

# CREATING A COMPETITIVE INDIANA

May 4<sup>th</sup>, 2015

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Special thanks to Dr. Audretsch and Aileen Richardson for their coordination of this project.

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## BACKGROUND AND TASK INFORMATION

*Creating a Competitive Indiana* is a Master's capstone project at the School of Public and Environmental Affairs (SPEA) at Indiana University, Bloomington, under the supervision of Dr. David Audretsch. Sean Keefer, Deputy Chief of Staff, Executive Branch Agencies and Adarsh Mantravadi, Economic Policy Director, Office of Governor Mike Pence, have requested a report to provide well-crafted and practical suggestions for the economic growth and development of Indiana. The capstone is divided into five task groups with each group focusing on a set of critical issues impacting economic development in Indiana. The focus areas of each task group include: workforce development, healthcare and health sector workforce, reversing brain drain, spawning high tech innovations, and leveraging higher education and research institutions.

### WORKFORCE DEVELOPMENT

Workforce development within Indiana has been a substantial issue over the last decade. Like many other states, Indiana suffers from an oversaturation of low skilled laborers and a shortage of middle skilled laborers. Workforce development encompasses the wide range of tools and policies that governments utilize in order to improve the development of their labor force and to make overall improvements to the local economy. With over 60% of Indiana's population without some type of college degree, and roughly 400,000 people over 25 years old without a high school diploma, workforce development programs will become increasingly important. Solutions to improve workforce development can include legislation, education programs, and training programs located throughout the state. Examining the effectiveness and structure of these programs, and also comparing them to neighboring states, will provide a better understanding of how Indiana can become a leader in workforce development in the country.

### HEALTHCARE AND THE HEALTHCARE WORKFORCE

Healthcare availability and the health of Indiana's workforce can have vast impacts on the state's overall quality of life and the economic sector. Currently, Indiana has the ninth highest rate of obesity in the United States, and twelfth highest rate of smoking. Statistics like these can become important because the health of workforce is one the most important factors in business site selection and relocation. This is coupled with another large issue facing Indiana: availability and distribution of healthcare professionals. The average ratio of healthcare professionals throughout the United States is roughly 90 professionals per 100,000 residents. Comparatively, Indiana's ratio is only 53 per 100,000 residents. As the population ages, increasing the number of professional healthcare workers will become exceedingly important, especially in the oftentimes-understaffed rural communities. With these growing disparities in Indiana's health sector, focusing on improving Indiana's health and healthcare workforce

is important for developing, attracting, and maintaining a healthy workforce. This report will analyze how other states have dealt with these health sector issues, and review any relevant programs or initiatives that would be useful for Indiana.

## REVERSING BRAIN DRAIN

Brain drain refers to the large numbers of college graduates that leave Indiana. Currently less than 50% of STEM graduates from Indiana are employed within the state. Indiana suffers from a labor surplus within these job sectors, exacerbating the drain. With such a large portion of educated professionals leaving the state, economic development and innovation is impeded. This disparity is reflected among many recent graduates in the state, with only 43% of graduates saying they would stay in Indiana if a job would not advance their career path. However, only 66% of graduates say that they would stay if a job in Indiana did advance their career. Other factors such as social desirability, the quality of life and average wage were also found to be substantial factors in determining the degree of brain drain. As Indiana moves forward, and as more jobs require postsecondary education, retaining educated professionals within the state will become an increasingly important issue. By analyzing the underlying issues facing Indiana and brain drain, observing macroeconomic trends regarding the brain drain, and reviewing Indiana's current relevant policy issues, this task will focus on how to reverse brain drain.

## SPAWNING HIGH TECH INNOVATION

Indiana has increasingly tried to expand high tech innovation. Despite Indiana incentivizing entrepreneurial activity and innovation through policies and initiatives, Indiana has some of the lowest rates of spawning new technology. Currently Indiana has tax credit incentives, and is one of the easiest states for entrepreneurs to start a business in. However, Indiana has also lagged behind other states when creating a network linking entrepreneurs, innovators, and researchers. This, coupled with a difference in allowing transferable tax credits, has caused Indiana to lag further behind other states. As Indiana strives to become more competitive, this is an increasingly important issue, and looking at other states' policy initiatives and regulatory environments will allow for useful insight.

## LEVERAGING HIGHER EDUCATION AND RESEARCH INSTITUTIONS

Indiana has a number of universities with significant focus in research, including Indiana University Bloomington, University of Notre Dame, Purdue University, and several others. Currently, several of these universities have industrial affiliate programs that help to fund research, as well as add insight and innovation to the private sector. These programs are very

beneficial to public and private sectors, and learning how to incentive these partnerships is extremely useful. These partnerships can help better convey the needs of, and help with, major issues in states, and foster economic growth and innovation. By looking at how other states have created their partnerships, Indiana will be given insight on how to further create and maintain industrial affiliate programs.



## CHAPTER ONE WORKFORCE DEVELOPMENT

### INTRODUCTION TO INDIANA

The state of Indiana recognizes that their workforce is lagging behind other states and this decreases their ability to compete on a national and global scale. While Indiana is competitive and a leader in many fields, such as transportation, distribution, and logistics; the state struggles due to low educational attainment and innovation. Indiana has a high percentage of high school graduates; however, it ranks significantly behind states in the region and the U.S. average based on the percent of adults with a Bachelors degree or higher (See Figure 1A for a comparison of Educational Attainment). Yet, Georgetown University Center on Education and Workforce predicts that by 2018, 55% of all Indiana jobs will require some postsecondary education. Additionally, 54% of current jobs in the state of Indiana are middle-skilled positions, but only 47% of the workers possess the skills needed. Indiana is behind in significant measures of innovation that provide direct benefits to the local economy.<sup>1</sup> In terms of human capital, numbers of patents, and productivity, Indiana continues to fall behind the rest of the nation. There has been minimal job growth compared to population growth in Indiana relative to the nation, and this is a major contributing indicator of poor workforce development implementation (See Figure 1B for a comparison of Economic Capacity).

Workforce development is a concept that has become common among policy makers, politicians, and scholars. Broadly, it is understood as a wide range of policies or programs related to giving people skills to work. While an estimated 90% of the fastest-growing jobs will require postsecondary education, an increasing number of people come to the workplace without even the basic skills expected by employers.<sup>2</sup> Government at all levels has an important role to play in providing support for workforce development systems. Examples include vocational programs, public assistance programs, and regional economic development initiatives. Federal policies broaden the scope of workforce development to include youth training, adult training and retraining, and initiatives to encourage employment. One major piece of federal legislation is the Workforce Investment Act from 1998, which seeks to “promote an increase in the employment, job retention, earnings, and occupational skills improvement by participants. This, in turn, improves the quality of the workforce, reduces welfare dependency, and improves the productivity and competitiveness of the nation.”<sup>3</sup> This law was developed under the Clinton Administration and sought to encourage businesses to participate in local workforce development directed by individual communities.

In 2012, federal legislators recognized that the Workforce Investment Act (WIA) needed to be modernized for the nation's current workforce needs. The original emphasis of the WIA was short-term training and rapid re-employment. However, as the job market began to evolve and require more skilled labor, there was a need for long-term training to respond to growing and emerging industries. This legislation sought to respond to economic swings resulting from the competitiveness of major industries rather than periodic cycles, increased global competition leading to unexpected swings in markets with consequent unemployment impacts, and unskilled or static skilled workers who would be left out of the new economy.<sup>4</sup> The WIA sought to create stronger coordination among training and service providers to setup one-stop career centers. The theory behind this national legislation can be applied directly to the needs of Indiana (See figure 1B for a demographic comparison between the United States and Indiana).

This section of the report seeks to identify the current issues with Indiana's workforce development strategies, analyze state and national legislation impacting workforce development, and compare Indiana to other states and the United States in order to produce effective recommendations to make Indiana more competitive and prosperous.

## THEORETICAL UNDERPINNINGS OF WORKFORCE DEVELOPMENT

For many states and localities, inadequacies in the workforce hinder growth. However, these should be viewed as an opportunity for a region to utilize the creativity, productivity, and innovative capacity of their residents to promote the economic and social betterment of their society. People-centered development has "the unique advantage of promising increased equity, efficiency, and economic vitality".<sup>5</sup> A major problem in Indiana and many other states is that workers are under-trained for their current jobs and are not adequately prepared for future opportunities.

Workforce development varies based on the region, industry, and company size. Large companies are more likely to offer workforce training than small companies (fewer than 50 employees). A University of Michigan survey found that less than 20% of workers took advantage of employer-offered training. They concluded that "given the nation's growing competitive challenges and the need to create greater mobility and good careers for workers, the decrease in the amount spent on training—coupled with the number of employees who apparently are not participating in training programs—leads us to conclude that the already undereducated American workforce also is being under-trained."<sup>6</sup> Even as the total number of jobs in many industries is being reduced, the workforce is a vital community resource and is crucial to a locality's economic prosperity. In order to effectively train a workforce to become more competitive, the population of undertrained or uneducated workers needs to be identified and a strategic plan needs to be tailored to their needs.

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## WORKFORCE DEVELOPMENT STRATEGIES

Traditionally, workforce development occurs as either a sector-based approach or a place-based approach. Sector-based approaches examine what skillsets specific industries in a region need from their workers. This is referred to as a “demand side” model of workforce development and focuses on industries that are growing and likely to be hiring many new employees. These programs have higher requirements than place-based strategies because they are aimed at certain sectors and their specific needs, rather than increasing the general skillset of residents.<sup>7</sup>

Place-based programs are based on the “supply side” of the workforce and seek to improve a region in need of essential skills to be competitive in the labor market while also addressing other concerns such as housing or literacy. These programs traditionally train unemployed workers and give them skills to enter the labor market. This workforce development method focuses on the number of jobs created, rather than the quality of jobs created. Place-based strategies are effective in areas with high unemployment and poverty and can help to combat substance abuse issues, financial illiteracy, and basic development skills.

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## ANALYSING WORKFORCE DEVELOPMENT PROGRAMS

To develop an effective workforce development plan, it is essential to conduct a thorough preliminary assessment of the various needs of each community. There is no “one-size fits all” approach to workforce development and policies and programs need to be tailored to specific needs of communities. Input from local business leaders and politicians, along with the flexibility of these programs, will ensure the success of workforce development initiatives in responding to changing market conditions, community needs, and stakeholders.

A combination of place-based and sector-based workforce development strategies is most effective to address inner city poverty, unemployment, and underemployment. In many cities, the place-based strategy seems preferable over sector-based strategies that result in the “creaming” of the best candidates and in job placement in suburbs. Inner city residents, such as those in Gary, are not as likely to take these jobs due to higher housing and commuting costs. Also, many of these undertrained inner city workers lack the necessary skills to acquire the jobs that sector-based services seek. However, it is important that a workforce development plan that tries to aid inner city workers does not copy welfare-to-work policies that place people in jobs that do not develop any transferable skills in the greater labor market. The inner city development programs must work with the employers, community based organizations, and local community colleges to develop a strategy that provides job seekers with quality jobs as well as the necessary skills training to allow them to obtain and retain these jobs.

Firms and regions develop a competitive advantage through innovation, and through increasing the stock of human capital that is essential to these innovative environments. Governments create, rather than inherit, the development of key factors of production. Lowe (2007) uses North Carolina as an example to demonstrate how effective policies stimulate a workforce development strategy. Through government intervention, they encouraged partnerships between industry and local community colleges that ultimately led to a more stable workforce and lower turnover rates. North Carolina has actively tried to develop and understand these relationships in order to produce long-term results in urban regions through industry growth.<sup>8</sup> These long-term relationships will help urban development in identifying necessary skills and training, as well as connecting employers to potential workers. The government involvement furthers equitability and protects the competitive environment that helps to spur further growth, similar to policies implemented on a national level.

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## RECOMMENDATIONS

Workforce development requires a complex understanding of individual communities and their resources, opportunities, and resident. The identified inadequacies of the Indiana workforce, such as low educational attainment, innovation, and lack of essential soft and hard skills, present a difficult hurdle for state policy makers. Indiana is comprised of a very diverse demographic environment throughout the various regions of the state. In order to effectively address these differences, a comprehensive analysis is needed of specific workforce regions based on the local workforce and commuting patterns of the workforce coming from outside areas.

Depending on the needs of that specific region, place-based, sector-based, or combined approaches need to be utilized and tailored to those residents. Finding a way to encourage workers to take advantage of workforce training programs is a necessary after identifying the specific development strategy to implement. Many industries and communities offer free trainings, but the problem is getting workers to utilize these opportunities. To effectively address problems with the workforce, community leaders need to organize to identify their issues and focus on developing their workforce at the local level instead of creating policies for the entire state.

## STATE POLICIES

Every state in the United States has its own workforce development programs. However, the targeting and implementation of these programs vary widely. Indiana does most of its workforce development through WorkOne and Adult Learning Centers, oftentimes with at least one center in each county. While this is fairly common arrangement among many states,

several have created or are creating workforce development programs that target specific at risk groups or target specific job sectors.

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## OHIO

Ohio has several uniquely targeted workforce development programs. One program example is Connecting-The-Dots. This program focuses on foster children, one of the most at-risk groups in any state. Connecting-The-Dots targets foster children as they age out of care, placing them in vocational training and giving educational support and early adult education<sup>9</sup>. The rationale behind the program is that at foster-children in the United States have a much higher high school dropout rate, lower educational attainment, and lower test score in math, reading, and writing.<sup>10</sup> After they age out of the public school system, they have extremely high crime rates (averaging over 80% in men), unplanned pregnancy rates (just under 50%), and homelessness rates (20%).<sup>11</sup> Giving foster children vocational training and additional career support services and adult education as they age out of care will help reduce crime rates, improve workforce development, and create more productive citizens within this disadvantaged group.

Another targeted program from Ohio is the O.N.E. STOP, which focuses on incarcerated inmates' reintroduction to society with access to job training, the state's job boards, and "soft skills training."<sup>12</sup> The goal is to reduce recidivism rates while bolstering a middle skilled workforce among a characteristically at-risk group in ex-convicts. A third small program expands on this idea within a specific sector. This program is called the Ohio Commercial Driver's License Program, which allows nonviolent offenders near release to receive immediate training for Commercial licenses with immediate job placement within six months.<sup>13</sup> This is done through state training and partnerships with private firms. These types of programs could be particularly useful for Indiana; currently the state has roughly 10,000 children in foster care and over 30,000 inmates<sup>14</sup>. Targeting these groups with successful training and support services can increase workforce development while lowering crime and government reliance.<sup>15</sup>

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## GROUP BASED DEVELOPMENT PROGRAMS

Several other programs from other states focus on targeting at risk populations, primarily youth and immigrants for workforce development. The State of Washington in late 2014 implemented the Youth Works Initiative. This program focuses on low-income youth who are transitioning into adulthood. The initiative focuses on creating business internships, mentoring, and training for at risk youth in their last two years of high school, while partnering with dropout re-engagement programs<sup>16</sup>. California has a similar program called Improving Transition Outcomes for Youth With Disabilities, which gives a targeted intervention via jobs training and mentoring for those students who have physical disadvantages to becoming a functional member of

society.<sup>17</sup> South Carolina's Jobs for America's Graduates (JAG) focuses on at-risk youth finishing high school with training in hard and soft skills while helping young adults cope with early pregnancy, substance abuse, and other barriers typical of low income households.<sup>18</sup> JAG is partially funded through the federal government and Indiana has a similar reiteration of this program that targets low-income youth<sup>19</sup>. These types of programs focus on the last years of high school and the first years of adulthood. They are useful primarily when targeting lower achievement groups that have few chances at succeeding or enrolling in higher education. Oftentimes these programs successfully develop significant portions of the target group from low and unskilled laborers to middle skilled laborers. By targeting these groups during, and more importantly, just after major life transitions allows for a more effective integration to the middle skilled American workforce. For example, Indiana has the PLUS and apprenticeship programs which gives inmates vocational skills and helps with transitioning into the world outside of prison.<sup>20</sup> However, where these programs differ from Ohio's Programs is that once the inmates are out of the system they cease to receive training or assistance in general. Similar with many of the Youth Initiatives, they focus on transitioning while in high school as well just after they graduate with additional training and career support services.

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## SECTOR-BASED DEVELOPMENT PROGRAMS

While not technically a workforce development program, several states undertake an annual report of middle skill job shortages in specific industries. They then use the results of these reports to highlight special emphasis on certain vocational training programs that better cater to the states' employment needs.<sup>21</sup> This sector-based workforce development is the second type of program that states have been using. An example is New York State and the recently passed the Green Jobs Act. This pushes "green jobs" training by emphasizing and making energy sector job training more readily available through additional funding and training.<sup>22</sup> North Carolina has a similar program called the American Recovery and Reinvestment Act, which provides training for renewable energy jobs in the rural counties within the state as well as helping with job placement.<sup>23</sup> This was a part of the federal stimulus package passed in 2009 and North Carolina used its overlying goal to further develop an emerging sector.<sup>24</sup> Georgia's Go Build Program follows a similar model. This job program is even more detailed, emphasizing specific in-demand jobs within the state, such electricians, truckers, and welders.<sup>25</sup> Many of these sector-based programs are at least partially funded through federal acts such as the Workforce Investment Act and have become increasingly common throughout the United States.

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## RECOMMENDATIONS

Group-based workforce development, which targets specific groups, increases the overall skills of low attainment groups. However, it is necessary to accurately target their key transition points and allow for sufficient choice and flexibility with their vocational training. There are several demographic groups that could be targeted for group-based development. Indiana currently has over 10,000 foster children that benefit from no specific development program. Mimicking Ohio's Programs in this area or with the prison population could be fruitful<sup>26</sup>. Other demographic groups that Indiana could focus on include the 370,000 people who do not have a high school degree or the 8% of young adults ages 16-19 that are neither working nor in school.<sup>27</sup> We also recommend developing a group-based workforce development program for single parent mothers, which make up a large proportion of the people in poverty.<sup>28</sup> Sector-based workforce development allows better of the types of training participants receive, but this also relies on accurately either predicting or steering sector growth. Over the next five years several middle skill jobs are expected to dramatically increase, which could warrant sector-based workforce development programs. The health sector (particularly in home-based health aides) is projected to grow by up to 80% by 2020, with 20,000 jobs that need to be filled.<sup>29</sup> The health sector in general will be expanding rapidly and many of the new jobs will not require college degrees. Construction and maintenance professions are also predicted to grow by roughly 15%, adding tens of thousands of jobs and also providing an area of potential expansion of development programs.<sup>30</sup> Indiana clearly has several options when expanding its workforce development programs.

## ON THE JOB TRAINING

Workforce training programs are essential for the sustainable development of individual employers as well as interconnected industries. To better assist employers in providing workforce development programs, in addition to federal requirements and regulations, the state of Indiana provides many available tools for employers and employees to utilize.

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## FEDERAL LEVEL

The Employment and Training Administration (ETA) is a federal administration program that governs the job training and dislocation of employees, gives grants “to states for public employment service programs and unemployment insurance benefits.”<sup>31</sup> Although the ETA is a federal agency, its work is mostly done by lower-level government workforce development systems, such as the Indiana Department of Workforce Development.<sup>32</sup>

Besides the work and cooperation between state and local government with ETA, there are other federal agencies that provide support to states for employee-training programs. The U.S. Department of Labor gave more than \$1 million to Indiana’s Department of Workforce in

2014.<sup>33</sup>This money was used to promote employment and training programs and to evaluate the outcomes of employment training and education initiatives.<sup>34</sup> Other grants are also available and all of these federal grants and programs provide states with substantial help and guidance.

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## STATE LEVEL

There are many programs and services that Indiana offers to promote workforce development. Based on research, there are four types that are generally used: grants, workforce development, employment development, and other assistance programs. Grant programs focus on providing financial support to employers. Workforce development is primarily focused on employee training programs. Employment development covers employed and unemployed people. Other assistance programs are mainly designed to better support employees to work-life balance.<sup>35</sup>

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## GRANTS

The major grant opportunities in Indiana are the Training Acceleration Grant (TAG) and the Skill Enhancement Fund (SEF). The TAG program is Indiana's major workforce training program.<sup>36</sup> Organizations and companies of 100 or fewer people wishing to expand current employees' skill-set through a training program can apply for TAG, and successful applicants can get up to the maximum \$200,000.<sup>37</sup> TAG is relatively a new program and replaced the Incumbent Worker Training program in 2005.<sup>38</sup>

The SEF is another grant program in which businesses become eligible through making commitments to provide training for Indiana employees.<sup>39</sup> Companies cannot apply for SEF dollars to implement training required by law, such as Hazardous Materials Management or Heavy Equipment Safety.<sup>40</sup>

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## WORKFORCE DEVELOPMENT

Workforce development is specifically designed to train employees in various companies, institutions, and agencies. Due to its narrow target group, there are few workforce programs and they tend to focus on middle-skilled jobs.

