Introduction
During the first year of the Great Recession, Indiana was fully embarked upon an ambitious public policy reform agenda touching nearly every aspect of government and business. From 2006 to 2008, the state reformed a badly broken property tax system that had precipitated a taxpayer revolt. In 2006, the state de-regulated broadband, ushering in a period of rapid high-speed internet adoption. In 2007, the results of the Kernan-Shepard report provided a bipartisan blueprint for local government reform.

Immediately prior to the Great Recession, the Indiana Commission for Higher Education set aggressive goals for college attendance and completion. The financing model for Indiana’s public universities were aligned to meet these goals. Primary and secondary education financing was changed, with the state assuming all the operational funding. By 2012, Indiana had the most comprehensive school choice program in...
the nation. Every child, without regard to district of residence, could choose the public school they wished to attend (as long as the receiving school district accepted transfers and there was space available), and funding flowed with the student. The state expanded charter school authorizers, funded a broad voucher program and allowed individual school corporations to create their own charter options for students.

The State of Indiana raised the general sales tax, cut state government employment and demanded significant efficiencies from state agencies. The state passed Right-to-Work and implemented a number of management policies to speed regulatory review. From 2006 to 2010, Indiana experienced the most comprehensive policy reforms of any U.S. state in the post-World War II era.[1]

State Policy Post-Recession

From 2010 (as the state emerged from the Great Recession) through the end of 2019, Indiana continued to pursue similar policies. The Pence administration governed as a pragmatically conservative presence. In the early days of the Pence administration, a tepid national economic recovery brought significant pressure to engage in broad supply-side stimulus. Governor Pence offered modest income tax reductions and expanded Medicare through Indiana’s HIP 2.0 plan as part of the state’s compliance with the Affordable Care Act. The Holcomb administration saw the passage of comprehensive road funding reform. These were reasoned and pragmatic fiscal policies.

However, after 2010, the age of big policy adjustment ended, and Indiana settled into a period of tight budgets and internal shifting of resources. The adjustment of spending priorities moved funding away from universities and K-12 education, and toward tax incentives and vocational and remedial education.

Importantly, more than 100 percent of additional tax revenue growth in Indiana was allocated towards addressing long-term failures in educational and human capital development. Indeed, Indiana’s real (inflation-adjusted) spending per K-12 student in 2020 is 17 percent below its per-student spending in 2010.

State spending on colleges and universities dropped even further. Since 2010, in real terms, state and local governments have spent an additional $5 billion on business tax incentives, but added only $17 million to the budgets of colleges and universities. The intent of this funding shift was to ensure Indiana remained a low-tax state. Proponents believed the supply-side effects of this environment would attract new businesses and boost employment opportunities, wages, labor productivity, and overall economic growth. This approach enjoys widespread political support, but there is little to no empirical support. [2]

By employing data on GDP growth and the Tax Foundation’s data on total state tax burdens, we see the elusive nature of this relationship. From these most basic data there is no statistically or economically meaningful relationship between tax rates and growth. See Figure 1.

In the wake of these policies, the Indiana economy grew slowly and the job growth that occurred was clustered at the low end of the skill and income distribution. The productivity of Hoosier workers (average product of labor) lagged significantly, and the incomes declined relative to the nation as a whole. Business growth plummeted and measures of economic wellbeing across many domains languished. In short, the low-tax, policies pursued from 2010 through 2019 failed to produce broad economic growth.

