



INDIANA'S ECONOMIC FUTURE

An evaluation of economic performance, key economic drivers, trends, and ambitious opportunities for the future.

Phase I - Situational Assessment Report.

Prepared for:

Bradley B. Chambers
Secretary of Commerce, State of Indiana
CEO, Indiana Economic Development Corporation

Prepared by:

TEconomy Partners, LLC. with support provided by
the Central Indiana Corporate Partnership



TEconomy Partners, LLC (TEconomy) endeavors at all times to produce work of the highest quality, consistent with our contract commitments. However, because of the re-search and/or experimental nature of this work, the client undertakes the sole responsibility for the consequence of any use or misuse of, or inability to use, any information or result obtained from TEconomy, and TEconomy, its partners, or employees have no legal liability for the accuracy, adequacy, or efficacy thereof.

PROLOGUE

The unprecedented events of the past two years have laid bare both threats to and opportunities for a more prosperous future. This is as true for Indiana's economy as it is anything else. Indeed, our state stands at a crossroads. Steadfast state leadership has steered Indiana through multiple economic disruptions all the while nurturing critical assets, including our world-class research universities and enviable array of advanced industries. Yet the state does not exist in a vacuum. Global economic forces have and continue to make themselves felt in Indiana specifically as well as the Midwest more generally.

As documented in the report that follows, while Indiana is punching above its weight, no Midwestern state is included among those currently leading the nation in economic growth. States with above median growth can be found along the Atlantic and Pacific coasts, the Sun Belt, and the Mountain West. But as also made clear in this report, Indiana has a fighting chance of joining the leading cohort of states. While Indiana has real work to do to advance in several metrics, in our corner of the country we are among the leaders. The question we must now consider is whether to aim higher and attempt to become an economic leader in the Midwest as well as the nation as a whole.

Since assuming the role of Indiana's Secretary of Commerce and CEO of the Indiana Economic Development Corporation (IEDC), Brad Chambers has made clear his ambition for the state to aim considerably higher. Following his appointment by Governor Holcomb, Secretary Chambers has developed an economic growth strategy focused on what he terms the "5 Es": Environment, Economy of the Future, Entrepreneurship, Energy, and External Engagement. As a long-time strategic partner of the IEDC, the Central Indiana Corporate Partnership (CICP) was delighted to be asked by Secretary

Chambers to offer thoughts on how to make one of the 5 Es—Economy of the Future—a reality here in Indiana. To do so, CICP turned to TEconomy Partners, a leading consultant in innovation-driven economic development with whom we have worked throughout our 20-plus year history.

TEconomy's accompanying report provides an analysis of economic trends and key industry sectors in Indiana. The state's position as a world center for the automotive and life sciences industries offers a strong foundation for accelerated growth, yet the outlook is sobering. As suggested in the following report, future success likely lies in efforts to further integrate cutting edge technologies—technologies like advanced robotics, machine learning, and artificial intelligence—into our legacy manufacturing industries while also continuing to diversify our economic base, by leaning into high growth sectors.

A future report will delve deeper into the current state of our economy and key industries as well as strategies to grow them with increased urgency. For now, the pages that follow are intended to further the conversations that have already begun about how the state and our economy can and should aim higher. The positive impact of these efforts should be felt by current and future Hoosiers alike while also serving as yet another example of the many ways in which Indiana can lead the nation.

David L. Johnson

President and CEO

Central Indiana Corporate Partnership, Inc.

CONTENTS

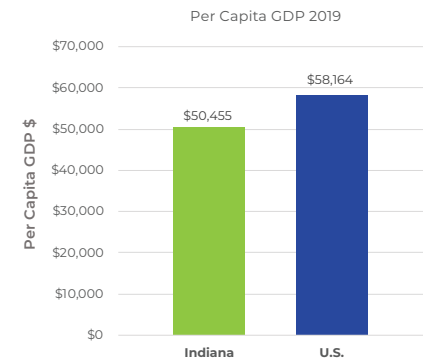
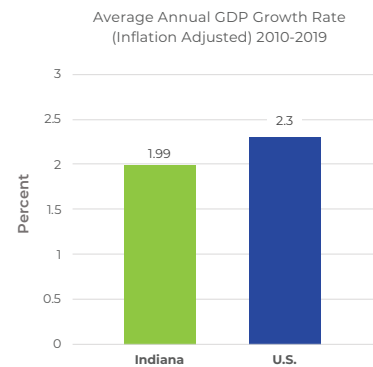
Executive Summary	i
An Ambitious Goal	ii
Getting to Growth – Indiana’s Toolkit.....	ii
Next Steps.....	iv
In Summary	v
I. The Economic Performance of Indiana	1
A. Introduction.....	1
B. Indiana’s GDP	3
C. Examining the Structure and Underlying Drivers Behind Indiana’s Economic Performance.....	10
II. Situational Analysis	21
A Dashboard of Indiana’s Recent Performance on Key Economic and Innovation Ecosystem Metrics	21
III. Conclusion.....	25
Appendices	27
Appendix A: Indiana 2-Digit NAICS Performance – Comparison to National Sector GDP Growth and Indiana Overall GDP Growth.	27
Appendix B: Large and Leading GDP Generating Traded Sectors in Indiana (50 Traded Sectors Contributing >\$1 Billion in 2020 GDP).....	28
Appendix C: Situational Analysis Summary Statistics	32
Appendix D: Modeling GDP Growth	43

EXECUTIVE SUMMARY

The health of the economy in Indiana is critically important for all in the state. Over the past decade, the overall performance of Indiana's economy has been on par with Indiana's Midwestern neighbors, but still has lagged behind national GDP growth. This is demonstrated by the state's average annual inflation-adjusted GDP growth of 1.99% for 2010-2019 compared to national growth of 2.3%. This performance ranked Indiana 20th among states across the decade.

The future will see increasing competition across the globe, fast moving new and disruptive technological innovations, changing education and technical skills needs across the workforce, and other significant forces of change. These make it imperative that Indiana understand the direction of its economy and the forces impacting it – assessing readiness to achieve future economic success and identifying opportunities to do so. The Indiana Economic Development Corporation (IEDC) and the Central Indiana Corporate Partnership (CICP) are seeking to understand these forces, how to harness them to Indiana's advantage, how to offset threats and leverage opportunities, and where to direct public and private sector investment to support optimal results. Doing so requires understanding the recent performance of Indiana's economy and the fundamental conditions that have been impacting the state's economic trajectory, and then strategizing actions to take that will positively impact that trajectory.

This report is the first in a planned set of two, with this first focused on visualizing the structure and trajectory of Indiana's economy and its underlying industrial economic drivers. It also seeks to preliminarily identify the parameters that need to be addressed, and opportunities to be pursued, to generate a high-performance economic future. Ultimately the complete program of work is focused on charting a pathway forward for Indiana, that seeks to propel it into the top 10 U.S. states in economic performance by 2031.



An Ambitious Goal

On a per capita GDP basis, a widely accepted economic measure for standard of living, Indiana ranks 31st among U.S. states, with a GDP per capita of \$50,455, versus the national average of \$58,164.

Based on the (pre-COVID) 2019 performance on GDP per capita, Indiana resides in the 4th quintile of states and would need to increase its GDP per capita by \$345 (0.7%) to move into the 3rd quintile, by \$6,246 (12.4%) to enter the 2nd quintile, and by \$12,100 (24%) to make it into the top quintile of states. Based on projections herein (examining GDP growth and population trajectories), achieving this ambitious goal is certainly challenging, but also achievable with focus and determination. It will require improving GDP growth performance by a factor of 1.6 times versus that achieved over the past decade.

Analysis shows that to move into the top 10 states in GDP per capita by 2031, Indiana would need to grow its GDP at a rate of 5% each year over the decade – while other states would need to stay on a national average 3% GDP growth path. A sustained 5% growth rate is a heavy lift. Between 2017 and 2019 no U.S. state managed 5% or higher growth over each of the three years – however, one state (Washington) averaged over 5% for the combined three years (2019 4.6%, 2018 7.2%, 2017 5.5%). Overall, the U.S. GDP growth rate for those years was 2.2% in 2019, 3% in 2018, and 2.3% in 2017. From 1997 through 2019 Indiana managed to grow its GDP at a rate above 5% twice (in 2010 with 6.44%, and 1998 with 6.03%).

Getting to Growth – Indiana’s Toolkit

Whether an ambitious 5% level of annual GDP growth is the goal, or a goal of simply exceeding average annual national GDP growth consistently, the question then is “what does Indiana have to work with to achieve it?” There is a great deal of in-depth analysis in this report examining the performance of 129 advanced or “traded” (export-oriented and wealth-generating) economic sectors in Indiana. The analysis leads to two groups of conclusions:

First, the Challenges –

1. There are not enough up-and-coming sectors to substantially advance Indiana towards its GDP growth ambition. Indeed, the majority of growing industries, that are not yet specializations for Indiana, are not keeping pace with national average gains in those industries (i.e. Indiana is losing competitive share in them).
2. The state has emerging positions in some interesting new sectors, such as precision agriculture and regenerative medicine, but none demonstrate the kind of competitive advantage position (yet) that would lead to them being transformational for the overall economy.
3. A strategy focused on recruiting companies and branch operations to the state in order to generate growth would help, but not be able to move the needle enough on its own based on one key factor – availability of workforce. Population and workforce growth projections show Indiana unlikely to experience major gains over the coming decade.¹ In order to support ambitious goals for growth Indiana will need to further prioritize population and workforce growth even more given macro and statewide headwinds concerning workforce.
4. While a shift to a “post-industrial” service economy has been pushed by some as the future, it would pose a particularly disruptive move

¹ See: Lyman Stone. “Time to Choose. Indiana’s Decade to Decide its Demographic Future.” American Enterprise Institute. November 2020.

for Indiana and disregard its unique competitive advantages. Analysis herein shows that non-manufacturing activities generate output for the state (via exports outside of the state) at a rate three-times lower than manufacturing. If manufacturing were allowed to languish at the expense of a focus on non-manufacturing, it would require extremely large-scale service sector growth to displace lost manufacturing.

5. Indiana is lagging in a number of key measures related to advancing innovation-led economic development, including in key areas such as educational attainment, STEM occupations, productivity, and early-stage capital investment (VC and SBIR).

Second, the Opportunities –

1. **Manufacturing is the key differentiator and specialization for Indiana,** with distinctive strengths in life sciences manufacturing, motor vehicles, basic materials (such as steel), and multiple other sectors. Normally, as a fairly mature aggregate sector, one would not anticipate the sort of growth in manufacturing productivity that would be needed to produce the sought-after GDP gains. However, the emerging capabilities of “Industry 4.0” technologies can translate into truly transformative growth in productivity across multiple manufacturing sectors. Indiana needs to be at the forefront of Manufacturing 4.0 technology implementation. Growth in manufacturing may be achieved through technology investment in Indiana’s existing base of large, midsize, and small manufacturing firms and via building out the supply chain of advanced and technical service providers supporting manufacturing.
2. Several of Indiana’s most impactful manufacturing sectors are adjusting to both challenges and opportunities associated with **disruptive technologies**. Most notable among these is Indiana’s largest aggregate manufacturing sector – motor vehicles and their components. Indiana has an

opportunity to push forward policies and incentives to advance positive investments and adjustments within this industry to an impending electric powertrain and autonomous operations technological future.

3. Building upon the considerable existing strengths at Indiana’s research universities, in combination with other higher education assets (such as Ivy Tech), Indiana needs to become a leader in STEM education, higher education, and workforce training and re-skilling in technologies and digital capabilities focused on Manufacturing 4.0, and more generally the deployment of IoT technology, analytics, and automation. **Attention needs to be paid to retaining the significant in-state talent graduating from Indiana’s higher education institutions, particularly in strategic technical fields.**²
4. Emerging skills and core competencies in industrial IoT (IIoT) and advanced analytics associated with Manufacturing 4.0 should be leveraged to help advance IIoT deployment, advanced analytics, and autonomous systems development and deployment **within other key strategic sectors of importance to the Indiana economy** – primarily, warehousing/distribution/logistics, insurance and finance, and healthcare.
5. While much can be accomplished in terms of productivity and GDP growth within Indiana via deployment of advanced digital/4.0 technologies that may be developed outside of Indiana, there is a parallel **need for Indiana-based innovation**. Converging R&D capabilities and interests in R&D between Indiana industries and Indiana’s research universities need to be further pursued. For some selected important industries in Indiana (for example pharmaceuticals and medical devices), the pathway to significant output growth is as likely to come from R&D innovations and new innovative product development than it is manufacturing productivity improvements.

2 See: TEconomy Partners. “Artificial Intelligence and Advanced Analytics in Indiana: An Initial Discussion of Industry Needs and University Capabilities.” Prepared for BioCrossroads. January 2020.

6. The government of the State of Indiana has long paid attention to maintaining competitiveness in the state in terms of business costs and taxes, creating a business environment favorably viewed as “business friendly.” The State has also been fiscally responsible, to the extent that there is a significant budget surplus available, in combination with federal funds, to strategically invest in economic development programs, including a portfolio of existing forward-thinking programs, focused on advancing the state to the next level of economic performance. The IEDC’s Manufacturing Readiness Grants program and its investment in the Emerging Manufacturing Collaborative Center (EMC2) are prime examples of innovative programming focused on advancing strategic industry investment. In effect the table has been set with the state being innovative and prepared to focus on moving to the next level.

Ultimately, the analysis performed across this project points to the most likely path to significant Indiana economic growth coming via Indiana becoming a world leader in the deployment (and, to the maximum extent possible, development) of Industry 4.0 productivity enhancing technologies – both within manufacturing and across other strategic sectors. That is going to need significant actions to promote the types of investment needed and capacity-building required to achieve transformational productivity gains. Indiana may not, under current population projections, be able to propel its growth through adding large volumes of people to the workforce. Rather, it has to generate more from the people it has, and via maximizing the capabilities of the generation engaged in the current K-12 system – investing to build a world-class base of competencies and talent in the digital technologies, advanced analytics, and autonomous operations that will be advancing a high-performance modern economy. This workforce development needs to occur in parallel with industry investment in the technologies that will require these skills.

The powerful digital technologies and the advanced analytics and control made possible through AI and machine learning are integral not only to advanced manufacturing applications but are also similarly applicable to

advancing productivity and growth in other Indiana growth sectors such as finance and insurance, and scientific and technical services.

Next Steps

This Phase I report characterizes the macroeconomic trajectory that Indiana’s economy has demonstrated. This phase also examines the recent performance of individual sectors of the Indiana economy, particularly traded and advanced industries that are central to building a high-performance economy. The work performed has helped to identify potential paths to a more dynamic future driven by improving productivity in Indiana’s advanced and strategic industries and identifying opportunities to build and attract investment around new and related fast-growing sectors (such as AI and advanced analytics, robotics, and industrial IoT).

Phase II (forthcoming) will go deeper, performing more detailed assessment work regarding opportunity areas. It will work to confirm or refine the vision for Indiana’s 2031 economy and profile the key areas of investments and actions that will be required to realize the vision. This will include examining options for increasing industry investment in advanced and next generation technologies, in innovation, in adaptation to disruption, in workforce development and education, and also specification of state actions and policies that will add value and stimulate desirable outcomes. It will also review new and expanding sectors of opportunity, including rising industries where Indiana does not yet have a signature position, and what it will take for Indiana to capture a robust position in areas such as (but not limited to):

- Advanced battery and electric power and propulsion technologies
- Autonomous systems and mobile robotics
- IoT systems and system integration
- Personalized and regenerative medical technologies.
- Energy technology generally
- Agricultural technology

It is Not About Manufacturing Alone

It should be noted that realizing the GDP enhancement goals outlined herein cannot be accomplished solely through advancing Industry 4.0 technologies within manufacturing. Manufacturing currently accounts for 26% of Indiana GDP. For it alone to meet the goal of advancing Indiana into the top 10 states in per capita GDP by 2031 it would need to achieve a year-on-year CAGR of 10.8% over the next decade – which is highly unlikely. For this reason, it is recommended that advancing Industry 4.0 technology deployment (in areas such as IIoT, advanced analytics and AI, robotics, and automation) needs to also occur not only in manufacturing but within other key sectors in Indiana including logistics, finance and insurance, healthcare, and other core sectors.

Phase II will provide a series of strategies and associated action recommendations, designed to advance Indiana towards a high performing economic position in 2031.

In Summary

Indiana has an opportunity to take its economy to the next level, via working to fully leverage the power and promise of Industry 4.0 technologies within its signature manufacturing sector, and more broadly by deploying digital technologies and advanced analytics to boost output in other core industry sectors. There is a window of opportunity to secure Indiana as a global leader in IIoT and Industry 4.0 technological deployment, within manufacturing and beyond into multiple other existing and expanding sectors. This will also require investing in developing, building, and attracting industry activity in new technologies, including disruptive technologies (in areas such as battery technologies, sensors, digital components, advanced life science technologies, and other opportunity and cross-cutting support spaces). Investing in R&D and innovation is also an important parallel strategic imperative, building on core competencies in academic and industry R&D to advance innovation and diversify the industry base in the state. The primary constraint on business attraction and growth for the state is population trajectory which

could limit workforce availability as a growth driver. As such, investment in the workforce that the state has, and the upcoming workforce currently in the K-12 system, is crucial to enabling deployment of productivity-enhancing technologies, automation, and technological core competencies that will drive GDP growth for Indiana. This report has provided a quantitative-based, situational assessment. Forthcoming work will advance the development of strategy and action recommendations to realize a bold vision for economic growth across the state.

