Mind the Gap: Identifying Opportunities for Export Expansion in Indiana

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SUMMARY

Over the last decade, Indiana's exports have been growing at a faster rate than the nation as a whole. But there are several industries that may still be missing out on export opportunities.

This analysis identified at least 10 industries that may be "under-exporting." For example, these 10 industries account for nearly 110,000 jobs, or 4 percent of Hoosier employment, but make up less than 1 percent of U.S. employment. Given their share of Indiana's employment, our analysis suggests they could still be exporting more.

Since small and medium-sized enterprises (SME) may be the firms that are under-exporting due to lack of resources or know-how for identifying potential international markets, the Indiana Business Research Center (IBRC) created a database, described in Appendix 1, of Indiana SMEs that may especially benefit from programs and policies to expand exports.

Our analysis also indicates that Indiana's major exporters are closely tied to a limited number of countries. While these industries at the national level tend to export to a broad range of countries, Indiana's exports are more concentrated among a small set. Within each under-exporting industry, exports to the top five destination countries accounted for 81 percent of Indiana exports, compared to only 63 percent of U.S. exports.

Our analysis suggests that Indiana's concentration in export destinations explains why many industries are under-exporting—or have an export gap—relative to the rest of the nation.

INTRODUCTION

If there is one thing that politicians on both sides of the aisle can agree on, it is that exports are good. Economic development experts and practitioners routinely look for new ways to spur export activity, as it is commonly thought to promote economic growth with very little downside. In general, Indiana has a fairly strong export profile. In 2011, Indiana's exports totaled 11.6 percent of its GDP, higher than the national ratio of 9.9 percent.[1] This should, perhaps, not be all that surprising given Indiana's strength in manufacturing—particularly in transportation equipment manufacturing. This sector accounts for 14.7 percent of total U.S. exports. It remains unclear, however, to what degree Indiana is exporting to its full potential given the prominence of high-export industries in the state.

In order to address the question of how to expand exports even more, we investigated which industries may be under-exporting—that is, experiencing an export gap—and we identified over a thousand small

[1] Data sourced from WiserTrade and the Bureau of Economic Analysis.

and medium-sized enterprises (SMEs) that may benefit from policies and programs to encourage companies to export.

At the state level, an export gap reflects the difference between an industry's concentration of exports and its concentration of employment relative to the nation as a whole. With this tool, we can assess which industries are under-exporting. Our goal is for practitioners to be able to use this information as a first step in helping SMEs in Indiana expand their export activity.

In the following pages, we define and measure export gaps for high-value exporting industries. We identify the industries with the largest export gaps and discuss possible explanations. We also place these SMEs in a geographic context. In addition to mapping their location, we suggest options practitioners have for engaging with these SMEs.

WHAT IS AN EXPORT GAP?

Industries are not evenly distributed across the U.S. economy. They tend to be concentrated in certain geographic areas and, more often than not, in specific states. For instance, Michigan is known for its concentration of motor vehicle manufacturers, California is known for its concentration of tech firms, and New York is known for its concentration of financial services firms. Indiana is no different in this respect. Certain industries represent a larger share of Indiana's employment relative to total U.S. employment, whereas other industries represent a smaller share. Yet, while particular industries might dominate a state's workforce, it is far from certain that those industries will also dominate the state's exports. Concentration of employment is only one factor that affects how much a particular industry exports from a particular state.

In order to assess whether an industry (or a set of industries) were under-exporting, we needed a rough measure of an export gap. Theoretically, if an industry represents a large share of Indiana's employment, but does not represent as much of the state's total exports, then Indiana is missing potential foreign markets for its products. While our measure isn't perfect, we define an export gap as the discrepancy between a state's concentration of employment in a given industry relative to the national average and the state's concentration of exports in that industry relative to the national average.[2] Thus, we measure the export gap as the difference between the state's location quotient (LQ) and its export quotient (EQ).

The LQ is a commonly used measure of local employment concentration. It is the ratio of an industry's share of a region's (Indiana) employment to the industry's share of U.S. employment. An industry LQ above 1 indicates a higher-than-average concentration of employment for that industry in a particular state.

[2] The measure isn't perfect because it treats all employment the same in terms of value added. Value-added, or gross domestic product, per worker differs across industries. GDP per worker in the production of medical devices, for example, will be greater than GDP per worker in food processing. That said, GDP per worker in a particular industry would not be expected to differ greatly across geographic boundaries.

The EQ is a ratio that we have developed for the purposes of assessing export concentration. It is the ratio of an industry's share of a region's (Indiana) exports to the industry's share of total U.S. exports.

To assess the export gap of any particular industry, we subtract the industry's Indiana EQ from its Indiana LQ, and if this difference is positive, we identify the industry as "under-exporting." We label it as such because the higher concentration of employment in the state suggests the industry may be missing an opportunity to export more from Indiana than it currently is.