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1. I have performed policy analysis on each and every reform relevant to Indiana’s economy since 2007. My work ranged from vetting internal policy proposals on tax and school reform, to a book on local government consolidation, to academic studies of Right-to-Work. Not all of this work was influential, nor did it uniformly support the resulting policy outcomes. The path from research to policy development is long and twisting. However, in my syndicated column and frequently in legislative testimony, I was publicly supportive of these efforts. My sole strong disagreement was entrenching property tax caps into the Constitution (see Hicks, 2012; Hicks, LaFaive and Devaraj, 2016; and Faulk and Hicks, 2011). Regarding recession and recovery, I argued Indiana experienced a much less damaging Great Recession because of its policy innovations. In a 2011 study, I argued that the reduction of tax uncertainty, the expansion of school choice and the generally market-friendly policies of the Mitch Daniels administration made Indiana a serious location for commercial expansion during the Great Recession. I argued that these policy steps acted as a buffer to what should have been a much deeper and longer downturn in our manufacturing- and logistics-heavy state. I remain confident in those conclusions (Hicks and Kuhlmann, 2011).

Most tellingly, through the longest economic expansion in U.S. history (3rd Quarter 2009 to 4th Quarter 2019), the Indiana economy averaged growth rates that were only 41 percent of the U.S. average. Indiana has not had a single quarter of economic growth as fast as the nation since summer 2016. This argues for a broad review of public policy, with a focus on economic growth.

As Indiana struggles through a pandemic that yielded the most damaging downturn since the Great Depression, both citizens and policymakers must undertake a serious period of reflection. It is time to understand the poor economic conditions that challenged Indiana’s prosperity during the previous recovery and frankly assess the factors that contributed to this decline.

This policy brief reviews Indiana’s relative performance during the 2010-2019 economic recovery, followed by an examination of factors contributing to the relative decline of the state economy 2009-2019, and concludes with a summary and policy recommendations. I begin this analysis with a review of those policies and outcomes in Indiana that offer an optimistic view of the long-term potential for faster economic growth.

Economic Growth in Indiana

Indiana’s geography lends itself to sustained economic growth. Though the state has a large share of residents in rural places, nearly 90 percent of households live within easy commuting distance to an urban labor market (Hicks and Terrell, 2017). Thus, the labor market barriers that affect ‘more rural’ states do not impose heavy burdens in Indiana.

The rapid growth of the Indianapolis Metropolitan Statistical Area (MSA) is enabled by an absence of restrictive housing supply rules that plague many urban places in the nation. The lack of these restrictions permits a more elastic supply of housing, which moderates home price growth (Glaeser and Gyourko, 2003). As demand grows, supply follows quickly, which in turn makes an urban place more attractive. Thus, the supply of housing continues to expand, while price growth remains modest. This is important because the Indianapolis MSA is responsible for nearly all of the population and employment growth in the state.

Since 2000, the Indianapolis MSA grew by more than 543,000 persons, while the rest of the state grew by fewer than 97,000 persons. Recent population growth is even more concentrated in the state’s central urban area. In 2010, the Office of Management and Budget merged the Anderson MSA into the Indianapolis-Carmel MSA. Excluding Anderson (Madison County) entirely, population growth in Indianapolis since 2010 comprised 73 percent of the state’s total. See Figure 2.

A recent study evaluating the interaction of labor demand shocks, home prices, and population growth reports that Midwestern cities face a more modest home price change as demand for labor increases. This in turn leads to a stronger population growth when compared to the southeastern United States that faces a much larger home price shock (Hicks, 2018). The implication of this finding is that the more elastic home supply in the Midwest accommodates greater urban population growth.

Figure 2. Cumulative Population Growth Since 2010 for Greater Indianapolis* and Rest of Indiana
Source: FRED St. Louis
* We show the Indianapolis Metropolitan Statistical Area (MSA) with and without the Anderson MSA (Madison Co.), which was added to the Indianapolis MSA in 2010.

Nearly all of the population and employment growth in Indiana occurred within the Indianapolis metro area.

