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KELLEY SCHOOL OF BUSINESS

Does Export Growth Create Jobs?



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From the Editor

Into each issue, a little rain must fall (Longfellow—sorry!). Our authors throw a bit of cold rain on two areas of importance in our state—population growth is slowing and job creation isn't a given with export growth.

First up is a big question: does growth in exports actually create jobs? The answer is not completely no or completely yes, but it does help to illuminate which industries are more likely to create jobs than not.

Population growth is becoming spotty across the state, with a slowing of overall growth from the previous year. The dreaded "natural decrease" is now occurring in 17 of our 92 counties. What's that, you ask? Natural relates to births and deaths, so the decrease means that a county is experiencing more deaths than births. No more spoilers on which counties are experiencing this phenomenon—we'll let you discover it yourself.

Does Export Growth Create Jobs?

Timothy Slaper, Ph.D. Director of Economic Analysis, Indiana Business Research Center, Indiana University Kelley School of Business

That increasing exports would result in increasing employment is almost selfevident. If we—as a nation or as a state—produce more goods and services for export, then that increased production should translate into more jobs. The International Trade Administration (ITA) of the U.S. Department of Commerce touts this regularly:

The International Trade Administration is focused on job creation. Specifically, ITA works to create environments where U.S. companies can export more effectively and exporting U.S. companies can create more jobs. To support ITA's efforts to create more American jobs, the Office of Trade Policy & Analysis assesses the impacts of various trade policies and issues on the U.S. economy and evaluates how they will affect U.S. employment.¹

The ITA produces annual reports and estimates for the number of jobs that each state can attribute to its exports. The Indiana Business Research Center (IBRC) traditionally reports these estimates in our annual export report. The ITA estimation procedure is straightforward: if a state employs 3 million people in manufacturing and one-third of that manufacturing output is sold overseas as exports, then exports can be said to have created or supported 1 million jobs.

There is at least one little problem to this happy story line: the academic research does not necessarily support the claim that exports generate jobs. The savvy reader will have already noted that it is one thing to allocate jobs based on export share of manufacturing shipments (as ITA has done) and another to show the effect of exports on employment over time (as several economists have done).

For example, Leichenko (2000) found that export growth tends to

contribute to employment reduction and raises the question of whether export-related increases in labor productivity may play a role. More recently, the empirical analysis of Kilkenny and Partridge (2009) agrees with similar studies that show "the relationship between the export sector employment and growth is *negative*" (emphasis theirs). They go even further to caution local development officials and policymakers that the export-base hypothesis-producing for markets outside the region will generate dollar inflows into the region and promote economic development-is not supported by the data (page 924).

These findings and the fact that Indiana's exports over the last 16 years have been rising strongly, almost tripling from 1998 to 2013, motivates one to look a little deeper.

The analysis and the article are structured as follows: First, a correlation analysis at the state level compares changes in manufacturing employment with changes in exports. Even if changes in exports are not the cause of all the stresses and shocks to the manufacturing sector, one would expect to see changes in exports having some influence on manufacturing employment. (We consider manufacturing because it is the dominant exporting sector and while agricultural exports are considerable, they cannot be directly traced to any one state. There are no Indiana logos on those soybeans going to China.)

Then, we look at changes in Indiana exports and employment by industry to see if one can reach any conclusions about export growth and employment growth in the Hoosier state. Are the relationships noted in the state-by-state analysis better explained by industry dynamics?

Third, we present some rudimentary evidence that may help explain—spoiler alert—the negative There is at least one little problem to this happy story line: the academic research does not necessarily support the claim that exports generate jobs.

relationship between export and employment growth.

Correlations

Table 1 shows the top 10 states in terms of manufacturing employment and presents the correlation between the change in exports for each state and the change in manufacturing employment. It also shows the states' rank in terms of manufacturing export volume.

While Washington State didn't make the top 10 list in terms of manufacturing jobs, it ranked third in exports. Interestingly, in terms of Washington, it was only one of six states that experienced growth in manufacturing employment over the time period, and easily the largest employer of that bunch. The other states that saw the number of jobs in manufacturing increase were, in the order of the number of jobs: Utah, South Dakota, North Dakota, Alaska and Wyoming. With the exception of Utah, which had a small negative relationship of 0.01 between exports and jobs, the remaining five states were the only ones to show a positive relationship between exports and jobs.