The purpose of this research is to identify key under-exporting industries and to generate hypotheses as to why they might not be reaching their full export potential.

KEY UNDER-EXPORTING INDUSTRIES

Table 1 shows the top 10 under-exporting industries in Indiana, as determined by the export gap measure calculated from the most recently available employment and export data.[3] We excluded from our analysis industries whose nationwide exports were below $3 billion, since Indiana companies' opportunities for export expansion in these industries would necessarily be limited. In addition, we excluded industries with no export activity in Indiana. The industries shown below are the top 10 under-exporting industries from the subset that met the national and state threshold criteria. We include the full list in Appendix 2.

Table 1: Top 10 Under-Exporting Industries

NAICS	Industry	Indiana LQ	Indiana EQ	Export Gap
3311	Iron and Steel and Ferroalloy	20.8	2.7	18.14
3336	Engines, Turbines, and Power Transmission Equipment	10.8	3.8	6.96
3253	Pesticides, Fertilizers and Other Agricultural Chemicals	6.7	0.4	6.30
3361	Motor Vehicles	7.9	2.1	5.80
3313	Alumina and Aluminum and Processing	6.7	2.0	4.73
3314	Nonferrous Metal (Except Aluminum) and Processing	4.6	0.5	4.09
3363	Motor Vehicle Parts	7.2	3.2	4.02
3342	Communications Equipment	3.0	0.2	2.79
3112	Grain and Oilseed Milling Products	3.6	1.1	2.43
3272	Glass and Glass Products	2.8	0.7	2.03

The top-10 list consists entirely of industries whose employment concentration in Indiana exceeds their employment concentration in the nation as a whole. Interestingly, the list also includes a number of industries whose export concentration in Indiana *does* exceed their overall export concentration in the nation. The positive export gap, however, suggests that these industries are not realizing their full export potential.

[3] The most recently available employment data is from 2010, and the most recently available export data is from 2011.

The iron and steel and ferroalloy industry tops the list. This industry's share of Indiana employment is more than 20 times its share of U.S. employment, and yet its share of Indiana's exports is only 2.7 times its share of U.S. exports. A number of other industries related to motor vehicle manufacturing also adorn the top-10 list: engines, turbines, and power transmission equipment; alumina and aluminum and processing; motor vehicle parts; and, of course, motor vehicles. These industries also exhibit greater export concentration in Indiana than in the United States as a whole. However, as with the iron and steel and ferroalloy industry, this figure is dwarfed by these industries' immense concentration of employment in Indiana.

This evidence raises the question: Why are industries that dominate Indiana employment not exhibiting commensurate dominance over Indiana exports?

As **Table 1** shows, there are also industries with a greater employment concentration in Indiana than in the nation, but a lower export concentration, leading to a substantial gap between the two measures. Among the top 10 under-exporters, these include pesticides, fertilizers, and other agricultural chemicals; nonferrous metal (except aluminum) and processing; communications equipment; and glass and glass products.

This evidence raises a slightly different question: How can Indiana lead the nation in employing people in these industries and yet lag the nation in exporting from them?

Change over Time

Before postulating an explanation for these findings, it is important to review the change these figures have exhibited over time to see whether the discrepancies are growing or shrinking.

Table 2: Top 10 Under-Exporting Industries, 2002 and 2011

		Share of U.S. Exports		Share of Indiana Exports		EQ	
NAICS	Industry	2002	2011	2002	2011	2002	2011
3336	Engines, Turbines, and Power Transmission Equipment	1.8%	1.9%	9.6%	7.2%	5.2	3.8
3272	Glass and Glass Products	0.5%	0.3%	0.8%	0.2%	1.5	0.7
3363	Motor Vehicle Parts	6.1%	3.6%	22.6%	11.4%	3.7	3.2
3313	Alumina and Aluminum and Processing	0.5%	0.5%	1.2%	1.0%	2.4	2.0
3253	Pesticides, Fertilizers and Other Agricultural Chemicals	0.6%	0.7%	0.5%	0.3%	0.9	0.4
3314	Nonferrous Metal (Except Aluminum) and Processing	1.1%	2.9%	0.8%	1.5%	0.7	0.5
3342	Communications Equipment	2.2%	2.2%	0.4%	0.4%	0.2	0.2
3112	Grain and Oilseed Milling Products	0.8%	0.9%	0.6%	1.0%	0.7	1.1
3311	Iron and Steel and Ferroalloy	0.7%	1.2%	1.4%	3.3%	2.0	2.7
3361	Motor Vehicles	4.0%	4.3%	4.8%	8.9%	1.2	2.1

The evidence suggests a somewhat permanent and systematic export deficiency in the under-exporting industries in Indiana. As **Table 2** shows, seven of the top 10 under-exporting industries saw an EQ decline between 2002 and 2011, one industry remained at a constant level, while two industries increased in the concentration of exports. Despite a weak trend over time toward smaller EQs, these data reveal no monumental shifts in either direction. Only one industry (engines, turbines, and power transmission equipment) exhibited a magnitude EQ change greater than 1.