Of course, across most of Indiana, an excess supply, rather than an excess demand of housing, is the prime challenge, but in the state’s fast growing urban counties, the absence of restrictive land use plans is a great boon to population growth (Hicks and Faulk, 2019).
Education Reform

Education reform in Indiana appears to have led to a sustained increase in student performance relative to the nation as a whole. Figure 3 illustrates improvement in reading test scores from the National Assessment of Educational Progress over the past two decades. This biennial exam measures test scores across states, and compares means and standard deviations across time. Like other standardized tests, these display modest annual variability, but Indiana’s reading scores have enjoyed a sustained improvement since educational reforms were introduced.

These data suggest that the educational reforms improved Indiana’s K-12 reading scores relative to the nation as a whole. While this is not a causal test, this observation corresponds to the expectations that school choice would result in better student outcomes. The fact that much of the student migration occurred from within the most troubled school corporations further bolsters support for choice positively affecting outcomes. While it is too early to conclude all of the positive effects of school choice, it is also clear from aggregate test scores that they did no harm.

Importantly, we must examine the aggregate effect of school reform. One important goal of school reform was to introduce competitive effects on schools. A simple examination of individual movers alone doesn’t address the broader effects on learning.

School choice also contributed to modest cost savings in the K-12 budget. Because students in charter schools, and those who receive vouchers (and would otherwise attend public schools), often receive lower levels of state tuition support than they would receive if they had attended the public school in the district where they live, the overall cost savings of choice is roughly 1.0 percent of annual K-12 education spending. (Faulk and Hicks, 2021)

In short, in the aftermath of the Great Recession, Indiana’s policy landscape was one with a very clear business-friendly, low-tax environment designed to boost investment and employment. Some of the policies adopted by Indiana extended beyond traditional supply-side policies, such as school choice and the Medicaid expansion inherent in HIP 2.0.

The geographic and regulatory conditions in Indiana are amenable to job and business growth. Likewise, the Great Recession affected Indiana less deeply than it should have given the level of national economic distress. Nationwide, 2009 to 2019 saw the longest economic expansion in U.S. history and the longest uninterrupted growth in manufacturing employment on record. Interest rates remained low, facilitating an increased demand for both business plant and equipment and consumer demand for goods.

This recovery was an opportunity for the Indiana economy to flourish—unfortunately, it did not. We next examine the contributing factors.
Indiana’s Poor Recovery

Despite favorable business conditions for Indiana’s economy, the recovery from the Great Recession marked the fastest relative decline in living standards, worker productivity, population growth, and educational attainment in the state’s history. In this section, we describe these phenomena, what they mean for the future of Indiana’s economy and most importantly the likely cause of these declines.

Hoosier Incomes

From the 1920s through the 1950s, Indiana’s per capita income rose relative to that of the nation as a whole. However, from the 1950s through the Great Recession, the relative per capita income in Indiana fell steadily. In a 2013 study, we identified the annual change in per capita income in Indiana from the Great Depression through the Great Recession (Hicks, et. al., 2013). That study performed a technical analysis of the differences in per capita income, and related the causal factors to the Indiana deficit. We concluded:

“…divergent tax policy, persistent gaps in human capital development, differentials in state regulatory climate, and other such policy-sensitive matters clearly may play a role in slowing convergence of incomes. We note, however, that in tax and regulatory policy, Indiana would possess significant advantages relative to all but a few states nationwide. In human capital acquisition and retention, we are at a relative disadvantage, given the levels of educational attainment of our residents. This matter should, therefore, be the focus of additional policy-focused analysis.” (pg. 7.)

In the years following that analysis, Indiana’s relative decline in per capita income accelerated, dropping by nearly 3.0 percentage points relative to the nation as a whole. This was the most rapid decline in the state’s history, and occurred during a period of national expansion, including the longest period of uninterrupted growth in factory jobs in more than a century. See Figure 4.

That study evaluated those factors contributing to per capita income growth across the United States. The four largest factors they report are the share of adults with a bachelor’s degree or higher, the child and elder dependency ratio, the labor force participation rate, and the population share in urban areas. Notably, the effect of educational attainment was larger than all other factors combined. Unfortunately, educational attainment is the one area among all the tested variables in which Indiana fares the worst.

