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Anchor Impact:
Understanding the Role of Higher Education and Hospitals in Regional Economies

COMMUNITY DEVELOPMENT AND REGIONAL OUTREACH

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Introduction

For the past 30 years, higher education institutions and hospitals have been widely recognized as anchors of regional economies and have therefore been referred to as anchor institutions.[2] Their impacts are felt through the large number of people they employ, the local goods and services they purchase, the innovation they spur, and the talent they produce and attract. And, while individual institutions often quantify these impacts in reports to their stakeholders, the total impact of anchor institutions within communities and across the country has not been documented, leaving practitioners, policymakers, and researchers with questions of precisely how important anchors are to regional economies and what the consequences are of relying on anchors for employment and economic output.

To fill these gaps, the Anchor Economy Initiative at the Federal Reserve Bank of Philadelphia has created the Anchor Economy Dashboard, a new data set and website. The dashboard improves our understanding of anchor institutions' role in the economy through four main contributions. First, it provides new estimates of the regional economic impacts of the higher education and hospital sectors for the 524 regions that compose the United States. Second, it offers a reliance index that describes each region's economic dependence on anchor institutions and allows for comparisons of this dependence across regions of different sizes. Third, it supplements these core measures with variables that provide additional context for understanding the importance and role of anchor institutions in regional economies. Last, it provides all of this information as raw data and customizable summaries to allow for direct comparisons of these data points across all regions in the U.S. for the first time.

This report provides an overview of the data contained in the Anchor Economy Dashboard. Our goals are to describe the data, discuss initial insights, and demonstrate the potential of the dashboard for studying the regional and community impacts of anchor institutions. Specifically, in the following sections we explore the characteristics of anchor institutions, their presence in regional economies, their overall economic impacts in regional economies, and the reliance of regional economies on anchor institutions. Our results serve as a foundation for a planned series of reports and future research that will advance discussions around the challenges and opportunities of an anchor-based economy, the impact that disruptions in higher education and health care might have on local economies, and the role of anchor institutions in driving economic equity and opportunity in their communities.

[1] We would like to thank George Hobor, Jason Jolley, Christelle Khalaf, Michael Richards, and David Zuckerman for their assistance in creating the framework for the Anchor Economy Dashboard and Olivia Bobrownicki for providing excellent research assistance. Barbara Denham, Hamilton Galloway, and Mike Reid from Oxford Economics were expert guides in gathering data inputs and conducting the regional economic impact analyses.

[2] Ira Harkavy and Harmon Zuckerman articulated the role that higher education institutions and hospitals play as "anchor institutions" in *Eds and Meds: Cities' Hidden Assets,* Washington, D.C.: Brookings Institution, 1999.

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Background: The Importance of Anchor Institutions to Regional Economies and Communities

Higher education institutions and hospitals are known as *anchor institutions*[3] because of the multiple ways they are tied to place. Unlike corporate headquarters or manufacturing facilities that can pick up and move, higher education institutions and hospitals stay put. Their business operations further solidify the connection between them and the regions they are in. Both higher education and health care are labor-intensive, making them some of the largest employers in their regions.[4] They are generally more recession-resistant, and university enrollment is countercyclical, so that even in economic downturns, universities and hospitals can stabilize local economies as they continue to employ, buy from, and serve residents in the community.[5] Increasingly interested in place-making, higher education institutions and hospitals invest in neighborhood economic development, building up commercial corridors, encouraging residential real estate development, and creating neighborhood amenities like parks.[6] And, for even longer-lasting impacts, some higher education institutions and hospitals generate growth through innovation, new venture formation, and talent attraction.[7] In each of these ways, higher education institutions and hospitals anchor the economies of the cities and regions they are in.