I. THE ECONOMIC PERFORMANCE OF INDIANA

A. Introduction

Complex and dynamic, state economies are subject to both internal and external forces of change. Globalism has expanded the influence of outside forces on state economies, and while the U.S. dominated the economic landscape for much of the 20th Century, the destinies of the national and individual state economies seem to be less secure in the fast-paced, globalized 21st Century.

At the geographic level of states, there are evident divergences occurring in economic performance. Some state economies continue to power forward, buoyed by R&D competencies, an ability to create and capitalize successful new companies, invest in technologies to advance the productivity of their existing businesses, and develop and attract the top-tier human talent required for high performance advanced industries. Some have seen their economic performance stagnate and more than a few are struggling, seemingly unable to adapt to the intense pressures of modern economic competition.

Indiana appears to sit at an inflection point, with a potential to go in either direction. By many indicators, Indiana sits in an enviable position—buoyed by having extensive and diversified manufacturing core competencies, world-class research universities, and logistics assets that build-upon its central U.S. location. On the other hand, there are warning signs that raise legitimate concerns. Industry productivity is flattening compared to that of the competition in many industries, investment in digital technologies is not where it needs to be, new firm start-up and growth is underperforming against benchmarks, and state demographic and educational trends suggest an expanding divide developing between industry demands and talent

availability and capability. Signs that the state may be tipping in the wrong direction – including Indiana being slow to recover from recent pre-pandemic recessions and having GDP lag the national growth rate (2017-2021 notwithstanding) for much of the past decade – are justifiably raising concerns among forward-thinking leadership within the state.

There are two potential roads ahead for Indiana. One follows a path of slow decline, with the state continuing to underperform as new firm growth and industry investment lags and the workforce shrinks and is undereducated. An alternative, positive path, can instead leverage the state's significant signature assets (its manufacturing capabilities, university R&D, hardworking people, stable governance, etc.), and through directed investment and innovative actions reverse course to achieve high-performing productivity gains and competitive GDP growth. This road can also leverage the existing assets of the state, and invest in further asset building, to attract and build fast growing, innovative new industries to call Indiana home and enhance the competitiveness of important existing industries in the state.

Indiana does not have to let the forces of change push it in an unwanted direction. Rather, the state has the opportunity to leverage these forces to its advantage. Doing so, however, requires understanding these forces, how to harness them to Indiana's advantage, how to offset threats and leverage opportunities, and where to direct state resources to accomplish optimal results. It requires understanding the recent performance of the Indiana economy and the fundamental conditions that have been impacting the

Phase I (reported herein) characterizes the macroeconomic trajectory that Indiana's economy is on and projects it through 2031. This phase also examines the recent performance of individual sectors of the Indiana economy, particularly traded and advanced industries that are central to building a high-performance economy. This phase works to identify potential alternative paths to a more dynamic future driven by improving productivity in Indiana's advanced and strategic industries and identifying opportunities to build and attract investment around new fast-growing sectors (such as AI and advanced analytics, robotics and autonomous systems, industrial IoT, clean and renewable technologies, regenerative and personalized medicine, etc.). This first phase serves to highlight the downsides of staying on the current economic trajectory and profile a well-reasoned alternative high-performance economy for Indiana by 2031.

Phase II (forthcoming) will perform more detailed assessment work to confirm or refine the vision for Indiana's 2031 economy and profile the key areas of investments and actions that will be required to realize the vision. This will include examining options for increasing industry investment in advanced and next generation technologies, in innovation, in adaptation to disruption, in workforce development and education, and in state actions and policies that will add value and stimulate desirable outcomes. It will also take a deeper dive into new and expanding sectors of opportunity and what it will take for Indiana to capture a robust position in these. The work will take the results of Phase I and profile suggested pathways to improve current sectors and build new ones. It will provide the IEDC and partner stakeholders in Indiana with a series of strategies and associated recommended actions, designed to advance Indiana towards a high performing economic position in 2031. This plan will make specific recommendations for the activities and programs of IEDC and the State of Indiana, and the organizational structure required to achieve 2031 goals.

state economic trajectory and then strategizing actions to take that can positively shift that trajectory.

Indiana's Secretary of Commerce is seeking to advance Indiana's economy to the next level of performance. Secretary Chambers has reviewed previous work by Brookings, the American Enterprise Institute, TEconomy Partners, the IBRC, and others who have recently examined the Indiana economy and rightly concludes that there is important work to do in assuring Indiana moves onto the right path. In discussions between IEDC and the Central Indiana Corporate Partnership (CICP), an organization that shares IEDC goals for significantly enhancing the Indiana economy, it was determined that TEconomy Partners (TEconomy) should be retained to undertake an urgent project that will help chart the course to significantly enhance state performance by 2031.

TEconomy developed a scope-of-work that is divided into phases (see sidebar). The report herein covers Phase I – providing an overview of the recent performance of Indiana's economy and the trajectory it is on. The report starts by reviewing the economy at the macro level of statewide GDP, then examines the trajectories of specific industry sectors influencing recent GDP performance.

What is “GDP”

As noted by the BEA, referring to GDP at a national level, it is:

“A comprehensive measure of U.S. economic activity. GDP measures the value of the final goods and services produced in the United States (without double counting the intermediate goods and services used up to produce them). Changes in GDP are the most popular indicator of the nation's overall economic health.”

State GDP comprises all private and public consumption, investments, government outlays, additions to private inventories, paid-in construction costs, and the external balance of trade. (Exports are added to the value and imports are subtracted).

Indiana GDP Growth During the Holcomb Administration

From the first quarter of 2017 through to the latest reported period (third quarter 2021) Indiana's compound annual growth rate (CAGR) for GDP was 2.0%. This exceeded the national CAGR of 1.9%.

Source: U.S. Bureau of Economic Analysis

B. Indiana's GDP

The Gross Domestic Product (GDP) of a state is a standard bellwether for examining economic performance. Tracked by the U.S. Bureau of Economic Analysis (BEA), national and state-level GDP are regularly reported, and detailed time-series data are available for state economies overall and for the performance of individual sectors of the economy in terms of their contribution to GDP and its growth (or contraction).

This report uses GDP data to examine the recent performance of the Indiana economy and to project where the current trajectory may position Indiana within the U.S. overall by 2031. It also uses other measures to assess Indiana's comparative performance – measures such as employment and occupational make-up, personal income trends, industry productivity, educational attainment, R&D and innovation performance, and other factors, that are impacted by, or act upon, GDP. In effect this report is a health check-up on the Indiana economy, diagnosing current conditions and parameters and what those suggest for the trajectory and ongoing health of the state econ-

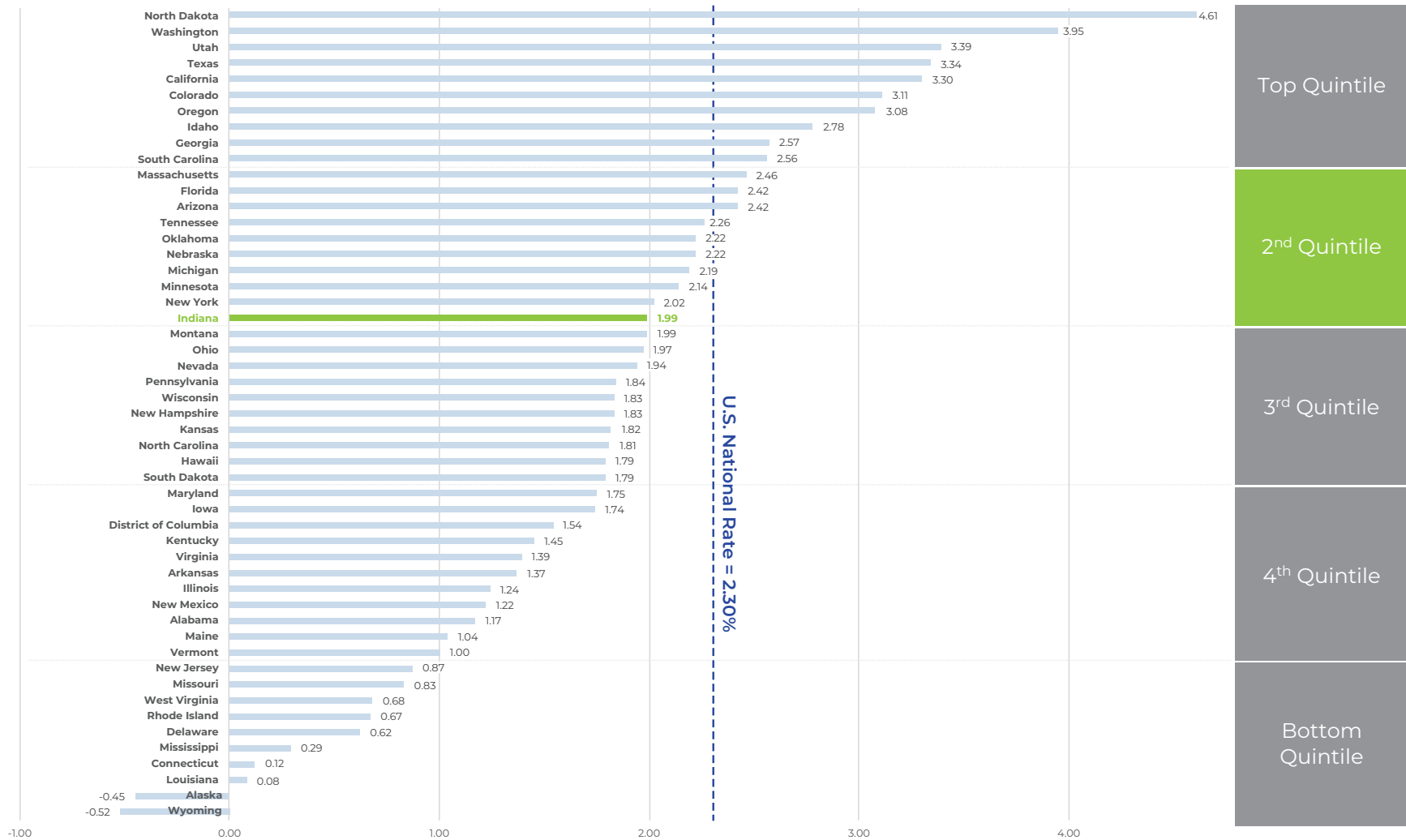
omy into the future. The analysis is designed to inform the development of strategies and actions that Indiana should consider to improve its economic trajectory – working to advance Indiana towards a level of performance that will propel the state into the upper echelons of economic advancement.

Indiana's Macroeconomic Performance Over the Past Decade

Across the past decade, and relative to other states, Indiana has had a “middle of the road” economy. Overall, across the 2010-2019 timespan, Indiana ranked 20th among the 50 states and the District of Columbia (DC) in terms of its average annual GDP growth rate of 1.99% (Figure 1).³ This decadal growth in GDP places Indiana just inside the 2nd quintile of U.S. states, and below the national average GDP growth rate. To move into the top quintile in GDP growth rate, Indiana would have needed to have grown its GDP at an annual rate of 2.57% (an additional 0.58 percentage points) – a rate 29.1% higher than it achieved (2.57 is 29.1% higher than 1.99).

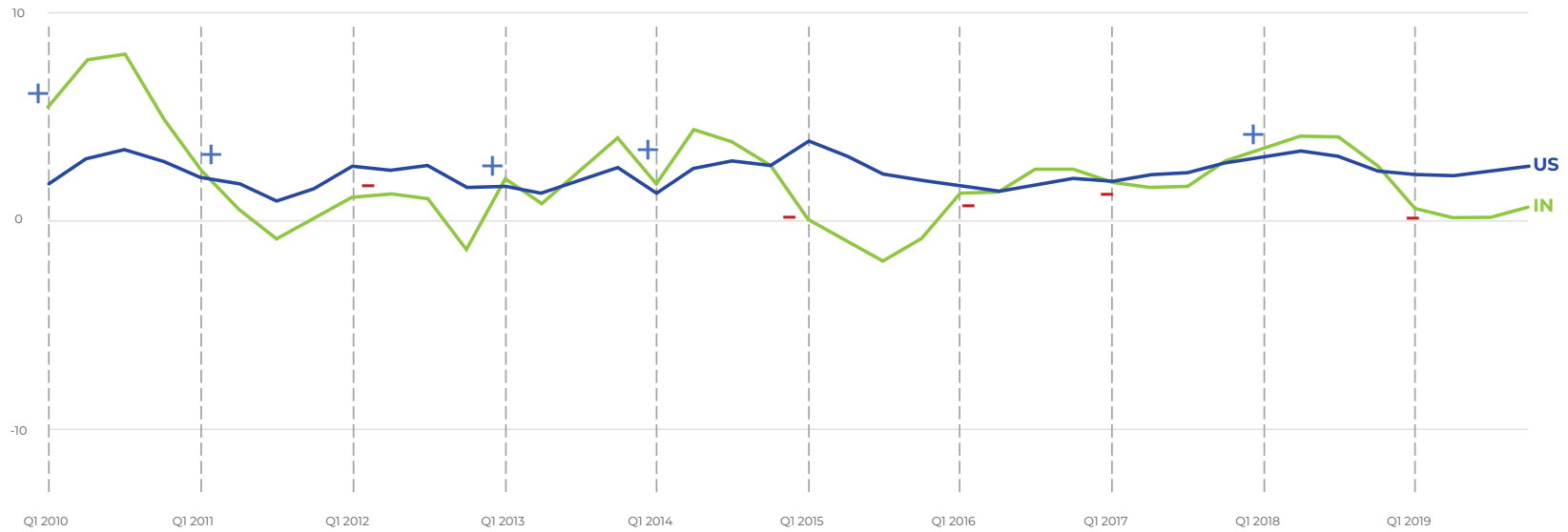
³ The GDP growth rate is calculated as a “real”, inflation-adjusted growth rate using constant chained 2012 dollars to show real growth, rather than expansion due to monetary inflation. Source: U.S. BEA.

Figure 1: National and State Real (Inflation Adjusted) GDP Average Annual Growth Rate (2010-2019)



Source: TEconomy Partners' analysis of U.S. Bureau of Economic Analysis (BEA) Gross Domestic Product data

Figure 2: Indiana’s Real GDP Growth Rate Compared to the Nation (2010-2019)



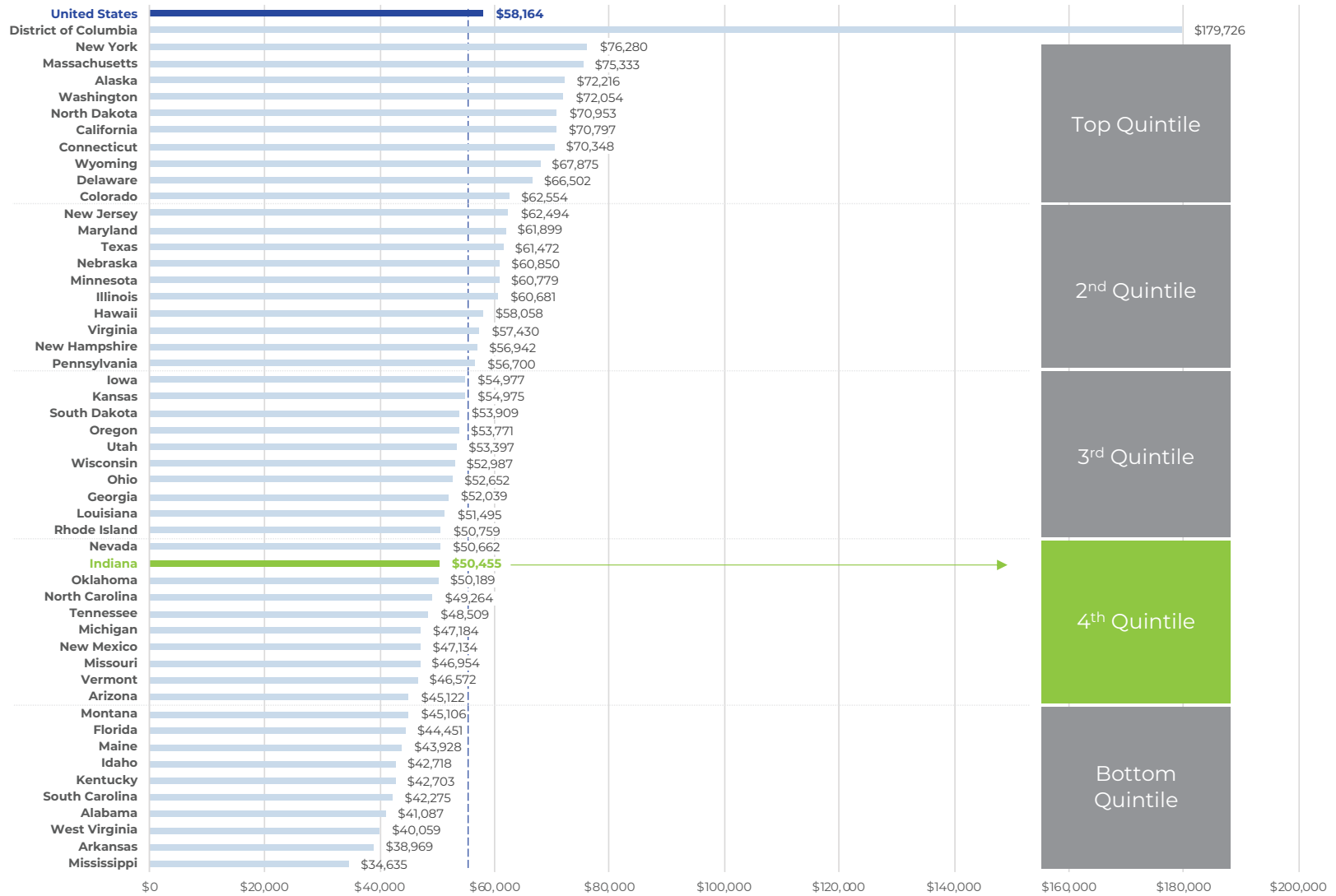
Source: U.S. Bureau of Economic Analysis (BEA), chart by Urban Institute. Accessed at <https://apps.urban.org/features/state-economic-monitor/>

For 2019 the growth rate for Indiana’s GDP was 1.65%, below the average for the decade (1.99%). This placed the state at a rank of 24th.