The takeaway here appears to be that no strong case can be made to argue that export growth is fueling employment growth. In fact, considering only six states experienced job growth and export growth—and this employment growth is only "on average" because these states had an employment surge before the Great Recession

TABLE 1: Correlation between Growth in Exports and Growth in Manufacturing Employment for States with Greatest Number of Manufacturing Jobs

State	Correlation, 2002 to 2013	Manufacturing Jobs, 2013	Export Rank, 2013	
California	-0.83	1,355,092	2	
Texas	-0.38	945,402	1	
Ohio	-0.70	691,317	9	
Illinois	-0.80	600,782	5	
Pennsylvania	-0.89	593,373	10	
Michigan	-0.51	581,113	8	
Indiana	-0.71	506,683	13	
New York	-0.84	490,939	4	
Wisconsin	-0.66	474,374	19	
North Carolina	-0.88	464,654	15	



Note: Table is sorted by total manufacturing jobs. Source: U.S. Bureau of Economic Analysis

TABLE 2: Employment and Export Performance, Indiana Manufacturing, 2002 to 2013

NAICS Code	NAICS Title	Correlation	Average Employment	2013 Exports (\$ millions)	Average Annual Change in Employment	Average Annual Export Growth
311	Food Manufacturing	0.95	32,701	966	0.8%	13.7%
324	Petroleum and Coal Products Manufacturing	0.84	3,357	175	0.7%	21.2%
313	Textile Mills	0.63	574	51	1.0%	6.9%
316	Leather and Allied Product Manufacturing	0.43	660	12	5.4%	0.8%
312	Beverage and Tobacco Product Manufacturing	0.39	3,755	96	1.0%	12.2%
339	Miscellaneous Manufacturing	0.06	29,196	2,067	0.1%	11.3%
321	Wood Product Manufacturing	-0.24	16,300	183	-4.8%	3.3%
332	Fabricated Metal Product Manufacturing	-0.25	56,340	965	-1.3%	6.1%
314	Textile Product Mills	-0.27	3,115	27	-0.9%	7.4%
333	Machinery Manufacturing	-0.36	42,502	4,109	-1.6%	5.1%
327	Nonmetallic Mineral Product Manufacturing	-0.37	13,980	273	-2.5%	4.7%
336	Transportation Equipment Manufacturing	-0.39	121,045	9,763	-2.1%	6.4%
326	Plastics and Rubber Products Manufacturing	-0.41	39,537	837	-2.3%	4.8%
334	Computer and Electronic Product Manufacturing	-0.54	20,199	1,908	-3.9%	2.0%
315	Apparel Manufacturing	-0.72	1,185	23	-5.8%	15.9%
323	Printing and Related Support Activities	-0.72	18,369	271	-2.7%	6.6%
335	Electrical Equipment, Appliance, and Component Manufacturing	-0.78	11,735	1,099	-7.2%	7.1%
331	Primary Metal Manufacturing	-0.81	46,567	1,590	-2.9%	10.1%
325	Chemical Manufacturing	-0.85	30,743	8,916	-1.1%	11.8%
322	Paper Manufacturing	-0.86	11,082	162	-2.4%	4.4%
337	Furniture and Related Product Manufacturing	-0.97	24,597	193	-2.5%	10.3%

Source: Quarterly Census of Employment and Wages, Indiana Department of Workforce Development and WISERTrade

that most other states did not experience—one cannot say that exports had much, if any, influence on manufacturing employment.

Indiana Export Industries

Indiana's manufacturing performance in terms of employment and exports from 2002 to 2013 is shown in **Table 2**. As with the state-level data, there are few cases for which employment and exports are positively related. With the exception of food processing,

Food manufacturing is the only industry of significant size to show a strong and positive correlation between employment and exports.

the industries showing a positive relationship between exports and employment are relatively small. And while miscellaneous manufacturing (which includes medical devices) may not be small in terms of employment or the value of exports, the positive relationship is weak.