WHERE ARE THE PRODUCTS GOING?

Export Concentration by Destination by Industry

In order to generate hypotheses about what could be driving the export gaps, we examined the destinations for exports from these industries. Stated another way, we created destination-country profiles for the under-exporting industries. It is important to understand which countries are purchasing products from Indiana and whether the distribution of destination countries differs between Indiana and the United States as a whole. Perhaps Indiana companies are failing to exploit opportunities in certain countries, leading to an export gap.

To assess whether Indiana was systematically under- or over-exporting to major destinations, we examined the percentage of total exports for which each of the top 10 export gap industries accounted in 2011. The top three U.S. export markets are Canada, Mexico and China. We compared the U.S. percentage and the Indiana percentage for each of these destinations, as shown in **Figures 1, 2 and 3**, respectively.

Figure 1: Share of Total Exports (Destination: Canada)

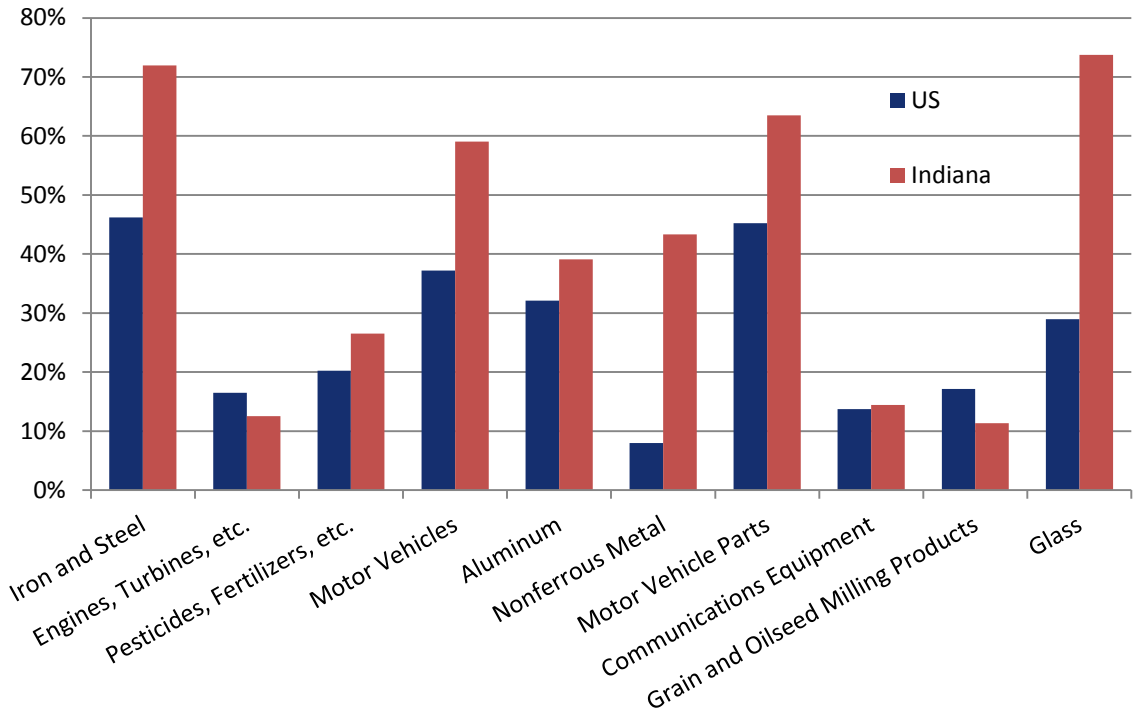


Figure 2: Share of Total Exports (Destination: Mexico)