Indiana’s annual level of GDP has fluctuated considerably more than that of the nation’s overall on a year to year basis. Figure 2 shows Indiana’s GDP growth rate compared to the national rate across the 2010 through 2019 timespan. It shows that in the 1st Quarter of each year, Indiana’s GDP growth rate was above the nations for 5 years, and below the nations for 5 years. As shown on Figure 1, this performance meant that, overall, Indiana’s GDP growth rate moderately lagged the national average.

Another key measure that allows meaningful comparison between states, and against the national average, is “GDP per capita” (using 2019 GDP divided by population) – the usual benchmark used to evaluate “standard of living”. On this measure Indiana is further down the table in terms of its position among U.S. states. Figure 3 illustrates that Indiana’s GDP per capita was \$50,455 in 2019, versus \$58,164 for the national measure (i.e., Indiana’s GDP per capita was only 86.7% of the national level). Put another way, Indiana would need to raise GDP per capita by 15.3% to reach the national level. Based on the 2019 performance Indiana resides in the 4th quintile of states and would need to increase its GDP per capita by \$345 (0.68%) to move into the 3rd quintile, by \$6,246 (12.38%) to enter the 2nd quintile, and by \$12,100 (23.98%) to make it into the top quintile of states.

Figure 3: National and State GDP Per Capita (2019)

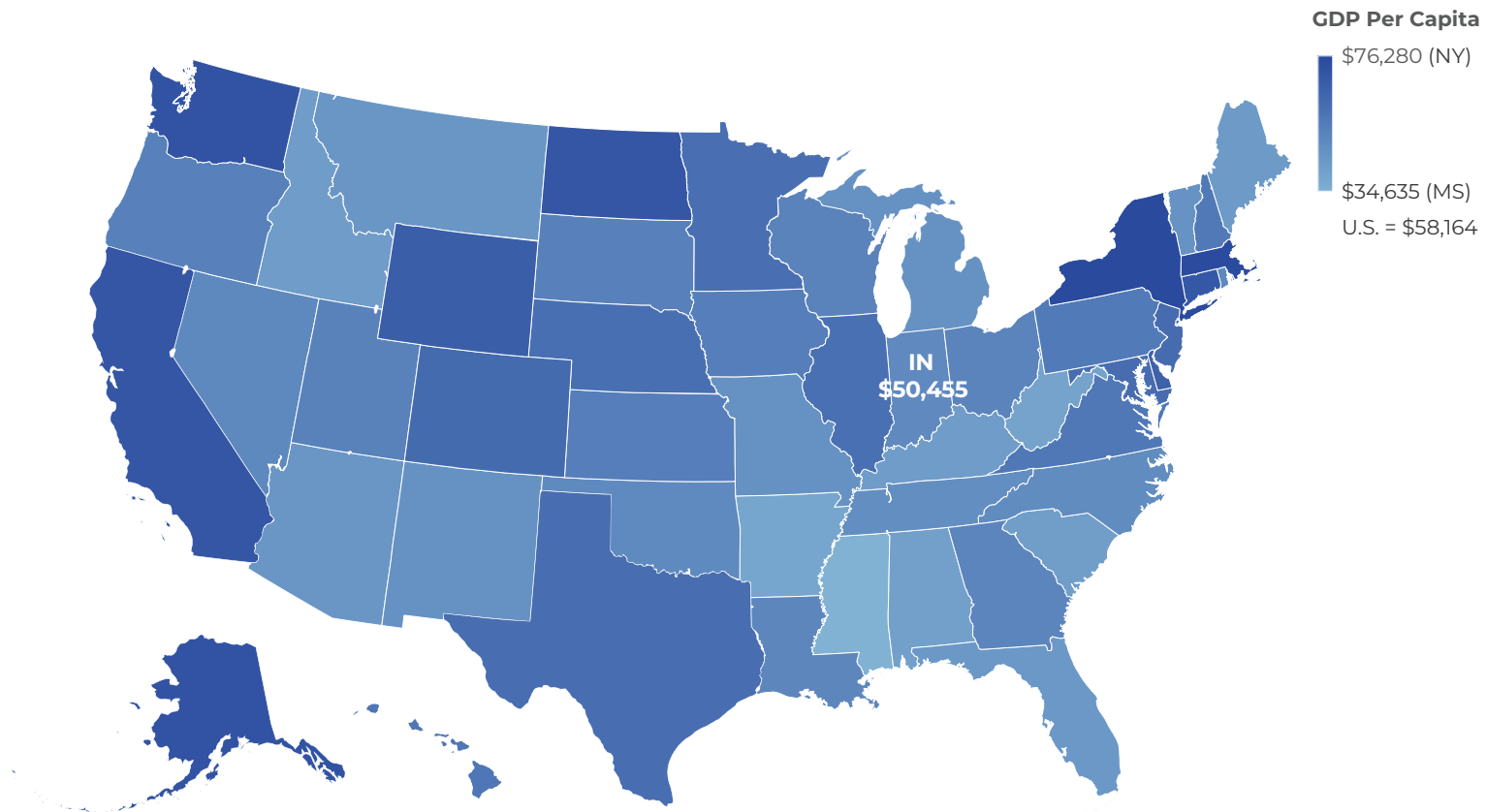


Source: TEconomy Partners' analysis of U.S. Bureau of Economic Analysis (BEA) Gross Domestic Product data

Figure 4 maps the data from Figure 3, illustrating that the highest performing states tend to reside in the Northeast or Pacific Coast regions of the U.S. Indiana's Midwest location sees a more moderate performance level on per capita GDP overall. Among Midwest states the highest performers are North Dakota (\$70,953), Nebraska (\$60,850), Minnesota (\$60,779), and Illinois (\$60,850) – each having a per capita GDP higher than the national average.

Kansas, South Dakota, Wisconsin, and Ohio have per capita GDP moderately higher than Indiana, while only Michigan (\$47,184) and Missouri (\$46,954) have a per capita GDP lower than Indiana among Midwest states. Compared to states with which it shares a border, Indiana outperforms Michigan and Kentucky to the north and south, but underperforms its western neighbor Illinois, and its eastern neighbor, Ohio.

Figure 4: State Per Capita GDP (2019)



Source: TEconomy Partners' analysis of U.S. Bureau of Economic Analysis (BEA) Gross Domestic Product data

Considering the performance of Indiana’s economy over the decade leading up to the COVID-19 recession (which began in 2020), there is little reason to believe that Indiana will naturally move – without further intentional action and investments – into the upper echelon of high-performing state economies.

Additional perspective on this is provided in Figure 5 which uses four performance quadrants based on a Y-axis showing the overall net growth rate for each state over the long-term 2010-2019 period, and the X-axis showing the recent (pre-COVID) 2017-2019 period. The crossing point of the two axes in the center of the graph is the U.S. national figure for these two data points. The position of each state on this graphic shows whether, compared to the U.S. overall the state was “Leading”, “Gaining”, “Slipping” or “Lagging”⁴ in its relative performance (the size of each state circle is proportionate to its GDP). **Indiana sits in the “Lagging” cadre of states by virtue of having a 2010-2019 growth rate lower than that of the U.S. overall, and a recent rate (2017-19) that was also lower than the U.S. overall.** Indiana is far from alone in falling within this category (which contains 31 states), and Indiana is closer to an average U.S. performance than many in this category, but the position is indicative of the state not being on a positive trajectory.

Getting to “Leading” Status

To move from the “lagging” into the “leading” designation, Indiana’s performance would need to have been improved by the following amounts.

- Its decadal GDP growth rate would need to have been >42% for 2010-2019, instead of its actual 34.8%.
- Its recent (2017-2019) GDP growth rate would need to have been >9.7%, instead of its actual 7.9%.
- Using the recent period growth rate as the baseline for calculating the necessary growth rate performance shows that Indiana needs to find a pathway to gaining significant ground. The difference between 7.9 and 9.7, indicates **a need to have improved GDP growth performance by 22.8%, a large, but not unsurmountable requirement.**

Of course, GDP growth at a national level is a moving target, so the actual number needed in the future to achieve “leading” status may differ. But the analysis provides a useful overall benchmark to target.

⁴ The “leading, slipping, gaining, lagging” nomenclature and its quadrant analysis was developed by the United States Regional Economic Analysis Project (REA). Further detail is available at: <https://united-states.reaproject.org/analysis/lsgl/>

Figure 5: Comparative GDP Growth Rate Position of U.S. States, 2010-19 and 2017-19 (Size of Bubble = GDP)



Source: TEconomy Partners' analysis of U.S. Bureau of Economic Analysis (BEA) Gross Domestic Product data.

C. Examining the Structure and Underlying Drivers Behind Indiana’s Economic Performance

An economy is the sum of its parts, with those “parts” being the sectors, or industries, that comprise the economy. The comparative make-up of states in terms of their sectoral structure can vary considerably. For those concerned with state economic development, it is clearly important to understand the structure of the economy and the comparative performance of sectors that are relatively large in terms of GDP contribution and employment. Key questions to answer for Indiana include:

- Which sectors are strong performers for the Indiana economy?
- Which sectors are up-and coming, showing potential for growth?
- Which sectors are experiencing challenges, and are these challenges related to external conditions (such as competition or overall demand) or do they relate to local issues, such as a shortage of labor or capital investment?

Insight into the structure of the economy of Indiana, and opportunities to improve economic performance, gains refinement the more detailed the data are on individual economic sectors. Resolution of the sectors being examined has an impact on the results of analysis. The most macro level is GDP overall (discussed above), with more resolution provided by examining the comparative performance of large aggregated 2-digit NAICS sectors such as “manufacturing”, “wholesale trade”, “retail trade”, “construction”, etc. 2-digit analysis shows where large components of the Indiana economy are trending. Further, refined insight is provided by disaggregating the data into more detail provided by 4-digit NAICS coding (later in this section).

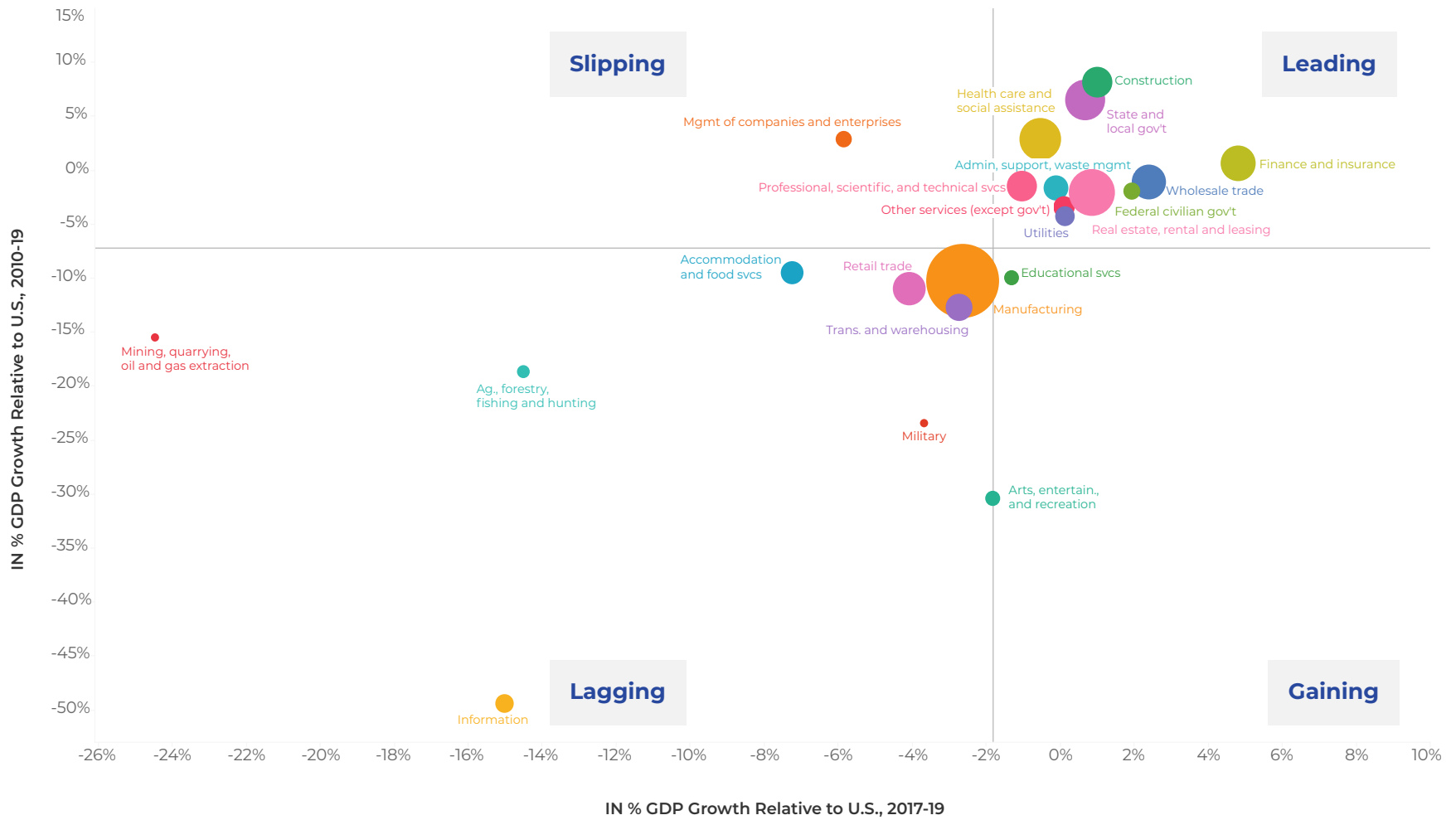
Insight at the 2-Digit NAICS Level

To examine the relative performance of 2-digit NAICS sectors, TEconomy performs two similar analyses. The first examines the performance of each sector on GDP growth relative to the national GDP growth rate using decadal data for 2010-2019 to show long-term trending and for 2017-2019 to define recent performance. These data allow the comparative performance of each sector to be plotted into four quadrants aligned with the “leading, slipping, lagging, gaining” naming convention for the quadrants used previously. The second analysis is similar but is purely internal to Indiana, using Indiana’s overall GDP growth rate for the two time periods as the basis for the analysis – effectively showing the positioning of each sector in terms of its trajectory within the state economy overall. The data for both figures is also provided in tabular form in Appendix A.

Figure 6 shows the results of the analysis for Indiana relative to national GDP growth. At the 2-digit level there are 22 sectors, with 11 (50%) of them contained in the “leading category” in Indiana. That said, several of these leading sectors are generally non-traded sectors, primarily just serving the Indiana economy (e.g., real estate, construction, utilities, and healthcare and social assistance), and they also include government operations (state and local government, and federal government). Two sectors that may be a basis for expanding the economy within the “leading” category would be the “finance and insurance” and the “professional, scientific, and technical services” sectors. Only one sector falls into the “slipping category”, which is the “management of companies and enterprises” – a sector comprising corporate headquarters operations.

Of concern should be the moderately “lagging” position of the large manufacturing sector.