Table 2 also shows the average change in employment and exports over the time period. In just about every three-digit industry, employment has declined over the last dozen years. Even miscellaneous manufacturing could only muster an imperceptible 0.01 percent increase in employment at an average annual rate (AAR)—even while exports from this industry increased on average 11 percent a year.

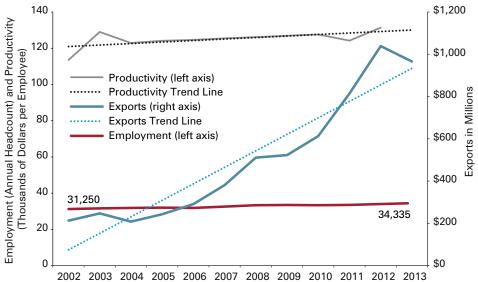
The state-by-state comparisons in **Table 1** together with the industry detailed correlation analysis corroborates with other academic findings that, on balance, there is a negative relationship between employment and exports (despite this relationship running contrary to one's intuition and the U.S. Department of Commerce's press releases). What can account for this?

Leichenko (2000) suggested that increases in labor productivity in exporting industries may play a role. While the following presentation won't pass academic muster, it does suggest that productivity growth appears to explain these relationships.

A Brief Excursus on Productivity

The word productivity sounds good. It has a nice ring. When someone reflects about her day and says that





Source: Quarterly Census of Employment and Wages (employment), WISERTrade (exports) and U.S. Census Bureau (productivity)

it was productive, she usually has a contented smile. She got a lot done.

Measuring productivity in economics is usually focused on labor, that is, how much labor and how much output. Increasing labor productivity means each unit of labor, measured in terms of hours or work or number of workers, is producing more.

A critical measure in analyzing productivity is value added. Value added is a payment or income to someone engaged in production either directly or indirectly—labor, profits, patent holders, royalties and interest—and the greater the value added per worker, the more income there is to share among capital, labor, patent holders, etc.

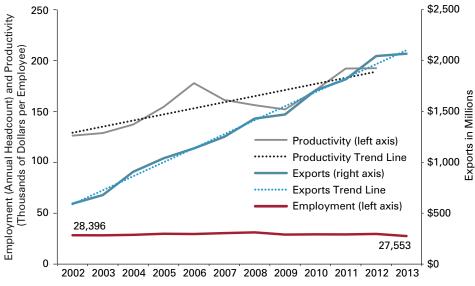
As a ballpark measure of value added for an industry, we use data from the Annual Survey of Manufactures (ASM) from the U.S. Census Bureau. The ASM "value added" is not the value added used in the national economic accounts (discussed above) so it needs some adjustments. The net measure of "adjusted" Census value added approximates income to labor, capital, intellectual property holders, physical property holders (like rental units or mineral owners) and interest that is used in the national economic accounts and used to measure labor productivity. The ASM data series is not as complete as the data captured from the U.S. Bureau of Economic Analysis or WISERTrade. The data from the annual survey are often suppressed for several industries, making it difficult to explore industry dynamics over time. Moreover, in this instance, the time series are abbreviated compared to employment or export data. That said, the ASM adjusted valueadded data do seem to show some interesting relationships.

Exports, Employment and Labor Productivity

The evidence over the last dozen years in terms of manufacturing employment and export growth appears to confirm Leichenko's suspicion: increases in productivity can help explain the negative relationship between export growth and employment.

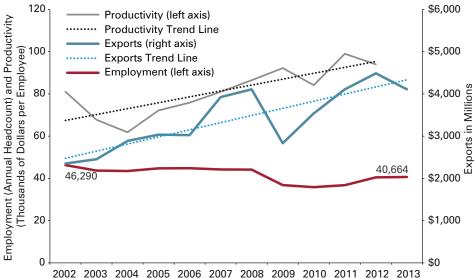
Using the productivity data derived from the ASM together with the employment and export data, we plotted the trends for six industries

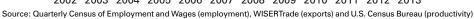




Note: Miscellaneous manufacturing includes medical device manufacturing. Source: Quarterly Census of Employment and Wages (employment), WISERTrade (exports) and U.S. Census Bureau (productivity)

FIGURE 3: Machinery Manufacturing Employment, Export and Productivity Trends





of interest. These industries are large employers, provide some contrast in terms of correlations and have complete or almost complete productivity data.