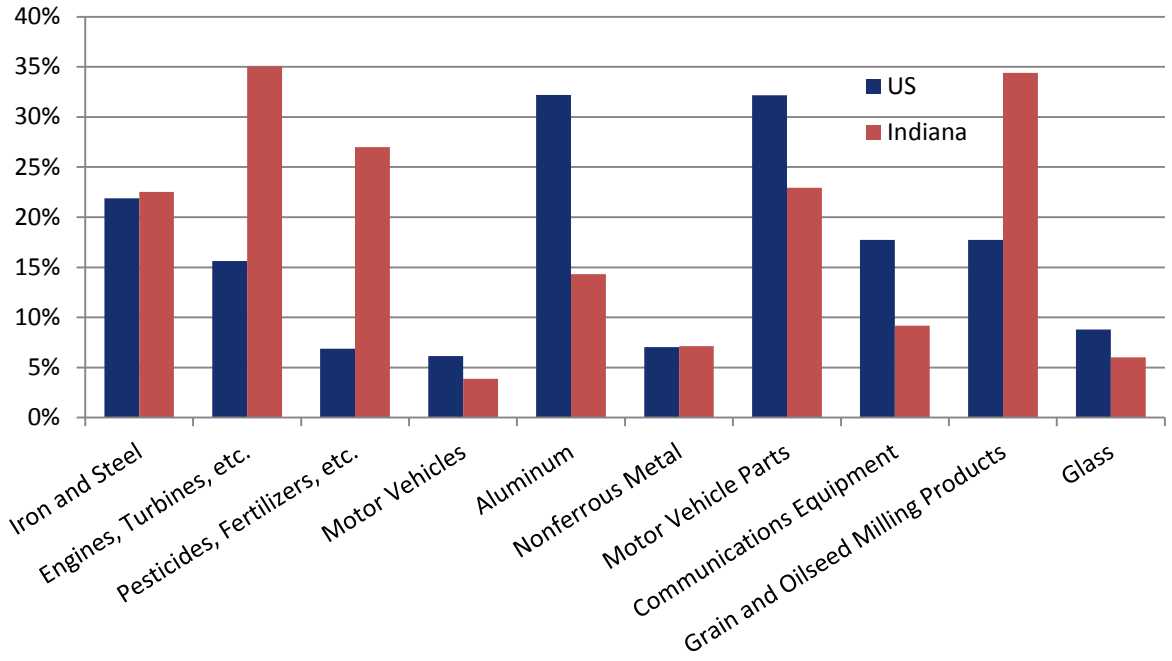
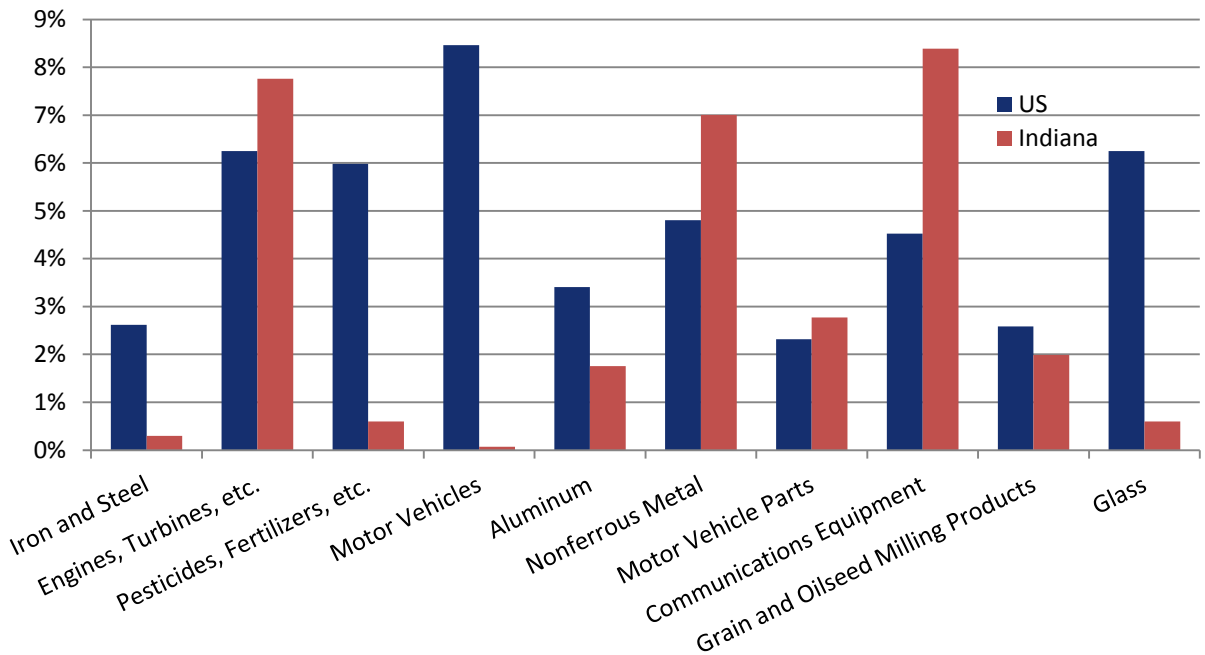


Figure 3: Share of Total Exports (Destination: China)



There does not appear to be any systematic bias in the destination of Indiana's exports from these under-exporting industries. At most, we could say that Indiana's export gap industries slightly over-export to Canada, slightly under-export to Mexico, and exhibit basically no pattern in exports to China. There are, of course, some interesting discrepancies between the United States and Indiana for certain

industries. For instance, more than 8 percent of U.S. motor vehicle exports go to China, but China accounts for barely any of the motor vehicle exports from Indiana. On the other hand, China accounts for nearly twice the percentage of communications equipment exports from Indiana as it does from the United States as a whole.

Export Concentration by Destination Country

While differences within industries are interesting and important, unless they appear systematically across industries they are not a sufficient explanation for export gaps. All 10 of the industries shown above have high export gaps, and yet they exhibit no overall industry pattern in terms of their exports to the top U.S. export destinations.