Ready Indiana is one of the major workforce development programs in Indiana. By motivating employers to invest more in employees' training, this program aims to "engage, educate, and elevate Hoosier workforce."<sup>41</sup> Not only does this program help employers identify training needs, it also helps select training providers and monitors the use of employers' training fund.<sup>42</sup>



Two other workforce programs are available: the Advanced Manufacturing Program for Production Workers and the Marketable Mechanical and Electrical Program. These programs give certifications to eligible participants who “demonstrate that they have acquired the skills increasingly needed in the high-growth, technology-intensive jobs of the 21<sup>st</sup> century.”<sup>43</sup>

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## EMPLOYEE DEVELOPMENT

Compared to the limited number of workforce development programs, employment development programs are much greater in number, and many of them are open to both job seekers and employees.

Jobs for America’s Graduates (JAG) is a program that connects schools and careers in the United States and the UK.<sup>44</sup> Although JAG is not a state-level program by nature, the mission of JAG is “to establish state organizations committed to implementing the JAG Model for both in-school and out-of-school young people.”<sup>45</sup> Therefore, JAG could be employed as a state-level program that aims to provide job advancement opportunities for youth.

On-the-job training (OJT) is another major employment development program in Indiana. Different from traditional training programs, OJT allows trainees to work during training and is open to both unemployed and employed people.<sup>46</sup> People who are interested in this program can contact local WorkOne offices to enroll in OJT trainings. WorkOne has offices covering all the regions and counties in Indiana, and there is at least one WorkOne location in each county. Under the structure of OJT and WorkOne, there are numerous training programs for Hoosiers to choose from.<sup>47</sup>

Besides major training programs, the government of Indiana also provides an online directory, INTraining, for people to search trainings and education programs across the country. Nationally, there are 3,757 training programs, including online, green occupational, and high school certification.<sup>48</sup> There are currently 315 training programs to choose from in the state of Indiana.<sup>49</sup>

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## COMPANY-LEVEL PROGRAMS

Company-level programs are run and provided by private companies, institutions, and/or organizations. Since company-level employee training data is relatively hard to gather and the choice of providing training to employees is up to individual companies, this part of the analysis will focus on workforce training in the top 50 employers in Indiana (Appendix 1B).<sup>50</sup> These 50 companies employ 280,225 Hoosiers, which accounts for 10.16% of the total employed workforce in Indiana in 2014 at the end of the first quarter.<sup>51</sup> These employers can be further

divided into four sectors: hospitals, commercial companies, schools and universities, government, and other.

The healthcare industry provides training programs for employees, along with financial support, to promote continuing education and effective employees. Many large corporations and major manufacturing companies provide training programs and financial support to their employees, under the state-initiated programs, such as the *President's High Growth Job Training Initiative* and *Indiana Advanced Manufacturing Education Collaborative*.<sup>52</sup>

In education, as in hospitals, employers must be more attentive to the development of employees. Using Indiana University Bloomington as an example, there are four types of training for employees: Bloomington Continuing Studies, Employee and Organizational Development, Financial Management Services Training, and IT Training and Education.<sup>53</sup> Within these four categories, there are many other sub-training programs for employees to choose. Other schools and universities also provide diverse training programs to employees as well as students.

Government administration and other occupations include major employers such as military bases, police forces, and local and state government. These industries do not provide as many specific programs since they frequently are the organizations that provide training, but often will provide financial support for their employees to attend conferences and seminars to learn industry-specific information to make them more competitive.<sup>54</sup>

Based on the employee training opportunities among the top 50 largest employers in Indiana, the types of development vary based on the nature of business and profession. Employees in smaller-size business, agencies, and institutions may have fewer training opportunities when compared to employees in the top 50 employers in Indiana. Therefore, there is still a need to provide and promote employee training in Indiana, especially for small and mid-sized commercial business.

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## RECOMMENDATIONS

Based on available information and analysis, it seems Indiana actively encourages industry to provide workforce training, and yet, it has not reached its potential. Therefore, for future development, Indiana may consider providing stricter regulations on grant opportunities provided to companies, especially those that provide middle-skilled jobs and encourage them to be more engaged in terms of employee training. Community development assistance will be

a significant driver of workforce development by encouraging future workers to be responsible, to be punctual, and to take pride in their education.

## THE ROLE OF COMMUNITY COLLEGES AND TECHNICAL TRAINING CENTERS

The key to supplying Indiana with qualified, middle-skill workers is to increase enrollment and completion of community college and technical training programs. This section of the report will cover current opportunities, obstacles, financial aid, transfer credits, and the creation of career paths.

Currently, 40% of all U.S. college students are enrolled in community college.<sup>55</sup> Many of these students are working full or part-time, are older, are parents, or need remedial classes. Their motivations for enrolling in community college are often to gain employment with good wages in a growing economic sector. By 2020, 30% of job openings will require some type of college degree. Post-secondary education is becoming increasingly important in the United States and Indiana is no exception.<sup>56,57</sup>

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## AMERICA'S COLLEGE PROMISE AND TECHNICAL TRAINING FUN

On January 9, 2015, President Obama introduced America's College Promise (ACP), a bill to make two-years of tuition at a community college free to any student who maintains a 2.5 GPA and makes progress toward an associates degree. This bill has the potential to help grow Indiana's population of middle skilled workers. ACP could help 9 million students each year across the U.S. It could save each student about \$3,800 in tuition per year. The bill requires the federal government to pay 75% of the student's tuition cost with the state covering the remainder. Overall, ACP is estimated to cost the federal government \$60 billion over 10 years.<sup>58</sup>

While America's College Promise may seem like an obvious solution to increase enrollment in technical colleges, it has been met with substantial political resistance. House Speaker John Boehner (R-Ohio) and other Republican representatives have dismissed the bill claiming it is an example of wasteful government spending. Without their support, enactment of ACP is essentially impossible. Democrats generally support the bill. There is some bipartisan support, mostly from Tennessee where the model for this program was created.<sup>59</sup>

America's College Promise was designed to mimic successful programs being run in Tennessee and Chicago. Both locales offered to completely cover community college tuition. In the first year of Tennessee's program, 90% of high school graduates enrolled. Now, Tennessee Tech Centers (all across the state) can boast an 80% graduation rate and an 85% job placement rate.<sup>60</sup>

Additionally, President Obama has proposed the American Technical Training Fund (TTF). These funds will be awarded to outstanding technical training programs that have strong employer partnerships, experiential learning components, and those with excellent records of graduation rates, placements rates or wage rates. A portion of the fund would be used to establish 100 new technical education centers focused on the growing fields of energy, information technology (IT), and advanced manufacturing. Community Colleges and Technical Training Centers are especially poised to harness the strength of the growing economy through partnerships with industries and employers.<sup>61</sup>

Indiana should take advantage of this federal program by supporting the bill and implementing ACP and TTF in the state. As outlined in the next section, Indiana already contributes significant funding to community colleges and technical training centers. The additional costs to enter the ACP would be relatively low in Indiana compared to other states.

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## OBSTACLES TO ENROLLMENT

What prevents people from enrolling in and successfully completing technical education programs? There are two bottlenecks: information and access. Do potential students understand all of their options for education, employment, and financial aid? If a potential student wants to go to community or technical college, do they have logistical access? These are questions that must be addressed in order to ensure maximum potential enrollment and completion in postsecondary education.

Two of the most frequently cited obstacles to completing college, after financial constraints, are the surrounding logistics and academic preparedness. Access to colleges in rural areas is key. Training centers in rural areas can be few and far between, but many rural areas are seeing a rise in demand for middle-skill workers. Often students spend long hours commuting to and from work and school. In combination with logistical challenges, colleges repeatedly report that students are unprepared for the workload and do not have the discipline or study skills to succeed and complete their degrees on schedule.<sup>62</sup> This points toward a problem at the K-12 education level that will not be addressed in this report.

Knowledge about the numerous education and accompanying financial aid programs in the state will become increasingly important for young adults. Underlying any other efforts to increase enrollment in community and technical college is to make sure potential students are aware of the opportunities. The state's College Go Week is an example of a successful campaign strategy to promote college, but we propose expansion in marketing to underclassmen and those considering college alternatives.<sup>63</sup>

The best solution is to target communication to high school students. Not only do high school students need to be aware of their options for continuing their education, they need to be versed in financial literacy and focused on building a career.

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## FINANCIAL AID

The most common approach to increasing post-secondary enrollment is financial aid. Indiana actually does comparably well in this area.<sup>64</sup> According to the Indiana Commission for Higher Education (ICHE), Indiana ranked sixth highest in the country and first in the Midwest for total need-based expenditures per undergraduate student in 2010-2011.<sup>65</sup> This per student expense added up to about \$238 million in need-based financial aid.<sup>66</sup>

A significant portion of Indiana's financial aid is distributed through the Frank O'Bannon grant program. Student can receive up to \$4,000 based on academic achievement and expected contribution of the student and parents based on the federal needs analysis formula.<sup>6768</sup>

A somewhat unique program to Indiana is 21<sup>st</sup> Century Scholars, an all-encompassing form of financial aid. Students who are eligible for free or reduced-price lunch in middle school and agree to maintain academic and behavioral standards will have their full public institution tuition and fees paid for by the state of Indiana. Because this program is a binding commitment from the state to pay the full amount in tuition and fees, it is the first program funded out of the financial aid budget. As the 21<sup>st</sup> Century Scholars program becomes more successful, it has the potential to significantly decrease funds available to students above the income restrictions for reduced-price lunch.

While ensuring availability of tuition money for the lowest-income students is important, need-based scholarships for the middle-income quartiles are also in high demand. The ICHE reports that low-income eighth graders who place in the second quartile of I-STEP scores were 15% less likely to matriculate to college than their higher-income counterparts.<sup>69</sup> In fact, there are a greater number of higher-income students with lower test scores that end up in college. Closing this gap is important to economic success in Indiana.<sup>70</sup> Financial aid must be targeted to low and middle-income students performing in the second-quartile academically. Given the opportunity, they are very capable of success.<sup>71</sup>

Although large amounts of money are given out as scholarship, this money could potentially be better targeted. Studies have shown that high school grades and success are the best indicators of collegiate success.<sup>72</sup> Increasing aid to students enrolled in college should be based on completion of courses toward their degree and GPA. Tying aid to performance is one of the few factors that consistently affect student outcomes. ICHE cites several studies that show state

GPA requirements can positively increase academic performance, though they may cause students to drop classes, take fewer classes, or avoid STEM classes.<sup>73</sup>

Financial aid alone will not ensure successful completion of technical education programs. Coordination between high schools, community colleges, and universities must provide for the smooth transfer of credits.

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## TRANSFER CREDITS

Joint programs from high school to technical colleges and universities will allow students to take specific prerequisite and introductory courses that either count toward a technical degree or take place on the college campus. These courses will give students an early advantage in earning their degrees and give them a better idea of the careers they wish to pursue.

For various reasons, many students end up taking time off, changing degree programs, and transferring schools throughout their college career. Better credit transfer between institutions will help ensure student success.

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## CAREER PATHS

There is plenty of evidence for the importance of internships and real world experience to students' future employment. TPMA (a consulting agency hired by the state) reports that students who participate in internships or other work experiences before graduation earn roughly 20% more than those who did not.<sup>74</sup> Furthermore, 81% of employers expect students to have internships (or equivalent experiences) in applying classroom knowledge to the real world. Employers will draw 40% of their new college hires from their internship programs. New hires that come to a company through internship programs are more likely to stay with the company over five years.<sup>75</sup>

Indiana like other states has a Work Study Program that aims to connect low-income students with employers. This program is only open to low-income students and excludes private-sectors employers. TPMA released a report with recommendations for the Indiana State Work Study Program.<sup>76</sup> The program must be rebranded, open to more students and employers, and increase its recruitment assistance.

Indiana's Work Study Program is the only centralized, government program that aims to directly connect students to employers. Generally, universities and other institution attempt to provide career services to students through career fairs, on-campus recruiting, and on-campus information sessions with varying degrees of success.

Indiana students and employers could benefit from more targeted programs and the creation of career pathways. By encouraging and supporting coordination between private-sector employers, government agencies, and universities, Indiana can ensure a qualified workforce and matching job opportunities.

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## CONCLUSION

Indiana excels in providing financial support to encourage students to pursue a college education. In order to further develop the state's workforce, a wider array of targeted programs must be developed. These programs can ease the transition between academic institutions by increasing the transferability of credits. They must do a better job of connecting employers and students and developing promising career paths.

## CHAPTER TWO

### HEALTHCARE AND HEALTHCARE WORKFORCE

#### INTRODUCTION

Healthcare plays an essential role in building a more competitive Indiana. The health of the state's workforce has an impact on both business strategy and business site selection. It also factors into business operating costs and the health of the workforce. If Indiana wants to attract and retain businesses, it must acknowledge and address its health shortfalls.

The availability and distribution of healthcare providers also has a significant impact on public health, which directly impacts the wellbeing of the current and future workforce. The availability of healthcare providers in rural and disadvantaged communities is an important element of the overall strength of the state's health system.

This section contains an examination of the health of the workforce and the state of healthcare providers in Indiana. A number of policy recommendations will be proposed to help make Indiana's workforce and healthcare system more competitive, and to make them a solution, not a barrier, to economic development efforts.

#### ISSUES

##### THE STATE OF PUBLIC HEALTH IN INDIANA

Though not traditionally seen as an aspect of economic development, public health ties in with the economic health of the state in many ways, including prospects for firm attraction, worker productivity, and the need for primary care physicians in rural areas. We found that there are several issues of common interest to all healthcare-related tasks for the project—issues that, if more adequately addressed, would relieve pressures on the healthcare workforce, state financial resources, and make the state a more attractive business environment.

We will begin by addressing the health of the workforce of Indiana, giving particular attention to health measures considered by firms in relocation and those that relate to distinctive rural health problems and significant Medicare and Medicaid expenses. Policy recommendations will be offered in the areas of obesity, smoking, and drug abuse. Many of these conclusions and policy recommendations are not entirely new initiatives. In fact, Indiana State Department of Health currently has several of the same policy priorities for 2015.<sup>77</sup> However, this chapter will explain issues impacting both the general health of the workforce and the public perception of the health of the state's citizens in the context of economic development.



Indiana suffers from poor public health by a number of key measures, with broad impacts on economic development, government finances, and the workforce of the healthcare sector. Literature on firm location and interviews with consultants have shown that the health of the workforce is a key consideration for business operating costs, particularly as it related to controlling health insurance costs and minimizing absenteeism.<sup>78</sup> Many sources point back to the different measures on which Indiana is behind the national averages, including obesity, smoking, and drug use. Firms give particular attention to these measures when considering relocation of mid- to large-sized manufacturing facilities outside of metropolitan areas, a common strategy to capitalize on lower labor costs.

For example, Indiana has the ninth highest obesity rates nationally, with 36.9% of the additional healthcare costs paid by Medicare and Medicaid. Two-thirds of adults in Indiana are overweight or obese, and the figures are higher in rural populations. The obesity rate is over 33% in adults with high school degrees or some college, which is the subpopulation that largely makes up the manufacturing sector. Firms consider these factors related to obesity because obese workers exhibit more absenteeism than their peer workers of normal weight.<sup>79</sup>

Smoking is another issue firms consider, and Indiana's smoking rate is the twelfth highest nationally. These smokers are disproportionately living below the poverty line and have less than a high school degree. The effects of high smoking rates are also fiscally and economically significant; each pack of cigarettes sold in the state results in \$15.90 in additional healthcare expenses, reduced productivity, and early death. Additionally, smoking rates during pregnancy in Indiana are nearly twice the national rate (16.5% as compared to 8.7%) affecting 13,000 births per year at a cost of \$4.8 million.<sup>80</sup>

Drug use is another significant drain on the productivity and financial resources of the state, and an additional consideration weighed in firm relocation.<sup>81</sup> Indiana is behind national benchmarks in this area as well, with just one example being that the state has the seventeenth highest drug overdose mortality rate in the United States.<sup>82</sup> These deaths and the correspondingly high use rates come from a number of intersecting factors. The overall drug use rate has quadrupled since 1999. Throughout this period, a majority of deaths have come from prescription drugs<sup>83</sup> and three-quarters of all prescription drug overdoses are prescription painkiller overdoses.<sup>84</sup> Methamphetamine use and production continues to be an issue; after federal laws and enforcement managed to reduce production to historic lows in 2007, the number of methamphetamine lab seizures has risen by 108%.<sup>85</sup> Additionally, federal crackdown on prescription opioids over the last several years has led to a rise of heroin usage in many counties, both urban and rural, throughout Indiana.<sup>86</sup> When combined, these factors create the impression that Indiana's workforce is prone to drug use, absenteeism, and other risky behavior that would result in higher costs and greater uncertainty for businesses considering relocation.

On February 23, 2015, it became clear that the town of Austin in Scott County, Indiana, was experiencing an HIV epidemic. In a region that normally sees five new HIV cases annually, within the first three months of the year, 55 new HIV cases were reported.<sup>87</sup> As of April 19, 2015, that number stands at 130.<sup>88</sup>

At the center of the crisis is William Cook, the only doctor in the town of 4,300.<sup>89</sup> Over the past few years, Cook struggled to support the rural population of Austin as they grappled with drug addiction, and consequently, drug overdoses. Then came a Hepatitis C outbreak, and by that time, many health experts knew an HIV outbreak was inevitable. But without resources, staffing, or a health system in place, Cook struggled to treat the patients he saw, let alone the patients without access to health professionals. The HIV epidemic in Scott County is the first one in the history of the state, and although the Centers for Disease Control has since supplied resources and professionals, a long-term solution has yet to be seen.

The situation in Austin that led to the epidemic—the lack of primary care physicians and access to healthcare—is unfortunately common in Indiana. Indiana has a ratio of 53.6 Primary Care Physicians (PCPs) per 100,000 people, which is less than the national average of 90.5 PCPs per 100,000 and far short of the best-practice standard of having 100 PCPs per 100,000 people.<sup>90</sup> This ranks Indiana 39<sup>th</sup> nationally;<sup>91</sup> a ranking that shows two things: the workforce in Indiana is vastly underserved, and the healthcare workforce is overworked and stretched. These are factors that dissuade businesses from making long-term investments in the state, and do little to attract healthcare workers into the state's underserved and rural areas. More importantly, due to the state's aging population, growing unmet chronic health conditions, and expanded access to health insurance, the shortage that already exists in the state is expected to grow at a much faster rate.

The problem is even more extreme in rural areas like Austin. In fact, the state's rural areas face the largest shortages of healthcare workers in the country. More than half of Indiana's rural counties are designated medically underserved areas by the U.S. Health Resources and Services Administration, meaning they have too few primary care providers, high infant mortality, high poverty rates, or a high elderly population.<sup>92</sup> Educating primary care physicians and attracting them to work in Indiana's rural areas is key to improving health outcomes, preventing chronic health conditions and epidemics, and increasing the health and efficiency of Indiana's workforce.

Out of the 92 Indiana Counties, 55 (60%) are in rural or nonmetropolitan areas and over one million people reside in these areas.<sup>93</sup> While the majority of the state is either rural or nonmetropolitan, there is a large deficit in healthcare providers in these areas. Only 31% of

hospitals in Indiana are located in and serve rural areas, Error and of the 55 rural and nonmetropolitan counties, a striking 26 are partially or completely medically underserved. Furthermore, 16 of these counties are without acute care hospitals and 11 are without any obstetrical services. The lack of healthcare professionals to serve the population in rural areas is a dire issue in Indiana and a change must be made.

To attract more healthcare professionals to practice in Indiana's underserved areas today, legislators can use innovative policies and strategies that make use of the current infrastructures already in place to improve the efficiency and effectiveness of providing rural healthcare.

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## WORKFORCE AND BUSINESS STRATEGY

The health of Indiana's workforce is a significant factor for businesses considering relocation to the Hoosier State. According to Larry Gigerich, Managing Director at Ginovus, workforce health typically ranks third or fourth in importance among the location considerations of corporations, just behind cost of living and crime.<sup>94</sup> Ginovus specializes in assisting corporations identify new locations for relocation or new enterprises. Companies considering locating to Indiana will often examine the costs associated with providing healthcare benefits to their employees, as well as the expected rate of absenteeism due to illness.<sup>94</sup> compared to other states. These factors impact both profitability and productivity. Simply put, a business will increase its profitability and productivity by identifying a location that can support its operations with a healthy workforce. Therefore, it is advantageous for Indiana to consider policies that will improve the health of its workers.