Figure 1 presents the case of food manufacturing, the only industry of significant size to show a strong and positive correlation between employment and exports. Even with

Δ

a correlation of 0.95, we see exports rising considerably faster than employment, but at least both are on the upswing. In contrast, productivity growth in the industry is relatively flat.

Figure 2 presents the relationship of employment, exports and productivity for miscellaneous manufacturing. The positive

Increases in labor productivity may play a role in the negative relationship between employment and exports.

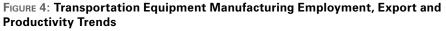
relationship between employment and exports is weak for this industry. For all intents and purposes, employment in the industry was unchanged from the beginning to the end of the time period, although the correlation statistic does register fluctuations in the two series over time. Exports rose robustly by more than 11 percent (AAR) and productivity followed suit, but at a slower 4 percent rate (AAR).

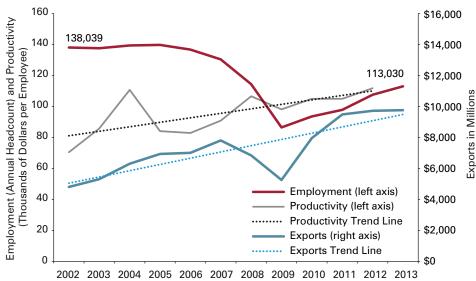
Figure 3 plots machinery manufacturing. Here one begins to see the divergence between employment trends and export growth. Employment declined nearly 6,000 workers over the time period (AAR of 0.3 percent) while exports grew by over 5 percent yearly (AAR). Since the mid-2000s, there is a consistent upward trend in productivity, the recessionary downtick notwithstanding.

Figure 4 shows the Indiana industrial powerhouse of transportation equipment manufacturing (TEM). As with many manufacturing industries, TEM has seen employment fall over time (about 2 percent a year AAR), with particularly dramatic employment cuts during the Great Recession. Despite the dip in exports during the recession, the overall trend in exports shows a respectable rise of about 6 percent a year (AAR) over the entire period. As it happens, over the (truncated) period, productivity grew at about 5 percent a year (AAR).

Figure 5 plots Indiana's primary metal manufacturing employment, export and productivity changes. Both exports and productivity were a bit choppy over the time period,

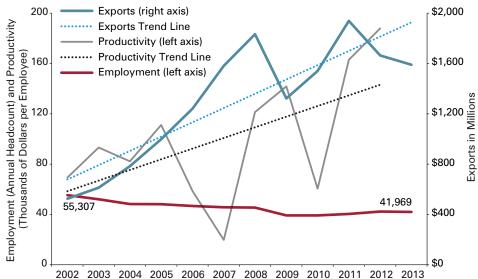
Indiana University Kelley School of Business, Indiana Business Research Center





Source: Quarterly Census of Employment and Wages (employment), WISERTrade (exports) and U.S. Census Bureau (productivity)







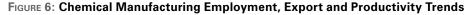
but the overall trend was up for both, increasing on an annual average rate of about 10 percent. Meanwhile, employment dropped over 13,000, an average annual rate of -2.5 percent. This helps to explain a distinctively negative relationship between employment and exports observed with the correlation coefficient. **Figure 6** visually describes the chemical industry from 2002 to 2013 for employment, exports and productivity. Employment dropped some 2,000 jobs. More detailed industry data show that pharmaceutical exports grew quickly, bringing the aggregated chemical industry annual average rate of export growth to over 11 percent.