With this knowledge, we then shifted our focus from the specific destination countries to the diversity of export destinations. Perhaps these industries' export gaps can be explained by a lack of market diversity—that is, exporting to too small a set of destinations—rather than any specific destinations.

To assess the concentration of destination countries, we calculated a five-country concentration ratio for each industry at both the U.S. and Indiana levels. This is the share of total exports from a given industry going to the top five destination countries for that industry. **Table 3** presents these concentration ratios.

Table 3: Five-Country Concentration Ratios in the Top 10 Under-Exporting Industries

NAICS	Industry	US Concentration	Indiana Concentration	Percentage Point Difference
3311	Iron and Steel and Ferroalloy	74%	97%	23
3336	Engines, Turbines, and Power Transmission Equipment	46%	68%	22
3253	Pesticides, Fertilizers and Other Agricultural Chemicals	65%	78%	13
3361	Motor Vehicles	67%	95%	28
3313	Alumina and Aluminum and Processing	74%	76%	2
3314	Nonferrous Metal (Except Aluminum) and Processing	66%	76%	10
3363	Motor Vehicle Parts	84%	92%	8
3342	Communications Equipment	49%	66%	17
3112	Grain and Oilseed Milling Products	48%	69%	21
3272	Glass and Glass Products	61%	95%	33

A much clearer pattern emerges. Indiana's markets for these industries are less diverse. In every one of the top 10 under-exporting Indiana industries, Indiana's exports are more concentrated in the top five export destinations than are the U.S. exports. In 8 of the 10 industries, Indiana's five-country concentration ratio exceeds the United States' by double-digits. This certainly suggests that lack of diversification among destination countries may be contributing to these industries' export gaps—that is, Indiana may not be taking advantage of potential markets—although this evidence by itself is not definitive.

In order to assess this hypothesis—that under-exporting industries are overly dependent on a handful of countries—we wanted to determine if *all* of Indiana's exports were more concentrated among a few destination countries. Turning the attention to those Indiana industries that were "over-exporting," or that had a negative export gap, one sees a more diverse portfolio of destination countries, as shown in **Table 4**.

Table 4: Five-Country Concentration Ratios in the Negative Export Gap Industries

NAICS	Industry	Export Gap	U.S. 5-Country Concentration Ratio	Indiana 5-Country Concentration Ratio	Percentage Point Difference
3362	Motor Vehicle Bodies and Trailers	-3.7	82%	99%	17
3369	Transportation Equipment, Nesoi	-0.8	48%	5%	-43
3231	Printed Matter and Related Product, Nesoi	-0.5	72%	18%	-54
3341	Computer Equipment	-0.3	58%	29%	-29
3359	Electrical Equipment and Components, Nesoi	-0.2	58%	22%	-36

Nesoi: Not Elsewhere Specified or Included

There were five manufacturing-related industries in which Indiana out-exported the broader United States: motor vehicle bodies and trailers; transportation equipment; printed matter and related product; computer equipment; and electrical equipment and components. With the exception of motor vehicle bodies and trailers, Indiana exports from these industries are far more dispersed among destination countries than are U.S. exports. While this does not conclusively prove that concentration of export destinations contributes to the export gap, it certainly provides some support for the hypothesis.

How Shall We Then Expand Exports?

Identifying the Firms

Having developed a hypothesis for why some Indiana industries may be under-exporting, the next step is to identify the businesses that would be prime candidates for export growth initiatives and resources. Industries tend to cluster in different parts of the state, so if one is to promote exports from certain industries, it is important to know where those industries predominantly locate.

In determining the locations of these industries, we examined only small and medium-sized enterprises (SMEs) because larger firms typically have larger marketing staffs and more resources with which to conduct market research. Most likely, SMEs in under-exporting industries would benefit the most from efforts by economic development practitioners and policy makers to expand exports.

Table 5 shows the SME employment for the top 10 under-exporting industries. Employment figures are shown for the five counties with the highest SME employment, as well as for the state as a whole. As might be expected, the largest employer is the motor vehicle parts industry, and it has a presence in

many different counties. Marion County, home of Indianapolis, has the most even distribution of SME employment across under-exporting industries, with at least a handful of workers in every industry except pesticides, fertilizers, and other agricultural chemicals.

