the greening of the economy.

The industry approach is akin to the industry-output side of green production. That is, counting the number of employees at firms that produce green products or services—what one may also call "green-making." The Pew report used this approach to reckon the number of green jobs.

The industry output approach to counting green jobs—if a firm's products or services are green, then that firm's employees can be considered green—does have its challenges. NAICS[1] industry codes are often not specific enough to separate the core green firms from those that are green-related in a secondary or tertiary sense. Pew used a proprietary database that, in contrast to the standard government-issue industry definitions used to report economic data, allowed researchers to define industries based on specific products.

The occupational approach to counting the number of green jobs is akin to the industry-input side of green production. That is, irrespective of a firm's output, count the number of green jobs based on whether the occupational activities of the job make production greener. In other words, the green economy demands or uses certain types of green jobs as labor input (with certain sets of green skills) and those jobs are counted as green. When summing up the number of green jobs, the Michigan Green Jobs Report used the industry-input approach as the central method for counting green jobs in the state. (Michigan did report green-related employment numbers based on an industry-output definition, but this was not the showpiece number or method).

To better understand the effect of choosing one approach over another, consider the differences between the Pew and Michigan reports' summaries of the green economy in the state of Michigan. The Pew report counted 22,674 green jobs in 2007, less than 1 percent of total employment. The Michigan report counted 96,767 green jobs in 2008, just under 3 percent of total employment. Their respective green activity distributions are shown in **Figure 1** and **Figure 2**.

Pew reported a 2007 total of 19,340 clean energy jobs in Oregon, or 1.1 percent of total Oregon employment, while the Oregon study counted 51,402 green jobs, also 3 percent of total employment. The Oregon report does not break down its jobs figure by core green area.

For Washington State, Pew's total was 17,013 jobs, or roughly 0.6 percent of total employment. The state's report found 47,194 green jobs, or 1.6 percent of total employment. A categorical breakdown is found in **Figure 3** and **Figure 4.** Here, again, Pew finds the majority of jobs in conservation and pollution mitigation. While the Washington study reports the majority of jobs providing energy efficiency, Pew finds only 7 percent coming from this category, indicating that many of the energy efficiency jobs that

the state counted were in non-green businesses.

The choice of industry versus occupational approach explains why the two types of studies reported such different green job totals. Limiting a study's scope to just businesses that produce green products or services excludes green-related jobs at traditional firms. If a motor vehicle manufacturer hires an engineer trained in energy efficient design, this job would not be counted in the Pew study, but would have been counted in the state-based studies. While the occupational approach makes the green job total more comprehensive, the data collection method used to count these jobs leaves more room for ambiguity and loose interpretation in the final results.

Methodological Limitations

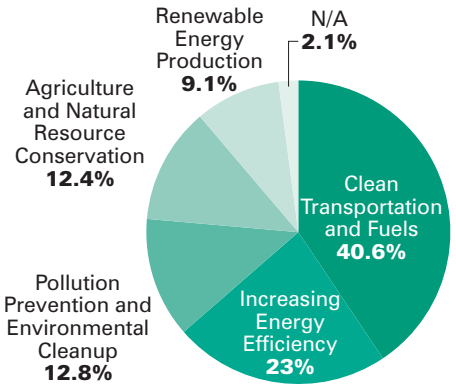
Different definitions of the green economy, and their corollary approaches, require different methods of identifying and quantifying green jobs and the green economy. For instance, as long as one can identify a firm's line of business as green, that firm's employees can be considered green from the industry-output approach. This is how Pew arrived at their figures. They searched for firms that met their specific guidelines for green classification, and added those firms' employment figures to the green jobs total.

Conversely, the Michigan, Oregon, and Washington reports' industry-input approach required a survey as its primary means of information-gathering. This is because firms may have employees with the same Standard Occupational Classification (SOC) code, but not all of them may be green.

At first glance, the Pew method seems more valid and reliable. By using an industry-output approach to the green economy, Pew was able to apply a stricter standard for qualifying firms as green, and was able to apply that standard consistently. In addition to calculating green jobs and businesses, Pew provides other useful green statistics that offer valuable insight. Along with the number of jobs and businesses in the green economy, Pew reports on venture capital funds, patents, and federal and state policies such as financial incentives, renewable energy portfolio standards, energy efficiency resource standards, and cap and trade programs.