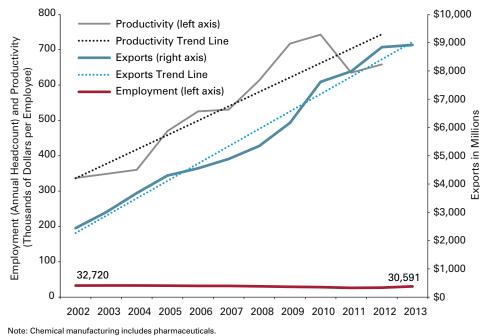
The alert reader will have noted that the scale of the left axis is considerably larger for chemicals than for say food or transportation manufacturing. This reflects that components of value added per employee are much larger than in other industries. In the case of chemicals, or pharmaceuticals more specifically, there is a lot more intellectual content embodied in production of specialized drugs than, say, car parts. As a result, the productivity measure-value added per worker—not only pays the wages and salaries of the employees as well as the earnings for shareholders, it also pays the royalties on patents and returns to investment on research and development that created those very special molecules.

Conclusion

So what to make out of all this? First, we will have to accept that increasing exports will not necessarily translate into new jobs. The opposite may not be true, however. If a strengthening dollar results in reduced or negative export growth, employment in those industries may fall.

Second, it is difficult to accept the export base strategy for economic development and regional prosperity as a viable approach. There isn't much empirical evidence to support this approach. That said, the negative relationship between exports and employment for most industries, at least most industries in Indiana and most states, may say something about the nature of U.S. exports. That is, the U.S. exports manufactured goods that are specialized, differentiated and have a high level of intellectual content. In short, these are goods that are not generic commodities but ones that have higher value per unit and, thus, higher value added, all other things equal. Only additional analysis would be able to determine if this is indeed the case. That analysis





were not expanding. Export growth may not greatly expand employment opportunities, but it likely beats the alternative.

Notes

 "Employment and Trade," International Trade Administration, www.trade.gov/mas/ ian/employment/.

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- Leichenko, Robin M. "Exports, Employment, and Production: A Causal Assessment of U.S. States and Regions." *Economic Geography* 76, no. 4 (2000): 303-325.
- Kilkenny, Maureen, and Mark D. Partridge. "Export Sectors and Rural Development." *American Journal of Agricultural Economics* 91, no. 4 (2009): 910-929.

Source: Quarterly Census of Employment and Wages (employment), WISERTrade (exports) and U.S. Census Bureau (productivity)

would likely have to differentiate the flow of goods between NAFTA partners—there is a lot of export and re-importation of parts in the auto industry, for example—with those in advanced and developing countries.

It would also be illuminating to determine the degree to which exports from the U.S. are sensitive to the scale (or volume) of production. One way to think about the sensitivity to scale is to contrast one additional sales unit of a video game versus a bicycle. The additional unit of a video game is pennies—one could sell millions of copies without needing a single additional worker. In contrast, a physical bicycle requires several people to form and assemble all the parts that make up a bicycle. One cannot produce and sell a million mountain bikes without hiring a lot of additional workers.

Finally, without accepting the mantra of the U.S. Commerce Department, we may still believe that expanding exports is desirable. The manufacturing sector lost jobs in the U.S. and in Indiana, even while exports were expanding robustly. But imagine how bad the employment picture may have been if exports

Population Growth Cools in Many Indiana Communities

Matt Kinghorn, Demographer, Indiana Business Research Center, Indiana University Kelley School of Business

fter finally snapping a stretch of six consecutive years of declining annual population growth in 2013, Indiana saw its rate of population change take another step back in 2014 (see Figure 1), according to population estimates released in March by the U.S. Census Bureau.

The state added roughly 26,140 residents in 2014-a 0.4 percent increase over the previous year. By comparison, Indiana added 33,100 residents in 2013, and grew by an average of nearly 40,000 per year between 2000 and 2010. Indiana ranked as the 29th fastest-growing state last year and its growth rate outpaced each of its neighboring states. With nearly 6.6 million residents in 2014, Indiana is the nation's 16th most populous state.

Population Change around the State

Suburban communities in the Indianapolis metro area claimed the top three spots among all Indiana counties for pace of growth (see Figure 2). Boone County was the state's fastest-growing county with a 2.3 percent increase, followed by Hamilton County (2.0 percent) and Hendricks County (1.6 percent). These three held the top spots in 2013, as well, but each of them saw slightly slower rates of growth in 2014.

Southwestern Indiana's Daviess County and Clark County in the Louisville metro area—each with 1.3 percent growth-rounded out the state's top five fastest-growing counties in 2014. Both of these communities bucked the statewide trend and posted stronger growth in 2014 than they did the previous year.