Table 5: SME Employment in Under-Exporting Industries by County

NAICS	Industry	Elkhart County	Noble County	Bartholomew County	DeKalb County	Marion County	Indiana SME Employment
3311	Iron and Steel and Ferroalloy	60			374	80	3,020
3336	Engines, Turbines, and Power Transmission Equipment			684		270	1,299
3253	Pesticides, Fertilizers and Other Agricultural Chemicals						120
3361	Motor Vehicles	248				60	558
3313	Alumina and Aluminum and Processing	235			370	296	2,888
3314	Nonferrous Metal (Except Aluminum) and Processing		175	80	250	334	2,868
3363	Motor Vehicle Parts	3,276	2,085	1,598	993	310	25,457
3342	Communications Equipment	230				255	1,329
3112	Grain and Oilseed Milling Products					130	1,277
3272	Glass and Glass Products	100	375		250	160	3,470

Figures 4 and 5 show the distribution of total SME employment and SME establishments, respectively, across all Indiana counties for all under-exporting industries (not just the top 10). The map closely follows the subset of data shown in **Table 5**. Northern Indiana, including the counties of Elkhart, Noble and DeKalb, boasts much of the employment in these industries. This should not be surprising, as this is the source of much of Indiana's manufacturing output, especially in the motor vehicle-related industries. In addition, central Indiana in and around Marion County also is home to a large number of SME employees in under-exporting industries. For those looking to help SMEs boost their exports, these two regions appear to be prime locations to begin work.

Figure 4: Employment in Small and Medium-Sized Enterprises by County

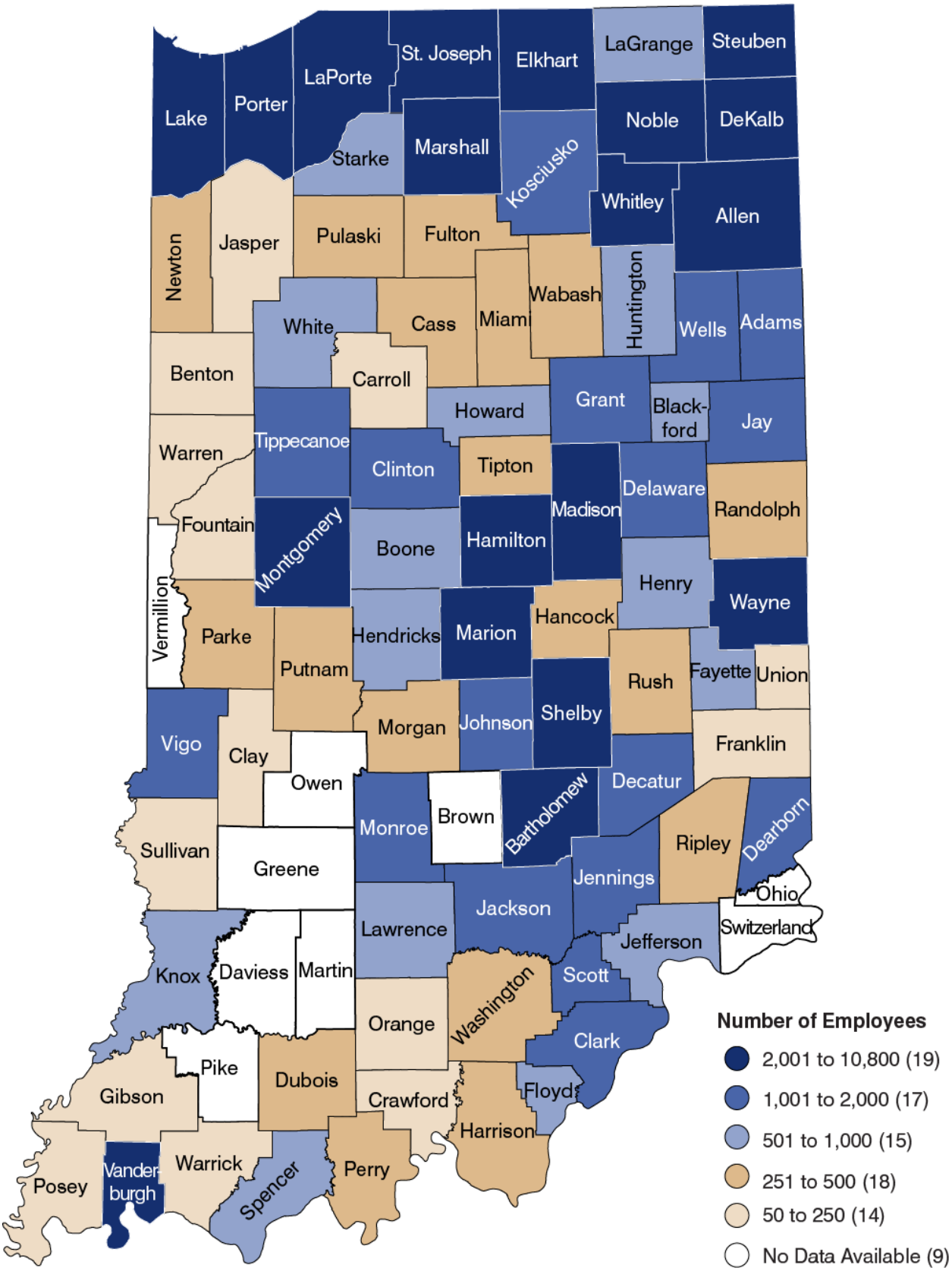
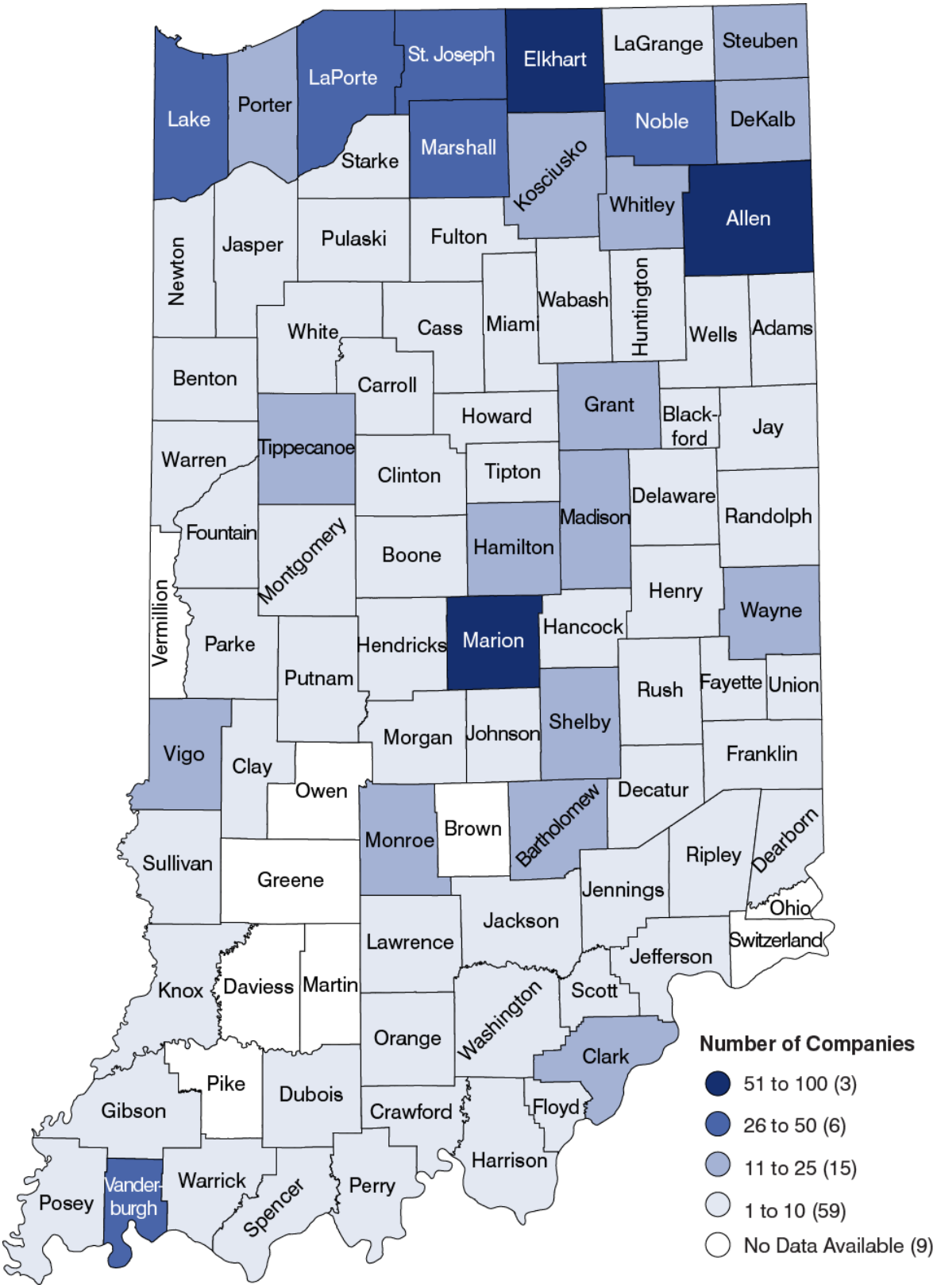