Education and Income

Indiana’s educational attainment is growing, but much more slowly than that of the nation as a whole. We are well below average and becoming relatively worse. The long-term causal effect of education on per capita income is among the most consistent empirical findings of social science. With 80 years of data, we see the effects of educational losses most especially in recent years.

Compared to the U.S. as a whole, Indiana’s educational achievement peaked in the 1950s. At that point, the difference between the share of adults with a college degree in Indiana and the rest of the nation was less than 1.0 percent. However, at that time only 6.2 out of every 100 Americans had graduated college. The role of a college education in regional differences in per capita income were weaker. In the decades since, the role of educational attainment has become more important, determining a larger share of income differences between states.

Unfortunately, the decline in relative educational attainment in Indiana coincided with a growing importance of education on the performance of state economies. Even more regrettablty, the decline accelerated during the recovery from the Great Recession. In fact, based on the share of adults with a bachelor’s degree, the last decade was likely the worst period of educational attainment growth in the state’s history. This slowing growth of educated adults in Indiana occurred at the same time national educational attainment levels rose markedly.

To illustrate this, we report the gap in educational attainment levels of adults age 25+ with a bachelor’s degree or higher. Because college attendance has grown significantly over the past 80 years, we report both the absolute gap (percentage point differences)
and the percent gap (percent of U.S. levels). We have decennial Census estimates from 1940 through 2010, and Census estimates for 2019. See Figure 5.

The 2019 data are preliminary, but it appears that the relative decline in educational attainment in Indiana in the decade following the Great Recession was roughly equivalent to all of the decline since 1940 combined. This reversed a period of convergence between 1990 and 2010. The post-Great Recession period marks the single worst decline in relative educational attainment in Indiana’s modern history.

**Education and Migration**

Educational attainment levels within a state or region are affected by both the education quality for the incumbent population and by net migration. To illustrate this, we use American Community Survey data on migration by educational attainment level as compiled by the Social Capital Project of the Republican staff of the Joint Economic Committee. These data series report the interstate migration of adults age 31-40 by educational attainment level. The 31-40 age cohort is at a stage of life when family formation, purchasing a home, and ‘putting down roots’ is common, thus statistics for this cohort are of interest to policymakers and community planners.

Two data series examining this cohort from the Social Capital Project are especially informative—the ‘brain drain’ (net loss of highly educated workers) and the ‘leaver gap’ (comparing the education levels of adults leaving the state). See Figure 6.

The first series, the ‘brain drain’ of educated workers, reports the net loss of highly educated adults through migration out of versus into the state. The ‘highly educated adults’ category for this metric considers adults age 31-40 whose educational attainment places them in the top third of the nation. Among Hoosiers in this category, 42.7 percent of highly educated adults left the state in 2017, while an equivalent of 32.2 percent moved into Indiana. Because more highly educated adults age 31-40 moved out of the state than into it, the net loss in 2017 was 10.5 percent. This is up markedly from 2000 when the net loss was 3.9 percent.

The other series we report is the ‘leaver gap’—the difference between the out-migration rate of adults among the top third and bottom two-thirds of educational attainment. In this series we use the state level of educational attainment, not the national level for comparison. Figure 6 illustrates the gap, but the levels are also of interest—out-migration (‘leavers’) in the top third of the state’s educated adults were a full 44.4 percent, while out-migration among the bottom two-thirds was only 26.5 percent, for a difference of 17.9 percent in 2017. International immigration is not included in these data, only the migration trends of native-born Americans.

As evident in the observed data, Indiana’s net loss of highly educated workers via interstate migration is a deeply challenging
issue. A turnaround in this migration pattern is unlikely in the immediate future. Even if these data have improved since 2017 (most recent year available), the first two decades of the 21st century represent the worst period of brain drain in Indiana’s history.