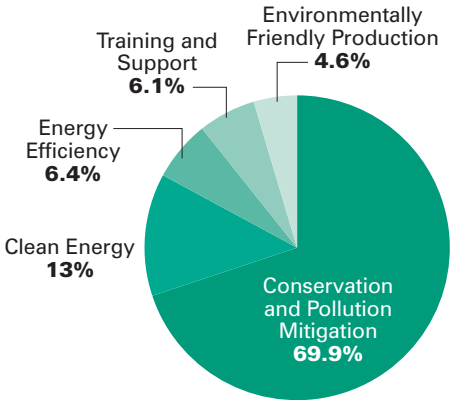
The state-based surveys' chief drawback is that interpretation of what constitutes a green job is partially left up to the survey respondent. The Michigan survey question asks the respondent to estimate the number of employees who have one of the study's core green job areas as their "primary focus." It is up to the respondent to determine if an employee's primary focus is "increasing energy efficiency" or simply turning off the lights at the end of the day. This opens the reliability of the results into question. Instead of asking for the "primary focus," the Oregon survey instructs respondents to list jobs as green only if work in one of the green categories

Figure 1: Michigan Report Job Categories for the State of Michigan—Industry Input Framework



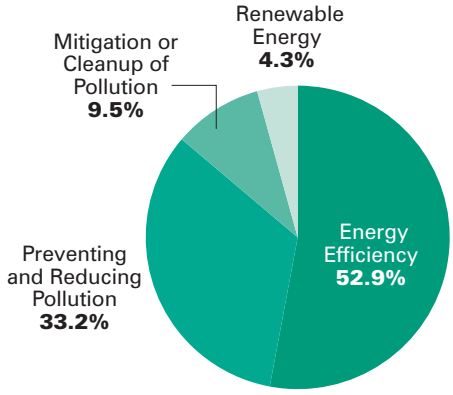
Source: IBRC, using Michigan Bureau of Labor Market Information and Strategic Initiatives data

Figure 2: Pew Report Job Categories for the State of Michigan—Industry Output Framework



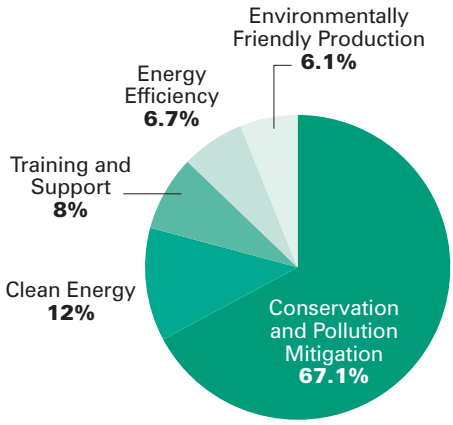
Source: IBRC, using Pew Charitable Trusts data

Figure 3: Washington Report Job Categories for the State of Washington—Industry Input Framework



Source: IBRC, using Washington State Employment Security Department data

Figure 4: Pew Report Job Categories for the State of Washington—Industry Output Framework



Source: IBRC, using Pew Charitable Trusts data

was essential to the job. This difference hardly seems to alleviate the problem of ambiguity though.

The occupational (industry-input) approach may have great potential in the future. There may be emerging green occupations, but to date, most are without an SOC code. Indeed, one might think that unambiguously green jobs would require special certifications that could clearly identify the position and its skill set as green. Yet, based on responses gathered from employer focus groups, the Michigan study found that most new green jobs would require in-house training, in contrast to external certification. Employers predominantly want employees with basic skills. If this is true, then a discussion of well-defined green skills might be somewhat unproductive, since the main skills employers are seeking are not unambiguously green.

"If measuring the scope and growth of the green economy is more than a fad, then devoting significant federal analytical resources to rigorous, consistent analysis is required."

An Alternative Approach to Measuring the Green Economy

If measuring the scope and growth of the green economy is more than a fad, then devoting significant federal analytical resources to rigorous, consistent analysis is required. The preferred method would likely be a "green economy satellite account" produced by the U.S. Bureau of Economic Analysis (BEA), in collaboration with other federal statistical agencies. BEA currently releases economic statistics for several satellite accounts.