Figure 6: Indiana's GDP Growth by 2-Digit Industry Sector Relative to the United States



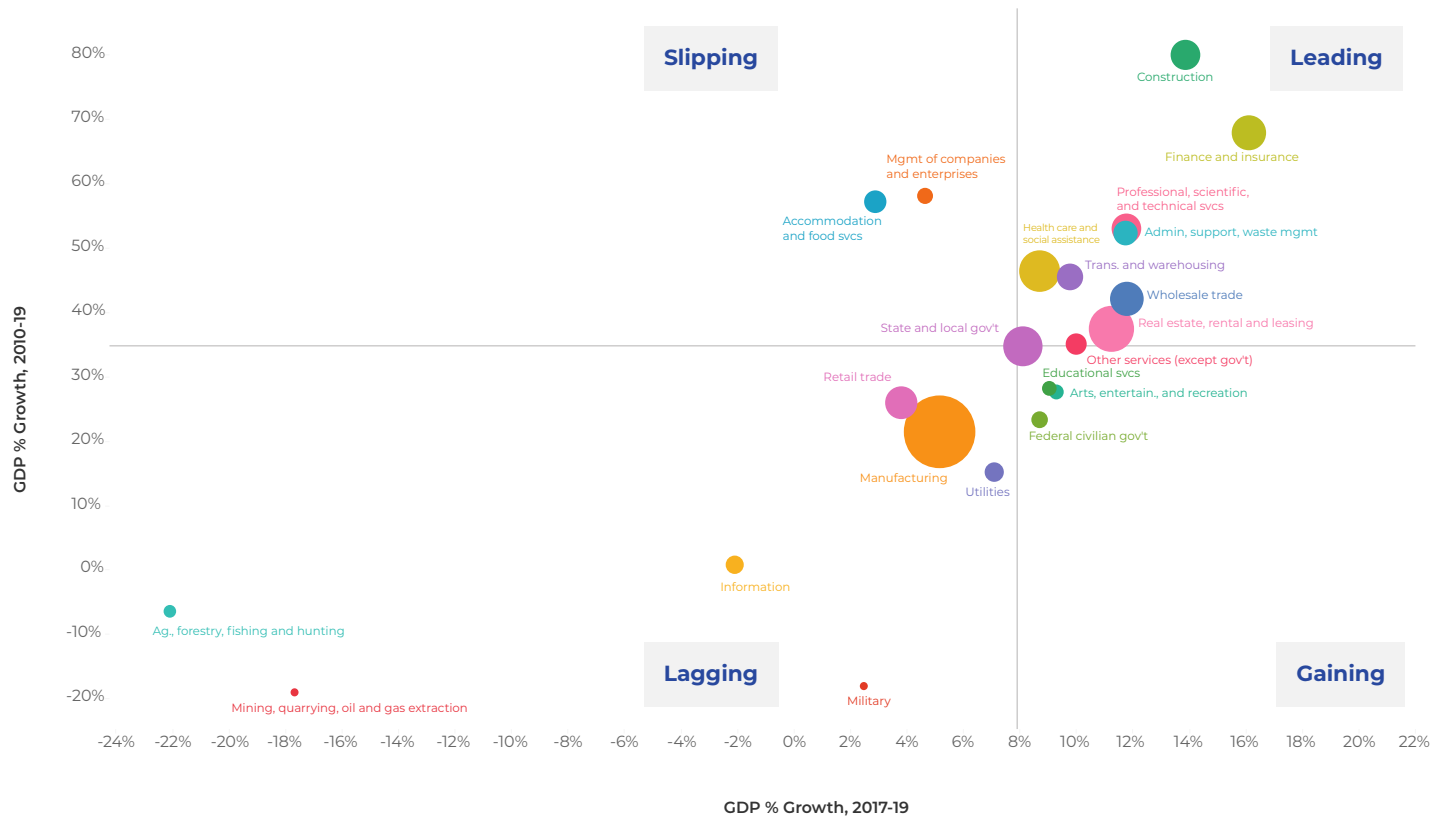
Note: X-axis is comparative recent performance (2017-2019), and the Y-axis is comparative decadal performance (2010-2019).

Source: TEconomy Partners' analysis of U.S. Bureau of Economic Analysis (BEA) Gross Domestic Product data.

While Figure 6 compares Indiana sector performance on GDP growth versus the national benchmark, some additional insight can also be gained by examining the performance of each Indiana sector's GDP growth versus Indiana's overall aggregate GDP growth. Figure 7 shows the results of this analysis. **In effect, this graphic shows which sectors are gaining importance in terms of their impact on GDP growth in Indiana, and which have**

demonstrated a declining trajectory. Noteworthy from this analysis is the lagging recent performance and contributions from manufacturing overall while key traded-sector areas such as professional, scientific, and technical services and finance and insurance have driven the state's economic gains both over the longer- and shorter-term.

Figure 7: Indiana's GDP Growth by 2-Digit Industry Sector Relative to the Aggregate (Overall) Indiana GDP Growth Rate



Source: TEconomy Partners' analysis of U.S. Bureau of Economic Analysis (BEA) Gross Domestic Product data.

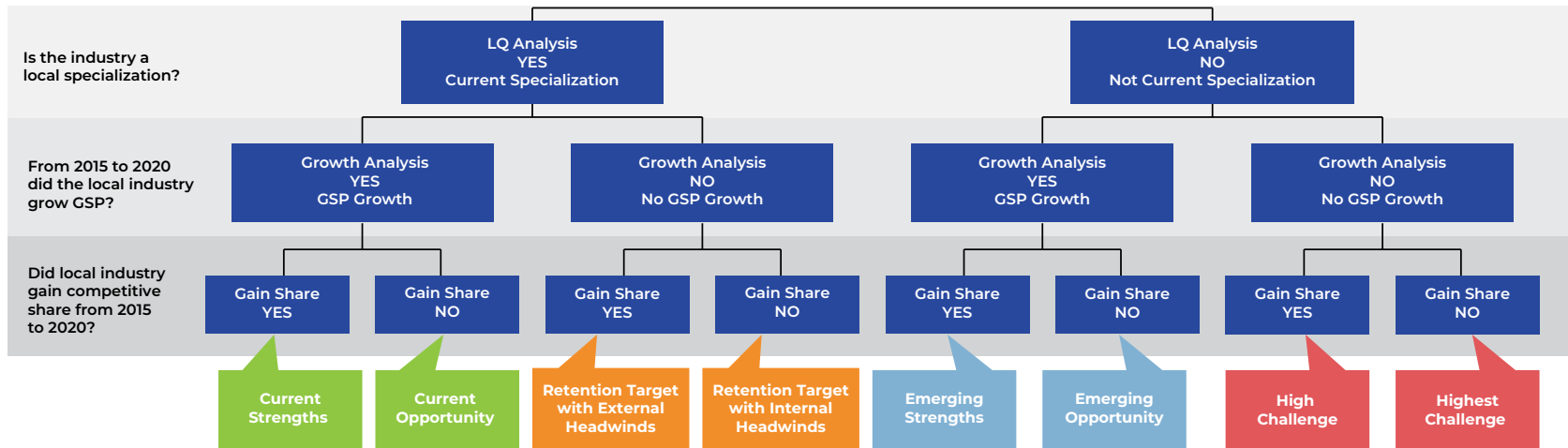
4-Digit NAICS Analysis

While it is important to understand the trajectory of overall sectors, such as “manufacturing” or “construction”, these sectors comprise multiple constituent industries, or manufacturing sub-sectors, that have individual trajectories. Policies and economic development actions may be designed to address perceived needs of a macro sector, such as manufacturing, overall, but the needs and challenges of individual manufacturing subsectors can be quite different depending on their specific sector. Steel manufacturing, for example may have a very different outlook than the manufacturing of computer chips or pharmaceuticals, and each of these sectors will have unique concerns, needs, and business considerations. **It is critically important, therefore, for the State of Indiana to have a detailed understanding of its individual industry sectors and the trajectories they are on (particularly those that are large in terms of GDP and employment).** To provide this insight TEconomy has employed the analytical structure of Industry Targeting Analysis (ITA) to examine the performance of detailed 4-digit NAICS sectors in Indiana for 2015-2020.⁵ The analysis focuses on industry sectors that are “traded”, meaning that they have a significant component of their sales that are exported from Indiana (either domestically or internationally). These are the industries that drive new wealth creation in the state, helping to support and expand the state economy.

As illustrated by Figure 8, ITA uses a cascading structure to divide individual industries into one of eight trajectory-focused categories of economic performance. The first analysis uses location quotients which determine whether an individual sector is “specialized” or not currently specialized within Indiana in terms of its relative concentration. It is a measure of whether the industry comprises a higher or lower level of state GDP than the industry does in the national economy overall. A location quotient (LQ) of 1.0 equates to the industry comprising the same percent of GDP in Indiana as it does in the national economy. Generally, regional economists consider a location quotient of 1.2, or higher, being indicative of a state “specialization” in an industry (i.e., the industry has a 20% higher presence in the state economy than in the national economic structure). ITA then proceeds to assess these industries as to their GDP expansion or retraction during a recent five-year period (2015-2020), a general indicator of their performance trajectory. Finally, the analysis assesses whether the percent change in GDP for the sector in Indiana exceeded or was lower than the change in the sector’s GDP in the nation. This latter analysis effectively highlights whether an industry sector in Indiana is gaining or losing competitive share relative to the nation.

⁵ Because of fast moving technologies and industry changes in some sectors, the most recent data available are used for analysis at the 4-digit level. It should be noted that doing this does incorporate 2020, a COVID-year, into the analysis.

Figure 8: The Structure of Industry Targeting Analysis



Source: TEconomy Partners.

As Figure 8 shows, ITA segments each industry sector analyzed into one of eight categories of performance, defined as follows:

1. **Current Strength** – These are sectors that are specializations for the state ($LQ \geq 1.2$), that expanded their GDP between 2015-2020, and gained GDP share versus the sector nationally. Specialized, growing, and gaining share, these are the highest performance sectors for the economy.
2. **Current Opportunity** – These sectors are specialized and growing (expanding their GDP), but their growth was lower than that for the sector overall in the nation (thus they effectively lost share). These are still important sectors for the economy, but attention needs to be paid to factors that may be limiting their competitive performance in the state.
3. **Retention Target with External Headwinds** – These are specialized sectors ($LQ \geq 1.2$) that did not experience GDP growth over the 2015-2020 period, but which did effectively gain share against the sector overall in the nation. This, by definition, indicates that the sector in the nation did not grow either. This implies an industry sector likely impacted by national competitive challenges likely related to constraining factors such as international competition, trade barriers, supply constraints, or other external factors. Indiana sectors in this category should be examined to determine the external factors that may be impacting their competitiveness and whether Indiana’s Congressional delegation can effect policies that would improve competitive conditions.
4. **Retention Targets with Internal Headwinds** – These are specialized sectors ($LQ \geq 1.2$) that did not experience GDP growth over the 2015-2020 period and lost competitive share against the sector overall in the

nation. The lower level of performance versus the industry nationally may suggest that internal Indiana factors may be impacting industry trajectory (factors such as access to workforce, lack of investment in the latest technologies, etc.)

- 5. Emerging Strength** – These are sectors where Indiana experienced expanding GDP and which gained competitive share but are not yet at the level of being a state industry specialization ($LQ < 1.2$). These can be viewed as promising up-and-coming sectors for the Indiana economy – industries on a growth trajectory and improving their comparative performance versus the industry overall in the nation.
- 6. Emerging Opportunity** – These are sectors that grew their GDP contribution over 2015-2020 but are not yet specializations and did not gain share versus the sector overall in the national economy. These are growing industries that are not keeping pace with their industry growth nationally, and there may be local factors to examine that are constraining their performance.
- 7. High Challenge** – These are sectors where the state is not specialized ($LQ < 1.2$) and did not grow in terms of GDP between 2015-2020. However, they did gain share. Not growing, but gaining share implies that they are contracting to a lesser extent than the industry in the nation overall. However, the trajectory demonstrated is still not positive.
- 8. Highest Challenge** – These, as the name implies, are sectors experiencing significant constraints on their performance. They are not specialized, not growing, and losing competitive share. These are the industries in the most challenged position.

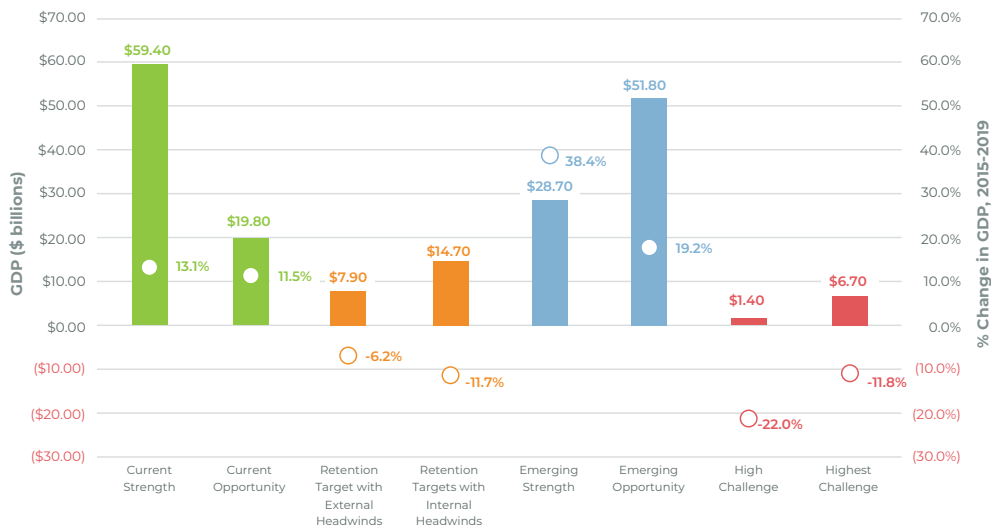
The ITA analysis examined 129 sectors in Indiana, comprising 72 manufacturing sectors and 57 non-manufacturing sectors (each with a significant traded component to their business volume). Only sectors having 100 or more employees are included. Collectively, these sectors combined for \$190.4 billion in 2020 Indiana GDP (58.6% of total state GDP), support 1.34 million direct Indiana jobs (45.9% of state total employment) and generated \$461.8 billion in economic output (58.4% of total output). The 129 sectors collectively form the basis for the growth potential within the economy, generating out-of-state sales (state exports) that bring funds into the state economy. The overall impact of these traded sectors is significantly higher however, because much of the activity in other sectors of the economy such as in retail, construction, clinical healthcare, government services, etc. is driven by the economic activity and employment generated by the traded sectors. Table 1 reports the data findings, in aggregate, for each of the 8 ITA categories.

Table 1: Industry Targeting Analysis Overall Results (129 Sectors, \$ Billions)

	Current Strength	Current Opportunity	Retention Target with External Headwinds	Retention Targets with Internal Headwinds	Emerging Strength	Emerging Opportunity	High Challenge	Highest Challenge	Total*
GDP	\$59.4	\$19.8	\$7.9	\$14.7	\$28.7	\$51.8	\$1.4	\$6.7	\$190.4
GDP % of IN Total	18.3%	6.1%	2.4%	4.5%	8.8%	15.9%	0.4%	2.1%	58.6%
%Change, 2015-2020	13.1%	11.5%	-6.2%	-11.7%	38.4%	19.2%	-22.0%	-11.8%	15.4%
Jobs	312,434	173,307	73,152	86,468	174,815	371,743	12,058	40,984	1,244,961
Jobs % of IN Total	10.6%	5.9%	2.5%	2.9%	5.9%	16.0%	0.4%	1.4%	45.9%
%Change, 2015-2020	21.5%	-0.9%	-3.3%	-12.1%	11.9%	-2.6%	-28.1%	-21.1%	0.9%
Output	\$178.5	\$47.2	\$33.6	\$47.0	\$52.2	\$88.7	\$2.4	\$12.7	\$462.4
Output % of IN Total	22.6%	6.0%	4.2%	5.9%	6.6%	11.2%	0.3%	1.6%	58.4%

* May not sum due to rounding. Source: TEconomy Partners' analysis of U.S. BEA GDP data; employment data from Emsi 2021.3 dataset.

Figure 9: Industry Targeting Analysis Overall Results (129 Sectors, \$ Billions)



Source: TEconomy Partners' analysis of U.S. BEA GDP data; employment data from Emsi 2021.3 dataset.

Key Traded Sector Findings

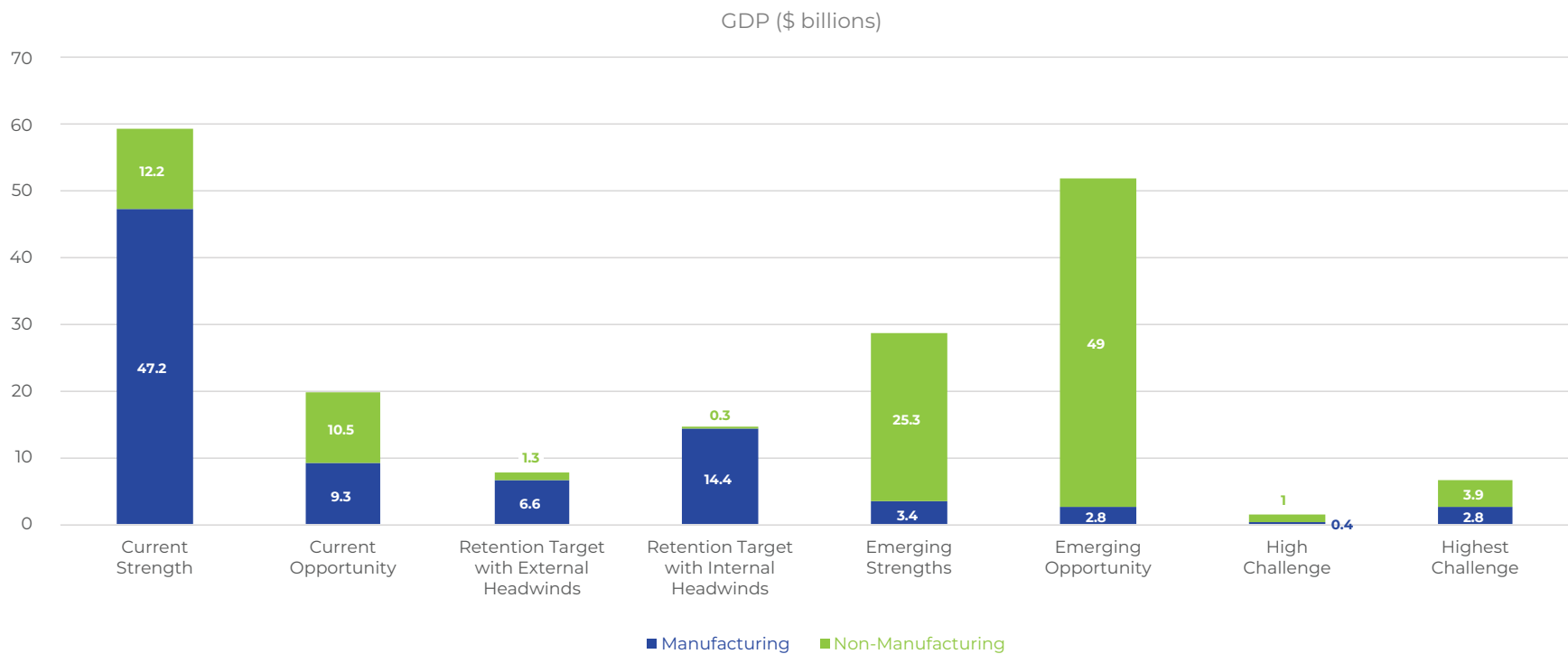
- 24.4 % of total state GDP is generated in the green sectors that are "current strengths" or "current opportunities". Comprises 485,741 jobs.
- 7% of GDP is contained in the orange retention sectors, influenced by external or internal condition headwinds. Comprises a substantial 159,621 jobs in these at risk retention sectors.
- The largest collective category is in the emerging sectors space, which combines for 24.8% of GDP. These emerging sectors combined generate 646,558 jobs.
- Only 2.5% of GDP is in the high/highest challenge sectors. That still equates to many jobs at risk, as these two sectors combine for 53,042 jobs.