It should be evident that the primary determinant of wage levels in a market economy is educational attainment. Indeed, the simple correlation between wages and the share of adults with a bachelor’s degree or higher explains almost 77 percent of the variation in median wages among states in 2019. In that metric, Indiana performs poorly, both nationally and within the Great Lakes region. See Figure 7. Indiana is performing modestly above trend, a circumstance dictated by its large share of well-paying manufacturing employment.

**Education and Productivity**

Indiana’s manufacturing employment post-recession peaked in October 2018, and has now lost more than 41,000 jobs. The state’s manufacturing productivity fell dramatically over the same period, apart from modest growth in 2019. See Figure 8.

Indiana’s expected 2019 decline in manufacturing productivity was partially mitigated by firms reducing employment. It appears that any future productivity growth among manufacturing firms in the state will be accompanied by a decline in the demand for labor. Thus, the resulting effect on average wages and educational attainment will be to move Indiana closer to the predicted level. The nation, including Great Lakes states, experienced overall modest productivity growth through 2011-2019.

**Job Demand**

National employment growth across all sectors, especially manufacturing, has been driven by the demand for better-educated workers. Since 2010, demand for college-educated workers has risen by nearly 35 percent, resulting in 15.2 million new jobs. Demand has been far more modest for workers who either earned an associate’s degree or attended college without earning a degree. The resulting employment growth was less than 2.9 million new jobs, or an 8.0 percent increase in total U.S. employment. See Figure 9 (pg. 8).

For adults with only a high school diploma, job prospects are far more bleak. Demand for these workers has expanded less than 1.0 percent nationwide, resulting in only 327,000 new jobs since 2010. For context, the total number of new jobs available to adults with only a high school diploma roughly matches the total number of high school diploma-only workers produced by Indiana alone over that same time period. Lastly, the national demand for workers without a high school diploma dropped 7.3 percent, or more than 732,000 fewer jobs.
Figure 9 captures only the recent economic expansion that motivates this study. A fuller data series going back to 1992 shows both declining employment availability for non-college attendees and a higher share of total employment for college graduates. For almost three decades, no net new jobs have been created for workers who did not attend college.

Does the growth in demand for college graduates reflect underemployment or job changes not tied to actual need for skills? Vedder (2012), portrayed the disproportionate employment growth by college graduates as a result of filling non-college jobs with college graduates. This argument was popular among policymakers, but suffers two important weaknesses.

First, this argument could have been levied against any educational requirement for any occupation at any time. The first graduate medical program in the United States did not open until well after the Civil War. Today few would argue that a medical degree would be appropriately offered to a student after three years of undergraduate education. Technical requirements expand within both industry and society; knowledge grows, as does life expectancy. All of these argue in favor of the increasing demand for education.

Empirical evidence from help-wanted advertisements bolster that conclusion. Blair and Deming (2020) studied specific skill requirements in online advertisements, focusing on recovery from the Great Recession. They report:

“We find large and persistent increases in skill demand following the Great Recession, during a time when labor markets became much tighter. This suggests that employer skill upgrading is probably here to stay, and that many more job candidates will have to obtain a four-year college degree to compete in the labor market of the twenty-first century.” (pg. 365).

Continuing to the second point of the argument, wages for college graduates have grown faster than for non-college graduates. Vedder’s 2012 hypothesis of underemployment by college graduates would require wages among non-college workers to grow faster than among those with a college degree. The reason for this is straightforward; businesses may want college graduates to perform jobs typically performed by non-graduates, but additional pay requires additional productivity. Unless there is a productivity benefit from the more highly educated worker, there would be no reason to pay them a higher wage.

From 1980 through 2017, the wage premium for college graduates rose from 40 percent to 70 percent (Autor, Goldin and Katz, 2020). At the same time, the share of college graduates doubled. A circumstance where both labor supply and wages increase means that demand also must be rising. Nationally, the growth in demand for educated workers exceeds supply, so wages rise, but that experience is not universal. In fact, Indiana’s experience is quite different. See Figure 10.