The size and profile of a business affects the degree of importance its management places on workforce health when considering relocation. According to Gigerich, larger companies tend to have more sophisticated analytics capabilities and/or resources, which can allow management to quantify the savings that can be expected from establishing operations in a healthy community.<sup>94</sup> The economies of scale associated with larger enterprises may also increase the importance of workforce health.

Workforce health also is a higher priority for white-collar corporations and those companies whose workforce has a large segment of 22-35 year olds. These populations tend to place a greater degree of emphasis on their personal health and well being.<sup>94</sup> Improving the health of the working population will make Indiana a more attractive place for employers of white-collar professionals and young people.

## RECOMMENDATIONS

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### IMPLEMENTATION OF STATE-WIDE PROGRAMS TO FIGHT OBESITY

High obesity levels deter companies from relocating to a given area.<sup>94</sup> In 2005, it was estimated that the United States spent \$190 billion in healthcare costs related to obesity.<sup>95</sup> In 2013, Indiana had the ninth highest adult obesity rate among all states at 31.8%.<sup>96</sup> Any effort to reduce Indiana’s obesity rate will improve the health of the workforce, lower healthcare costs to companies, and attract and retain more businesses.

The state has already made some efforts to address obesity rates, though significant advances could be made through directing additional resources to INShape Indiana, wellness activity infrastructure, and public education through traditional and social media. INShape Indiana’s current program has the best-practice components—promotion of better eating, more physical activity, and reduced smoking—and would make an ideal coordination point for expansions of efforts and resources (alternatively, this could easily be arranged in a different manner by the Department of Health). The program currently utilizes social media well, but additional resources would allow for a traditional media push through radio and television—outlets more likely to reach target populations in rural and disadvantaged areas. Indiana is making progress in a number of areas that will help reduce obesity by promoting healthy lifestyles, including programs such as Double Up Fresh Bucks, Complete Streets, active living workshops, and bike and pedestrian master plans. Greater resources directed toward each of these initiatives and other similar programs will enable the healthy lifestyle choices that are beginning to gain popularity in urban areas to spread to the rest of the state. For instance, a program such as Double Up Fresh Bucks, a state grant-funded Indianapolis program that enables SNAP participants to double the value of their benefits when purchasing fresh foods at local farmer’s markets,<sup>97</sup> could build on its success<sup>98</sup> through a statewide scale up. Another example would be to use the Office of Community and Rural Affairs’ review of Planning Grant applications for Community Development Block Grant funds as an opportunity to incentivize bike- and pedestrian-friendly planning.<sup>99</sup>

Some states have enacted programs to combat obesity in children, with the aims of building life-long habits and better health. One such program is the *Healthy Kids New Mexico* program. The program, managed by the New Mexico Department of Health, seeks to promote good eating and active lifestyles as “two lifestyle choices that prevent obesity and subsequent chronic disease.”<sup>100</sup> Through the program, New Mexico was able to achieve a 20% decrease in childhood obesity since 2010.<sup>100</sup>

Indiana should consider implementing a program similar to the *Healthy Kids New Mexico* program and target its efforts at youth. Long-term investments in the health of the population will help make Indiana a more attractive place to locate for future businesses. It will also make current employers confident that the state understands the importance of a healthy workforce, and is committed to controlling healthcare costs.

Though Indiana has made some advances in decreasing tobacco use, more can be done to support and supplement recent efforts. Some examples include the passage of the Smoke Free Air Law in 2012 and public outreach efforts such as the Indiana Quitline and INShape Indiana's tobacco-use prevention component. The 2012 Smoke Free Air Law includes exemptions for bars and taverns, casinos and off-track betting facilities, tobacco and cigar retail stores, and several others.<sup>101</sup> Removing these exemptions from the Smoke Free Air Act would help remove the disproportionate impact currently felt around the state. Urban areas have since enacted more stringent laws and banned smoking in these state-exempted areas.<sup>102</sup> This effectively removed the issue from statewide debate, while public smoking continues in many of these establishments outside of cities.

Additionally, Indiana's cigarette tax should be increased. Currently the state's per pack tax is \$0.995, less than the national average of \$1.54 and ranking 32nd overall in highest per pack taxes. Retailer's concerns about losing business across borders are likely overstated; all surrounding states except for Kentucky have higher taxes (Illinois and Michigan have approximately double the Indiana tax).<sup>103</sup> The tax increase would both create a disincentive for smoking through the higher end-user prices and raise revenue that could be earmarked for additional public health initiatives.

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## FIGHT DRUG ABUSE

Drug abuse prevention is a task with numerous components spanning a broad swath of policy areas including law enforcement, medical health treatment, and public education. Indiana already makes preventing drug abuse a policy priority, and the efforts in enforcement and general legality of various classes of drugs seems to be in line with laws and policing throughout the nation.<sup>104</sup> Where progress can be made is in the expansion of treatment facilities in rural and disadvantaged areas. The issue of limited treatment options and locations in these areas is one of the major factors that leads to Indiana being ranked 44th in states with the highest prevalence of adults with mental illness and lowest rates of access to care.<sup>105</sup> In many areas of the state, a single community mental health center provides the sole treatment option for four or more counties.<sup>106</sup> Hospital networks and independent facilities tend to be located in urban areas, and for those patients seeking a variety of treatment options, drive times of more than an hour to some facilities can be prohibitive to seeking treatment. Public education efforts should also be expanded through traditional and social media outlets, as noted in the section above, along with an effort to specifically target at-risk communities in rural and disadvantaged areas.<sup>107</sup>

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## IMPROVE STATE-WIDE BICYCLE INFRASTRUCTURE

In order to improve the health of the overall workforce, Indiana should look to the Mountain West and Southwest United States as examples.<sup>94</sup> Many western states tend to have populations that are encouraged to embrace a healthy lifestyle.<sup>94</sup> According to the World Health Organization, physical inactivity is the fourth highest risk factor for mortality on a global basis.<sup>108</sup> Investments in infrastructure designed to promote physical activities, such as bike trails, serves as clear means by which government can promote healthier lifestyles.<sup>94</sup>

Investments in infrastructure to improve physical well-being can have direct economic benefits. For example, Denmark recently studied the impact of its bicycle trail network in a Copenhagen suburb and concluded that the country saves €40 Million annually on healthcare cost due to bicycling.<sup>109</sup> Portland, Oregon is expected to invest between \$138 million and \$605 million into a city-wide bicycle network between now and 2040.<sup>109</sup> This investment is expected to result in a health-care costs savings between \$388 million and \$594 million.<sup>110</sup>

Colorado is one state that recently enacted a statewide bicycle and pedestrian program. The initiative, which is run through the state's Department of Transportation, provides structure and criteria by which state funds can be disbursed to bicycle path infrastructure.<sup>111</sup> Having such plan in place for Indiana will send a message that such investment is important to the broader economic development strategy.

Indiana should consider implementing a statewide bicycle and pedestrian initiative that would provide grants to communities to invest in paths and trails to promote an active lifestyle. Such a program would encourage communities to invest in the necessary infrastructure to improve the health of their populations and also attract a population that is committed to personal health. In turn, it would help the community become a more attractive location for new businesses.

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## STATE SUPPORT FOR HEALTH NETWORKS

We propose government benefits for health networks. Health networks are common throughout the country and in Indiana. These nonprofit networks are made up of individual healthcare professionals who receive benefits to incentivize coordination for mutual gain. Private practice is extremely expensive and it is very hard for individual doctors to be financially successful.<sup>112</sup> The benefits from being in a health network include salary, paid vacations and sick days, medical insurance, malpractice insurance, and legal representation.<sup>112</sup> By providing these benefits to a large group of doctors in a given health network, many costs of purchasing and providing these items are lowered. Many health networks also have programs that help put providers into rural areas. One program that Eskenazi Health Clinic in Indianapolis implements is the National Health Service Corps Scholarship and Loan Repayment in which doctors commit to working in a rural area in exchange for up to \$100,000 in student loan repayment assistance.<sup>112</sup> Another program allows doctors to rotate into different rural offices throughout the workweek.<sup>112</sup> Health networks are successful models and could be instrumental in combating the lack of healthcare providers in rural areas.

One of the biggest needs for health networks is increased governmental funding to health centers to improve access and services.<sup>112</sup> Eskenazi Health Clinic frequently writes letters to government officials to voice concerns over funding for rural healthcare programs.<sup>xxvi</sup> The proposed policy of government benefits to health networks not only addresses the issue of the lack of rural healthcare providers, but also addresses the concerns and obstacles health networks face. We suggest a policy that creates grants for health networks who implement a rural health program in underserved areas. These grants would help to overcome the main obstacle health networks see in implementing rural healthcare programs: money. The grants would subsidize many costs health networks incur including continuing education and supplies. Another government benefit we recommend giving to health networks who implement rural programs is lowered malpractice insurance costs. Malpractice laws are determined state-by-state and are approved by the Department of Insurance.<sup>113</sup> Lowering these insurance costs would lower the costs that health networks incur when providing coverage for their doctors.

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## SCHOOL-BASED HEALTH CENTERS

We also suggest a policy that would facilitate and provide funding for a partnership between rural public schools and health networks to offer primary care in underserved rural areas. This proposal is modeled off of the Crusader Community Health school-based health center program in Rockford, Illinois. Public schools are accessible in every community, both rural and urban, and offer many opportunities for community growth and engagement. The Crusader Community Health program combines the Rockford Public Schools, Crusader Community Health, Rosecrance Health Network, Edgebrook Primary Eye Care, and Swedish American Health System to offer medical and dental services, optical services, behavioral health services, and health education for children 18 years and younger<sup>114</sup>. While the Crusader Program is only offered to students and provides an array of services, we recommend the program be open to all community members and solely focus on primary care.

The partnership between public schools and health networks would have many benefits. A school-based health center would lower the capital requirements for physical buildings that are needed for physicians to practice in and greatly cut overall startup and maintenance costs. Such a center would also capitalize on health networks that implement the doctor rural rotation programs. This rotation program allows doctors to practice in multiple offices during the week on designated days. A physician may be in one rural area on Monday and Tuesday providing care, but then drive to his or her office in another rural area for Wednesday and Thursday. It may be more attractive for doctors to practice in the school-based, rural environment if they can also practice in a main, more urban office for a portion of the week. The school-based health center program would provide a safe, clean, and comfortable environment for rural populations to receive primary care.

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## EXPAND THE RURAL MEDICAL HEALTH PROGRAM

Indiana’s medical schools are a key component to reversing the growing shortage of healthcare professionals, including the shortage of primary care physicians (PCPs) in rural areas. Indiana University Medical School has the second largest student body in the country, and yet it has one of the newest and smallest rural medical programs. The state actually educates the least amount of medical students compared to its population. Indiana enrolls 20.5 students per 100,000 people in medical school, ranking the state 39<sup>th</sup> nationally, and yet it is one of the best states at retaining the students it educates, ranking eighth nationally in retaining graduates. The State can support and encourage its medical schools to increase enrollment in medical programs, and to ensure more students are enrolled in a Rural Medical Health Program to specifically address the rural shortages Indiana is facing.

The Rural Medical Health Program was launched in 2008, modeled after successful programs at the University of Washington and University of Alberta in Canada. The key component of these programs includes recruiting students who grew up in rural areas, and ensuring those students are committed to completing their residencies in rural areas. Where a person grows up and where they complete their residencies are two of the biggest predictors of where a student ultimately practices.<sup>115</sup> For Indiana’s underserved rural areas, the key to addressing the growing shortage is to further develop this medical professional pipeline in Indiana.

Currently the Rural Medical Health Program exists on just one of Indiana University’s medical campuses at Indiana University--Terre Haute, and just 12 first year students were enrolled for the 2015-2016 school year.<sup>116</sup> Compared to the current shortage of primary care physicians—estimated at 1,000 state-wide<sup>117</sup>—this young program provides a new opportunity for solving the shortage of health professionals, but key improvements are needed along the pipeline in order for the investments to pay off.

The Rural Medical Program at Indiana University—Terre Haute is one of the first in the country to have students start working in rural areas starting in their first year of medical school. They are also assigned patients that they follow over the four years of their schooling, and this gives them valuable experience providing long-term care and addressing lifestyle issues specific to rural populations. Compared to the rural program medical program at the University of Illinois, where students do not focus on rural health until their fourth year, the rural program at Indiana University—Terre Haute is one of the most immersive in the country.

The Rural Medical Health Program also tackles another issue plaguing medical schools across the country: encouraging students to become primary care physicians instead of specializing. In fact, 70% of the graduating class of the Rural Medical Health Program in 2012 became primary care physicians,<sup>118</sup> compared to less than 40% of the general medical student body at Indiana



University<sup>119</sup>. Even more surprising is that all of these students stayed in Indiana for their residency. While Indiana ranks 9<sup>th</sup> nationally for retaining its medical school graduates, this is still just a 53% retention rate.<sup>120</sup> The 100% retention rate for students in the Rural Medical Health Program can be attributed to the admission process it uses, as well as the unique, immersive curriculum of the program.

Indiana University has been increasing medical student enrollment since 2007, following the nation-wide trend of other universities<sup>121</sup>, but the state should work with Indiana University to ensure the following: more students are being enrolled in the Rural Medical Health Program specifically; that the University applies the Rural Medical Health Program's enrollment qualifications to its general student body; and that the University expands the Rural Medical Health Program to Indiana University's eight other regional medical campuses.

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#### ALLEVIATE TUITION COSTS FOR STUDENTS IN RURAL MEDICAL HEALTH PROGRAM

Compared to other rural medical programs that offer students attractive financial aid packages, only 40% of students enrolled in Indiana University's Rural Medical Health program receive any non-debt financial aid.<sup>122</sup> This means that the majority of the students who are most likely to work as primary care physicians in Indiana's rural communities are paying the same full tuition rates as the medical students who plan on choosing specialties, working in premier hospitals and health systems, or even moving out of state--all in pursuit of higher salaries. For an example, the average income for a primary care physician is \$177,330 per year, compared to \$231,550 for surgeons.<sup>123</sup> With an average medical student debt of \$161,290<sup>124</sup>, it is not surprising that students who choose the medical profession are making a financial decision to avoid rural areas.

Currently, other states are taking a more proactive approach to alleviating the financial costs associated with working in rural areas, and they serve as examples for Indiana and its medical schools. A national program, the National Health Service Corps, serves as a model for similar state programs where physicians who practice in federally-designated Health Professional Shortage Areas (HPSA) receive loan repayment assistance, totaling up to \$60,000. Indiana currently runs a similar program, the Indiana Primary Care Scholarship Program, which is given to students while they are in medical school. It covers their tuition and fees for each of the four years of medical school. However, the program is only available to six to eight students each year.<sup>125</sup> In comparison, the Health Professional Loan Repayment Program in the state of Washington encouraged 100 licensed health professionals to work in the state's underserved areas in 2014.<sup>126</sup> The program in Washington provides conditional scholarships or loan repayments of \$70,000 for a two-year, full-time service obligation as a licensed physician in

rural areas. Since the program started in 1990, the state of Washington has funded over 1,000 health professionals working in rural areas.

Senate Bill 496, introduced in Indiana's legislature in 2015, would create a primary care physician loan forgiveness program for physicians in rural areas, similar to that in Washington. Supporting this bill could move provide immediate incentives for today's medical students to practice in Indiana's underserved rural areas tomorrow.

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#### ADDRESS THE RESIDENCY BOTTLE-NECK

Across the nation, medical schools are increasing enrollment to address the shortage of healthcare workers, but they are now facing a new issue: residency opportunities are not growing at the same rate as medical school acceptance rates. For rural medical programs like that at Terre Haute, residency options in rural settings are increasingly hard to facilitate. Again, where a student does their residency has a huge impact on where they practice, and so the state should strategically support the creation of new residency opportunities in rural communities in order to address the health care workforce shortage. In fact, the state of Indiana ranks behind its peers in the total number of residency positions offered in the state. On average, Indiana has 9.2 residents and fellows in primary care programs per 100,000 people, which ranks the state 32<sup>nd</sup> nationally.<sup>127</sup> These ratios of range from a high of 32.4/100,000 in New York, to a low of 1.8/100,000 in Montana.

Increasing residency opportunities in rural areas has its own set of challenges, however, it is estimated that a doctor's efficiency decreases by 30-40% when they take on a student for residency.<sup>128</sup> For rural doctors, this means fewer patients are seen, resulting in less income. Funding programs and incentives for doctors to take on residencies, particularly in rural areas, will not only address this bottle-neck, but create more rural residency options in the state of Indiana.

House Bill 1323, currently being considered in Indiana's legislature, would provide startup funding for entities that wish to establish a residency program. An estimated 160 new residency positions would be created from the bill.<sup>129</sup> Supporting this bill, and encouraging additional legislation that provides funding for rural residencies specifically, would support medical schools as they attempt to increase medical student enrollment.

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#### TAX CREDITS FOR RURAL PHYSICIANS

Nearly 56% of the medical students that go through the Northern Alberta School of Medicine choose primary care residencies and go on to work in rural areas.<sup>130</sup> In comparison, just 13% of graduating medical students in the United States report wanting to become a primary care

physician.<sup>131</sup> Canada in general is graduating more students who become primary care physicians, and in response to their shortage of physicians in rural areas, they started rural medical programs that the programs in the United States are modeled after. However, the choice to become a primary care physician in Canada is even more attractive because they are paid higher than those physicians who specialize.<sup>132</sup> The opposite is true in the United States, and to make the comparison even starker, primary care physicians in Canada additionally receive tax-free incentives and grants for those starting new practices rural areas.<sup>133134</sup> In order to make rural areas a more attractive option for physicians, the state of Indiana can make sure that rural doctors receive tax credits for the work that they do. Rural doctors spend more of their time traveling from town to town, work in emergency rooms when needed, serve as a town's only family doctor, and develop and implement community health programs. For physicians who do more work in areas where Indiana needs them most, the state's ability to raise their income through tax credits and deductions are necessary for attracting the healthcare workforce that is needed.

## CHAPTER THREE

### BRAIN DRAIN

#### INTRODUCTION

The phenomenon known as brain drain is a global as well as national issue. Brain drain is defined as the migration of well-educated college graduates to a few concentrated sites of similarly educated individuals.<sup>135</sup> Much research on brain drain centers on foreign immigrants moving from developing countries to industrialized countries;<sup>136</sup> so a differentiation must be made between international and national brain drain. The latter concerns intellectual emigration within a country, which is the focus here. Both have a common denominator: professionals who move because of social and economic issues.

Brain drain remains a pressing issue in the United States, especially in states transitioning from manufacturing and agricultural economies. In Indiana, brain drain remains a serious issue, especially in science, technology, engineering, and math (STEM) fields. The relocation of high-skilled individuals from one state to another leads us to ask one main question: what factors contribute to the outflow of STEM graduates from Indiana to other states and what policy strategies can be used to mitigate this issue?

Brain drain policies are easily divided into three different categories: job growth, talent retention (keeping undergraduates in the state), and talent acquisition (enticing out of state residents to work in Indiana) to better focus understanding of the mechanisms behind brain drain. The first section provides a brief overview of current Indiana policy directed towards brain drain. This provides background to better understand the issues that drive brain drain in general and in Indiana. The second section analyzes macroeconomic trends, demonstrating a problem with labor supply and demand in Indiana. Next, factors that influence an individual's choice of location will be presented. Since comparisons are made between Indiana and other states, the next section provides information on brain drain policies elsewhere in the United States. The last section provides policy recommendations in all three categories.

#### CURRENT INDIANA POLICY

Indiana's current policies towards brain drain can be classified into three categories: job growth, talent retention, and talent acquisition. Job growth policies focus on encouraging businesses to grow and develop in the state. They also promote entrepreneurial startups in the state that have potential to grow into employers. Talent retention policies are traditionally thought of when focusing on brain drain. These policies focus on retaining in-state high school and university students after graduation. Finally, talent acquisition policies are a newer area where states bring talent from other states through various means.<sup>137</sup> In this section, the specific policies in each category will be explored more in depth. This provides a background for understanding the trends that Indiana is experiencing in employment rates and brain drain.

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## JOB GROWTH

One of the major contributors to brain drain in Indiana is the lack of jobs available to recent graduates. This policy area, job growth, relates to the disconnect between the number of graduates from universities located in Indiana and available entry-level positions. Indiana has promising trends in areas such as technology job growth and favorable business tax rates. Key state-level programs include the Economic Development for a Growing Economy (EDGE) tax credit, Headquarters Relocation Tax Credit, and Venture Capital Investment Tax Credit. At Purdue University, there is also a capital investment program called Purdue Foundry.