Figure 10 shows the respective contribution of manufacturing and non-manufacturing sectors to the total for each of the eight ITA categories. It is a very informative graphic, showing **that the important “current strength” sector sees GDP from advanced and traded industries very much dominated by manufacturing, whereas the emerging categories (“emerging strengths” and “emerging opportunity” sectors) are dominated by non-manufacturing sectors (primarily wholesale trade and services).** Attention to retention (holding on to sectors that are specializations in the Indiana economy but facing evident headwinds) will clearly need to be focused on the manufacturing sector.

One interpretation of Figure 10 is that it tells a tale of two different traded economies in the state:

1. The manufacturing economy is strong and there is not a great deal there that looks significantly challenged in the near-term based on recent trends. But there is very little emerging in new manufacturing industry sectors, and there is considerable Indiana GDP tied to manufacturing sectors that look to be facing headwinds (suggesting need for retention or strategic “pivoting” strategies).

Figure 10: Manufacturing and Non-Manufacturing Structure of Targeting Analysis Categories



Source: TEconomy Partners' analysis of U.S. BEA GDP data.

2. The non-manufacturing economy has relatively little that is a current strength, and mostly represents an emerging opportunity. It should be noted that the largest component of the emerging economy is in the weaker of the two categories, the “emerging opportunity” sector which grew its GDP but lost share against the same sectors in the nation.

Overall, this analysis shows Indiana in just a middling position, but certainly not a great one – and a position that does not show a trend towards achieving a significantly rising trajectory.

One thing that is certain is that sustaining manufacturing in the near- to mid-term is immensely important for Indiana as most of the non-manufacturing is in the emerging categories and we can't be certain that trajectory will hold (given declining share in many of the sectors that comprise it). Plus, manufacturing has a large multiplier effect and robust pay levels – effectively punching above its weight in terms of overall impact and importance to the full Indiana economy.

The big question is “what does the future hold for the individual manufacturing and non-manufacturing industries that are the key drivers underpinning the data?” As will be examined next, some are of outsized importance and their economic performance will hold considerable sway over the direction the Indiana economy takes over the next decade.

Examining the Top 4-Digit NAICS Sectors in Indiana

Out of the full set of 129 sectors evaluated, a considerable percentage of the Indiana traded sector economy is generated by the top 50 sectors (listed in Appendix B). There are 50 sectors that generated at least \$1 billion in 2020 each and taken together these 50 account for \$147 billion in 2020 GDP (77.2% of the total generated by all 129 sectors studied). **Examining the top 50 sectors, therefore, covers more than three-quarters of the traded sector GDP generated in Indiana. Indeed, fully one-third of the traded sector GDP generated for 2020 comes from just the top 10 sectors.** The

Jobs at Risk?

More than 53,000 jobs are in the “high challenge” or “highest challenge” categories and a further 159,000 jobs in the “retention target” categories. So more than 200,000 jobs that could be called significantly “at risk” (around 16% of the total).

It should be noted that the total risk to the Indiana economy in terms of jobs could be significantly larger. Only counted in the analysis are the traded industry jobs (exporting industries), and a great many non-traded sector jobs (in retail and real estate for example) depend on the GDP and income generated within these sectors to sustain their economic activity.

Top 50 sectors directly employ 915,902 personnel in Indiana, while the Top 10 employ 233,799.

Several sectors and related-clusters of sectors stand out in terms of their large-scale importance to the Indiana economy:

- **Medical Products/Industrial Life Sciences manufacturing** – with “Pharmaceutical and Medicine Manufacturing” being the single largest sector, with a 2020 GDP of \$10.5 billion, and “Medical Equipment and Supplies Manufacturing” contributing an additional \$3.6 billion in GDP. Together these two sectors employ over 38,000 personnel in Indiana.
- **Motor vehicle and associated part manufacturing** – with “Motor Vehicle Manufacturing” the second largest sector in terms of GDP generation (\$10 billion), and “Motor Vehicle Parts Manufacturing” contributing an additional \$6.5 billion. “Motor Vehicle Body and Trailer Manufacturing” is also a large contributory sector with generating \$3.8 billion in GDP. These three manufacturing sectors combine for a very large employment level, generating over 115,000 direct jobs in Indiana.

- **Insurance, Banking, and Finance** – including “Insurance Carriers” with \$6.1 billion in GDP contribution (23,385 jobs), “Depository Credit Intermediation” (comprising commercial banks and credit unions predominantly) with \$5.9 billion contributed to state GDP (29,172 jobs), “Nondepository Credit Intermediation” (credit cards, sales financing, etc.) with \$2.2 contributed to GDP (9,166 employees), and “Other Financial Investment Activities” contributing \$1.7 billion (4,14 jobs).
- **Iron and Steel Mills and Ferroalloy Manufacturing** – remains a long-standing industry of significant size in Indiana, contributing \$4.7 billion in GDP and supporting over 16,600 jobs.
- **Computer Systems Design and Related Services** – is an important emerging opportunity sector with \$4.2 billion in GDP and over 30,000 personnel. This sector looks, however, to be quite internally focused inside of Indiana, with exports outside of the state only comprising 15% of sales.

Table 2: Top 10 Highest Traded Sectors in 2020 Indiana GDP Generation

		Current Strength	Current Opportunity	Retention Target (External Headwinds)	Retention Target (Internal Headwinds)	Emerging Strength	Emerging Opportunity	High Challenge	Highest Challenge
1	Pharmaceutical and Medicine Manufacturing	10,467,172,239							
2	Motor Vehicle Manufacturing	10,040,099,555							
3	Motor Vehicle Parts Manufacturing			6,503,157,023					
4	Insurance Carriers						6,102,016,399		
5	Depository Credit Intermediation						5,935,057,440		
6	Petroleum and Coal Products Manufacturing	5,014,390,711							
7	Management of Companies and Enterprises						4,846,294,732		
8	Iron and Steel Mills and Ferroalloy Manufacturing				4,712,941,270				
9	Wired and Wireless Telecommunications Carriers					4,700,497,248			
10	Agencies, Brokerages, and Other Insurance Related Activities						4,549,763,266		
Totals by ITA Category		25,521,662,505	0	6,503,157,023	4,712,941,270	4,700,497,248	21,433,131,837	0	0

The results show Indiana to be unlikely to shift onto a steep upwards trajectory, primarily because the emerging sectors are generally in the weaker of the two emerging categories (“emerging opportunity”) based on having a GDP growth rate that, while positive, still lags behind the national rate of growth in the sectors.

The industry targeting analysis certainly shows manufacturing to be of critical ongoing importance within the Indiana economy, and it dominates the current strengths category. The results lead to the following conclusions:

- Manufacturing industries assessed employ 491,159 and non-manufacturing employs 753,802, but GDP from these two categories is more closely matched at \$86.97 billion for manufacturing and \$103.46 billion for non-manufacturing. GDP per worker is thus significantly higher in manufacturing (\$177,071) than for non-manufacturing (\$137,251).
- Manufacturing’s output is \$283.1 billion, and of that fully \$232.8 billion is exported outside of the state (82.2%). In comparison, non-manufacturing only exports \$58.9 billion (32.8%) of its \$179.3 billion in

total output. If manufacturing declined, it would take significantly higher levels of output from non-manufacturing to generate equivalent levels of exports for Indiana (i.e. the generation of “fresh” dollars coming into Indiana to enable economic expansion).

- Manufacturing needs to be defended, and invested in, aggressively in order to assure Indiana doesn’t have an even steeper hill to climb in terms of increasing its economic performance.

Finance and, especially, insurance related commercial activities represent a larger and expanding “emerging opportunity” for Indiana. Other areas of opportunity are evident in computer systems design and in the management and science consulting, engineering services, and business services sectors. These emerging areas, and others, will be examined further in Phase II to better understand their potential growth trajectories.

II. SITUATIONAL ANALYSIS

A Dashboard of Indiana's Recent Performance on Key Economic and Innovation Ecosystem Metrics

Whether or not a state is moving economically in the right direction, or poised to do so, need not only be considered from a GDP perspective. GDP is a good measure of overall performance of an economy, but there are underlying and additional factors to consider. In this section of the report, several additional metrics are considered that help to diagnose economic and important innovation ecosystem conditions in Indiana, including:

- **Employment** – What has been the recent performance in terms of employment growth relative to the nation?
- **Average Wages** – How does Indiana compare to the nation in terms of current wage levels and income growth trends?
- **Growth in Business Establishments** – Is Indiana growing new business establishments faster, or slower, than the nation overall?
- **Productivity** – A key measure underpinning overall economic performance. Is labor productivity increasing or decreasing in Indiana relative to the nation?
- **R&D Spending Per Capita** – Examining how the state compares on investment in R&D, a key driver of innovation economy performance and competitiveness.
- **SBIR/STTR award growth** – What have been recent trends in Indiana's performance on these important early stage funding tools for the commercialization of innovations?
- **Venture Capital** – Measuring performance on the attraction of risk capital for sustaining growth entrepreneurial business ventures
- **STEM Occupations** – Examining the position of Indiana in the important category of science, technology, engineering, and math oriented occupations.
- **Educational Attainment** – Assessing the percentage and growth in members of the working-age population with higher education credentials.
- **Population** – Considering this baseline demographic metric and trends in population growth.

Figures 11 and 12 summarize the data for each of these economic and innovation ecosystem metrics. The results are summarized in a “dashboard” format showing the position of Indiana on each metric in terms of its national rank, with the baseline central axis being the state's GDP rank (18th in the nation). This provides a readily scannable summary of economic and ecosystem performance for 2010 through 2019 (Figure 11) and just for 2019 (Figure 12).

It is clear from these results that while Indiana performs well on a few of the measures (such as venture capital deals over the decade), for the most part the state is lagging – performing at a ranking often considerably below its overall rank among all U.S. states in GDP (18th). An important point to note is the uptick in performance in terms of R&D activity for 2019, an area that is

critical for sustaining innovation to advance Indiana's economy (this should be monitored to see if this uptick is sustained moving forward). Overall, however, the results show that Indiana has a lot of work to do to advance most of the measures to simply where they would be expected to be based on the size of the state economy. Where Indiana appears particularly constrained is in the portion of its population that is working age generally, and particularly in terms of the working age population having higher education credentials (where Indiana ranked 43rd in 2019). Productivity is also an evident issue, with Indiana ranked 23rd over the 2010-2019 timespan, and 35th in 2019. It is also notable that while Indiana's R&D performance is overall comparable to

the nation, the findings for SBIR/STTR activity (programs funding early stage innovative commercialization ventures) indicate that there are challenges in Indiana in converting R&D into commercial innovations that are the basis for new companies, and/or that there is a low level of awareness of these important federal programs among Indiana's emerging businesses.

Appendix C provides more detail and commentary on findings for each of the individual dashboard metrics.

Figure 11: Summary Dashboard, 2010-2019 Timespan

GDP Rank = 18th

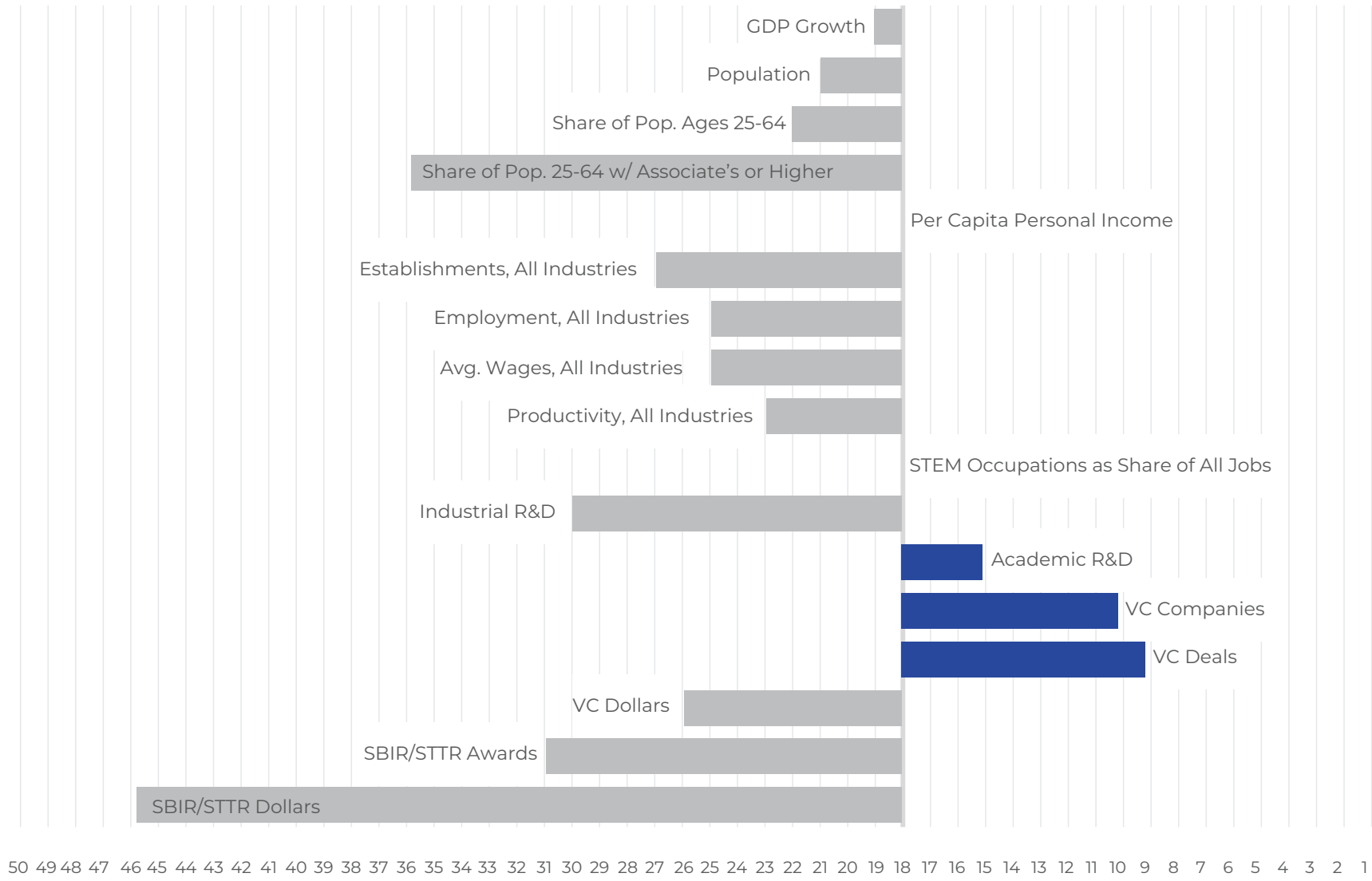
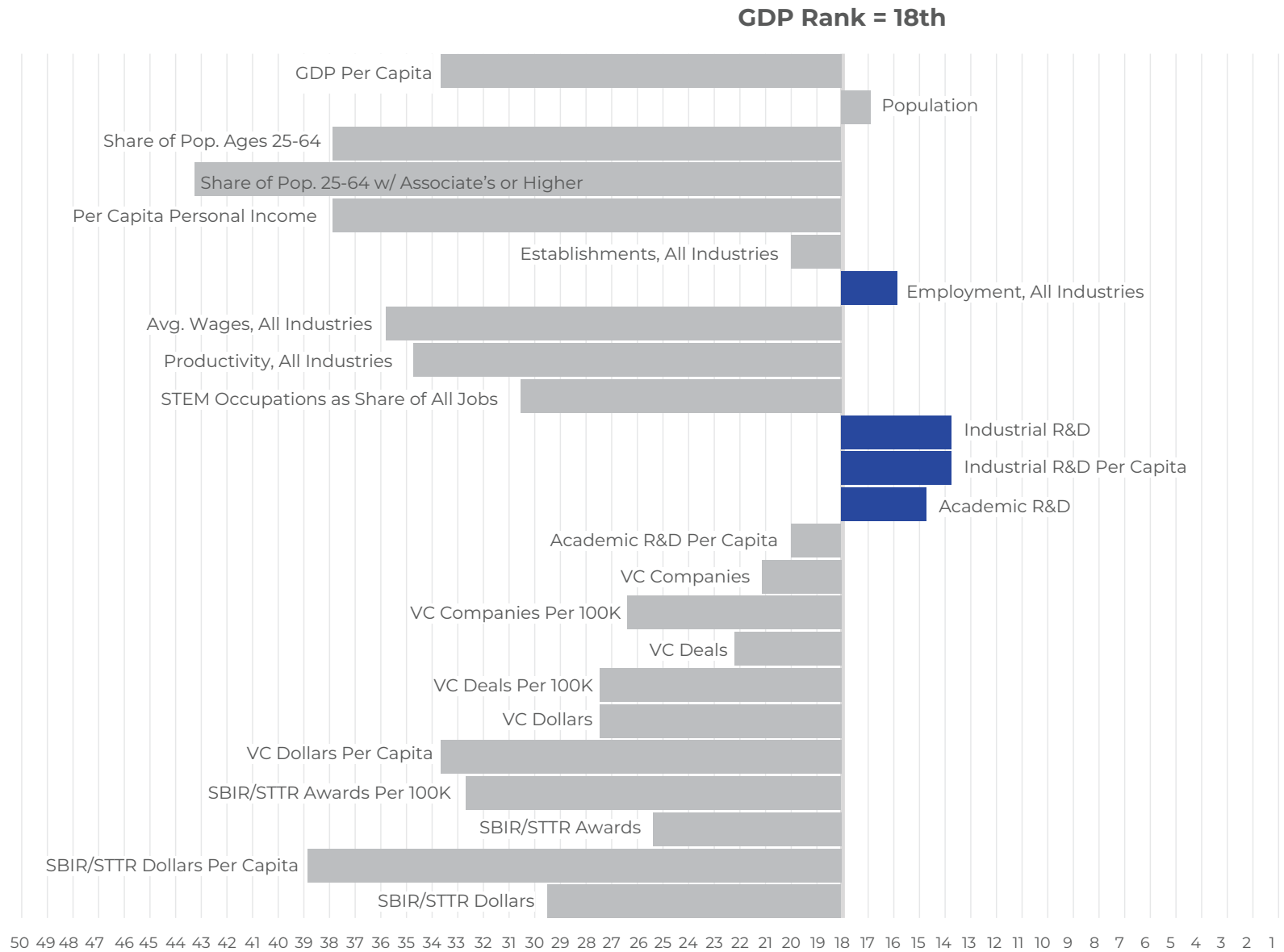