From 2010 through the end of 2019, Indiana saw a disproportionate increase in employment for workers without a high school diploma. In fact, demand for workers within this category rose more as a share of initial employment than all remaining educational categories combined. This group represents a smaller share of total employment, so actual employment growth for high school non-graduates rose by 108,775 over this time period. New jobs for high school graduates rose by 89,111, new jobs for those with some college rose by 101,368, and jobs for college graduates rose by 62,179. Over the same period, the college wage premium shrank, indicating lower demand statewide for college-educated workers.
What’s Slowing Indiana’s Recovery?

Indiana’s quick rebound from the deepest part of the Great Recession quickly transitioned into a period of slow growth, accompanied by declining labor productivity and a significant decline in the educational composition of employment, as reflected in Figure 10.

A recent study by the Brookings Institution (Muro, et. al., 2021) identified declining digital technology adoption as the most likely factor in these trends. This was based on Indiana’s relatively poor ranking in Brookings’ internal measures of digital technology adoption. But, as this section explains, that cannot be the primary causal mechanism in the decline of labor productivity.

There is an abundant literature linking technology adoption to productivity growth. This link occurs at the worker, firm, and economy levels. Models of inter-regional differences in economic growth include technology measures. So, slower-growing economies and those experiencing productivity declines should have lower or declining levels of technology. However, central to this literature are formal linkages of technology to human capital (educational attainment). This relationship is termed by economists as endogeneity, or jointly determined.

Both levels and changes in technology are linked to levels and changes in human capital. Perhaps the clearest paragraph on the subject appears in Cosar (2011):

As it is well-known in growth literature, productivity differences explain a significant part of the variation observed in cross-country income distribution. A major determinant of productivity is the set of technologies available to firms in a country. The model presented here demonstrates that productivity differences may arise as a result of differences in skilled labor endowments which facilitate the adoption of technologies from an exogenously available set (pg 1).

This study, and others, demonstrate that the availability of educated workers determines the type of technology chosen by firms. Other work in this area include Comin and Hobjin (2006), who conducted a long-term study of technology adoption across 21 countries. They report that the variation in technology adoption is explained by human capital differences (Comin and Hobjin, 2006). This study confirmed earlier work by Nelson and Phelps (1966), Chari and Hopenyahn (1991), and Batu and Weil (1998). This latter study focused attention on the type of technology applied to production, suggesting that the local choice of technology is adjusted to other inputs, primarily human capital (Batu and Weil, 1998). In other words, firms with less access to high human capital workers, adopt less high technology.

Evaluating the relative importance of human capital and investment on Indiana’s economic performance requires an empirical test. We offer both a formal model of growth and data comparisons for a sample of Midwestern states from 2009 to 2019. See Table 1.

First, we test a flexible and frequently used growth model as described in Hicks (2019). This human capital augmented growth model tests the relative contribution of technology, labor inputs, business capital, and human capital. Second, we test a model of human capital, investment, and regional convergence akin to that produced by Mankiw, Romer and Weil (1992, hereafter MRW). This model yields insights about the long-term convergence of economies.

We populate these models with GDP and employment data from the U.S. Bureau of Economic Analysis. Our human capital measure is the proportion of working adults who hold a bachelor’s degree or higher, and our capital measure is derived from El-Shagi and Yamarik (2018), state summary of national data. The MRW model uses these variables, along with population growth, per capita GDP growth, and depreciation growth. These are derived from the same sources.

The results of the first model (Table 1, Column 2) offer several important insights surrounding the relative importance of inputs to a state economy. The first of these are output elasticities, which measure the growth of the economy for each 1.0 percent increase in a particular input. As Table 1 reports, in the most recent period, a 1.0 percent increase in physical capital will increase GDP by 26 percent. A 1.0 percent increase in employment will increase GDP by 123 percent, and a 1.0 percent increase in human capital (share of adults with a college degree) will increase state GDP by 43 percent.