The Travel and Tourism Satellite Account (TTSA), for example, measures the size of the travel and tourism "industry." Producing the TTSA requires some analytical gymnastics not unlike what is required to define and measure the green economy. There really isn't a travel and tourism industry as such. Industries are defined in terms of their production. Travel and tourism, on the other hand, is based on the consumer. On a weekend trip, a tourist will eat at a restaurant, sleep at a hotel, golf, rent a car, and take a guided tour. In this example, the tourist consumed the output of five distinct industries with five distinct production processes.

The same experience and talent that BEA has gained developing the TTSA, the Transportation Satellite Account and the future Research and Development Satellite Account could also be applied to measuring the green economy. In this way, green economic activity—the dollar-value and the number of jobs—would be defined rigorously and measured consistently over time.

Measuring Green Occupations

A green economy satellite account does not preclude or replace an occupational survey. The Bureau of Labor Statistics (BLS) currently conducts the Occupational Employment Statistics (OES) Survey. The data from the OES help to evaluate many elements of labor dynamics. And, because occupations can be linked with educational and training needs, these data can help inform training programs that develop the skill and knowledge sets needed for the future. The green jobs surveys conducted by Michigan and the other states are similar to the OES survey.

As it happens, the Obama Administration has sought funding in the FY 2010 request for BLS to produce a new series on "green-collar" jobs, addressing the need for detailed data on these rapidly evolving industries and occupations. Specifically, the BLS will produce new data measuring employment and wages for businesses whose primary activities can be defined as green, and produce information on the occupations involved in green economic activities.

Conclusion

Measuring the green economy and green jobs is a path with many conceptual and analytical pitfalls. While we may be keen to be green, we may find, like Kermit, that it isn't easy.

Note

1. North American Industry Classification System

References

Michigan Bureau of Labor Market Information and Strategic Initiatives. "Michigan Green Jobs Report." Michigan.gov. May 2009. www.michigan.gov/nwlb/0,1607,7-242-49026---,00.html.

Oregon Employment Department, Workforce and Economic Research Division. "The Greening of Oregon's Workforce: Jobs, Wages, and Training." Quality Info. June 2009. www.qualityinfo.org/pubs/green/greening.pdf.

Pew Charitable Trusts. "The Clean Energy Economy: Repowering Jobs, Businesses and Investments Across America." Pew Center on the States. June 2009. www.pewcenteronthestates.org/uploadedFiles/Clean_Economy_Report_Web.pdf.

Washington State Employment Security Department, Labor Market and Economic Analysis. "2008 Washington State Green Economy Jobs." Workforce Explorer. January 2009. www.workforceexplorer.com/admin/uploadedPublications/9463_Green_Jobs_Report_2008_WEXVersion.pdf.

Indiana Business Research Center
Kelley School of Business, Indiana University
100 South College Avenue, Suite 240
Bloomington, Indiana 47404

Nonprofit Organization
U.S. Postage
PAID
Bloomington, Indiana
Permit No. 2

CHANGE SERVICE REQUESTED

INDIANABUSINESSREVIEW

FALL 2009
VOLUME 84, NO. 3

WHAT'S IN STORE FOR 2010?

The Annual Economic Outlook Tour

Find out what the experts are saying at the Annual Economic Outlook Tour. Will consumers finally open their wallets? Will firms start hiring? Can interest rates go even lower? What does it all mean for my business?

For more than three decades, Indiana University's Kelley School of Business faculty have collaborated with economists from other universities within Indiana to present forecasts for the world, the nation, our state and communities. This unique event is brought directly to Hoosier communities hungry for information on what these economies may bring in the coming year. Mark your calendars for an upcoming panel near you.

TOUR SCHEDULE

Thurs., Nov. 5	Indianapolis Bloomington
Fri., Nov. 6	Columbus Schererville
Tues., Nov. 10	Richmond Anderson
Wed., Nov. 11	Kokomo
Thurs., Nov. 12	South Bend
Fri., Nov. 13	New Albany
Wed., Nov. 18	Fort Wayne

Visit **www.ibrc.indiana.edu/outlook/2010.html** for more information.