Indiana's commitment to lowering taxes provides an environment open to growth and new businesses. The state's corporate income tax will drop from 7.5% to 4.9% in the next five years.<sup>138</sup> In the *2014 State Business Tax Climate Index*, Indiana moved into the Top Ten.<sup>139</sup> Indiana also ranks 8<sup>th</sup> on the Small Business Policy Index.<sup>140</sup> The index takes into account 42 different measurements, including tax policy, number of regulations, and government spending measurements. Tax reforms reduce the costs of risk taking and doing business.<sup>141</sup> With a generous business environment and support from the state government, Indiana has recently become one of the promised lands for business in the United States. These policies will begin to attract new companies and industries to Indiana, increasing employment opportunities for STEM graduates.

Indiana's current tax incentives for job growth are diverse. The EDGE tax credit requires a contract between the state and company. The company must propose a project with new capital investment and full-time jobs.<sup>142</sup> During the contract, the business must report employee data reflecting employment and wage thresholds as well as a summary of the capital investments involved with the project. There is no stated requirement for the size of job creation. The Headquarters Relocation Tax Credit requires that at least 75 employees must be in Indiana after the relocation.<sup>143</sup>

Job growth policy requires the creation of businesses, not just growth of existing ones. The Venture Capital Investment Tax Credit encourages private investors to provide capital to Qualified Indiana Businesses.<sup>144</sup> It does not directly contribute to employment growth, but helps create an entrepreneurial environment in the state. The Purdue Foundry also encourages innovation. Its professional staff assists innovators with grant writing, product development, business plans, and regulatory requirements.<sup>145</sup> The Foundry includes four different funds that assist innovators and inventors in commercializing their ideas.

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## TALENT RETENTION

There are three major periods of brain drain: after graduation from high school, after graduation from college, and during the first three years after completion of college.<sup>146</sup> Migration after high school graduation can affect the state's development. As high school graduates leave the state, there is a decrease in college graduation rates within the state, which indirectly affects the workforce education levels.<sup>147</sup> However, migration after college graduation has a much greater effect on the state's productivity and represents a much larger

loss of investment. Thus, most of our policy focuses on the retention of college graduates in the three years after graduation.

Recent college graduates report that their likelihood of living in Indiana in three years declines sharply based on whether or not they believe their current position is likely to help their career path.<sup>148</sup> Indiana lacks good training programs or experiential learning programs for college graduates to gain experience and be prepared when job opportunities come. Indiana has a number of programs focused on retaining graduates such as the Orr Fellowship program, Grant County's Grants for Grads Program, and a number of Indiana University career fairs. On their own, however, these programs have not sufficiently stemmed the flow of Indiana graduates leaving the state.

The Orr Fellowship program targets Indiana undergraduates.<sup>149</sup> The program places students into a two-year executive leadership program. The Orr Fellowship is attractive because it provides excellent networking opportunities, leadership training, and other resume-building activities. These are key issues that graduating seniors look for in their first jobs when beginning to build their careers.<sup>150</sup> This is a prime example of the types of programs Indiana needs to market to graduates to keep them in the state. Since the fellowship targets graduates with interest in entrepreneurial business and organizational leadership, it should have lasting effects on the state's job growth rates.

The Grant County Economic Growth Council (GCEGC) funds a program called Grants for Grads that provides financial incentives to recent graduates to live and work in the county.<sup>151</sup> Recent graduates with a job offer in Grant County or full-time employees of less than three years are eligible to have the GCEGC pay a portion of a down payment on a house or monthly rent. The financial incentive encourages educated individuals to move to Grant County and helps employers retain educated employees.

The Bloomington Chamber of Commerce developed Helping Young Professionals Excel (hYPe).<sup>152</sup> It connects young professionals in the area to each other by fostering personal relationships, professional growth, and civic development. hYPe hosts social events, financial wellness workshops, and an "Under 40" awards program. The group provides an outlet for young professionals in a geographically isolated area where most programs are oriented towards university students.

Lastly, Indiana University hosts a number of career fairs at all campuses to connect employers with students. These career fairs are important because they help students see available opportunities in and out of the state. Connections with employers during their undergraduate years, including internships and job shadowing, keep students in the state where they are attending university. Job fairs can provide students with valuable connections to an employer, which incentivizes them to remain in-state after graduation.

Among the broader base of older college graduates in the workforce, Indiana is attracting workers. The annual U.S. Census Bureau's American Community Survey (ACS) makes it possible to examine the flows in and out of Indiana across different groups of college educated workers. It shows that slightly older and more experienced college educated workers, ages 25 to 54, are moving into Indiana than are moving out between 2004 and 2010.<sup>153</sup> This suggests that Indiana employers are actively recruiting more experienced college educated workers from outside of the state. Many of the positions being vacated by retiring Baby Boomers are not suitable for relatively inexperienced recent college graduates, but they provide a great opportunity to attract mid-career professionals to the state.

Acquiring talent from other states helps reverse brain drain by replacing Indiana graduates with talent educated in other states. Talent acquisition is also important to keep the state from being too inward-looking.<sup>154</sup> Since Indiana has a promising trend in talent acquisition, it should exploit this opportunity by implementing policies to attract mid-career professionals. Very few states, Indiana included, have policies meant to attract out-of-state talent.<sup>155</sup> Talent acquisition can also extend to recent college graduates of other states, but given this trend, the focus here is mostly on mid-career professionals.

In Indiana, there are three main talent acquisitions tools: the Career Connect website, Indiana state government website, and TechPoint. Each website connects job seekers with job opportunities, which includes out of state job seekers. The weak point in the current system is there does not seem to be significant recruitment of out of state individuals or an active campaign to increase the perception of Indiana as an exciting place to work and live.

The most interesting of the three websites is TechPoint. TechPoint is one of the organizations that support the Orr Fellowship program, but they have many more endeavors such as Xtern and Xpat.<sup>156</sup> The Xtern program connects 50 students to internships in Indianapolis. The Xpat program recruits mid-career professionals outside of the Indiana through spreading information about Indiana's cities and job opportunities. TechPoint posts a variety of technology-related job opportunities and plans many different types of technology events, connecting people to Indiana-based employers.

## DATA ANALYSIS

The data analysis focuses on two major areas, macroeconomic changes and individual choice factors. Macroeconomic trends analyzed in Indiana include unemployment rates, migration, and job concentration. Various studies have discussed the brain drain issue; however, few researchers quantified brain drain by comparing the percentage of STEM graduates with respect to the availability of STEM jobs. Indiana is well-known for its university system, producing high-quality college graduates, but these jobs are not ready for these students after graduation. The analysis shows that Indiana lags behind other states in high-quality jobs. Research shows that aggregate job availability is an important predictor for new college graduate migration.<sup>157</sup>

Regardless of macroeconomic trends, individuals still make decisions based on their personal preferences. The second part of this section investigates how factors like job responsibilities and average wages influence location selection. Producing a qualified work force is one thing, while creating an environment in which professionals can apply their skills and flourish professionally is another.

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## MACROECONOMIC TRENDS

It is important to understand that states with favorable conditions that attract workers will have a more rapid and sustained economic growth than states that do not. High unemployment rates are one of the socioeconomic quandaries that hinder economic progress. Indiana ranks as the 35<sup>th</sup> highest average annual unemployment rate from 2010 to 2014, at 8.30% (See Figure 1 in Appendix 3a).<sup>158</sup> Indiana's relatively high unemployment rate may be analyzed through the supply and demand of the labor force. In simple economic terms, this implies that, in Indiana, the supply of the labor force exceeds the demand for workers. Indiana can adopt policies to promote the job creation and bridge the gap between supply and demand. It is obvious that those who cannot be accommodated by the job market in Indiana would be incentivized to relocate to places they can find jobs.

However, unemployment rates provide a limited understanding of brain drain. Indiana's university system graduates a high number of STEM students, but less than 50% in any given year are employed in-state.<sup>159</sup> Indiana continuously lags behind the United States in key high-skills areas of growth (See Figure 2 in Appendix 3a).<sup>160</sup> Consequently, the surpluses of individuals with STEM degrees are inclined to relocate to places where they can find jobs. Recipient states of the incoming workforce have two primary benefits. First, they acquire a qualified workforce for which they did not provide a capital investment. Second, they earn income tax from the out-of-state workers, which contribute to their overall economic development.

In a study of 21 states, researchers provided a framework for comparing brain drain rates by utilizing college graduates as supply and high-tech industries as market demand.<sup>161</sup> In 2009, Indiana had 0.0018 STEM graduates per capita, ranking 9<sup>th</sup>, whereas Texas granted 0.0015 science and technology degrees per capita, ranking 17<sup>th</sup>.<sup>162</sup> On the demand side, Indiana registered 0.015 export occupations per capita in science and technology, ranking the state 19<sup>th</sup>.<sup>163</sup> On the other hand, Texas had 0.022 export occupations per capita in science and technology, ranking this state 7<sup>th</sup>.<sup>164</sup> Looking at this comparison between Indiana and Texas, there is a higher level of undergraduate enrollment per capita in Indiana than Texas, which implies that higher education in Indiana results in a greater labor supply for high-tech jobs than Texas. However, when considering the demand side, it is clear that Texas has a higher demand for labor in high-tech sectors. Therefore, brain drain is a problem which hinders Indiana's economic development. Additional research asserts that though brain drain from Indiana has slowed in recent years, it is still higher than neighboring states.<sup>165</sup>



Compared to its neighbors Michigan and Illinois, Indiana still struggles with matching labor supply and demand. Utilizing data from the U.S. Census Bureau, an analysis of the concentration of manufacturing jobs with employees shows that Indiana has a much higher concentration of jobs. This concentration means jobs are more competitive in Indiana than in Illinois and Michigan. Indiana's manufacturing job concentration is ranked 12<sup>th</sup> out of the 21 most populous states while Illinois and Michigan are ranked 5<sup>th</sup> and 8<sup>th</sup>, respectively. The concentration of more employees and fewer industries in Indiana illustrates the need for more diverse jobs in Indiana. In situations where the retention of recent graduates is determined by the number of local job opportunities, demand in high-tech jobs must be above average in high-tech labor supply.

Projections for the number of jobs available in the manufacturing sector in Indiana show that there will continue to be a trend of over-supply of Indiana-trained engineers. Colleges and universities in Indiana granted 3,514 undergraduate degrees that were directly related to engineering in 2012.<sup>166</sup> However, the Indiana Department of Workforce Development estimates that there will be a total of 13,509 engineering related job openings in Indiana between 2012 and 2022<sup>167</sup>. Therefore, if Indiana continues to produce 3,514 workers with undergraduate degrees in engineering each year, there will be a surplus of 21,631 workers over the next 10 years (See Figure 3 in Appendix 3a). If there are no jobs available to these engineers, it is likely that they will be forced to move to another state that has better employment opportunities.

Another way to measure the degree of job concentration within Indiana compared to the nation is through the use of Location Quotients (LQs). A statewide LQ that is greater than 1.0 is said to have a greater concentration than the national average. When the LQ is significantly above average, 1.2 or greater, the state is said to have a "specialization" in the occupation. Among the key high skilled occupational groups, none in Indiana met or exceeded this specialized threshold in 2010 (See Figure 4 in Appendix 3a). Just one group, life science technicians, exceeded 1.0 with a 1.13 LQ or 13 percent greater concentration in Indiana relative to the national market.

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## INDIVIDUAL CHARACTERISTICS

While career choices depend on job availability, there are many individual characteristics and perceptions that influence where a college graduate decides to locate, such as career opportunities, average wages, and quality of life. The perception of Indiana in many of these areas is not conducive to retaining college graduates, but steps can be taken to increase the attractiveness of the state and metro areas especially Indianapolis, a growing tech center.

According to Mark Schill, Research Director at Praxis Strategy Group, almost 92% of the nation's STEM graduates are not directly employed by their degree-related industries.<sup>168</sup> Instead, companies in manufacturing, business service and finance industries employ many of them. Core areas of STEM employment growth include cities with diverse employment opportunities. Indianapolis is ranked among the top metro areas for technology-related job growth.<sup>169</sup> In the future, Indianapolis will be positioned to become one of the largest technology centers in the

Midwest. This growth will benefit the whole state in both workforce and economic development.

For high-achieving individuals, ensuring job growth is important. Since Indiana's high-tech job concentration is very low, it means that college graduates looking for flexible career opportunities are going to seek out employment elsewhere. A large availability of jobs requires companies to entice high-achieving graduates with career development and leadership programs. A study of Indiana graduates found that job roles and responsibilities are a leading factor in choosing a location to live.<sup>170</sup> Just 43% of Hoosiers are likely to stay in Indiana when they do not view their current job as helping their career path, compared with 66% likely to stay when they have jobs in Indiana today that are helping their career path (See Figure 5 in Appendix 3a).<sup>171</sup> With a glut of graduates, there is little incentive to employers to promise substantial career growth and little opportunity for graduates to move between employers to expand their skills.

Another major factor that influences an individual's choice of location is wages.<sup>172</sup> Average wage reflects the quality of available jobs in a state and the value placed on skilled employees. Activities on the job that earn premiums involve greater value-adding activities. In Indiana, the average wages for high skilled jobs generally fall well below the national averages (See Figure 6 in Appendix 3a).<sup>173</sup> There is one exception. Wages for Indiana life science occupations meet the national averages and reflect the competitive nature of the life sciences industry cluster in Indiana involved in a range of higher value-adding sectors including pharmaceuticals and medical device manufacturing.<sup>174</sup> Generally though, high skilled workers in Indiana are earning significantly less than their counterparts nationally, even when controlling for cost of living.<sup>175</sup> By attracting high tech jobs, Indiana's average wage will increase.

While the average wage will take time to correct, Indiana can begin changing the perception of the state from a manufacturing and agricultural producer to a high-tech and innovative place. The framework already exists with programs such as the Purdue Foundry and Venture Capital Investment Tax Credit. The key to attracting individuals to Indiana is to provide opportunities for career development.

## OTHER STATE POLICIES

When comparing Indiana's macroeconomic trends to other states, Indiana seems to fall short in several areas. It has a higher unemployment rate, lower wages, and fewer jobs available. Looking at how other states combat brain drain provides a pool of ideas that Indiana can select from and tailor to the state's unique needs. First, the brain drain policies of states with similarly transitioning economies, like Michigan and Ohio, were examined to find similarities and differences in policy making. Then a wider net was cast to see what innovative policy initiatives were taking place in any state in fighting brain drain. Thus, the policies in this section come not only from Midwestern states, but also states like Maine and Virginia. Similar to Indiana, other states have policies that fall into the three categories: job growth, talent retention, and talent

acquisition. These states' ideas are not perfect, but some are successful and can be implemented in Indiana with similar success.

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## JOB GROWTH

Most states in the Midwest region have similar tax credit incentives for job growth and relocation. The Job Creation Tax Credit in Ohio and Michigan's Economic Growth Authority Standard Job Creation Tax Credit (MEGA) are very similar to the EDGE tax credit in Indiana. A major difference between Michigan's and Ohio's tax credits and Indiana's is that Michigan and Ohio outline very specific job growth requirements. In Michigan, companies must create at least 50 new jobs or 25 high tech jobs that are full-time within five years.<sup>176</sup> Ohio's tax credit requires 10 new jobs within three years that pay at least 150% of the federal minimum wage.<sup>177</sup>

In Michigan, the 21<sup>st</sup> Century Job Fund leverages up to \$1 billion in tobacco settlement money to foster the "creation and growth of new jobs, new businesses and new entities."<sup>178</sup> The job fund is leveraged for a capital investment program, commercialization program, and commercial lending program. It operates similarly to Purdue's Foundry by focusing on encouraging venture capital projects and the commercialization of innovative products created within the state. The third prong of the Job Fund facilitates loan enhancement programs, meant to increase lending by commercial banks. A similar capital loan program is available in Ohio called JobsOhio Growth Fund Loan. The Growth Fund Loan is run by a private economic development corporation and provides up to half of the capital investments for existing companies that have a track record of creating revenues but have issues obtaining necessary capital for growth from other sources.<sup>179</sup>

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## TALENT RETENTION

Many other states have programs that connect students to employers after graduation or financially incentivize them to remain in-state after graduation. Michigan has the Small Company Internship Award. Maine and Ohio both have financial incentive programs for in-state college graduates. These three programs are investments into community growth, encouraging employers to offer internships and graduates to stay in-state.

Michigan's Small Company Internship Award is administered by the Michigan Corporate Relations Network, a collaboration between six Michigan universities and the Michigan Economic Development Corporation.<sup>180</sup> The internship award provides small businesses with matching funds from the student's university to support a 12-week internship or co-op position.<sup>181</sup> The award focuses on the STEM fields and requires internship projects be beneficial to the company and academically relevant to the student. One criteria of selecting companies for the award is future hiring plans, whether the intern could potentially be hired on as a full-time employee.

Opportunity Maine provides a tax credit on student loans to in-state graduates who remain living and working in Maine.<sup>182</sup> It is easily obtained by filing the Educational Opportunity Tax Credit Worksheet when filing the state income tax. STEM graduates are eligible for a fully

refundable tax credit. On the other hand, Ohio's Choose Ohio First program provides scholarship funds to Ohio universities with innovative STEM programs, plus medicine.<sup>183</sup> The scholarship funds are used to recruit high-achieving Ohio students. The goal of the program is to position Ohio as a high tech state and attracting Ohio high school graduates to state universities. A vast majority of recipients stay in-state after graduating with a STEM degree through the program.<sup>184</sup>

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## TALENT ACQUISITION

Indiana's neighboring state, Michigan, has a number of acquisition-focused endeavors. The Detroit Revitalization Fellows program targets mid-career professionals with advanced degrees to live and work in the downtown area.<sup>185</sup> The program mostly partners with local businesses and nonprofits that need expert help in data analysis, development, and leadership. Employers in 2015 include the City of Detroit, Southwest Detroit Business Association, Data Driven Detroit, and Global Detroit.<sup>186</sup>

Other programs in the state of Michigan include a virtual career fair and the MichAGAIN job fair. The virtual career fair gives out-of-state individuals an opportunity to see job openings and communicate directly with human resource professionals from participating companies.<sup>187</sup> In 14 career fairs, almost 30,000 job seekers have interacted with 189 employers. The virtual nature provides out-of-state job seekers an opportunity to explore career options in the state. While no longer active, the MichAGAIN career fairs were part of the Pure Michigan campaign and sponsored job fairs in cities like Chicago, Boston, and Washington, DC.<sup>188</sup> The program targeted Michigan University graduates who moved out of state by highlighting the benefits of living in Michigan and included alumni events, CEO breakfasts, and job opportunity information. While Indiana University sponsors online career fairs for students and alumni, these fairs are not available to non-IU affiliated job seekers and also promote many out of state companies.<sup>189</sup> That means the career fair could be working against talent retention and does not successfully promote talent acquisition.

In Virginia, the Return to Roots campaign works to match an estimated 15,000 local high school graduates who want to return home with jobs in a nine county region.<sup>190</sup> It helps high-tech companies fill important jobs with local talent. And in southwest Indiana, there is a partnership with Kentucky to promote the region as a place to work and live.<sup>191</sup> The Kentucky Indiana Exchange (KIX) promotes the region to the nation, while also fostering regional collaborations that make quality of life higher.

## RECOMMENDATIONS

For many years, Indiana has addressed brain drain with varying success. A variety of programs exist to encourage students to stay, improve job outcomes, and increase quality of life. These policy recommendations focus in on the opportunities that exist in Indiana: a number of state university graduates, in-migration of mid-career professionals, and growth in STEM industries. While ensuring jobs exist, creating an environment that connects Hoosiers to jobs and encourages long-term careers in the state are vital to economic development. The

recommendations are listed according to the three categories: job growth, talent retention, and talent acquisition.

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## JOB GROWTH

Other task groups have focused much more heavily on economic development through innovation, university connections, and job growth. These are only three suggestions specifically related to brain drain and creating more opportunities for STEM graduates in Indiana. The task group highly recommends increasing opportunities for Indiana graduates to keep them in the state, but also realize that mid-career professionals can also invigorate the community.

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## REDESIGN EDGE TAX CREDIT

Indiana's EDGE tax credit is a common tool in economic development. However, Indiana's current design fails to incentivize high skill and STEM jobs. Redesigning the structure of EDGE to mirror that of Michigan and Ohio would incentivize businesses to create higher paying, higher skills jobs that graduates desire. The redesigned EDGE should include a lower threshold requirement for STEM jobs. Another consideration should be to create an incentive for companies that build career development programs. This will be described in more detail in the Talent Retention section.