The next five fastest-growing counties were Hancock (1.2 percent growth), Johnson (1.2 percent),

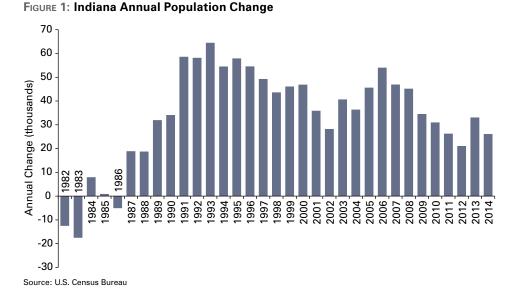
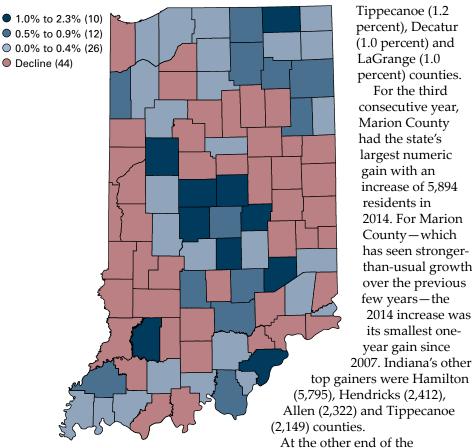


FIGURE 2: Percent Change in Population by County, 2013 to 2014



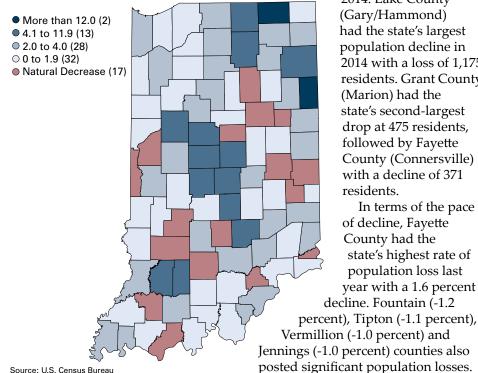
Source: U.S. Census Bureau

Tippecanoe (1.2 percent), Decatur (1.0 percent) and

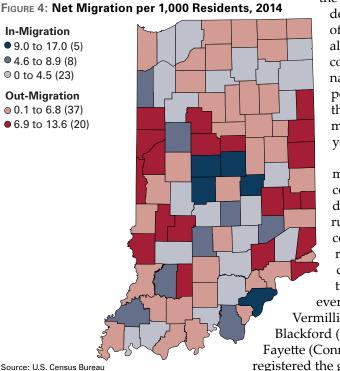
> percent) counties. For the third consecutive year, Marion County had the state's largest numeric gain with an increase of 5,894 residents in 2014. For Marion County-which has seen strongerthan-usual growth over the previous few years-the 2014 increase was its smallest oneyear gain since 2007. Indiana's other

(5,795), Hendricks (2,412), Allen (2,322) and Tippecanoe

spectrum, many Indiana communities



Source: U.S. Census Bureau



In all, 44 of Indiana's 92 counties lost population in 2014. A net out-migration of residents was the primary driver of decline in nearly all

Components of Population Change

lost population in

2014. Lake County

(Gary/Hammond)

(Marion) had the

had the state's largest

population decline in

state's second-largest

drop at 475 residents,

County (Connersville)

In terms of the pace

state's highest rate of

year with a 1.6 percent

population loss last

followed by Fayette

with a decline of 371

of decline, Fayette

County had the

residents.

2014 with a loss of 1,175

residents. Grant County

of these communities. although 17 Indiana counties also posted a natural decrease of the population-meaning the county recorded more deaths over the year than births.

As Figure 3 shows, many of the Indiana counties with a natural decline in 2014 are rural or mid-sized communities. With rates of natural decrease at roughly two residents per

every 1,000 in population, Vermillion (Newport), Blackford (Hartford City) and Fayette (Connersville) counties registered the greatest relative

declines through this process in 2014. The largest communities with a natural decrease in 2014 were Grant (Marion) and Wayne (Richmond) counties.