Figure 12: Summary Dashboard, 2019



III. CONCLUSION

Indiana has an opportunity to take its economy to the next level via working to fully leverage the power and promise of Industry 4.0 technologies within its signature manufacturing sector, and more broadly by deploying digital technologies and advanced analytics to boost productivity and output in other core industry sectors. There is a window of opportunity to secure Indiana as a global leader in IoT and Industry 4.0 technological deployment, within manufacturing and beyond into multiple other existing sectors. This will also require investing in developing, building, and attracting industry activity in new technologies, including disruptive technologies (in areas such as battery technologies, sensors, digital components, advanced life science technologies, and other opportunity and cross-cutting support spaces). Investing in R&D and innovation is also an important parallel strategic

imperative, building on core competencies in academic and industry R&D to advance innovation and diversify the industry base in the state. The primary constraint on business attraction and growth for the state is the flat population trajectory which limits workforce availability as a growth driver. As such, investment in the workforce that the state has today, and the upcoming workforce currently in the K-12 system, is crucial to enabling deployment of productivity enhancing technologies, automation, and technological core competencies that will drive GDP growth for Indiana. This report has provided a situational assessment that will be further expanded upon. Forthcoming work will focus analysis on sectors of opportunity (both existing and new) and advance the development of specific strategy and action recommendations to realize a bold vision for economic growth across Indiana.

APPENDICES

Appendix A: Indiana 2-Digit NAICS Performance – Comparison to National Sector GDP Growth and Indiana Overall GDP Growth.

NAICS	2019 GDP (mil)	IN 2010-19	U.S. 2010-19	IN Variance	IN 2017-19	U.S. 2017-19	IN Variance	Performance, 2017-19
All industry total	\$381,020	34.80%	42.00%	-7.20%	7.90%	9.70%	-1.80%	lags U.S.
Manufacturing	\$99,255	21.40%	31.70%	-10.30%	5.20%	7.80%	-2.60%	lags IN and U.S.
Real estate and rental and leasing	\$39,735	37.40%	39.50%	-2.10%	11.20%	10.40%	0.80%	exceeds IN and U.S.
Health care and social assistance	\$32,423	46.40%	43.50%	2.90%	8.70%	9.20%	-0.50%	exceeds IN but lags U.S.
State and local government	\$29,927	34.80%	28.30%	6.50%	8.10%	7.40%	0.70%	exceeds IN and U.S.
Finance and insurance	\$22,955	67.90%	67.20%	0.70%	16.10%	11.30%	4.80%	exceeds IN and U.S.
Wholesale trade	\$21,968	42.10%	43.30%	-1.20%	11.80%	9.40%	2.40%	exceeds IN and U.S.
Retail trade	\$20,163	25.90%	36.90%	-11.00%	3.80%	7.90%	-4.10%	lags IN and U.S.
Construction	\$17,081	80.00%	71.90%	8.10%	13.90%	12.90%	1.00%	exceeds IN and U.S.
Professional, scientific, and technical services	\$17,002	53.00%	54.40%	-1.40%	11.80%	12.80%	-1.00%	exceeds IN but lags U.S.
Transportation and warehousing	\$13,391	45.40%	58.20%	-12.89%	9.80%	12.50%	-2.70%	exceeds IN but lags U.S.
Admin and support and waste mgmt and remediation svcs	\$11,446	52.30%	54.00%	-1.70%	11.80%	11.80%	-0.00%	exceeds IN but lags U.S.
Accommodation and food services	\$9,633	57.20%	66.70%	-9.50%	2.90%	10.10%	-7.20%	lags IN and U.S.
Other services (except gov't)	\$8,563	35.00%	38.50%	-3.50%	10.00%	9.90%	-0.10%	exceeds IN and U.S.
Utilities	\$7,131	15.10%	19.40%	-4.30%	7.10%	7.00%	-0.10%	lags IN but exceeds U.S.
Information	\$6,329	0.90%	50.30%	-49.40%	-2.10%	12.90%	-15.00%	lags IN and U.S.
Federal civilian government	\$5,308	23.40%	25.30%	-1.90%	8.70%	6.80%	1.90%	exceeds IN and U.S.
Management of companies and enterprises	\$4,896	58.10%	55.20%	2.90%	4.70%	10.50%	-5.80%	lags IN and U.S.
Arts, entertainment, and recreation	\$4,186	27.70%	58.10%	-30.40%	9.30%	11.10%	-1.80%	exceeds IN but lags U.S.
Educational services	\$4,117	28.30%	38.20%	-9.90%	9.00%	10.40%	-1.40%	exceeds IN but lags U.S.
Agriculture, forestry, fishing and hunting	\$3,046	-6.50%	12.20%	-18.70%	-22.10%	-7.60%	-14.50%	lags IN and U.S.
Military	\$1,236	-18.10%	5.40%	-23.50%	2.50%	6.20%	-3.70%	lags IN and U.S.
Mining, quarrying, and oil and gas extraction	\$1,233	-19.00%	-3.50%	-15.50%	-17.70%	6.80%	-24.50%	lags IN and U.S.

Appendix B: Large and Leading GDP Generating Traded Sectors in Indiana (50 Traded Sectors Contributing >\$1 Billion in 2020 GDP)

Description	2020 GDP \$	2020 GDP LQ	2015-2020 GDP Change %	2015-2020 Productivity Chang %	2020 Jobs	2015-2020 Emp Change %	2020 Avg. Earnings Per Job \$	2020 Payrolled Business Locations	2020 Total Sales \$	2020 % Exported Sales	Targeting Category
Pharmaceutical and Medicine Manufacturing	10,467,172,239	3.96	32.2%	22.2%	18,887	8.2%	203,645	92	16,771,155,416	89%	Current Strength
Motor Vehicle Manufacturing	10,040,099,555	7.39	12.9%	-4.8%	18,913	18.5%	95,482	26	53,411,075,917	95%	Current Strength
Motor Vehicle Parts Manufacturing	6,503,157,023	6.37	-2.7%	1.5%	57,959	-4.1%	75,672	334	30,003,128,522	74%	Retention Target (External Headwinds)
Insurance Carriers	6,102,016,399	0.98	5.5%	4.6%	23,385	0.9%	103,474	735	12,065,547,294	40%	Emerging Opportunity
Depository Credit Intermediation	5,935,057,440	0.70	34.9%	36.3%	29,172	-1.0%	76,757	2,457	8,307,384,910	20%	Emerging Opportunity
Petroleum and Coal Products Manufacturing	5,014,390,711	1.84	14.9%	0.3%	3,653	14.5%	184,808	52	16,512,759,652	80%	Current Strength
Management of Companies and Enterprises	4,846,294,732	0.69	15.3%	12.9%	34,035	2.1%	124,572	1,242	7,952,628,865	23%	Emerging Opportunity
Iron and Steel Mills and Ferroalloy Manufacturing	4,712,941,270	13.06	-10.4%	4.5%	16,657	-14.2%	114,927	33	23,823,752,768	82%	Retention Target (Internal Headwinds)
Wired and Wireless Telecommunications Carriers	4,700,497,248	0.83	46.1%	83.5%	8,125	-20.4%	92,459	436	9,844,003,519	36%	Emerging Strength
Agencies, Brokerages, and Other Insurance Related Activities	4,549,763,266	0.95	31.2%	16.7%	23,013	12.4%	80,061	3,910	9,909,937,920	15%	Emerging Opportunity
General Freight Trucking	4,416,025,736	1.91	14.3%	22.9%	38,088	-7.0%	72,651	2,824	9,731,045,208	40%	Current Opportunity
Computer Systems Design and Related Services	4,237,803,662	0.61	42.8%	15.7%	30,063	23.5%	114,008	4,852	5,395,817,788	15%	Emerging Strength
Employment Services	4,186,939,198	1.13	3.3%	28.5%	77,741	-19.6%	40,707	2,736	6,581,758,864	28%	Emerging Opportunity
Petroleum and Petroleum Products Merchant Wholesalers	3,968,668,607	1.23	22.6%	14.6%	2,540	7.0%	96,703	217	4,794,324,968	39%	Current Strength
Motor Vehicle Body and Trailer Manufacturing	3,830,875,903	17.74	18.8%	9.2%	38,562	8.8%	73,551	168	15,325,281,540	84%	Current Strength

Description	2020 GDP \$	2020 GDP LQ	2015-2020 GDP Change %	2015-2020 Productivity Chang %	2020 Jobs	2015-2020 Emp Change %	2020 Avg. Earnings Per Job \$	2020 Payrolled Business Locations	2020 Total Sales \$	2020 % Exported Sales	Targeting Category
Medical Equipment and Supplies Manufacturing	3,634,755,230	3.43	-2.0%	-8.5%	19,512	7.0%	95,126	276	5,885,884,933	90%	Retention Target (Internal Headwinds)
Plastics Product Manufacturing	3,396,784,568	2.91	2.6%	5.2%	32,120	-2.5%	61,664	457	9,939,857,329	82%	Current Opportunity
Warehousing and Storage	2,984,795,565	1.94	84.8%	-2.0%	52,651	88.7%	48,895	447	5,696,505,860	55%	Current Strength
Legal Services	2,933,391,116	0.60	18.6%	21.9%	13,944	-2.7%	86,934	2,724	3,917,091,907	9%	Emerging Opportunity
Machinery, Equipment, and Supplies Merchant Wholesalers	2,738,190,338	1.45	13.6%	8.3%	18,788	4.9%	82,216	2,010	4,537,881,664	51%	Current Strength
Management, Scientific, and Technical Consulting Services	2,697,476,821	0.61	48.2%	7.1%	20,681	38.4%	87,275	4,713	4,082,253,096	24%	Emerging Strength
Engine, Turbine, and Power Transmission Equipment Manufacturing	2,467,019,322	8.95	1.1%	10.5%	12,173	-8.6%	118,981	41	8,507,105,163	87%	Current Strength
Architectural, Engineering, and Related Services	2,393,626,870	0.67	28.6%	13.8%	20,628	13.0%	90,593	2,406	4,017,764,631	14%	Emerging Strength
Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	2,219,937,805	1.98	10.5%	8.5%	12,146	1.8%	72,686	752	4,462,394,165	63%	Current Opportunity
Professional and Commercial Equipment and Supplies Merchant Wholesalers	2,212,304,123	0.91	25.2%	11.2%	12,895	12.7%	112,623	1,577	3,673,630,807	73%	Emerging Opportunity
Nondepository Credit Intermediation	2,208,586,247	0.74	53.0%	50.1%	9,166	2.0%	114,332	796	3,594,447,910	34%	Emerging Strength
Services to Buildings and Dwellings	2,190,557,559	0.94	27.1%	23.0%	39,278	3.3%	37,120	4,453	3,899,276,531	12%	Emerging Opportunity
Outpatient Care Centers	2,077,185,505	0.91	57.1%	27.0%	19,281	23.7%	67,562	952	3,328,792,338	35%	Emerging Opportunity
Aerospace Product and Parts Manufacturing	1,777,775,441	0.80	-2.3%	1.8%	6,076	-4.0%	119,907	54	3,680,911,182	76%	Highest Challenge
Other Financial Investment Activities	1,709,279,404	0.35	17.0%	1.3%	4,140	15.5%	130,738	1,120	4,165,465,478	11%	Emerging Opportunity
Accounting, Tax Preparation, Bookkeeping, and Payroll Services	1,633,814,376	0.72	25.7%	12.8%	15,706	11.4%	76,321	2,333	2,308,640,748	14%	Emerging Strength

Description	2020 GDP \$	2020 GDP LQ	2015-2020 GDP Change %	2015-2020 Productivity Chang %	2020 Jobs	2015-2020 Emp Change %	2020 Avg. Earnings Per Job \$	2020 Payrolled Business Locations	2020 Total Sales \$	2020 % Exported Sales	Targeting Category
Drugs and Druggists' Sundries Merchant Wholesalers	1,587,460,394	0.82	38.5%	20.5%	3,387	15.0%	156,540	423	2,891,920,177	64%	Emerging Opportunity
Other General Purpose Machinery Manufacturing	1,579,706,522	2.17	12.8%	11.0%	11,807	1.7%	71,325	220	4,182,002,042	89%	Current Strength
Basic Chemical Manufacturing	1,530,307,852	0.82	37.0%	35.6%	3,124	1.0%	104,673	87	4,559,011,678	78%	Emerging Strength
Household Appliances and Electrical and Electronic Goods Merchant Wholesalers	1,483,828,046	0.91	11.1%	0.9%	6,964	10.1%	85,193	753	2,710,167,689	66%	Emerging Opportunity
Other Professional, Scientific, and Technical Services	1,444,057,909	0.63	31.9%	22.5%	11,870	7.7%	53,152	1,466	2,155,641,845	13%	Emerging Opportunity
Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	1,333,920,778	2.32	5.1%	13.9%	14,292	-7.7%	63,699	689	2,761,722,270	61%	Current Strength
Couriers and Express Delivery Services	1,333,058,946	1.29	40.1%	5.1%	20,585	33.3%	50,802	246	2,399,918,106	51%	Current Opportunity
Miscellaneous Nondurable Goods Merchant Wholesalers	1,329,555,473	1.23	1.3%	8.5%	7,703	-6.7%	68,429	780	2,226,922,714	41%	Current Opportunity
Securities and Commodity Contracts Intermediation and Brokerage	1,303,552,225	0.46	2.5%	1.2%	5,617	1.2%	174,684	966	1,931,933,915	16%	Emerging Opportunity
Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	1,263,223,570	0.53	16.8%	31.3%	5,944	-11.1%	99,860	150	1,576,412,869	79%	Emerging Opportunity
Grain and Oilseed Milling	1,208,813,442	3.26	43.5%	35.9%	3,003	5.6%	95,413	30	6,397,014,419	80%	Current Strength
Grocery and Related Product Merchant Wholesalers	1,160,216,938	0.73	-1.7%	12.3%	10,691	-12.5%	65,570	721	2,043,264,892	38%	Highest Challenge
Specialized Freight Trucking	1,146,528,852	1.68	15.3%	17.4%	13,317	-1.8%	68,722	1,374	2,526,516,921	36%	Current Strength
Architectural and Structural Metals Manufacturing	1,143,407,102	1.83	19.5%	20.1%	12,711	-0.5%	66,616	390	3,011,769,989	69%	Current Strength
Animal Slaughtering and Processing	1,140,761,642	1.29	47.8%	30.8%	11,466	13.0%	58,206	102	5,684,934,881	75%	Current Strength

Description	2020 GDP \$	2020 GDP LQ	2015-2020 GDP Change %	2015-2020 Productivity Chang %	2020 Jobs	2015-2020 Emp Change %	2020 Avg. Earnings Per Job \$	2020 Payrolled Business Locations	2020 Total Sales \$	2020 % Exported Sales	Targeting Category
Wholesale Electronic Markets and Agents and Brokers	1,067,306,646	0.85	-27.2%	8.3%	8,696	-32.8%	103,634	2,573	1,149,013,423	16%	High Challenge
Household and Institutional Furniture and Kitchen Cabinet Manufacturing	1,062,405,833	3.87	7.0%	6.1%	15,700	0.8%	55,432	408	2,631,069,932	86%	Current Strength
Printing and Related Support Activities	1,061,269,032	1.71	-6.4%	11.5%	12,998	-16.0%	54,721	630	2,307,071,869	77%	Retention Target with External Headwinds
Beverage Manufacturing	1,028,379,315	1.08	59.4%	20.7%	6,052	32.0%	61,357	227	2,705,273,708	65%	Emerging Strength
TOTALS	146,994,943,796				915,902			57,455	361,979,090,229		
% of All Traded Analyzed	77.19%				73.57%			76.20%	78.29%		

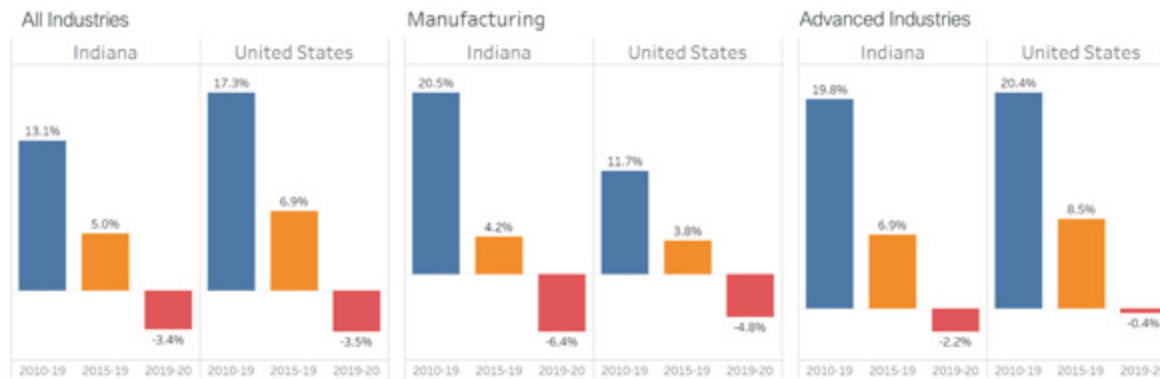
Source: TEconomy Partners' analysis of Emsi 2021.3 dataset.