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## INCREASE ACCESSIBILITY OF TAX INFORMATION

The state can make tax incentives and legal issues more easily navigable for new businesses. The current Indiana Economic Development Website makes it somewhat difficult to find the incentives that various businesses qualify for. Consolidating all the available economic development programs into one site that is easily accessible would cut down the opportunity cost of researching eligibility. For example, Ohio's economic development website contains a funding page with a short 45-80 word summary of each tax credit.<sup>192</sup> This makes finding the appropriate job-related tax credit much easier to navigate for entrepreneurs and new businesses.

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## STOP ENFORCING NON-COMPETE AGREEMENTS

Employee non-compete agreements are enforceable in Indiana. These agreements reduce the career mobility of highly skilled workers.<sup>193</sup> Michigan inadvertently adopted the enforcement of non-compete agreements in 1985 and the subsequent migration drew away inventors and innovators from the state.<sup>194</sup> These migration trends were larger for workers with more collaborative and transformational work. Highly skilled professionals, most likely to be inventors and innovators, are incentivized by non-compete agreements to leave states where these are enforced.

Since Indiana’s job growth plan should encourage entrepreneurship, enforcing non-competes for companies could be driving the most innovative workers out of the state. Non-competes have been demonstrated to depress research and development costs, even though they decrease the challenge of employee retention.<sup>195</sup> By eliminating non-compete agreement enforcement, Indiana could take a major step towards creating an environment that is welcoming to entrepreneurs, innovators, and inventors. Unlike many migration determinants, this policy is one that is easily actionable.<sup>196</sup>

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## TALENT RETENTION

A major indicator of talent retention post-graduation is connections with employers and alumni. The majority of the following policy recommendations focus on increasing student connections with industry leaders and entrepreneurs. Programs similar to the Orr Fellowship are needed within the state to provide career development and growth.

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## INCREASE ACCESSIBILITY AND UNDERSTANDING OF PATHWAYS

Currently, this is being achieved through IU career fairs, but career fairs are few in number and provide very low levels of contact between employers and students. Incorporating internship opportunities into academic programs ensures students are connected with employers. However, universities need to play an important role in helping students obtain meaningful internships.

One way is through alumni programs. Alumni hold unique influence when they have experience in the industry students are studying. At Central Michigan University during Homecoming week, the Journalism department brings alumni to every mid and high-level journalism class.<sup>197</sup> Students have an opportunity to talk to public relations professionals, journalists, and broadcasters who sat in their seats a few years ago. In these situations, alumni are available to answer questions about the industry, networking, and job searching. These meetings help students solidify their career goals. Another model for connecting students to employers is the Live.Work.Detroit. program, where college students and recent graduates interact with young local professionals and local employers in a career networking setting.<sup>198</sup> A state-sponsored study in Ohio recently suggested social-hours between firm’s new employees, executives, and students to promote interdisciplinary discussions of ideas.<sup>199</sup>

Indiana also needs to ensure there are ample internship opportunities available for students. IndianaIntern.net provides a starting place for student internships, but the state can do more to ensure opportunities are available. Indiana should explore a Small Business Internship tax incentive. Creating internship opportunities in high demand fields helps students discern their career path and provides important employer connections. Secondly, internship scholarships for low-income students should be considered. Internships can be very expensive, requiring temporary housing and often preclude working summer jobs.

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## PROVIDE CAREER DEVELOPMENT OPPORTUNITIES

Indiana's Orr Fellowship program touches on an important aspect of talent retention. Expanding the Orr Fellowship program would detract from its prestige, but other options are available to increase career development opportunities in specific careers. A tax incentive program similar to EDGE could be implemented for companies that provide multi-year career development programs. Many large companies offer leadership programs, such as General Motors' Technical Rotation and Career Knowledge Program. These types of programs offer recent graduates with little professional experience multi-year placements in the company with rotations through various departments. By encouraging employers to implement these types of leadership programs, Indiana will retain more recent graduates.

Another issue is the lack of opportunities in rural Indiana. Many professionals of rural areas, such as doctors, teachers, and lawyers, have little contact with other professionals. The perception of low economic growth and career development in rural areas results in teachers and parents pushing high-achieving students to leave.<sup>200</sup> Indiana should explore the creation of Rural Networks for young professionals. These networks do not have to be segregated by profession, but can provide well-educated rural residents with career development and social opportunities. Bloomington's hYPe program provides the state with a solid blueprint for networking opportunities in rural areas. Fostering relationships between young professionals increases the probability that young people will enjoy the community they live in and leads to an improved community.

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## PROVIDE FINANCIAL INCENTIVES FOR REMAINING IN INDIANA

Indiana already has highly qualified graduates, but needs to retain them. A scholarship program, like Choose Ohio First, has negligible effects on graduate retention when the supply of graduates is high.<sup>201</sup> The Maine Opportunity tax credit, which provides in-state public and private university graduates with tax credits on loan repayments would be more effective. The tax credit requires graduates to remain in-state and provides additional incentives for STEM graduates in the form of a fully refundable tax credit.

In the same vein, Grant County's Grants for Grads program could be implemented in target counties. Only new graduates are eligible and by helping residents purchase homes, the program ensures commitment to the area. In 2014, the program provided rental assistance to 15 individuals with a median age of 24 and 18 new homeowners with a median age of 27.<sup>202</sup> A state-level program might only apply to purchasing a home to encourage permanency. It could focus the grant on neighborhoods of particular economic development interest like Detroit Live Downtown.

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## FOCUS ON INTERNATIONAL STUDENT RETENTION

International students make up a sizeable portion of Indiana's university students. While some students want to return home, many students want to find employment in the United States. International students with private funding are more likely to remain in the United States.<sup>203</sup>



Indiana can encourage businesses to fund international student education opportunities, especially with incentives for future employment. Diverse career opportunities are one of the most important enticements for international students, especially in technology-related fields.<sup>204</sup>

Lastly, the longer international students stay in the United States, the higher probability they remain in the United States.<sup>205</sup> Indiana universities need to provide solid integration programs for international students to help assimilate them into American lifestyles. Assimilation programs help international students adopt preferences for American culture, which encourages them to remain in the country after they graduate.<sup>206</sup>

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## TALENT ACQUISITION

Talent acquisition focuses recruitment efforts on graduates and professionals in other states. Indiana must position itself as an industry leader and promote itself as an interesting place to live. Many of these policy recommendations are related to increasing relationships. Some also point towards making transitions easier, especially for relocating families.

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### INCREASE ACCESSIBILITY OF EMPLOYERS AND JOB OPPORTUNITIES

The usability of career websites is important in recruiting out-of-state candidates. If a website is enticing and easily accessible, applicants have a better perception of the quality. The difference between Indiana Connect and the state employment website is stark. The state employment website looks modern and aesthetically pleasing. It is easily navigable for job seekers because it presents information and options in an intuitive and attractive manner. A redesign of Indiana Connect to be more accessible and aesthetically pleasing is necessary to promote Indiana as a high tech epicenter for out-of-state recruits.

Once the website redesign is completed, a virtual career fair should be held. Michigan's virtual career fair successfully connected job seekers with employers and Indiana could similarly benefit. A Hoosiers Come Home campaign could precede the virtual job fair to encourage out-of-state professionals to log in and see the opportunities available. The campaign should also include quality of life components.

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### CREATE OPPORTUNITIES FOR MID-CAREER PROFESSIONALS

Since mid-career professionals are already moving to the area and studies show an increase of mid-career management positions opening up over the next few years, Indiana should leverage this promising trend by promoting mid-career professionals moving to Indianapolis. A program similar to the Detroit Revitalization Fellowship would increase the number of people moving to the city and provide better networking opportunities and support structures for various local organizations. The new fellowship program could be an extension of the Orr Fellowship, so the fewer resources are needed to implement the program for mid-career professionals.



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## MAKE RELOCATION EASY

Relocating a family is difficult and time consuming. Indiana needs to ensure relocation is not only worth the recruit's time, but also minimize the stress that family is put through. One way to do this is to provide spousal employment assistance. This can be done by encouraging companies to partner with each other to create networks with employment opportunities, or through employment assistance with the state.

Another option is providing relocation assistance. While many large companies offer relocation assistance, the state can still assist new employees moving to the state. This does not have to be in the form of financial reimbursement, but can include providing housing information, basic tax knowledge, and information on childcare in the area, among other things. Information at times can be hard to obtain from out of state. Indiana can become a leader in providing relocation information to new recruits online.

## CHAPTER FOUR

### INNOVATION AND ENTREPRENEURSHIP IN INDIANA

Promoting innovation and entrepreneurship in Indiana is key to improving regional economic competitiveness and growth. The State is already widely known as a hotbed of many of the core drivers of entrepreneurship and innovation, including world class universities, outstanding entrepreneurial programs, and a highly favorable business environment.<sup>207</sup> However, despite all of these resources, Indiana has consistently lagged in its generation of innovators and entrepreneurs. This section of the report addresses the impediments that the State faces and formulates a series of policy recommendations for transforming the entrepreneurial ecosystem into an environment that will be conducive to the realization of Indiana's full innovative potential.

Understanding the linkages between innovation and entrepreneurship is central not only from a conceptual point of view, but also for policy makers. These two areas are critical to economic growth and have only recently begun to receive coordinated attention from policy makers. Although technological innovation has long been understood as a fundamental driver of economic growth, it was not until recently that policy makers and scholars acknowledged the important role of entrepreneurs in the innovation process. For many years, specialists in the study of innovation believed that large firms are the most important drivers of innovation because they have the resources and sophisticated personnel to develop new technologies. However, contemporary research has shown that entrepreneurs and other small firms play an instrumental role in innovation.<sup>208</sup>

Entrepreneurs and small businesses are important to the innovation ecosystem – understood most generally as the network of universities and businesses, public and private pools of risk capital, and government programs devoted to bringing innovative, commercializable ideas to market – because they specialize in the exploitation of new business opportunities that are otherwise underutilized in other parts of the economy. These groups are particularly adept at taking advantage of new opportunities for two key reasons.<sup>209</sup> First, high-growth entrepreneurs are frequently among the first to commercialize new research from universities. University researchers with years of academic experience often do not have the management and business know-how to capitalize on the economic potential of their work. This is why business incubators and venture capital funds commonly have close ties to research universities. Second, “spin-off” entrepreneurs often break away from larger firms that undervalue the potential of new ideas and fail to develop them. This route is often pursued by entrepreneurs whose ideas are not aligned with the core mission of the originating firms.

High-growth entrepreneurship also accounts for an exceptionally high proportion of overall economic activity. Numerous studies have noted the link between high-growth entrepreneurs and the creation of new jobs. Zoltan Acs, for instance, found that between 1994 and 2006 the top 3% of firms in terms of growth accounted for nearly all of the country's growth in private sector revenue and employment.<sup>210</sup>

Indiana needs to do a better job of fostering its entrepreneurial ecosystem. Although the State is home to a number of world-class universities and sophisticated industries, it ranks notably low in terms of entrepreneurship and high-growth firms. In Acs' study, Indiana placed just 37<sup>th</sup> out of all states for its share of high-growth firms. The rest of this section proceeds as follows: the first subsection reviews Indiana's level of entrepreneurial activity relative to other states and transitions into a discussion of some of the best policy practices for fostering high-growth entrepreneurship. This subsection concludes with a recommendation for the State to create a more robust entrepreneurial networking platform that will unite the disjointed programs and incubators that are scattered throughout Indiana. The second subsection addresses the tax policy environment for entrepreneurs, focusing on "what works" and "what doesn't."

## CURRENT STATE OF THE INDIANA ECOSYSTEM

Healthy networks between relevant stakeholders are the sine qua non of innovation ecosystems because entrepreneurs don't operate in a vacuum. Even with the best ideas, entrepreneurs need funding, mentorship and access to critical resources and talent pools in order to create successful businesses. Given the importance of this dimension of the innovation process, this subsection reviews the current State of Indiana's Innovation Ecosystem in order to establish the baseline from which we formulated our policy recommendations. Entrepreneurs have the ability to shape a regional economy, and, if successful, their innovations may improve Indiana's standard of living. In short, "in addition to creating wealth from their entrepreneurial ventures, they also create jobs and the conditions for a prosperous society."<sup>211</sup> Entrepreneurship and innovation can be difficult metrics to measure, but using indicators--such as the Kauffman Index of Entrepreneurial Activity, the level of economic development, the number of patents issued in the state, and the level of venture capital activity within the state--we can begin to get a clear picture of how Indiana is performing in terms of innovative and entrepreneurial activity.

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## ENTREPRENEURIAL ACTIVITY

The Kauffman Foundation's Kauffman Index of Entrepreneurial Activity is a leading indicator of new business creation in the United States that reveals "important shifts in the national level of entrepreneurial activity and shifts in the demographic and geographic composition of new entrepreneurs across the country."<sup>212</sup> The index, using data from the Current Population Survey (CPS), "measures the monthly business-creation rate at the individual owner level, reporting the percentage of non-business-owning adults who start businesses with more than fifteen hours worked per week."<sup>213</sup> Overall, the United States has seen a decline in the business creation rate in 2013 from 300 out 100,000 adults in 2012 to 280 out of 100,000 adults in 2013. The "business creation of 0.28% translates into 476,000 new business owners each month during the year."<sup>214</sup> Yet while the United States saw an overall decline, the data is not necessarily negative. The decline can be attributed to "improved market labor conditions, putting less pressure on individuals to start businesses out of necessity."<sup>215</sup>

Entrepreneurship helps to create jobs. According to the U.S. Small Business Administration, high-growth small entrepreneurs are the types of businesses that provide the greatest percentage of net new jobs.<sup>216</sup> Furthermore, according to U.S. Department of Commerce data, “firms with greater than 500 employees have been contracting, resulting in net job losses year to year over the last decade, while firms with fewer than 500 employees have been consistent in creating net new jobs over the same period.”<sup>217</sup> Small businesses in Indiana “created nearly double the number of net new jobs created by large businesses.”<sup>218</sup>

Even though the importance of small, high-growth entrepreneurs is recognized, Indiana still ranks the lowest in the country alongside Iowa, Rhode Island, Minnesota, Washington and Wisconsin in terms of entrepreneurial activity, according to the Kauffman Index.<sup>219</sup> This is not entirely surprising as entrepreneurship rates are lowest in the Midwest overall.<sup>220</sup> To put this into a better perspective, Indiana has an entrepreneurial index of 0.16% (this translates to 160 per 100,000 adults), while Montana leads the country with an entrepreneurial rate of 0.61% (or 610 per 100,000 adults).<sup>221</sup> The Midwest has an index score of 0.20%, while the Northeast has a score of 0.24%; the South has a score of 0.30%, and the West has a score of 0.34%.<sup>222</sup> The national average entrepreneurial index score is 0.28%. Therefore, the Midwest as a whole falls 0.08% percentage points behind the national average, and Indiana falls 0.12% percentage points behind the Midwest region.<sup>223</sup>

Indiana ranks low on the rate of entrepreneurial activity, even though it is these high-growth firms that are creating the most new job opportunities. In the next section, we will look to certain indicators to get an idea of the economic climate that these firms are operating in to determine whether it is having an impact on their success.

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## INNOVATION ACTIVITY

Indiana has a steadily growing GDP with major industries leading the charge in R&D as well as patent outputs, particularly the manufacturing and life sciences sectors. This is good news as it means that innovation within Indiana is not stagnant and is continuing to grow. Over the past 5 years, there has been remarkable growth in both venture capital investment within the state as well as patents granted. While this is good news, we are still lagging in entrepreneurial activity as a whole. The Kaufmann Index shows that Indiana (and the Midwest more generally) falls behind the rest of the country. Therefore, Indiana is missing the opportunity for new business creation somewhere along the way.

Academic and government sponsored R&D projects are valuable in the sense that they foster knowledge and applications that have commercialization potential beyond the developers environment. Although Indiana ranks 16th of all states when comparing total R&D expenditures, it ranked 25th in 2012 for academic R&D expenditures per capita. Indiana also ranked 38th in federally sponsored R&D expenditures per capita in 2011. R&D is a common indicator used to gauge productivity and innovation within a state. R&D expenditures have continued to climb in Indiana from \$5.4 billion in 2001 to \$7.6 billion in 2011, a 41% increase.

Industry leaders continue to have largest R&D expenditure receipts comprising over 80% of all R&D, with universities and colleges following behind at 16.8% of all R&D activity.

Moreover, when looking at number of patents granted, Indiana ranks in the top 20 with 2,167 patents granted in 2013 alone, a remarkable 81.3% increase from 2008. Most of Indiana’s patents are “utility” patents, meaning that they are “granted to anyone who invents or discovers a new and useful process, machine, manufacture, or compositions of matter or any new and useful improvement thereof.”<sup>224</sup> Table 4.1 shows the top 20 categories of patents granted in Indiana. Life sciences and manufacturing continue to be two strong fields for the state.

Finally, the amount of venture capital investment is an indicator of future growth within a state. Venture capital firms tend to invest in companies that promise high rates of return and increasing market share. Again, Indiana ranks very high nationally. In 2011, 14 deals were made totaling investments of \$177,927,100, a 133% increase in the number of deals made from 2001 and a 161% increase in dollars invested from 2001. Most striking is that in terms of dollars per deal, Indiana ranks 2nd, behind Oklahoma, but importantly in front of Arizona (3rd), Texas (4th), and California (5th).

**Table 4.1: Top 20 Utility Patent Sub Classes in Indiana from 2009 to 2013**

<b>Utility Patent Sub Classes</b>	<b>Amount Granted from '09-'13</b>
Surgery (instruments)	424
Prosthesis (i.e., Artificial Body Members), Parts Thereof, or Aids and Accessories Therefore	415
Drug, Bio-Affecting and Body Treating Compositions	353
Multicellular Living Organisms and Unmodified Parts Thereof and Related Processes	290
Surgery	197
Power Plants	177
Organic Compounds	149
Data Processing: Vehicles, Navigation, and Relative Location	143
Surgery (Medicators and Receptors)	141
Synthetic Resins or Natural Rubbers (includes Classes 520-528)	139
Communications: Electrical	122
Beds	117
Land Vehicles	117
Data Processing: Financial, Business Practice, Management, or Cost/Price Determination	109
Chemistry: Molecular Biology and Microbiology	102
Stock Material or Miscellaneous Articles	89

Metal Working	87
Measuring and Testing	86
Internal-Combustion Engines	83
Static Structures (e.g., Buildings)	83

Source: U.S. Patent and Trademark Office

## OTHER INDICATORS

In addition to economic indicators, we can look to various indices to get an idea of how Indiana ranks in terms of innovation relative to other states. The Milken Institute tracks and examines the key factors behind technology-based economic development in the United States. The State Technology and Science Index they produce “provides a benchmark for states to assess their science and technology capabilities as well as their broader ecosystem that contributes to job and wealth creation.”<sup>225</sup> The index:

“...computes and measures 79 individual indicators relative to population, gross state product (GSP), number of establishments, number of businesses, and other factors. Data sources include government agencies, foundations, and private sources. The states are ranked in descending order with the top state being assigned a score of 100, the runner-up a score of 98, and the 50th state a score of 2.”<sup>226</sup>

Indiana has an overall score of 50.40 and ranks 27<sup>th</sup> nationally, up from 30 in 2002.<sup>227</sup> The table below describes the other rankings and what they mean for the state.

**Table 4.2: The Milken Institute State Tech and Science Index for Indiana 2014**

Category	Description	Rank	Average Score
<b>Overall Ranking</b>		27	50.40
<b>Human Capital Investment Composite Index</b>	Use indicators that suggest the skill levels of the current and future workforce, including number of bachelor’s, master’s, and doctorate degrees relative to a state’s population, and measures specific to science, engineering and technology degrees	26	50.76
<b>R&amp;D Inputs Composite Index</b>	Examine a state’s facilities to see if they can attract funding and create innovations that can be commercialized. Use measures such as industrial, academic, and federal R&D, Small Business Innovation Research Awards, and the Small Business Technology Transfer program (among others)	26	53.60
<b>Risk Capital and</b>	Include several measures of venture capital activity as well as entrepreneurial pursuits, including patenting activity,	42	42.17

<b>Entrepreneurial Infrastructure Composite Index</b>	business formations, and initial public offerings to determine the success rate of converting research into commercially viable technology services and products		
<b>Technology and Science Workforce Composite Index</b>	Determine “intensity” of the technology and science workforce through the share of employment in a particular field relative to total state employment. Look at 18 occupation categories in 3 main areas of employment: computer and information sciences, life and physical sciences, and engineering	32	52.13
<b>Technology Concentration and Dynamism Composite Index</b>	Measures the percent of establishments, employments and payrolls that are in high tech categories, as well as the growth in a number of technology categories in order to assess how effective policymakers and other stakeholders have been at transforming regional assets into regional prosperity	24	53.33

Source: The California Center Milken Institute

Table 4.2 helps round out the innovation and entrepreneurial image of Indiana. The state ranks decently in indexes that measure the number of technology firms and jobs, amount of R&D, as well as the human capital available. Again, where the state severely falls behind is in the Risk Capital and Entrepreneurial Infrastructure Composite Index. We rank 42 out of 50 indicating that new business formation is markedly lower than in the rest of the country. Therefore, Indiana needs to prioritize creating an environment favorable to new business creation and supporting new business ventures to capitalize on the R&D and human capital already in place.