Figure 5: Number of Small and Medium-Sized Enterprises by County



Identifying the Policies and Practices

Aside from a focus on greater partner country diversification, what can economic development practitioners do to spur more exporting from Indiana businesses? Much of the academic research on firms' decisions to export has been conducted on non-U.S. firms. One study of Columbian firms showed that sunk costs strongly influenced the decision to continue exporting.[4] In other words, prior exporting breeds future exporting. A study of Mexican firms showed that the presence of multinational exporters increased the probability of exporting by other firms in the same industry and region.[5] A more recent study of Columbian firms produced similar results: entry costs, exchange rate expectations and prior export experience influenced the decision to export.[6] The authors of that study also report finding that "export revenue subsidies are far more effective at stimulating exports than policies that subsidize entry costs." Entry costs are the costs associated with choosing to start exporting to a particular country, such as the time and money it requires to build knowledge about, and develop an infrastructure in, a foreign country. Across all three studies, firm-level characteristics, such as profitability and size, appeared to play a large role in determining the export decision.

One notable study examined U.S. firms' decision to export and found some very interesting results. Examining data from all the manufacturing plants that responded to the Census Bureau's Annual Survey of Manufactures, the authors of this study examined firms' choice to begin or stop exporting.[7] They found results generally consistent with the aforementioned studies conducted in other countries, although they note that spillovers from other plants' export activities are negligible in determining whether a given plant will export. Also, state export promotion expenditures have little impact on firms' decision to export. This is important, because previous research also showed that direct expenditures to lower the costs of exporting have little effect, while programs that bolster exporting revenues have a more pronounced effect. Given that factors outside the government's control play such a large role in determining export decisions (e.g., firm profitability, exchange rates), subsidy programs that are linked to export revenues seem to be the best policy option if governments intend to do something to promote exports.

CONCLUSION

The evidence presented in this report suggests that Indiana is not reaching its exporting potential in some of its most important industries. Companies producing iron and steel, engines and turbines, motor vehicles and parts, as well as many other products could potentially constitute a much greater share of Indiana's exports than they currently do based on their share of Indiana's employment. In this report, we have conducted analyses to assess the current state of Indiana's export gaps, and have found some evidence suggesting that a lack of diversification in export destination countries may be to blame. In

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[4] Roberts, Mark and James Tybout. 1997. "An Empirical Model of Sunk Costs and the Decision to Export." *American Economic Review* 87:4, 545-564.

[5] Aitken, Brian, Gordon Hanson, and Ann Harrison. 1997. "Spillovers, Foreign Investment, and Export Behavior." *Journal of International Economics* 43:1-2, 103-132.

[6] Das, Sanghamitra, Mark Roberts and James Tybout. 2007. "Market Entry Costs, Producer Heterogeneity, and Export Dynamics." *Econometrica* 75:3, 837-873.

[7] Bernard, Andrew and J. Bradford Jensen. 2004. "Why Some Firms Export." *The Review of Economics and Statistics* 86:2, 561-569.

going forward and advising companies on how to expand export activity, we would advise economic development practitioners to study companies' current export destinations and encourage a broader range of potential partner nations. According to our analyses, greater diversification has the potential to narrow the export gaps in these industries.

APPENDIX 1

In addition to this report, the Indiana Business Research Center (IBRC) compiled a database of small and medium-sized enterprises (SMEs) that, based on the export gaps in their industries, are potential targets for export-promoting efforts. The establishments in the IBRC's database are a subset of the National Establishment Time Series (NETS) list of establishments. In order to target SMEs in a position to increase their export activity, we limited the establishments included in the database to those with fewer than 500 employees, but more than 49 employees. This filter produced a list of 925 Indiana SMEs in industries with positive export gaps. Of these SMEs, 412 have between 50 and 99 employees, 374 have between 100 and 249 employees, and 139 have between 250 and 499 employees. IBRC provides these establishments' locations as well as industry information, including the export gap for each establishment's industry. With this information, practitioners can identify establishments that are in a position to increase their exporting activity.

APPENDIX 2

All High-Value Industries with Export Gaps Greater than 1

NAICS	Industry	Indiana LQ	Indiana EQ	Export Gap
3311	Iron and Steel And Ferroalloy	20.8	2.7	18.1
3336	Engines, Turbines, and Power Transmission Equipment	10.8	3.8	7.0
3253	Pesticides, Fertilizers and Other Agricultural Chemicals	6.7	0.4	6.3
3361	Motor Vehicles	7.9	2.1	5.8
3313	Alumina and Aluminum and Processing	6.7	2.0	4.7
3314	Nonferrous Metal (Except Aluminum) and Processing	4.6	0.5	4.1
3363	Motor Vehicle Parts	7.2	3.2	4.0
3342	Communications Equipment	3.0	0.2	2.8
3112	Grain and Oilseed Milling Products	3.6	1.1	2.4
3272	Glass and Glass Products	2.8	0.7	2.0
3335	Metalworking Machinery	2.3	0.7	1.6
3261	Plastics Products	2.8	1.2	1.6
3352	Household Appliances and Miscellaneous Machines, Nesoi	2.0	0.5	1.5
3399	Miscellaneous Manufactured Commodities	1.7	0.2	1.5
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment	2.4	1.0	1.4
3324	Boilers, Tanks, and Shipping Containers	2.1	0.8	1.3
3343	Audio and Video Equipment	1.6	0.3	1.3
3262	Rubber Products	2.3	1.0	1.3
3252	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filiment	2.0	0.7	1.3
3119	Foods, Nesoi	1.7	0.4	1.3
3339	Other General Purpose Machinery	2.2	1.0	1.2
3222	Converted Paper Products	1.8	0.6	1.2
3259	Other Chemical Products and Preparations	1.5	0.4	1.1
3255	Paints, Coatings, and Adhesives	1.7	0.6	1.1