Among the 75 Indiana counties with a natural increase in 2014, LaGrange and Adams countiesboth communities with significant concentrations of Amish residentshad the greatest relative gains in this measure with both around 13 per 1,000 residents. Hamilton, Marion and Elkhart counties rounded out the top five with each posting rates at a little more than 7 per 1,000 residents.

In terms of migration in 2014, Hamilton County had the state's largest net in-migration in absolute numbers at 3,298 residents, followed by Hendricks County at 1,594 residents and Clark County at 1,085 residents. Looking at net outflow, Lake County led the way with a net loss of 1,977 movers. Marion (-827) and Dearborn (-373) counties had the next-largest net out-migrations in 2014.

In terms of the rate of migration, Boone County outperformed its suburban Indianapolis-area peers with a net migration rate of 17 residents per 1,000 in 2014 (see Figure 4). Fayette County had the greatest rate of net out-migration last year at nearly 14 per 1,000, followed by Jennings (-11.7) and Randolph (-11.2) counties.

Indiana's Largest Counties

Indiana has six counties with populations greater than 200,000. Marion County is the state's largest with 934,243 residents, which ranked as the nation's 53rd-largest county in 2014 (out of 3,141 counties). Other counties above the 200,000-resident threshold are Lake (490,228), Allen (365,918), Hamilton (302,623), St. Joseph (267,618) and Elkhart (201,971).

Rounding out Indiana's 10 largest counties are Tippecanoe (183,074),

FIGURE 3: Natural Increase per 1,000 Residents, 2014

With a gain of more than 18.100 residents in 2014. the Indianapolis-Carmel-Anderson region accounted for nearly 70 percent of the state's net growth last year.

Vanderburgh (182,006), Porter (167,076) and Hendricks (156,056).

Indiana's Metropolitan Areas

The 11-county Indianapolis-Carmel-Anderson metro area continues to be the engine of population growth in the state. With a gain of more than 18,100 residents in 2014, this central Indiana region accounted for nearly 70 percent of the state's net growth last year. The total population count for the Indy metro now stands at 1.97 million, which represents 30 percent of the Indiana total and ranks as the nation's 33rd-largest metro area. Among the 15 largest metro areas in the Midwest, the Indy area's growth rate of 0.9 percent in 2014 ranks as the fifth-fastest in the group (see Figure 5).

With a population of nearly 427,200, the three-county Fort Wayne area is Indiana's second-largest metro and ranks as the 123rd-largest nationally (out of 381 metro areas). The Fort Wayne metro area posted 0.6 percent growth rate in 2014. Indiana's other large metro areas can also boast of growing populations last year, including South Bend-Mishawaka (0.2 percent), Evansville (0.2 percent) and Lafayette-West Lafayette (0.9 percent).

In all, 44 of Indiana's 92 counties belong to a metropolitan area. Combined, these counties account for 78 percent of Indiana's total population and, as a group, grew at a 0.5 percent rate in 2014. The state's 48 counties that are not part of a metro area had a combined population loss of 1,339 residents last year – a 0.1 percent decline.

Conclusion

In 2013, Indiana finally snapped a stretch of six consecutive years of declining population growth rates, and the hope was that the state would keep the momentum going in 2014.

However, growth slowed again last year, and Indiana's annual rate of growth remains well below its prerecession norm. While it's certainly possible that these 2014 numbers are an indication that this period of sluggish growth will continue for a while longer, we believe that this setback will be temporary and that Indiana will slowly begin to see stronger population gains over the next few years. 🖵

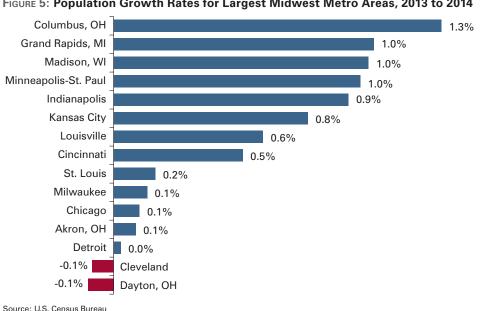


FIGURE 5: Population Growth Rates for Largest Midwest Metro Areas, 2013 to 2014

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