**INNOVATION AND POLICY**

The idea of innovation has recently become such a trending topic among those in private industry, the media, and the government that it has become a pursued goal in-and-of itself.<sup>228</sup> What is largely lost in the aura surrounding the innovation-hype is that it is not itself a performance goal for business decisions or policies. Instead, innovation is the transformation of new ideas into resources that facilitate the achievement of desired outcomes. Innovations can be in the form of disruptive or breakthrough technologies, but they can also occur as incremental improvements to processes and production. With this in mind, innovation is used as means to achieve typical goals such as generating and growing revenue, decreasing production or logistical timelines, improving the standards of living, or providing employment opportunities. Given the significance of such goals, innovation is essential to the achievement of those goals and to a location’s ability to thrive. It is argued that enhancements to technological processes account for seven-eighths of America’s long-term economic growth.<sup>229</sup> Additionally, innovation has a disproportionately powerful impact on job creation. It has been shown that each new high tech job created in a city generates at least five additional jobs within that same city, in both skilled and unskilled occupations, outside of the high tech sector.<sup>230</sup> The pursuit of innovation can also lead to well-paying jobs. This has been

demonstrated in Indiana through a study of the Purdue Research Park which finds that Park employees receive wages 65% higher than the Indiana average.<sup>231</sup> These facets highlight the notion that innovation “remains the wellspring of America’s economy” and remains crucial to Indiana’s long-term economic development.<sup>232</sup>

If innovation provides a means through which private and public goals can be achieved, it is important to understand how organizations or processes leverage it. In terms of enhancing the standard of living and competitiveness of the region through the innovation system, entrepreneurship is inextricably linked to innovation. While the preponderance of innovation still occurs through large organizations and institutions, small business entrepreneurship is critical to the dynamism of a region’s economy in general.<sup>233</sup> According to the 2010 report *An Analysis of Small Business and Jobs* from the Small Business Administration, small firms—those with fewer than 500 employees—have been shown to create the majority of net new jobs between 1993 and 2009.<sup>234</sup> The report also demonstrates that small business accounted for approximately 40% of employment among the science and engineering workforce.<sup>235</sup> In a comparison of the significance of scientists and engineers at small firms versus their large counterparts, it has been found that those in small businesses produce fourteen times as many patents and those patents are twice as likely to be cited.<sup>236</sup>

The Indiana Chamber of Commerce emphasizes that increasing the number firms and innovation in the state increases the probability of developing successful companies.<sup>237</sup> An establishment of firms and new jobs implies that some existing firms and jobs have requirements that change substantially or become structurally uncompetitive and are subsequently destroyed. This process of “creative destruction” is shown to result in new products, processes, technologies, markets, stimulating dynamism and competitiveness of an economy.<sup>238</sup> This notion can be captured by measuring a variations of net employment growth and the relationship to establishment births, expansions, deaths, or contractions. An analysis of these relationships can be considered a measure of labor churn, with higher levels of labor churn signifying a more dynamic and competitive economy. When comparing variants of Indiana’s labor churn against other states, Indiana consistently ranks among the six lowest states.<sup>239</sup> This figure corresponds with Indiana’s relatively low entrepreneurial ranking.

Given Indiana’s relatively modest ranking, but recent gains, in innovation in terms of variants of R&D spending, patent creation, national research grants awarded, and venture capital investments, the state is seemingly lagging in its entrepreneurial capacity. This signifies that Indiana is not realizing the full potential of its innovative-activity, through commercialization, occurring in the state. Commercialization can be thought of as the means by which innovative-activity can be translated into products, services, or productivity enhancements. Commercialization is often defined as occurring when a first-sale is made. Entrepreneurs are critical to this process because they play a key role in introducing technologies to the market, often responding quickly to new market opportunities. However, innovation for the pure sake of commercialization should be used advisedly as certain innovations may not be directly commercialized, but contribute to other innovations that have indirectly been brought to market. With that in mind, it is important to note that policies enhancing research and



development (R&D) funding, such as the federal Small Business Innovation Research (SBIR) program, have had a significant effect on the commercialization of innovations and research, especially among research taking place at universities.<sup>240 241</sup>

Government policy can have a significant impact on the development of both entrepreneurship and innovation. At the federal level, programs such as the Small Business Innovation Research and Small Business Technology Transfers grants encourage engagement in R&D that has the potential for commercialization. Both of these grants operate through extremely competitive awards processes whereby commercialization potential must be demonstrated. However, the awards are substantial, not only in their size, but also in their ability to successfully foster innovation. Through the SBIR grant, small businesses can gain funds in two phases: phase one provides a maximum award of \$150,000 over six months, and phase two provides a maximum award of award of \$1,000,000 over two years. Funding for the program is provided by federal agencies with an external R&D budget greater than \$100 million. These agencies are required to allocate 2.8% of their budget to the SBIR programs. In terms of their scale, SBIR and other federal programs provide nearly one-fourth of early stage technology funding to small businesses.<sup>242</sup> A 2008 study by the National Research Council also shows that the programs such as SBIR have been highly effective. Perhaps the most striking finding is that nearly two-thirds of projects funded by SBIR grants would not have occurred without SBIR funding. Furthermore, the study shows that the SBIR program leads to a relatively greater number of technology-focused businesses and that they exhibit stronger growth than non-SBIR recipients.<sup>243</sup> In terms of interactions with the academic community, David Audretsch points out that SBIR grants have increased the number of university researchers who have become entrepreneurs.<sup>244</sup>

The effectiveness of programs such as SBIR demonstrates that government can, in fact, have a substantial effect on innovation and small business development. However, the federal government has resources specifically devoted to R&D substantially beyond the capacity of state and local efforts. At the state and local level, innovation policy can be accompanied by some degree of R&D and direct small business financial support, but due to limited resources, policies at this level tend to take advantage of sustained civic leadership and network building. There are number successful state policies with features that can be incorporated in Indiana to enhance its innovation ecosystem.

## INNOVATION-BASED PRACTICES IN OTHER STATES

The innovation process is extremely complex, involving collaboration among researchers, universities, investors, small and larger companies, and the government. The complexity and number of actors involved in the innovation process introduces a myriad of uncertainties regarding the creation of sustainable and effective innovation policies. This is especially true at the state and local level where resources for innovation funding are limited. The National Research Council report, *Best Practices in State and Regional Innovation Initiatives*, emphasizes

that “innovation policies at the state level often involve taking advantage of existing resources and recombining them in new ways, forging innovation partnerships among universities, industry and government organizations, growing the skill base, and investing in the infrastructure to develop new technologies and new industries.”<sup>245</sup> Similarly, “successful innovation-based economic development is often fostered by a small number of key individuals bridging the space between science and commercialization.”<sup>246</sup> Thus, effective policy at the state level often seeks to address network failures by enhancing collaboration among these groups, reducing the perceived risks of investing in innovations and research, catalyzing commercialization, and coordinating existing efforts.

The following programs maintain a number of unique features that can be implemented in Indiana in an effort to coordinate the policies and programs focusing on innovation and technology-based small business development. In particular, these programs emphasize the importance of networks between the academic and business communities, between entrepreneurs and auxiliary business service providers, and the importance of supporting research with commercialization potential at the state level.

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## CONNECT

San Diego CONNECT, originally founded in 1985 by the University of California San Diego (UCSD), the San Diego Economic Development Corporation, and leaders in private industry, was developed with the intention to stimulate the commercialization of research discoveries in the local area and facilitate high-growth industry clusters in the area. The organization focused on how research institutes and the broader community could collaborate to facilitate connections between researchers and entrepreneurs, and how those parties could be linked to capitalists and business service providers. The intention of improving the connection between the academic and the business community was to grow the potential commercialization pipeline to foster new companies. Essentially, the program acts as a business incubator by focusing on the point where the market potential of an innovation is being assessed and commercialized. However, unlike traditional business assistance or networking programs the CONNECT organization emphasizes innovations that have market potential but may have not yet been considered for entrepreneurial involvement.

Since its founding, it has assisted in the development of over 3,000 companies in the San Diego area.<sup>247</sup> In the process, it has helped these companies attract more than \$2 billion in private capital. Today, the organization’s flagship program is called Springboard. The program assists science and technology companies with marketing, financial, and strategic business advice. The program connects companies with business services, which they term as “venture catalysts,” to assist them in obtaining federal grants, and provide them with support from a network of entrepreneurs. Throughout the program, the company’s progress is assessed. A final determination is made as to whether the company is prepared for more substantial investment or if additional coaching is needed.

A number of programs around the world maintain similar mentor-based programs. However, the CONNECT program is exemplary in several distinct ways. The first is the depth of its network. The organization maintains a network of 20 full-time staff, 1,800 volunteers, and over 500 mentors. At the onset of the organization, the founders understood the importance of business services in supporting “science-based, commercially focused innovation companies.”<sup>248</sup> Access to specialized business services can facilitate the movement from innovation to commercialization by reducing start-up barriers for would-be entrepreneurs.

The second unique aspect is the degree to which it interacts with the innovation and academic community along with the entrepreneurial community. This is crucial because it involves the analysis of innovations and other research for their commercial potential prior to significant capital injection. The collaboration is enabled through events which bring together San Diego scientists, engineers, researchers, and the business community. It also maintains talent-search services and resources providing information on innovation and research occurring in the region. Such coordinated programs provide a platform to assist with the process from taking concepts to markets. This is echoed by Duane Roth, a former CEO of CONNECT, who emphasized the “4 Ds” of commercialization: 1) discovery research; 2) defining potential application; 3) developing and validating the application; 4) delivering the solution to the market.<sup>249</sup>

The organization’s long-term support and involvement in the community is a critical factor of its success, as “policy continuity and sustained funding are essential for the development of innovation clusters.”<sup>250</sup> As testament to the replicability and appeal of the organization, the program has been modeled in over 50 regions around the world.<sup>251</sup> In developing policies or programs similar to CONNECT, it is important to ensure that such programs are not a central-gateway for researchers or technology transfer offices; providing multiple gateways to commercialization more conducive to economic development.<sup>252</sup> However, the benefit of the organization and its programs involves its holistic and coordinated nature in fostering entrepreneurs, along with the innovation pipeline.

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## SOUTH CAROLINA RESEARCH AUTHORITY (SCRA) APPLIED TECHNOLOGIES AND SC LAUNCH

The SCRA is a nonprofit applied research corporation founded in 1983 which manages \$3.6 billion in R&D programs for federal and corporate clients. SCRA accomplishes this through its innovation facilities that are partnered with Duke University (North Carolina), The University of South Carolina, and the Medical University of South Carolina. The SCRA has the mandate to “build innovation systems to commercialize knowledge produced at the state’s three research universities.”<sup>253</sup> SCRA’s key program is SC Launch, which provides guidance, networking, and funding to early stage, high tech companies in the state. SC Launch was created in response to a 2006 South Carolina legislative mandate to grow the state’s innovation economy.

The organization was launched with an initial grant of \$500,000 in 1983 and a donation of land. Today its operations are supported by revenue from its R&D facilities and contributions from industry partners. The organization maintains a definitive network of business service providers to catalyze the operations of its SC Launch client companies. The defining feature of this program is the degree to which the organization and its client companies are directly involved with its innovation centers at its partner universities. This allows the organization to be familiar with innovative activity occurring in the state and to foster the commercialization of these activities through its client companies.

What these programs have in common is their support for academic research, their incorporation of university-driven innovations into the entrepreneurial community, the emphasis on attracting high-skilled researchers, and an assessment of the commercialization potential of innovations. A common goal of these programs is the growth of entrepreneurial activity by fostering the marketability of research and innovative-activity in coordination with other innovation efforts occurring within the state.

Though Indiana has a variety of programs and organizations targeting the development of innovation efforts within the state, they are primarily uncoordinated and often duplicative in their efforts. Indiana can benefit by taking lessons from the CONNECT and SC Launch programs to strategize and coordinate the activities of the organizations tasked with spurring development and high tech innovation.

## CURRENT INNOVATION PROGRAMS IN INDIANA

Indiana and various organizations in the state support a number of programs dedicated to producing R&D, generating innovative activity, encouraging entrepreneurship, and creating a favorable business climate. In terms of innovation and entrepreneurial-focused policies and programs at the state level, the Indiana Economic Development Corporation (IEDC) provides a number of services. These include coordinating regional and local economic development efforts, providing resources for entrepreneurs to launch their business, assisting establishments seeking to move into the state, provide resources for special financing and capital arranges for qualified businesses, and assists businesses with the myriad of tax policies encouraging development, innovation, and entrepreneurship. The IECD also supports Elevate Ventures, a state-sponsored business incubator, and its 21 Fund, which co-invests in innovative, high-growth companies. The IECD launched Indiana Indure, a database comprising intellectual property, technologies, and research projects developed at universities across the state. The organization also partners with the recently established Indiana Small Business Development Center (ISBDC). The ISBDC aims to provide a network of business services and tools for establishments across the spectrum of small businesses.

Pertaining directly to innovation proliferation, Indiana is home to a host of research institutes and science parks. The most prominent of these are the Purdue Research Park network and the Discovery Research Park at Purdue in West Lafayette. Furthermore, the state hosts a number of

networking organizations for entrepreneurs in specific sectors, twenty-eight business incubators, and a number of collaborative or shared work-spaces.

In terms of efforts connecting innovators, entrepreneurs, business service provider, and capitalists encompassing the entire state and its innovative-activity resources, BioCrossroads and the 21 Fund stand out in particular.

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## BIOCROSSROADS: CATALYST FOR THE CONTINUED GROWTH OF INDIANA'S LIFE SCIENCES INDUSTRY

In face of the emerging life sciences opportunities in areas of innovation, Indiana launched BioCrossroads in 2002 to advance the establishment and growth of new life science companies. BioCrossroads is successful in forming a dynamic life sciences ecosystem by engaging stakeholders from industry, academia, health care, philanthropic and state government.<sup>254</sup> Such an ecosystem is conducive to leveraging Indiana's "deep and diverse" life sciences research and industrial base in order to accelerate research and commercialization of its competitive life sciences industry.<sup>255</sup>

Today, life sciences is one of Indiana's strongest industries. From 2001 to 2007, life sciences accounted for 23% of Indiana's job growth.<sup>256</sup> From 2001 to 2010, it continued to grow by 14% while total private-sector employment in Indiana declined by 7%.<sup>257</sup> As of 2013, life sciences has contributed \$59 billion to Indiana's economy, an increase of \$27 billion from 2002 to 2013.<sup>258</sup> Indiana is among the top five states in the United States measured by number of life sciences jobs and companies, and is only second to California and Texas in terms of life sciences exports. In Indiana, life sciences constitutes one third of total Indiana exports, outperforming the automobile industry.<sup>259</sup>

BioCrossroads's effective contribution to the formation of vibrant life sciences ecosystem in Indiana highlights its efforts in catalyzing capital, knowledge, and collaboration.<sup>260</sup> Since its founding, BioCrossroads has generated more than \$270 million investments for life sciences opportunities.<sup>261</sup> From 2003 to 2012, BioCrossroads provided \$59.75 million venture capital funding for emerging life sciences companies through its Seed Fund and Indiana Future Fund, compared to no such funding over the decade prior to its founding.<sup>262</sup> The increase in venture capital, as well as other innovation capital for Indiana life sciences, outpaced the nation and led to a remarkable increase in Indiana's life sciences innovation activities.<sup>263</sup>

Indiana is rich in academic and research resources with many leading universities such as Indiana University, Purdue University, the IU School of Medicine, and the University of Notre Dame. The universities' advanced bioscience and biomedical research over the past decade received sufficient funding from the State and the federal government. Moreover, there has been a growing focus on entrepreneurship and innovation in these universities, characterized by increasing entrepreneurship and incubation activities.<sup>264</sup> Such unique academic and industrial resources offered great opportunities to advance Indiana's life sciences industry.

In response, BioCrossroads collaborated with Indiana industry and universities in order to leverage existing resources and seize new opportunities. Biosciences Research Institute and Indiana Clinical and Translational Sciences Institute are some examples of such efforts. By catalyzing university-industry collaboration, BioCrossroads aimed to advance Indiana's life sciences research and development, as well as facilitate Indiana's life sciences commercialization and university technology transfer. It also collaborated with national venture capital firms to ensure sustained funding and long-term growth of Indiana's life science companies.<sup>265</sup>

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## 21 FUND: SUPPORT THE RESOLUTION OF NEXT-STAGE CAPITAL FORMATION ISSUES BY CO-INVESTING WITH INSTITUTIONAL INVESTORS IN ORDER TO FURTHER BUILD INNOVATIVE, HIGH-IMPACT, HIGH-GROWTH COMPANIES

The 21st Century Research & Technology Fund (21 Fund) managed by Elevate Ventures is one of the most important investment funds available to entrepreneurs in the state.<sup>266</sup> Initially, it was created by the State of Indiana to advance university research.<sup>267</sup> It then shifted its emphasis to venture capital funding to facilitate commercialization of research and technology transfer,<sup>268</sup> and changed its focus from the university setting to high tech start-ups more generally.<sup>269</sup>

As an integral part of Indiana Economic Development Cooperation (IEDC), the 21 Fund created 11,132 jobs and contributed \$427 million in economic activity to Indiana from 1999 to 2007.<sup>270</sup> In its efforts to support technology transfer and commercialization in Indiana, the Fund has invested \$238.5 million in 188 awards to industrial recipients as of 2010. It allocated 37% of its fund to universities and 63% to private firms. Nearly half of its fund went to life sciences and health care industries.<sup>271</sup>

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## OTHER PROGRAMS AND INITIATIVES

Indiana has various sources of economic development activities that drive innovation. These activities are vibrant and are connected at the university level. They include the IU Innovation Fund, Purdue Research Park, and the defunct Indiana Innovation Alliance. These programs aim to connect Indiana's research universities and industrial partners in Indiana's advanced industries. Such a network represents an increasing focus of Indiana on the formation of a technology cluster that hopes to advance innovation, promote entrepreneurship, and facilitate the growth of venture companies.

## PROGRAM RECOMMENDATIONS

While these initiatives are important to the state, their disparate and uncoordinated nature limits their ability to make a significant economic impact in the state. In the following section,

we propose several program initiatives specifically designed to foster better linkages between Indiana's entrepreneurs, universities, venture capital funds, and other programs. We believe that uniting these resources into a single network can help Indiana to realize its innovative potential.

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## CONNECT INDIANA'S UNIVERSITIES AND RESEARCH INSTITUTES WITH THE BUSINESS COMMUNITY

*Expand upon Elevate Ventures' role within the state and coordinate the networking activities of Indiana's organizations and governmental programs focusing on innovation and high-technology small business development.*

Indiana has a number of promising programs that aim to support researchers, innovators, and entrepreneurs. Additionally, Indiana is rich in academic resources and its ability to generate marketable innovations. However, these organizations or policies largely operate independently of other each other or are targeted to specific groups. The state of Indiana should transform Elevate Ventures from a small incubator into the state's flagship innovation networking and commercialization program—with its key mission to coordinate the efforts of the disjointed programs currently operating in the state.

An organization similar to CONNECT or SCRA would provide a platform to engage the entire innovation spectrum in a coordinated manner, reducing the barriers between the different components of the innovation ecosystem. They also contribute to the innovation ecosystem by reducing network failures. While the existing programs in the state add considerable value, the presence of a network between them can catalyze innovation by engaging the stakeholders and creating feedback mechanisms. This network program is not meant to be a gatekeeper. Rather, it is intended to encompass the innovation ecosystem's components to foster collaboration and information-sharing among independent actors.

Existing resources can be used to form such a collaboration organization. Elevate Ventures' mandate could be expanded to specially facilitate commercialization among the State's universities. The organization already operates with early stage entrepreneurs and the broader business community, but it is largely disconnected from innovation occurring in academia. Such a relationship would broaden Elevates' knowledge of marketable innovations, broadening its ability to find suitable business ideas for early stage funding. In essence, such an organization may be similar in structure to BioCrossroads, but be focused beyond the life sciences industry to incorporate other high-growth sectors within the state such as advanced manufacturing, athletics and business-to-business software.