Appendix C: Situational Analysis Summary Statistics

Basic summary statistics are provided for each of the situational analysis measures that relate to economic performance and ecosystem capabilities and assets to leverage. Data findings are presented in terms of a table on each metric that summarizes the raw statistic for Indiana and the United States focused on three groupings of industry sectors – 1) all industries, 2) manufacturing industries (as defined by the 2-digit manufacturing NAICS), and 3) industries defined by TEconomy as advanced industries, which includes manufacturing and non-manufacturing industries that have a high STEM, IT/digital content, are in innovation-driven sectors and have a significant traded content. The advanced industries concept used comprises an expansion of the “Advanced Industries” concept, put forward by Brookings Institution and is defined using 4-digit NAICS.

C1. Employment

2020 Employment	All Industries	Manufacturing	Advanced Industries
United States	197,499,479	12,920,032	53,836,086
Indiana	3,869,262	521,117	1,209,187

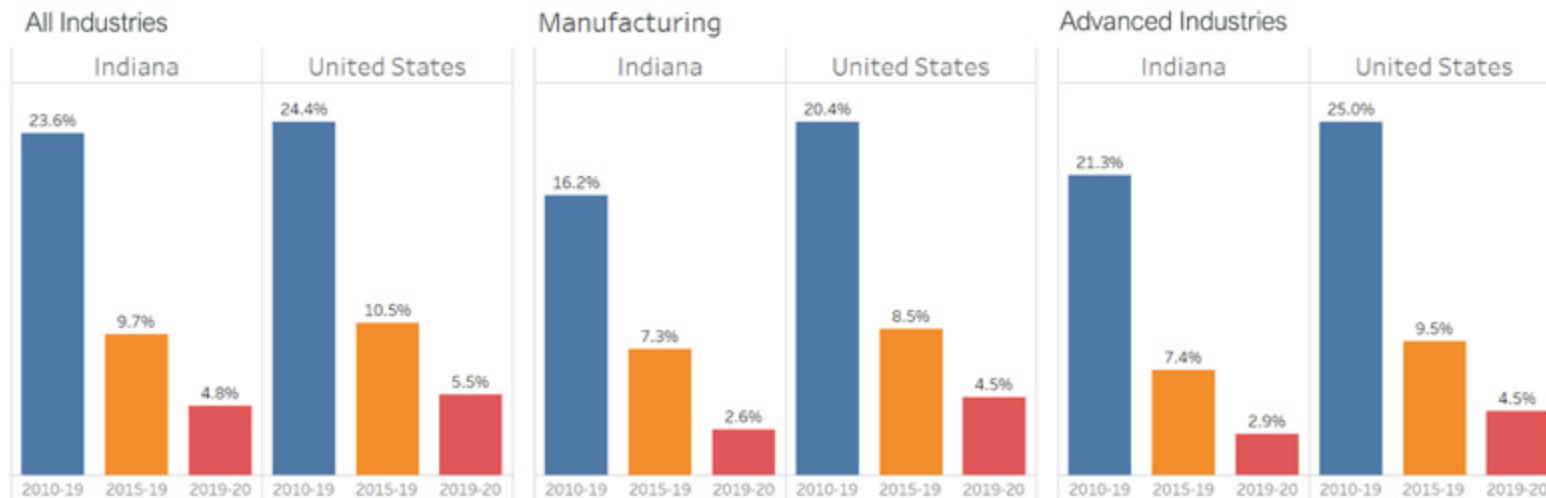


Source: Emsi (Datarun 2021.4); TEconomy calculations

- Across all industry sectors, Indiana’s growth in employment from 2010 through 2019 fell somewhat behind national levels. When the COVID induced recession hit, Indiana saw a moderately lower decline in employment versus the nation.
- In manufacturing for 2010-2019 Indiana outperformed the nation in employment growth, particularly in the earlier part of the decade. COVID generated a somewhat larger proportionate decline in manufacturing jobs than was seen in the nation.
- In the advanced industries category, for 2010-2019 overall, Indiana kept pace with the nation overall. However, the more recent 2015-2019 part of the timespan saw Indiana losing ground somewhat.

C2. Average Wages

2020 Avg. Wages	All Industries	Manufacturing	Advanced Industries
United States	\$55,822	\$70,942	\$81,996
Indiana	\$46,791	\$64,289	\$63,315



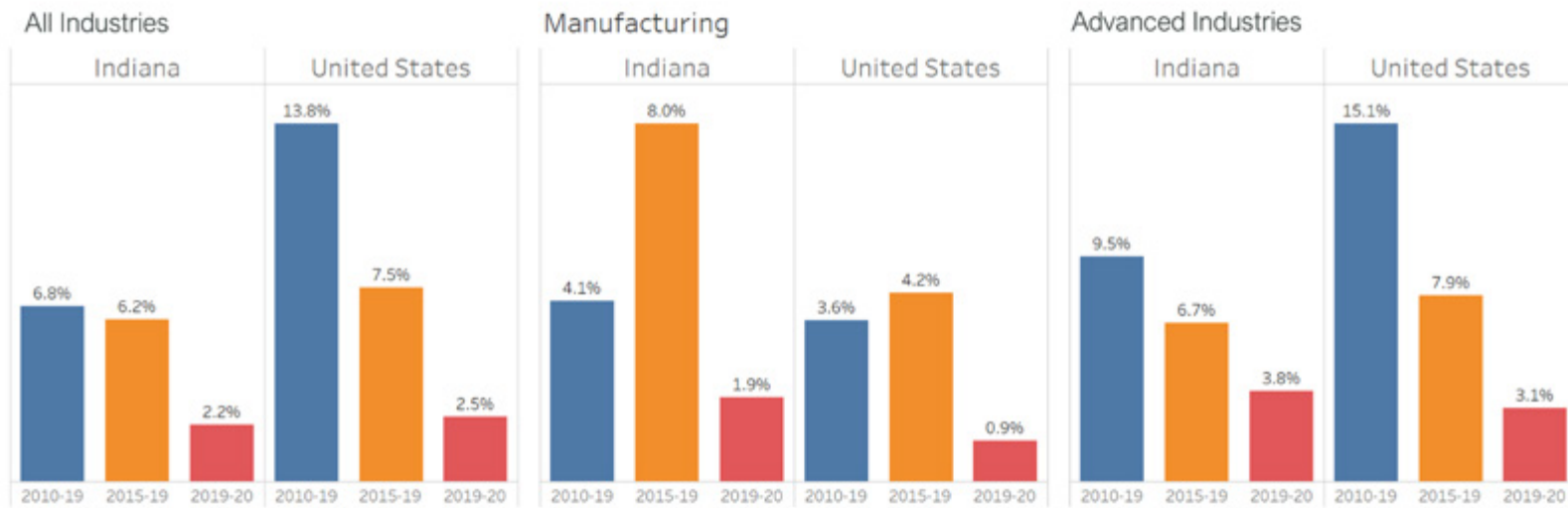
Source: Emsi (Datarun 2021.4); TEconomy calculations

- Indiana demonstrates average wages that are significantly lower than average wage levels in each of the three industry aggregations. The widest differential is in advanced industries, where Indiana's average wage of \$63,315 is 77.2% of the national average wage. In manufacturing Indiana is at 90.6% of the average national wage for the sector, while for all industries Indiana is at 83.8% of the national level.
- Evident across the graphs is the fact that in each of the three classifications, and for each of the three time periods shown, Indiana's wage growth has been lower than the average experienced in the U.S. overall.

C3. Business Establishments.

Count of individual business establishment locations in Indiana and the United States. For example, an individual firm having a headquarters, a manufacturing plant, and a distribution center in different non-contiguous Indiana geographic locations would be three establishments.

2020 Establishments	All Industries	Manufacturing	Advanced Industries
United States	10,486,796	358,272	2,929,689
Indiana	172,587	9,255	57,709

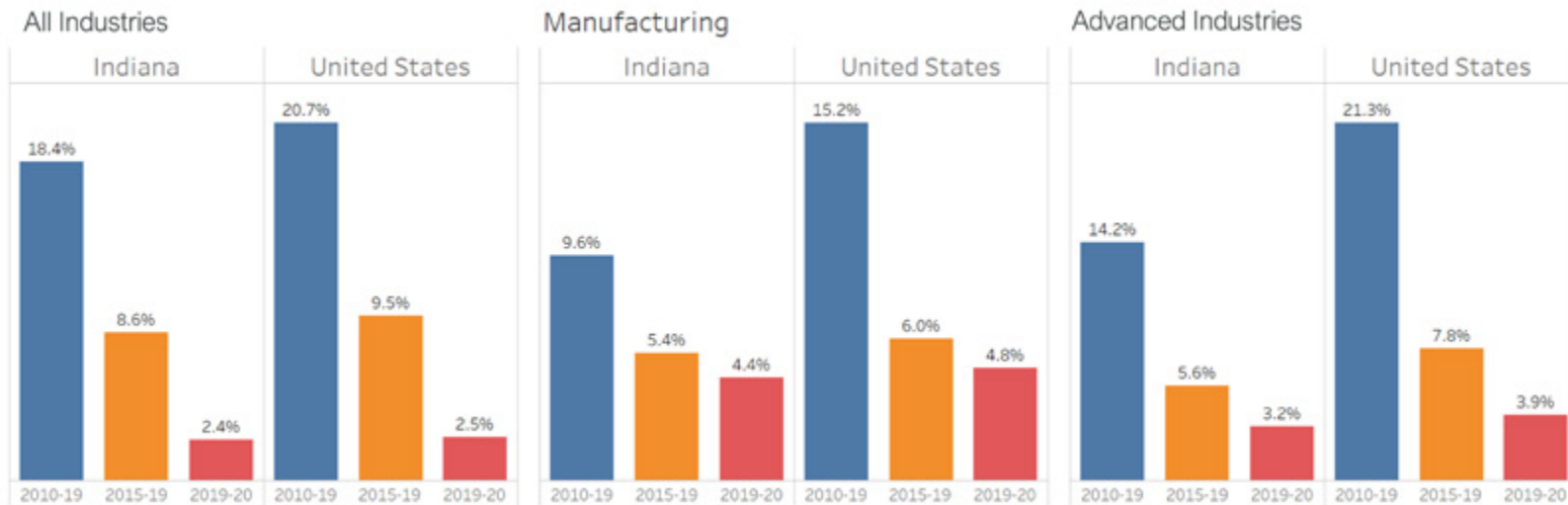


Source: Emsi (Datarun 2021.4); TEconomy calculations

- Overall (all industries) Indiana has experienced a lower growth rate in the number of business establishments during the 2010-2019 timespan. It is evident however, that more recently, in the 2015-2019 latter part of the decade, Indiana closed the gap in its differential in business establishment growth versus the national growth (however, this can be seen to be largely a result of national establishment growth slowing significantly in the latter part of the decade, rather than Indiana increasing its establishment growth rate). The same result holds true for the advanced industries classification.
- Notably, the oft discussed “decline in U.S. manufacturing” is not evident in these data. U.S. manufacturing business locations have grown over the past decade, and Indiana has experienced growth in manufacturing establishments that is significantly higher than the national rate – especially in the latter half of the past decade.

C4. Productivity (Value-Added per Employee)

2020 Productivity	All Industries	Manufacturing	Advanced Industries
United States	\$95,228	\$117,728	\$159,815
Indiana	\$84,269	\$167,913	\$140,521



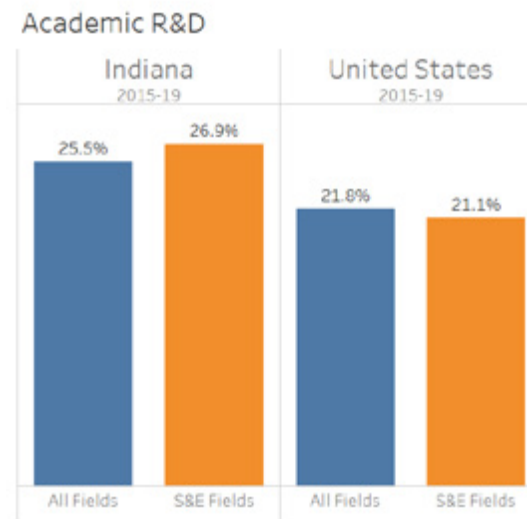
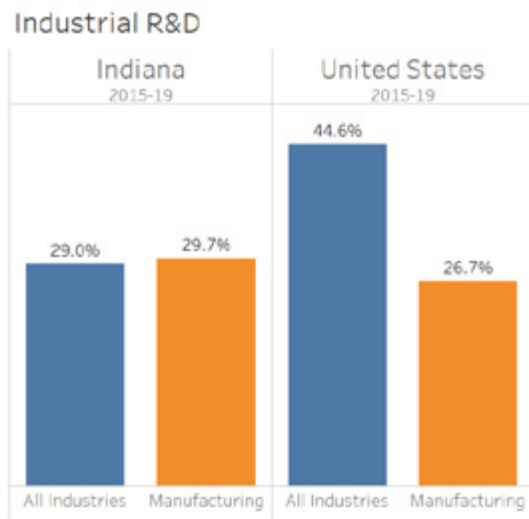
- Indiana manufacturing productivity⁶ is a standout characteristic of the state economy. For 2020, productivity in manufacturing in Indiana stood at \$167,913 (as measured by value-added per worker) versus \$117,728 for the U.S. overall. Indiana’s manufacturing productivity was 42.6% higher than the national level in 2020.
- Across the “all industries” classification and “advanced industries” classification, however, Indiana demonstrated a somewhat lower productivity level than the nation. Indiana’s productivity level for 2020 was 88.5% of the national level for all industries and 87.9% of the national level in advanced industries.
- Of concern is that, in terms of productivity growth rate over the past decade, Indiana’s rate of productivity growth has consistently lagged behind the national average level. Indiana is thus losing ground in productivity growth, including within manufacturing.

⁶ Productivity is calculated as value added per employee on an industry or regional basis. Value added is also characterized as the contribution to GDP. TEconomy uses the Emsi industry-level contribution to state GDP divided by the state’s industry employment to generate a productivity value for each industry for each year of the analysis. For these data Emsi uses data from the U.S. Bureau of Economic Analysis (industry, national, and county-level data) and the U.S. Bureau of Labor Statistics (covered employment data) and U.S. Census Bureau (other employment data) to generate its industry estimates.

C5. R&D Expenditures

Industrial R&D per Capita, 2019	All Industries (Mil)	Manufacturing (Mil)
United States	\$1,302	\$753
Indiana	\$1,021	\$971

Academic R&D per Capita, 2019	All Fields (Mil)	Science & Engr Fields (Mil)
United States	\$254	\$239
Indiana	\$247	\$225



Source: NSF, Higher Education Research & Development Survey; TEconomy calculations

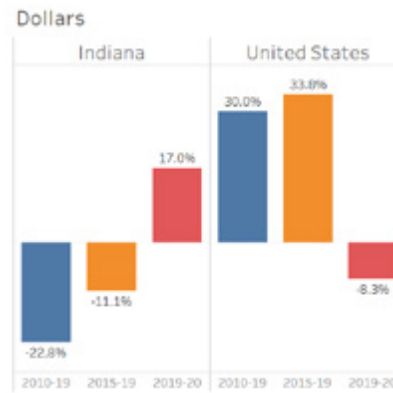
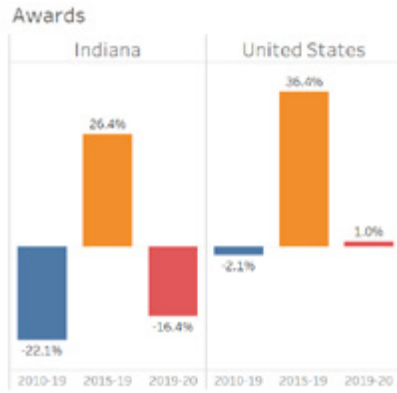
- Academic R&D expenditures per capita in Indiana are very close to the national average. There is more differential evident in industrial R&D, where “all industries” saw an R&D spend per capita in Indiana in 2019 that was 78.4% of the national expenditure level. This reversed, however, when looking at manufacturing where Indiana manufacturers have R&D expenditures that are 29% higher than the national average.
- In terms of growth rate in academic R&D expenditures, Indiana is experiencing faster growth than the U.S. overall. This holds true in science and engineering disciplines, as well as in all disciplines combined.
- On the industry side, Indiana R&D growth was lower than for the nation in the overall “all industries” category. However, Indiana’s manufacturing R&D growth rate exceeded the national average – indicating that Indiana’s comparative advantage in terms of higher levels of manufacturing R&D spend versus the national average is expanding.