The second model (Table 1, Column 4) requires more explanation. The convergence rate estimate is low and implies a much slower regional convergence occurring within the Midwest than that observed internationally. This is consistent with most recent studies that find regional economic divergence in the United States. Because this model is estimated in logarithmic form, the investment and human capital estimates are directly comparable. The MRW model (Table 1, Column 4) illustrates a remarkable

### Table 1. Growth Model Results, 2010-2019

Source: Author calculations using U.S. Bureau of Economic Analysis

* MRW = Model by Mankiw, Romer and Weil (1992)

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Output Elasticities 2010-2019</th>
<th>Inputs</th>
<th>Elasticities 1993-2019</th>
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<tr>
<td>Capital Investment (Physical Capital $)</td>
<td>0.256*** (3.65)</td>
<td>Investment Share (K/GDP)</td>
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<td>Human Capital (% Workers with BA)</td>
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difference between human and physical capital investments. Over the quarter-century illustrated in this model, the effect on state GDP of a 1.0 percent increase in the share of adults with a bachelor’s degree is more than 10 times larger than a 1.0 percent increase in capital investment.

The results of this model also permit us to evaluate individual productivity changes during this period. Table 2 illustrates the relative effect of technology on growth and the change in total factor productivity (overall growth in productivity due to all factors of production). The data sets provide the change in average labor productivity and the capital-to-labor ratio (investment per worker).

Interestingly, Indiana does well during this period in its technology effectiveness, leading the nation alongside Wisconsin. However, Indiana lags considerably in the other factors. Overall total factor productivity growth declined, while labor productivity barely changed in a decade. Indiana also experienced a decline in its capital-to-labor ratio. This means the typical firm in the state invested less per worker than they did in 2009. See Table 2.

These data and results strongly imply a structural change in the employment mix within Indiana’s economy following the Great Recession. That is consistent with the findings from Brookings (Muro, et. al., 2021), who observe a decline in ‘good’ jobs, which is likely due both to inter- and intra-industry change in the demand for labor.

These results are also consistent with the observed decline in manufacturing productivity (Figure 8) and in the creation of a larger share of employment among those without a high school diploma (Figure 10). It is also consistent with the poor ranking Indiana received in its digital technology investment from Brookings (Muro, et. al., 2021).

Figure 11 depicts the change in the capital-to-labor ratio (K/L) in the Midwest during the prolonged economic expansion 2009-2019. One way to interpret Figure 11 along with the data in Tables 1 and 2 is that Indiana entered the recovery with an above-average K/L and better relative performance from its technology inputs. The recovery saw the state move away from higher K/L industries toward more labor-intensive industries with lower K/L.

The decline in the K/L ratio reported here is necessarily due to shifts in the type of production occurring in Indiana because the data are derived from national data and applied to Indiana through a simple share of industries. In the case of Indiana, this structural shift accompanies a move away from more capital-intensive, highly productive firms. The lack of college-educated workers appears to be causing the private sector to shift its employment mix away from high-skilled to low-skilled production of both goods and services.

The state’s decline in relative human capital (educational attainment) is the prime casual factor in slower GDP growth, declines in labor productivity, and total factor productivity. Concomitantly, firms in Indiana are shifting production towards activities that use a lower share of capital. The higher labor share means wages are more closely tied to individual productivity. This explains declining relative personal income. Typically, these changes experience significant hysteresis, with effects on the economy occurring later and persisting longer than changes in educational attainment.