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## PROGRAM TO SUPPORT PROOF OF CONCEPT AND PROTOTYPE DEVELOPMENT FUNDING

*Indiana should adopt a program that provides state resources for applied research with proven commercialization potential.*

In order to stimulate the process of transforming applied research to business applications, Indiana should provide a mechanism to increase resources for applied research. In 2013, Indiana's academic R&D expenditures were \$176 per capita, ranking 25<sup>th</sup> among other states. Similarly, in 2011 Indiana received \$129 per capita in federal R&D funding, ranking 38<sup>th</sup>.<sup>272</sup> However, the state ranked 16<sup>th</sup> in total R&D expenditures in 2011, of which 81.3% came from private industry. R&D expenditures from universities comprised 16.8% of the total, ranking the state 34<sup>th</sup>. Furthermore, less than 1% of the states R&D expenditures came from federally funded research and development centers or other nonprofit institutions, ranking Indiana 48<sup>th</sup> among other states.<sup>273</sup> These figures indicate Indiana's relative inability to generate entrepreneurial activity that originates from universities and research institutes.

Proof of concept and prototype development funding are critical to ensuring a sufficient quantity of investment opportunities for early-stage companies. Funding for applied research and proof of concept development reduces barriers for researchers and scientists to start companies and commercialize their innovations. Currently, university-based programs within Indiana, such as Indiana University's Innovation Fund and Spin Up Program, and Purdue's Foundry, provide some university-sponsored research funding and seed capital for businesses spun-out of these institutions. However, these R&D expenditures and seed-stage funding in Indiana remain low relative to other states.<sup>274</sup> Proof of concept funding programs can help bridge the gap between research discoveries, business development, and formal funding stages.

At its onset in the late 1990s, Indiana's 21 Fund primarily supported research funding and university spin-offs. Later, it was devoted to early stage funding to catalyze small businesses. Efforts to bolster the deal pipeline could include the expansion of the Fund's scope to again incorporate university spin-offs and prototype research. The state should also consider expanding the resource base for these purposes by utilizing existing grantee programs such as those from the National Institute of Health, National Science Foundation, or the SBIR program. Similar programs in other states, such as the Montana Matching Funds Program which matches a percentage of SBIR or Small Business Technology Transfer grants, have increased the innovation research pool by leveraging established programs.

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## FROM BUILDING NETWORKS TO TAX POLICY



State supported venture capital funds and other ancillary services are critical components of an innovative ecosystem. As necessary as these components may be, Indiana still needs to stay abreast of other types of benefits and financial incentives that are available in other states. Venture capital tax credits are another device that is widely utilized by state governments across the country. At the most basic level, governments use tax credits to promote certain types of behavior, and VC credits aim to foster the investment of VC funds in innovative start-ups.

There is considerable variation across the country in terms of the availability of VC tax credits and the level of credits provided. Out of Indiana's nearest neighbors, Iowa, Kentucky and Wisconsin have among the most comprehensive programs. Iowa, for instance, sponsors three distinct tax credit programs that target different types of investors and entrepreneurs. The state's Community-based Seed Capital Fund targets only investors that hold at least a 70% stake in a business with total capital commitments under \$3 million. Meanwhile, its Innovation Fund Tax Credit complements this program by targeting investors that hold under a 70% stake in an early-stage start-up with a high-growth potential. Kentucky's tax credit program targets investors that hold under 20% ownership in a company that is valued at less than \$10 million. The program is targeted more broadly at small businesses as opposed to just early-stage start-ups. Finally, Wisconsin's tax credit programs, the Angel Investor Credit and the Early State Seed Investment Credit, are aimed directly at early-stage companies. Investors are limited to a 20% share or less and to companies that have received less than \$10 million in private equity investments.<sup>275</sup>

There are pros and cons to all of these programs. For instance, limits on the size of capital commitments can restrict the total tax credit expenses to the government and help to target certain types of investors. However, this type of restriction can also deter high-quality investors, who may not be interested in investing in small-scale entrepreneurs with a lower potential for growth. More significantly, many evaluations of these programs, especially small-scale programs, suggest that they have little effect on firm survival and performance.

What is most important for Indiana to understand about VC tax credits is, put simply, "what works" and "what doesn't." Tax credits can be expensive and less transparent than the direct provision of services. However, they cannot be neglected because of interstate competition to attract innovative start-ups. The following section reviews Indiana's venture capital tax credit program and provides direction on where there may be room for improvement.

Indiana already has a highly favorable tax environment. And entrepreneurs and business leaders throughout the state are well aware that Indiana is one of the lowest-cost places to do business from a tax perspective. However, one of the State's greatest challenges is attracting new venture capital funds into the state. The networking proposed above is an important

component of this mission because it increases the visibility of Indiana’s entrepreneurs. As a complement to this program, we also propose a minor revision to Indiana’s Venture Capital Investment Tax Credit.

## TRANSFERABLE TAX CREDITS FOR INVESTMENTS

*Indiana should improve its Venture Capital Investment Tax Credit by making it transferable to attract outside investors and to keep Indiana competitive with surrounding states.*

As a means of encouraging investment in new business ventures—specifically, the small to medium sized businesses that are consistently creating new jobs and those involved with innovative technologies—more and more states are adopting “angel investment credits.”<sup>276</sup> In a way, it lessens the risk of investing in these small ventures as the investor “may claim a state income tax credit equal to a percentage of their investment” and therefore has an “immediate, guaranteed return on their money in the form of a tax credit.”<sup>277</sup>

While Indiana already has a policy in place to incentivize angel investments (see Venture Capital Investment Tax Credit in Appendix 4a), it is only available to those who have tax liability within the state. As expressed during interviews with local entrepreneurs within the state, Indiana investors are risk-averse, even with the tax credit. Therefore, adding a transferability scheme to the Venture Capital Investment Tax Credit would allow investors from outside of the state to receive the same benefit and increase the opportunities of investment for start-ups within Indiana<sup>1</sup>. Transferable tax credits are but one tool states can offer taxpayers to incentivize certain behavior believed to be beneficial for the state. They “allow the company which generates the state tax credits to sell these credits on the market to companies that have state tax liability.”<sup>278</sup> The transferability allows an entity that has more tax credits than tax liability to sell what it cannot use.<sup>279</sup>

Looking at Indiana, there is a fair amount of VC activity taking place, however it is concentrated in a small number of deals with large investments. Creating transferable tax credits would keep Indiana competitive with nearby states such as Wisconsin, Minnesota, and Kentucky who have already modified their venture capital policies to include transferability. Minnesota, like Indiana, “does poorly in attracting venture capital... as venture capitalists on the coasts are reluctant to invest in ‘flyover land’”, so it would also incentivize investors from the outside to

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<sup>1</sup> Currently, Indiana offers a refundable tax credit, in the form of its EDGE program. A refundable tax credit differs from a transferable credit in that refundable credits “can be applied to state taxes to reduce the tax owed to below zero, resulting in a moderate negative income tax.”<sup>1</sup> Transferable tax credits can only be sold when there is a buyer present who also needs tax credits.

look towards the Midwest.<sup>280</sup> Making the Venture Capital Investment Tax Credit transferable will allow “new businesses to get an infusion of capital, investors receive a tax credit, and the states see increased employment and innovation that enhance the local economy.”<sup>281</sup>

## CHAPTER FIVE

# LEVERAGING HIGHER EDUCATION AND PUBLIC RESEARCH INSTITUTIONS

## INTRODUCTION

Higher education and public research institutions are vital to the economic development and continuing success of the State of Indiana. According to the Carnegie Classification of Institutions of Higher Education, Indiana has three universities that are considered to be of “very high research activity”: (1) Indiana University-Bloomington, (2) Purdue University, and (3) University of Notre Dame. Similarly, two universities within Indiana have been classified as “high research activity”: (1) Ball State University, and (2) Indiana University-Purdue University-Indianapolis. Through our task group’s current research, we have found that several of these institutions have partnered with what have been called “industrial affiliates”. Industrial affiliates are typically private businesses and companies, government agencies, or non-profit organizations that are rooted in certain industries, examples of which are given herein.

Several of these universities have programs that are adequately deemed “Industrial Affiliate Programs” or IAPs, whereby the universities establish communication lines between their university and certain industries to allow for extensive partnerships in specific industries. According to a Stanford University policy, IAPs are:

an opportunity to engage with University faculty, researchers, students, and industry peers in an open environment to discuss pre-competitive research and teaching activities in a field of mutual interest. In parallel, Industrial Affiliate Programs provide faculty and students with insight into the challenges and opportunities that face industry. The membership fees paid by members provide unrestricted financial support for the Affiliate Program’s research, teaching and administrative activities.<sup>282</sup>

Many of Indiana’s universities, such as Indiana University-Bloomington, Purdue University, and the University of Notre Dame, do in fact have IAP, or IAP-like, programs, whereby the university can partner with outside industries. For example, Indiana University-Bloomington’s Kelley School of Business has established cooperatives between the school and industrial affiliates within both supply chain and information management sectors. Similarly, Purdue University’s School of Aeronautics and Astronautics has partnered with companies such as Boeing and Aerojet Rocketdyne, along with several other aeronautics companies.

In this section, we will examine the current state of Indiana’s public research institution’s partnerships with private and government entities. We will also outline some of the practices

used by neighboring states and the most competitive states in the country. All of these states will be compared using the Milken Index (a trusted ranking system of technological innovation in states). Also, using the Naval Surface Warfare Center Crane, we will analyze a large public research institution outside of higher education. Lastly, we will assess conflict of interest policies and the role they play in public-private partnerships.

## INDIANA

### INDIANA UNIVERSITY

Indiana University-Bloomington's Kelley School of Business has formed what they call "corporate relations" within the supply chain and information management sectors.<sup>283</sup> For the supply chain program at the Kelley School of Business, a collaboration called the "Supply Chain Alliance" looks to provide a "forum between the Kelley School of Business's Department of Operations and Decision Technologies and supply chain industry partners [that] connect[s] companies to top students who study supply chain management theory and implementation".<sup>284</sup> This relationship is focused on the development of undergraduate students who are looking to enter into the supply chain sector through "alliance-sponsored" activities, as well as formulating a curriculum that prepares undergraduate students before they enter into the market. However, the forum also provides undergraduate, graduate, professional, and post-graduate research topics that allow for collaboration between school and sector.<sup>285</sup>

Similarly, the Information Management Affiliates (IMA) program, also offered by Indiana University-Bloomington's Kelley School of Business, is deemed "a cooperative that generates, synthesizes, and disseminates knowledge about the use and management of information and information technologies".<sup>286</sup> This program, unlike the Supply Chain Alliance, takes a much more industry-university cooperative approach, whereby the IMA members look to "exchange best-practice knowledge and new ideas" about the field, contributing to the future economic development of Indiana by developing relationships that allow these members to learn from mistakes made in their field and continue successful practices.<sup>287</sup> These two programs within the Kelley School of Business are a mixture of student development, industry-university cooperation, and sector-specific research aimed at creating better practices and better individuals suited for the appropriate fields.

### PURDUE UNIVERSITY

Purdue University has what they have called an "Industrial Affiliates Program" within the School of Aeronautics and Astronautics.<sup>288</sup> This program, unlike the Kelley School of Business's Supply

Chain Alliance and IMA programs, focuses more on the promotion of open, positive communication lines between the university and their industry partners. According to the School of Aeronautics and Astronautics, there is an annual membership fee owed by the “industry affiliate” to the university in the amount of \$10,000, which provides the affiliate with:

- A faculty liaison between the company and School
- MS and PhD thesis listings
- A display case to promote the company
- Listing of the company’s name on the website
- The opportunity to speak to Aeronautics and Astronautics classes<sup>289</sup>

this program at Purdue University is different from the previously mentioned programs at Indiana University-Bloomington, in that the former focuses more so on the affiliate and its promotion, while the latter revolves more around student development and industry-led and industry-based research.

However, Purdue University’s Urban Ecology Laboratory within the Entomology Department utilizes an IAP that serves as “a catalyst and facilitator of collaborative efforts”.<sup>290</sup> Specifically, the Center for Urban and Industrial Pest Management makes use of this IAP program to discover and implement “sound, practical pest management solutions”.<sup>291</sup> Much like Purdue University’s IAP, this program, too, requires a membership fee in order for the “industrial affiliates” to participate in the collaborative activities. Unlike the IAP within the School of Aeronautics and Astronautics, this IAP’s Advisory Board lists their top two priorities as: (1) identifying and prioritizing research needs, and (2) developing joint research projects.<sup>292</sup> Some of the “industrial affiliates” that are engaged in this program are Dow AgroSciences, DuPont, and Bayer Environmental Science. As the life sciences are an important sector to the agro-economic development of Indiana, the partnerships that these life sciences businesses have with this program is integral. With Dow AgroSciences’s headquarters in Indianapolis, this collaboration is important not only to the continued research of life sciences within Indiana, but it greatly benefits the state of Indiana purely because of this company’s location within the state.

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## INDIANA COMMISSION FOR HIGHER EDUCATION

The Indiana Commission for Higher Education (CHE) is a public organization that consists of 14 members. The goal of this organization is to “define the missions of Indiana’s colleges and universities, plan and coordinate the state’s postsecondary education, and ensure that Indiana’s higher education system is aligned to meet the needs of students and the state”.<sup>293</sup> Rather than being a governing board, this organization serves as a “coordinating agency” that

works closely with Indiana’s public and independent colleges, and has developed strong communication lines that create equally strong relationships with several State agencies.<sup>294</sup>

Although this organization’s objectives are not specifically aligned with furthering IAP development or the university-industry-state nexus, we suggest that the CHE seek to establish a subcommittee, or possible separate committee, within the Indiana Commission of Higher Education that looks to connect universities with “industrial affiliates” and/or government agencies, so that this partnership may look to better Indiana through open, collaborative research and possibly subsequent implementation of that research. It would also be beneficial for the CHE, on some level or another, to initiate the conversation in regards to developing these university-industry-state collaborations. By meshing the academic, private, and government sectors within Indiana, it is likely that research and economic development can be improved throughout the state. It is also the case that the connectivity and collaboration among the aforementioned sectors will aid the State in its attempt to make Indiana more competitive. As of now, it seems that the CHE is focused on higher education as a whole within the state and the continued adaptation and reformulation of curricula, where it might be beneficial to incorporate those IAPs previously mentioned.

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## RECOMMENDATIONS

With the communication lines that have been developed within Indiana University-Bloomington’s Kelley School of Business and Purdue University’s School of Aeronautics and Astronautics, it is suggested that the State take advantage of these institutions by utilizing these communication lines, which have developed into a mixture of research based, student development focused cooperatives; the State can effectively insert itself into the partnerships that have become known as IAPs. Through funding, legislative support, significant government interest, and a myriad of other methods, the State can become a partner in a cooperative that would aid further research and possibly contribute to a more developed Hoosier workforce, especially within the fields and sectors of these IAPs.

## ILLINOIS

The State of Illinois has eight universities that are ranked as “very high or high research activity” universities according to the Carnegie Classification of Institutions of Higher Education. This includes Northwestern University, University of Chicago, University of Illinois at Chicago, University of Illinois at Urbana-Champaign, Illinois Institute of Technology, Loyola University Chicago, Northern Illinois University, and Southern Illinois University-Carbondale. Of this list, four of the universities are public institutions: University of Illinois at Chicago, University of

Illinois at Urbana-Champaign, Illinois, Northern Illinois University, and Southern Illinois University-Carbondale.<sup>295</sup>

In addition to having numerous public research institutions at their disposal, the state of Illinois generally ranks higher than Indiana in metrics used to assess technology and research-based economic development<sup>296</sup>. Illinois ranks 19 spots higher than Indiana in regards to risk capital and entrepreneurial infrastructure. This aspect is based on patent activity, business formation, and public offerings. Indiana produced 31.47 patents per 100,000 people in 2013, while Illinois produced 39.67.<sup>297</sup>

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#### ILLINOIS SUSTAINABLE TECHNOLOGY CENTER

The Illinois Sustainable Technology Center produces research through the University of Illinois Urbana-Champaign. The State’s Hazardous Waste Research Fund supports this program. The purpose of the projects developed at this center are to “advance the state of knowledge/practice in areas of sustainability, pollution prevention, energy generation and conservation, and environmental issues of importance to the State.”<sup>298</sup> The Center's mission is to combine research and education; oversee information collection, analysis and dissemination; and direct technical assistance to industry, agribusiness and communities in a multidisciplinary approach to better manage the state's hazardous wastes and solve problems associated with it, along with dealing other critical environmental issues. This entity has produced research to improve the Illinois River in conjunction with “Illinois Department of Natural Resources, the Illinois Scientific Surveys, the University of Illinois, the U.S. Army Corps of Engineers, numerous private companies, and a variety of federal, state, and local organizations.”<sup>299</sup>

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#### UNIVERSITY OF ILLINOIS/CARLE HEALTH SYSTEM

The University of Illinois – Urbana- Champaign has created the country’s first college of medicine that has a focus on engineering and medicine together. This has been made possible through the partnership they formed with the Carle Health System. This program is being funded through corporate investments, including \$100 million from Carle and any subsequent revenue from patents developed from this partnership. The new program is being produced with zero state appropriations.<sup>300</sup> This collaboration between private entity and public research institution will attract residents to the State of Illinois, medical professional and healthcare workforce, as well as create new jobs.

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#### MICRON TECHNOLOGY

In December 2001 Micron Technology was an “academic partner” with the University of Illinois – Urbana – Champaign. Micron sued the school for patent infringement on three patents. In



addition, the University has sued the corporation. In the end, Micron Technology won the legal dispute and, consequently, has barred the hiring of any University of Illinois graduates.<sup>301</sup> This is a cautionary tale of unregulated partnerships between higher education and private companies that can result in negative effects on economic development.<sup>302</sup>

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## RECOMMENDATIONS

Recommendations from the State of Illinois include two far ends of the spectrum with respect to public/private support. The Sustainable Technology Center is funded through the state and the federal governments to in turn create public goods and also patentable technology. The new medical school at the University of Illinois – Urbana-Champaign on the other hand is being fully funded through private support. Building opportunities for public education institutions to work directly with private companies without the need for government intervention is the main takeaway from Illinois, and Indiana should emulate these initiatives. We recommend that a public entity be created to assist in facilitating these types of partnerships while also protecting the state from potential legal or economic issues.

## MICHIGAN

The State of Michigan has several programs designed to aid the research of universities, help with the development of small businesses, and connect both universities and small businesses. The Michigan Corporate Relations Network (MCRN) is a “collaboration between six of Michigan’s leading research universities... [That] was started in 2011 with support from the Michigan Economic Development Corporation (MEDC) and Michigan Strategic Fund Board (MSF) to create the first statewide network in the country to provide a critical and unique tool for business growth and attraction,” and we believe that this might be a valuable example to follow in order to make Indiana more competitive.<sup>303</sup>

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## SMALL COMPANY INNOVATION PROGRAM/TECHNOLOGY AND COMMERCIALIZATION ASSISTANCE

Under the umbrella of the MCRN, a program called the Small Company Innovation Program/Technology and Commercialization Assistance (SCIP/TCA) seeks to provide matching funds to small businesses throughout Michigan in order to alleviate the costs of conducting certain research projects with the universities partnered within the MCRN program.<sup>304</sup> Essentially, how the program works is that the MCRN looks to pair the expertise and physical infrastructure of the universities with the project needs of small businesses. In several instances, the small businesses simply do not have the funds to continue with their research and development. According to MCRN, a small business

appl[ies] to be a part of SCIP/TCA along with a researcher(s) from a university in MCRN. The industry/university partnership designs a research project that will be conducted at the university. SCIP matches the company's funds and universities pay for their own overhead costs. The company must provide the matching funds and then the grant funds will be released to the university researcher(s).<sup>305</sup>

The overarching goal of the SCIP/TCA is to increase the collaborative opportunities between businesses and universities within Michigan.

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## RECOMMENDATIONS

We have found very little information regarding programs that are similar to the MCRN in Indiana. By following the example of this type of program, Indiana might be able to create a similar program that will aid the state in its push to attract more businesses and establish a better connection between universities and those small businesses. What is even more astounding about the MCRN program is the fact that “MCRN’s six-school network represents 99% of all research and patent activity among Michigan universities”.<sup>306</sup> We suggest, especially since patent activity is an important factor in the success of making Indiana more competitive, that Indiana follow suit with Michigan and look to develop a program such as this. With implementation of this type of program, it would seem to be the case that the university-industry-state nexus within Indiana could become a much more interconnected network. This will allow each component to feed off of one another and, in turn, develop effective collaborative research strategies for the continued economic development within Indiana.