C6. SBIR/STTR Funding Awards

SBIR and STTR refer to the Small Business Innovation Research program and the Small Business Technology Transfer program which are highly important seed-funding sources provided by the federal government. The two initiatives are sometimes referred to as “the Nation’s largest source of early stage/high risk funding for start-ups and small business.” To be eligible, the small business must be American-owned, organized as a for-profit entity, and have less than 500 employees. There are eleven Federal Agencies that participate annually in the SBIR program and five that participate in the STTR program.⁷

Awards, 2020	Total Awards	Awards per 1 Mil Residents
United States	7,125	22
Indiana	56	8

Dollars, 2020	Total Dollars (Mil)	Dollars per Capita
United States	\$3,099	\$9.40
Indiana	\$26	\$3.82



Source: SBIR.gov; TEconomy calculations

- Indiana is significantly underperforming on this entrepreneurial business funding metric. In terms of both number of 2020 SBIR/STTR funding awards received (per 1 million residents) and level of funds awarded (\$ per capita), Indiana is substantially below the national average. This is evident across all the timespans covered on the graphics, except for growth rate in the dollar amount per capita for awards in 2019-20 (where Indiana’s growth rate exceeded that of the nation).
- Given that Indiana’s R&D performance is overall comparable to the nation, the SBIR/STTR findings appear to indicate that there are challenges in Indiana in converting R&D into commercial innovations that are the basis for new companies, or that there is a low level of awareness of these important federal programs among Indiana small businesses.

⁷ <https://www.sbir.gov/tutorials/program-basics/tutorial-1>

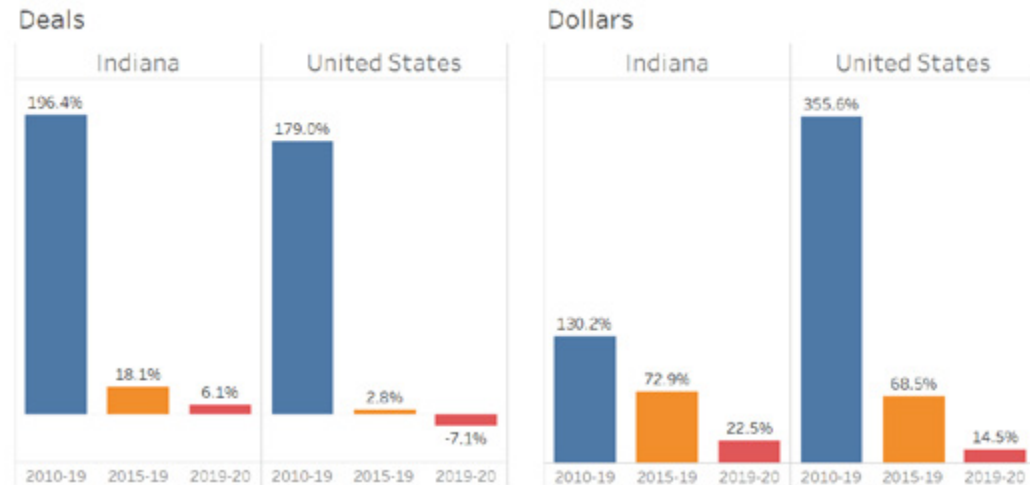
C7. Venture Capital. Companies receiving VC funding, deal volume, and VC amounts received.

Companies, 2020	Total Companies	Companies per 1 Mil Residents
United States	13,805	42
Indiana	150	22

Deals, 2020	Total Deals	Deals per 1 Mil Residents
United States	15,642	47
Indiana	173	26

Dollars, 2020	Total Dollars (Mil)	Dollars per Capita
United States	\$167,026	\$507
Indiana	\$445	\$66

Source: PitchBook Data; TEconomy calculations



- As was seen in the early stage SBIR/STTR data, in the later venture funding rounds supported by venture capital (VC), Indiana is also underperforming relative to its size. In terms of venture funded companies per 1 million residents, Indiana only sees approximately half the level of venture funded companies (22) versus the national average (42). The situation is similar in terms of the number of VC funded deals per 1 million residents, with Indiana at 26 versus the national average being 47.
- Of further concern is the actual dollar amount of venture funding in Indiana for 2020 was far lower than for the nation, these being \$66 versus \$507 respectively. Put another way, 2020 saw Indiana VC funding at only 13% of what it would be expected to be if performing at a national average level.
- The bar charts give further perspective, looking across 2010 through 2019. There is some good news in these in that, in the latter part of the decade, Indiana's growth rate in VC deals and dollar funding has begun to exceed the national average growth rate. That said, Indiana is starting from relatively small levels of VC activity, and under these growth rate differentials it would be many years before Indiana got to a national normative level on these measures.

C8. STEM Occupations

2020 Jobs per 100k Residents	All Industries	Manufacturing	Advanced Industries
United States	6,874	465	2,699
Indiana	6,121	685	2,114



Source: Emsi (Datarun 2021.4); TEconomy calculations

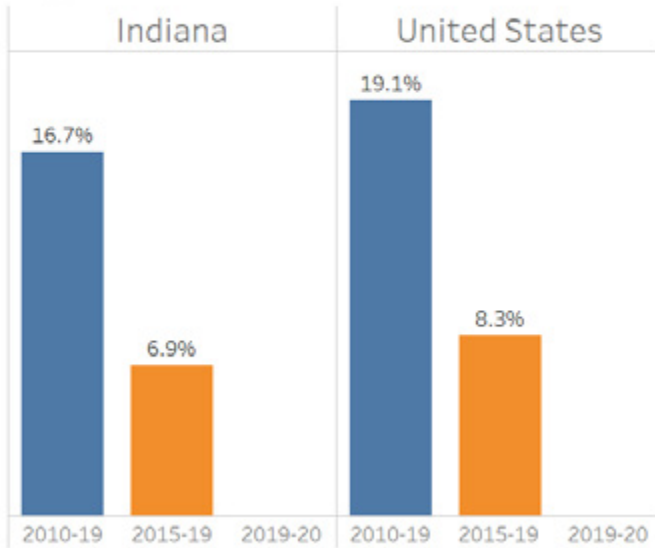
- Across all industries and advanced industries classifications Indiana sees a lower penetration of STEM jobs per 100,000 residents than is average for the U.S. Indiana's rate of STEM employment in all industries is 89% of the national average figure, while in advanced industries it is lower still at 79.2% (2020 data). This finding reverses for Indiana's manufacturing sector, where the proportion of Indiana employment in STEM positions is significantly higher than the U.S. average (likely as a result of the highly technical biopharmaceuticals, medical device, aerospace, propulsion and automotive technology, and other technical sector presence in Indiana's manufacturing mix). STEM jobs in Indiana manufacturing in 2020 stood 38.3% higher than the national average.
- In terms of STEM occupation growth rates, manufacturing has experienced higher than national average growth for 2010-2019, and the latter half of the decade (2015-2019). In the advanced industries category, Indiana started to grow STEM occupations at a rate somewhat faster than the U.S. in the 2015-2019 time period. Across all industries, however, Indiana has been lagging behind U.S. averages in STEM job growth rates.
- TEconomy would point IEDC and CICP to findings in our AI and advanced analytics study⁸ that found that Indiana's research universities have been producing robust volumes of students with technical education and skills, but these students had low levels of awareness of Indiana job opportunities and were being recruited early in their Indiana university education by out-of-state companies. Indiana companies were effectively missing out on talented, locally educated university students by not engaging soon enough with them nor explaining the STEM job opportunities that exist across Indiana companies and sectors.

⁸ TEconomy Partners. "Artificial Intelligence and Advanced Analytics in Indiana: An Initial Discussion of Industry Needs and University Capabilities." Prepared for BioCrossroads. January 2020.

C9. Educational Attainment Ages 25-64 (Associate's Degree or Higher)

Population	% of Pop. w/ Associate's Degree or Higher, 2019
United States	43.80%
Indiana	38.40%

Pop. 25-64 w/ Associate's Degree or Higher



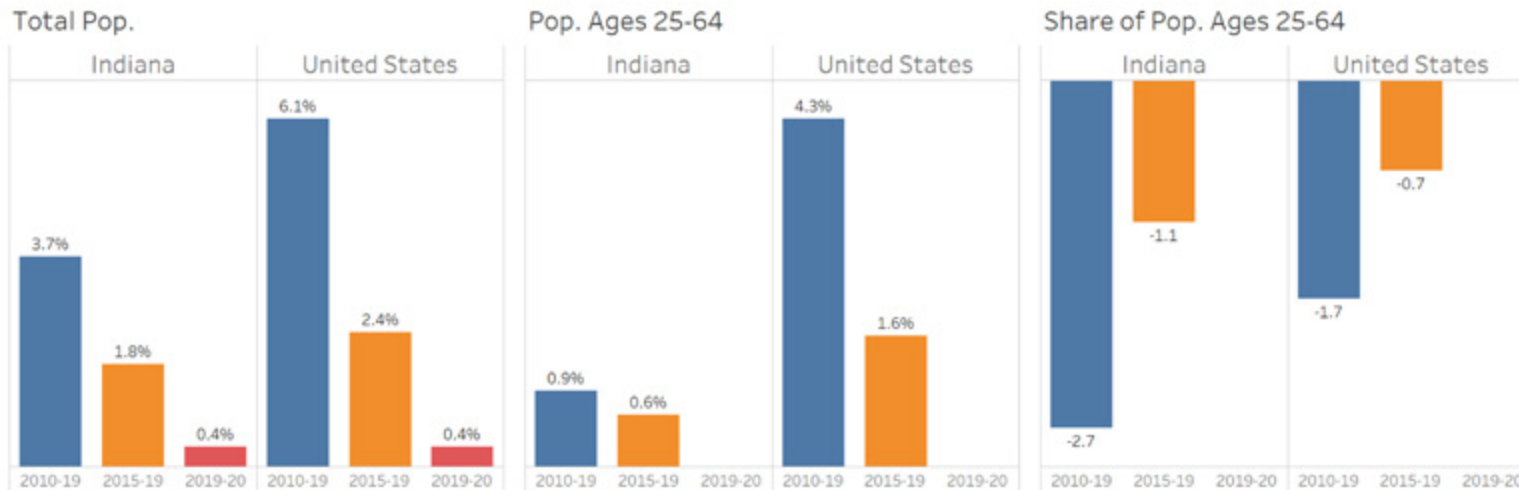
Source: U.S. Census Bureau, American Community Survey; TEconomy calculations

Indiana has a moderately lower level of overall post-secondary educational attainment across its population than is average for the nation. In 2019, Indiana was 5.4 percentage points lower than the U.S. in the proportion of its population with at least an Associate's Degree.

- It is also evident that the differential between the U.S. and Indiana in terms of educational attainment is widening. Between 2010 and 2019 growth of the cohort with an Associates Degree of higher lagged national growth in the same metric by 2.4 percentage points.

C10. Population.

Population	Total Pop., 2020	% of Pop. Ages 25-64, 2019
United States	329,484,123	51.80%
Indiana	6,754,953	50.80%



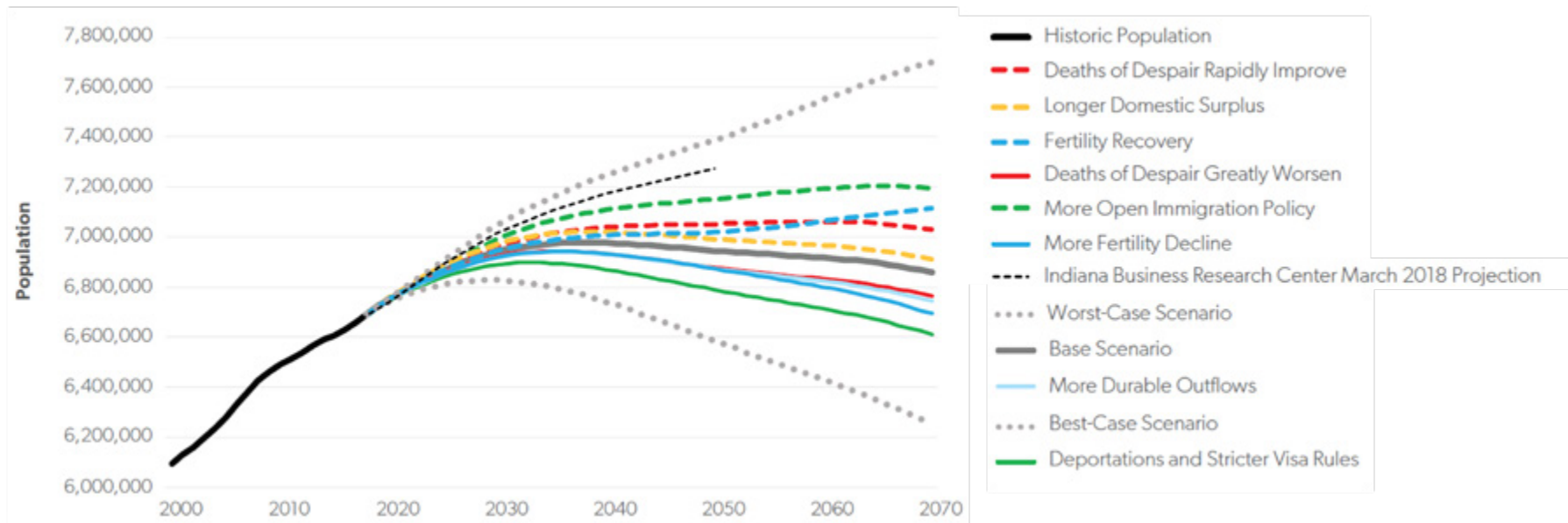
Source: U.S. Census Bureau, Population Division and American Community Survey; TEconomy calculations

- Across the 2010-2019 decade Indiana grew its population by 3.7%. This rate of growth, however, was significantly lower than that experienced for the U.S. overall (which was 6.1%). In the latter half of the decade, however, population growth slowed (for both Indiana and the nation overall) and the differential between Indiana population growth and national growth closed considerably.
- Indiana's population trends are somewhat more concerning in the 25-64 age cohort (the primary working age population group). Here, Indiana's share of working age population in the U.S. dropped, i.e., Indiana saw a larger reduction in its working age population that the U.S. did overall.
- It should be noted that the state has improved in its most recently released statistics, for 2020. Growth rate for 2010-2020 has risen to an overall rate of 4.7% because of recent population gains.
- Further information on population trend projections is provided on the next page, summarized from the recent American Enterprise Institute (AEI) report.

According to the American Enterprise Institute analysis, Indiana is likely to experience negative population growth by 2040. Meeting the “best-case scenario” trend would require significant policy change to improve migration and mortality. Most scenarios developed by AEI result in flat or negative growth beyond 2040.

Without more people being available to work to increase output, the alternative has to be investment in automation, robotics, and other productivity boosting capital equipment.

Indiana Population Trend Projections from the American Enterprise Institute



Source: American Enterprise Institute.

Appendix D: Modeling GDP Growth

TEconomy developed three models of GDP growth from 2020 to 2031. 2030 population projections by state are used to estimate GDP per capita, and all models use GDP in current dollars via BEA for 2010-19. The three models are:

- Model 1: assumes GDP growth equals the lowest year-over-year growth from 2010-19
- Model 2: assumes GDP growth equals CAGR from 2010-19
- Model 3: assumes GDP growth equals CAGR from 2017-19.

Note: In 2020, Indiana ranked 32nd, with a per capita GDP of \$55,565

Model 1: Assumes GDP growth equals the lowest year-over-year growth from 2010-19

Indiana actual CAGR of 1.2% (rank = 31st)

Indiana actual GDP Per Capita Rank = 28th

- **To break into the top quintile by 2031, Indiana would need a GDP CAGR of 3.0%, 2.50x the expected rate**
- If it accomplishes that, then the resulting rank of Indiana would be 7th in GDP per capita.

Model 2: Assumes GDP growth equals CAGR from 2010-19

Indiana actual CAGR of 3.4% (rank = 29th)

Indiana GDP Per Capita Rank = 29th

- To break into the top quintile by 2031, Indiana would need a GDP CAGR of 5.4%, 1.61x the expected rate
- This would place Indiana at CAGR Rank of 4th.

Model 3: Assumes GDP growth equals CAGR from 2017-19

Indiana actual CAGR of 3.9% (rank = 26th)

Indiana actual GDP Per Capita Rank = 31st

- To break into the top quintile by 2031, Indiana would need a GDP CAGR of 6.4%, 1.65x the expected rate
- Indiana CAGR Rank = 4th



TECONOMY
PARTNERS LLC