Our findings suggest that the focus on a lack of digital technology reported by the Brookings study is an incomplete answer to Indiana’s lagging economic growth (Muro, 2021). While they are surely correct that Indiana buys less digital technology than would

| Relative | Change in | Change in | Change in |
| Technology | Total Factor | Avg. Product | Capital-to-
<table>
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Figure 12. Indiana’s Factors of Production, 2009-2019

Source: Author calculations using U.S. Bureau of Economic Analysis

Figure 11. Capital-to-Labor Ratios, 2009-2019

Source: Author calculations using U.S. Bureau of Economic Analysis

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Table 2. Midwest Growth Model Results, 2010-2019

Source: Author calculations using U.S. Bureau of Economic Analysis

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be needed to support more middle- and high-paying jobs, the lack of digital technology is not the causal factor. Instead, that is the result of lower levels of educational attainment. Indiana's firms have access to a declining share of workers who are sufficiently educated and trained to adopt these newer technologies. Thus, Hoosier firms reduced their capital-to-labor ratio as an accommodation to lower relative levels of educational attainment.

However, it is not necessary to undertake these types of economic models to call into question the relative role of human capital versus other factors of production in explaining Indiana's moribund economic performance from 2009-2019. A simpler approach is to compare the key factors of production (capital investment, labor, and human capital) over this time period. See Figure 12 for this comparison using 2009 as the indexed reference point.

Employment growth outpaced growth in capital investment, but growth in human capital (the share of working adults with a bachelor's degree or higher) declined. One need not have studied graduate economics to appreciate which of these factors likely played the largest role in declining relative economic growth over this time period.

Over the past two decades, Indiana policymakers have relied heavily on tax incentives to generate investment in physical capital (machinery and equipment). Their explicit argument was that tax incentives would yield productivity-improving investment. To examine the effectiveness of this strategy, we use data from a recent study of tax incentives (Bartik, 2019). Focusing on the exporting sector, which provides footloose jobs (e.g., firms/jobs that can easily relocate to other locations), we compare Indiana to other states in the Midwest.

From 2009 through 2015, Indiana reduced the total tax burden of exporting industries from 5.29 percent to 4.54 percent. By 2015, Indiana had the median tax on these firms among our five-state region. Indiana's 2015 taxes were slightly higher than those in Ohio and Wisconsin, whose rates were 3.61 and 4.41 percent respectively. Our rates were slightly lower than those in Illinois and Michigan, whose taxes on exporting firms were 5.46 and 5.56 percent respectively. Although Indiana's total tax burden on this sector was lower than both Illinois and Michigan, those states experienced more growth in capital investment per worker than did Indiana.

Clearly, taxes and other capital costs cannot explain differences in levels of investment per capita (Figure 11) or differences in productivity (Figure 12). Some other factor must explain the decline in capital investment. As this policy brief demonstrates, that factor is the state's relative decline in human capital.

Summary and Recommendations

The ten-year span of 2009-2019 saw the longest economic expansion in U.S. history. Indiana began this recovery period behind the nation in almost every important economic metric and then fell farther behind throughout the decade.

Indiana's weak recovery saw the state perform much worse than the nation in measures of job creation, GDP growth, population growth, productivity growth, and personal income growth. The causal factor in this decline is the state's relatively declining levels of educational attainment.

The decline in educational attainment (human capital) occurred despite significant policy changes designed to introduce competition and cost savings in K-12 schools and higher education. They were also accompanied by a significant change in focus from 'college preparation' to 'career preparation' within Indiana's K-12 schools and higher education systems. At the same time, Indiana reduced its real spending to both K-12 and higher education, while spending more on workforce development programs. Overall, spending on K-12 education alone shrank from 2.6 to 2.2 percent of GDP, or roughly $1.28 billion per year by 2019.

By every measure these policies failed to improve economic performance. Moreover, given the high degree of hysteresis in educational policy, continued relatively poor performance of Indiana's economy over the coming decade is virtually inevitable.

Indiana's business firms lack access to a robust supply of workers who are sufficiently educated and trained to adopt newer technologies. Renewed support for K-12 schooling and higher education is the biggest influence for future economic sustainability.
Credits

References
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