## OHIO

As is seen in Appendix 4a, Ohio is comparable to Indiana on the Milken State Tech and Science Index rankings. However, Ohio greatly exceeds Indiana in the risk capital and entrepreneurial infrastructure subcomponent ranked 20<sup>th</sup> and 42<sup>nd</sup> respectively. When breaking down this category, Ohio is strongest in total venture capital investment growth. Indiana has negative growth and is ranked 42<sup>nd</sup> while Ohio has positive growth and is ranked 24<sup>th</sup>. It is worth comparing Ohio's programs to Indiana as they rank better and have 37 public colleges and universities.

Additionally, Ohio has twelve institutions listed with a Carnegie Classification of high or very high research activity compared to Indiana's five. These include the private universities of Case Western and the University of Dayton. The public universities are: Bowling Green State, Cleveland State, Kent State, Miami University, Ohio State University, Ohio University, University of Akron, University of Cincinnati, University of Toledo, and Wright State University.

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## OHIO TECHNOLOGY TRANSFER OFFICERS' COUNCIL

The Ohio Technology Transfer Officers' Council (TTOC) under the Ohio Board of Regents is the executive agency in charge of policy related to higher education and the university system in Ohio, and is meant to provide a forum for all of Ohio's academic, medical, and government research institutions to share information and best practices. This is to improve and encourage institutional technology transfer, enhance collaboration, and to elevate the role of institutional technology transfer throughout Ohio.<sup>307</sup> Ohio's TTOC is a state-run council to enhance the University System of Ohio by engaging in information sharing.

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## OHIO THIRD FRONTIER PROGRAM

The Ohio Third Frontier program, created in 2002 and extended through 2015, is a commitment to creating new technology-based products, companies, and jobs. It is a \$2.1 billion initiative to create an "innovation ecosystem" to allow for the efficient transition of great ideas from the lab to the marketplace.<sup>308</sup> Current programs under the Third Frontier Program include the Entrepreneurial Signature Program, Open Innovation Incentive, Technology Validation and Start-up Fund, Pre-Seed Fund Capitalization Program, and Commercial Acceleration Loan Fund. All of these programs are an effort to supply money for developing various technologies in the state. A good example of a state building "business-research partnerships" to improve the state's high-tech economy is given by Bob Taft, Governor of Ohio 1999-2007:

It was our big high tech initiative to create more higher-paying jobs in Ohio by building on our research and business strengths. Business-research partnerships like what the University of Dayton Research Institute does throughout the state to attract more federal research dollars, create new products, spawn hi-tech start-ups, and establish more seed capital monies to get start-ups off the ground. I don't think conservatives liked it too much but I thought we had to do something to build that sector since we were losing so many good manufacturing jobs. The first time we went to the voters for additional funds for it, the issue failed 51-49 because we forgot to include the farm sector and the Farm Bureau came out in opposition and put billboards to vote no all over the state. So we included agricultural high-tech and I appointed the head of the Farm Bureau to the Board of Ohio State (one of their requests) and the issue passed the second time around. Of course the research universities and research centers were all in the major cities so it was in that sense an

urban-focused initiative (B. Taft, personal communication, September 4, 2014).

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#### EFFICIENCY ADVISOR COMMITTEE

Ohio also has an Efficiency Advisory Committee under the Board of Regents. This committee is composed of representatives from all of Ohio's 37 public colleges and universities, 14 four-year institutions and 23 two-year institutions. This committee focuses on sharing services and saving money through collaboration and the open sharing of best practices.<sup>309</sup> They meet at least quarterly and aim to reduce the cost of textbooks and other education materials. Related to this cost-cutting committee, the Governor's Office of 21<sup>st</sup> Century Education and the Office of Budget and Management produced a shared services action plan for Ohio schools and local governments in order to promote collaboration among schools and governments to be even more cost effective.

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#### RECOMMENDATIONS

Using Ohio as an example, it is recommended that Indiana look into universities communicating in order to enhance shared service delivery and cost effectiveness. Additionally, researching the potential implementation of a program similar to the Third Frontier Program, which includes access to funds of money to spur partnerships between public and private institutions would greatly benefit the state.

#### KENTUCKY

Compared to Indiana, Kentucky consistently ranks lower in the Milken Index. Even so, there is one particular program in the Commonwealth of Kentucky that is worth examining and, perhaps, implementing.

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#### KENTUCKY COUNCIL ON POSTSECONDARY EDUCATION

The Kentucky Council on Postsecondary Education created a voucher program to partner small and medium-sized businesses with university researchers to undertake research and development ventures. Currently, the program is a \$3 million investment fund that invests in technology refinement, prototype development, and commercial product development.<sup>310</sup> This is an excellent program for Indiana to emulate in order to foster economic development through technological advancement by utilizing higher education.

Overall, the mission of the voucher program is to increase technology transfer and innovation; improve economic development and competitiveness; develop commercial concepts that lead

to commercially successful products or processes; stimulate and create growth enterprises; encourage partnerships between Kentucky universities, research organizations, and private companies; promote research and commercial activities that are free-market oriented; and to support small and medium-sized companies.

Moreover, the financial assistance is structured as follows: companies may receive grants of up to \$30,000 for exploring the feasibility of technology commercialization; companies may receive funding for up to \$250,000 for conceptualizing new technological development; companies may receive funding up to \$500,000 for post-initialization technology development; and companies may receive up to \$750,000 for high growth potential and a clear path to commercialization.<sup>311</sup>

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## KENTUCKY INNOVATION NETWORK

To implement the abovementioned voucher program, the Kentucky Innovation Network was created. This Network is staffed with experienced and educated business leaders who are located in thirteen offices throughout Kentucky. Since the inception of the Voucher Program, and subsequently the Network, 1,300 companies have been assisted, \$785 million of funding has been given to businesses, and 6,500 jobs have been created.<sup>312</sup>

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## RECOMMENDATIONS

In sum, the voucher program has been highly successful and it has created the partnerships and economic development that Indiana seeks. Therefore, Indiana should analyze this program and determine whether or not it is feasible to implement a similar program within the State. If Indiana is satisfied with the results of the Voucher Program and Kentucky's Innovation Network, and the outlays associated with such a program are reasonable, then Indiana should consider creating a similar program to best utilize its great research institutions while creating new jobs, revenue, businesses, and technology. Indiana has the foundations to be a leader of technological advancement, and a program similar to Kentucky's Voucher Program could spur Indiana to the level that is desired.

## COMPETITIVE STATES

In addition to looking at the states surrounding Indiana, it is useful to look at some states that are considered competitive due to their Milken overall rankings. New York, Texas, California, Washington, and Massachusetts can all be considered competitive states according to their rankings and people's general opinions of them. As seen in Appendix 4a, they are overall ranked 11<sup>th</sup>, 20<sup>th</sup>, 3<sup>rd</sup>, 6<sup>th</sup>, and 1<sup>st</sup> respectively. Massachusetts ranks first in all Milken subcomponents except for technology concentration and dynamism in which it ranks fourth

overall. Due to these excellent rankings, these states may be good to examine for policies that could make Indiana more competitive in the national workforce market.

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#### PARTNERSHIP TO ADVANCE COLLABORATION AND EFFICIENCIES

The Partnership to Advance Collaboration and Efficiencies (PACE) in Massachusetts is somewhat similar to Ohio’s Efficiency Advisory Committee. This is a “collaborative initiative of Massachusetts’ nine state universities and 15 community colleges.”<sup>313</sup> PACE initiatives are directed toward finding cost savings to provide financial assistance to students in need. The goal is to make college education in the state affordable and accessible for all students. One way they are looking to cut costs includes creating joint purchasing programs among the universities that the state of Indiana can initiate.

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#### MASSACHUSETTS LIFE SCIENCES CENTER

Massachusetts also has a research center that connects collaborators for research projects related to the life sciences in order to connect universities to clinics and hospitals. The Massachusetts Life Sciences Center (MLSC) is “a quasi-public agency of the Commonwealth of Massachusetts tasked with implementing the Massachusetts Life Sciences Act, a 10-year, \$1-billion initiative that was signed into law in June of 2008.”<sup>314</sup> The MLSC offers comprehensive incentives and collaborative programs specifically for the life sciences ecosystem in order to create jobs and support public health advancements. The MLSC utilizes a Scientific Advisory Board, a Peer Review Panel and the Board of Directors to garner input from experts to “drive the selection of the best investments of public dollars”.<sup>315</sup>

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#### EMPIRE STATE DEVELOPMENT

Empire State Development is New York’s chief economic development agency. Within Empire State Development, there is the Division of Science, Technology, and Innovation (NYSTAR) that works “to accelerate the growth of New York State’s high-tech economy.”<sup>316</sup> NYSTAR does this through the administration of numerous state programs including the Matching Grants Leverage Program. This program assists New York State research institutions in attracting new federal and private foundation or industry research dollars to New York.

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#### RECOMMENDATIONS

Through the research from some of the competitive states, it is seen that investing in partnerships like the Massachusetts Life Sciences Center and New York’s matching grants programs for high-tech projects is beneficial for the states. They provide the infrastructure and

the money to allow partnerships between hospitals, schools, research institutions, and other facilities to be successful.

## NAVAL SURFACE WARFARE CENTER CRANE

The importance of Naval Surface Warfare Center Crane (NSWC Crane), a division of Naval Sea Systems Command (NAVSEA), is apparent because it is a driving force for not only southwest Indiana, but for much of the state. Between employee compensation (including benefits) and contracts awarded to businesses in the state, the total money spent in Indiana is \$796 million per year. Moreover, NSWC Crane employs 4,386 people and is one of the largest employers in southern Indiana.<sup>317</sup> These numbers do not include the other entities that are located at Naval Supply Activity Crane (NSA Crane). These other organizations include various constituencies of the Army and the Navy, which employ a substantial amount of people and allocate substantial monies to be spent on various contracts and employment. However, because NSWC Crane is the largest tenant at NSA Crane, and because they spend the largest amount of money, only NSWC Crane's business will be discussed.

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### AREAS OF BUSINESS

NSWC Crane has three specialized mission focuses—Strategic Missions, Electronic Warfare, and Special Missions. Due to these areas of focus, NSWC Crane has substantial resources that industry partners can utilize. To be clearer, let us examine each of the capabilities of the three mission areas.

**STRATEGIC MISSIONS** has over 800 hundred technical professionals, 210,000 square feet of facilities, premier and powerful equipment, secure anti-tamper laboratories, and a plethora of industry information and patents for advancement. Within Strategic Missions, NSWC Crane is specialized in threat detection, integrated missile defense, global strike capabilities, and critical technology innovation<sup>318</sup>

**ELECTRONIC WARFARE** has more than 1,500 skilled personnel, 320,000 square feet of facilities, secure facilities, electronic technology integration center, technology assembly facilities, and unique technology and knowledge. Within Electronic Warfare, NSWC Crane specializes in air attack systems, maritime surface warfare, maritime subsurface warfare, and electromagnetic ground systems.<sup>319</sup>

**SPECIAL MISSIONS** has more than 700 government personnel, more than 1.3 million square feet of facilities, ground test ranges, and infrared test facilities. Within Special Missions, NSWC Crane specializes in mobility and maneuverability, special munitions and weapons, sensors and communications, and training.<sup>320</sup>

Public or private partnerships are able to utilize all of these resources if they collaborate with NSWC Crane. Moreover, these areas of specialization require substantial support from industrial partners including engineering intricate technology and supplying materials. NSWC Crane's specialization creates ample opportunity within Indiana for public and private academic institutions, government agencies, and private corporations. By partnering with Indiana public and private academic institutions, NSWC Crane is able to innovate new technology and foster new ideas to advance the interests of the Department of Defense and those research institutions that partner with NSWC Crane. Moreover, NSWC Crane partners with countless businesses including large corporations like BAE Systems, General Dynamics, Raytheon, Boeing, and Northrop Grumman to advance those same interests.<sup>321</sup> Despite partnerships with large corporations, there are countless partnerships with small businesses as well. These will be discussed shortly.

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## SMALL BUSINESS ADVANCEMENT

NSWC Crane, like every division on the Department of Defense, engages small businesses, minority and women owned small businesses, and other disadvantaged small businesses. As of March 2015, NSWC Crane has \$801 million of contract awards that are small business eligible. Of these eligible allocations, 21.20% (\$170 million) are awarded to small businesses. This exceeds the 17.50% goal.<sup>322</sup>

To delve into NSWC Crane's devotion to advancing small businesses, let us examine numbers from fiscal year 2010. In 2010, \$52.4 million was awarded to disadvantaged small businesses; \$54.4 million was awarded to women-owned small businesses; \$52.7 million was allocated to historically underutilized businesses; and \$4.7 million was allocated to service disabled veteran-owned small businesses.<sup>323</sup>

These awards are intentionally awarded to these aforementioned business categories because of federal acquisition laws, and due to NSWC Crane's desire to strengthen the state that supports them. This desire to strengthen Indiana is seen in the events NSWC Crane holds to attract small businesses. For instance, every year NSWC Crane holds the Buy Indiana Initiative, whose purpose is: "To implement a procurement strategy to increase awareness of contracting opportunities for Indiana companies, particularly those within the Crane Regional Economic Development Organization area."<sup>324</sup> Many of these purchases are allowed to be placed exclusively with local Indiana businesses as long as they are within a threshold of \$25,000. Many of the various required services and materials can be purchased from local businesses and, thus, it is the policy of NSWC Crane to make these purchases with local businesses if the prices are fair and reasonable, and if it is in the best interest of the government.<sup>325</sup>



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## LEADING IN INNOVATION AND KNOWLEDGE

NSWC Crane is a leader in Indiana in “Intellectual Capital.” NSWC Crane is a draw for a highly educated workforce, which can advance the economy and development of Indiana as a whole. For instance, 73% of NSWC Crane’s workforce is scientists, engineers, and technicians, 23% are administrative personnel, and 4% are clerical/blue collar workers. Of these workers, a substantial majority have four-year college degrees, and a large portion have advanced degrees. Moreover, NSWC Crane created a PhD Fellowship Program and a Masters Program, which provide funding and other support for those seeking degrees in science, technology, engineering, and math (STEM) and public management disciplines.<sup>326</sup> Largely, NSWC Crane is propelling the academic interests of Indiana through these programs. Because of these programs, NSWC Crane is succeeding in human capital and economic development.

Finally, the clearest way to view the success of NSWC Crane is to view their “Innovation Metrics.” For instance, NSWC Crane has been issued 69 patents since 2000, 55 of which are disclosed; another 118 patents are in process. Moreover, NSWC Crane has educational partnerships with 39 academic institutions, with seven more in process.<sup>327</sup> These metrics show NSWC Crane’s drive to advance technology innovation and research in Indiana, while involving as many outside parties as necessary.

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## BARRIERS TO ENTRY

Unfortunately for many potential vendors, beginning business relationships with NSWC Crane can be difficult. For instance, to do business with NSWC Crane, all business activities must coincide with the interests of the government (this decision is entirely in the hands of NSWC Crane). Moreover, the business must compete at a fair and reasonable price (determined by Crane) to be considered as a vendor. This can be challenging for small vendors to meet the same quality to price ratio as larger firms.

Regardless, NSWC Crane gives explicit instructions to potential vendors through their Buy Indiana Initiative. For an example, the vendor should define their products and services in detail, while explaining how the service or material will benefit NSWC Crane’s endeavors. A vendor that attends seminars such as the Buy Indiana Initiative will learn how to take advantage of these opportunities. This process, however, may take introspection, as the vendors need to create a target market for themselves to have more success at earning these contracts.<sup>328</sup> Despite the potential difficulties for new vendors, NSWC Crane’s attempts to assist and educate potential vendors should give the proper insights on how to conduct business at Crane.

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## RECOMMENDATIONS

With all of this information in mind, NSWC Crane is a driving economic force and knowledge innovator for Indiana. If the State of Indiana wants to increase private business interaction further with NSWC Crane, it is recommended the State create an educational plan to inform businesses about the potential opportunities at Crane. If more vendors understand the process of receiving business from NSWC Crane, and know what business is available, then it is likely more revenue will be given to Indiana companies. The advancement of Indiana businesses should help the overall economy by creating jobs and bringing in federal revenue. High technology jobs can attract, or retain, highly educated people, bringing in additional revenue and business to Indiana.

Other than the above recommendation, and perhaps with the exception of tax incentives, Indiana should not do much else to advance business with NSWC Crane, because there is not much else the state can do to encourage economic growth from Crane. NSWC Crane is already adept at advancing business and economic development on their own. Besides educating potential vendors and potentially giving tax incentives, it is likely other methods would be a waste of effort and resources without increasing economic development.

## CONFLICT OF INTEREST

In the State of Indiana there are four very high or high research activity institutions that are public: Indiana University-Bloomington, Ball State University, Purdue University and Indiana University – Purdue University Indianapolis.<sup>1</sup> In this section we are going to assess the barriers to partnerships with these public research institutions. We will use Indiana University as the basis for this discussion as all four entities have similar policies.

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## CONFLICT OF INTEREST

Indiana University-Bloomington has an Office of Research Compliance, also used by the Indiana University Purdue University Indianapolis, which follows a five-step process for determining if there are conflicts of interest between Indiana University and industrial affiliates. It begins with a detailed request for information that exceeds various thresholds (See Appendix 6a). One detail of interest is the requirement to disclose, “intellectual property rights and interests totaling \$5,000 or more, upon receipt of income related to such rights and interests.”<sup>329</sup> If a researcher wishes to pursue a project with “outside interests” it will move to the COI Committee for review. This will consist of an assessment of whether they need “to manage, reduce or eliminate the interest.”<sup>330</sup> On their website they include a list of management strategies depending on the outside relationship (See Appendix 6b). A project that will result in

patent royalties will be managed on a case-by-case basis or by a management plan. They include very non-specific guidelines for these management techniques.

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## CONFLICT OF COMMITMENT

There is also a Conflict of Commitment Policy, which can be found in Appendix 6c. The policy specifically states, “External activities not related to university responsibilities shall take place outside of the employee’s designated work activities or during periods of authorized leave. External activities for which paid or unpaid leave should be used include, but are not limited to: Providing non-university related services to another entity, including a corporation, business, association, government agency or not-for-profit organization, as an officer, director, owner, agent, consultant, or employee.”<sup>331</sup>

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## INDIANA UNIVERSITY RESEARCH AND TECHNOLOGY CORPORATION

The Indiana University Research and Technology Corporation works to build partnerships between IU and industry.<sup>332</sup> This entity works with the Innovate Indiana Fund to produce start-up entities that are developed through IU and assist professors or researchers commercialize products. To begin, a researcher must disclose their

invention or discovery, any sponsors of your research, the names of any collaborators and their university affiliations, and the names of the lab(s) where the original work was conducted. The information you provide will enable your IURTC technology manager to determine what legal protections are needed, if any, as well as to begin targeting potential business partners.

All of these aspects play a part in the commercialization of findings at a higher research entity.

With this information, it is our recommendation that any state partnerships with Indiana University – Bloomington, Ball State University, and Indiana University – Purdue University Indianapolis be produced through the entity or sub-department itself, and not individuals.

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## THE NEED FOR A CONFLICT OF INTEREST POLICY

Connecting high level academia in the State of Indiana to promote economic development can result in a compromise of research and resources for our institutions. For example, the University of Oklahoma has an affiliate, the Oklahoma Geological Survey, who conducted research that resulted in the conclusion that fracking is likely a “contributing factor to the increase in earthquakes.” Immediately following this finding, the CEO of Continental Resources,

a large oil and gas exploration company in Oklahoma, contacted the President of the University to influence them to down play their findings, who also happens to be on the Board of Directors of Continental Resources.<sup>333</sup> Even though conflict of interest policies may appear as a barrier to promoting economic development, they also serve the purpose of protecting the quality of research being produced. With situations like the aforementioned across the United States, conflict of interest policies are important mechanisms for guiding the relationships between research institutions and private entities.

## CONCLUSION

Overall, we suggest that the Commission for Higher Education (CHE) seek to establish a subcommittee to manage these partnerships. We recommend that CHE work with the Small Business Administration in Indiana to create an entity that incorporates the private sector. The structure of the Massachusetts Life Sciences Center appears to be the most advantageous because it is a “quasi-public” entity, which would include government guidance while empowering private companies and public institutions to promote economic development and build the essential infrastructure for these partnerships. Throughout our analysis, we found varying missions and structures for leveraging higher education and public research institutions. There are endless combinations that include government intervention, incentives from the private market, and federal funding. All of these avenues are available to the State of Indiana, however we recommend using opportunities that are already established such as Indiana University-Bloomington’s Kelley School of Business and Purdue University’s School of Aeronautics and Astronautics, in conjunction with a newly formed “quasi-public” entity, to create the opportunity for an open discussion between public research institutions and private companies about potential economic development in the state. In the end, conflict of interest policies force partnerships to go through the University itself, which may result in barriers to entry. However, they mitigate the risk of compromising research or undue stress on our institutions’ resources.

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