While regions have seen benefits from anchor institutions' activity and investments in their economies, economic dependence on anchor institutions may increasingly come with risk as both higher education and health care are disrupted by technology, demographic shifts, and increasing costs. The COVID-19 pandemic accelerated both telehealth and remote learning, creating opportunities for hospitals and higher education but also loosening the place-based nature of their services. If students and patients don't have to reside near or travel to these institutions for education or health care, students' and patients' dollars won't travel either. Additionally, the shifting demographics of the United States mean fewer 18-year-olds are heading to college — especially in the Northeast and Midwest, where there are higher concentrations of higher education institutions than other parts of the country — raising concerns about the viability of these institutions in the future.[8] At the same time, rural communities with declining populations have seen more hospitals close.[9] Regions that have reliably depended on anchor institutions, especially as other industries have moved out, may be looking at uncertain futures as changing technology, demographics, and costs create vulnerabilities in the higher education and health-care sectors.

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[3] Discussions around the role of anchor institutions in economic and community development often include additional types of institutions beyond higher education and hospitals, including philanthropies, large nonprofits, arts and culture institutions, and sometimes for-profit corporations committed to place. For the purposes of the Anchor Economy Initiative and Dashboard, we are focusing exclusively on higher education institutions and hospitals.

[4] Eugenie L. Birch, "Anchor Institutions in the Northeast Megaregion: An Important but Not Fully Realized Resource," in Revitalizing American Cities, Susan M. Wachter and Kimberly A. Zeuli, eds, University of Pennsylvania Press, 2013, and Irina Zhorov, "Eds and Meds: The Role of Universities and Hospitals in Economic Development," WHYY, September 2, 2014, available at whyy.org/articles/eds-and-meds-the-role-of-universities-and-hospitals-in-economic-development/.

[5] Andrew Barr and Sarah E. Turner, "Expanding Enrollments and Contracting State Budgets: The Effect of the Great Recession on Higher Education," *Annals of the American Academy of Political and Social Science*, 650:1 (2013), pp. 168–93, journals.sagepub.com/doi/full/10.1177/0002716213500035; and Marcus Dillender, Andrew I. Friedson, Cong T. Gian, and Kosali I. Simon, "Is Healthcare Employment Resilient and 'Recession Proof'?" NBER Working Paper No. 29287, September 2021.

[6] Case studies of some of these investments can be found in the *Journal of Higher Education Outreach and Engagement,* Volume 17, No. 3, 2013. Some additional examples include neighborhood development by the Memphis Medical District, Drexel University and Schuylkill Yards, and the University of Maryland in College Park, MD.

[7] Janet Bercovitz and Maryann Feldman, "Entrepreneurial Universities and Technology Transfer: A Conceptual Framework for Understanding Knowledge-Based Economic Development," *Journal of Technology Transfer*, 31 (2006), pp. 175–88; Johnathan G. Conzelmann, Steven W. Hemelt, Brad Hershbein, et al., "Grads on the Go: Measuring College-Specific Labor Markets for Graduates," NBER Working Paper No. 30088; Dante Di Gregorio and Scott Shane, "Why Do Some Universities Create More Start-Ups than Others?," *Research Policy* 32:2 (2003), pp. 209–27.

[8] Declines in college enrollment that began in 2012 accelerated during the years of the COVID-19 pandemic, with total postsecondary enrollment declining 7.4 percent (1.3 million students) during the pandemic, according to the National Student Clearinghouse Research Center's Spring 2022 Current Term Enrollment Estimates.

[9] The Sheps Center for Health Services Research at the University of North Carolina maintains a list of Rural Hospital Closures; also see Diane Alexander and Michael Richards, "Economic Consequences of Hospital Closures," NBER Working Paper No. 29110.

In addition to the economic effects of higher education and health care on the places where those anchor institutions are located, there is also significant debate around the role anchors play in economic and community development. Anchor institution engagement in local economic development, while often heralded as reviving neighborhoods and downtowns, has also been criticized for driving gentrification, increasing income inequality, and exacerbating racial disparities.[10] Efforts by anchors to participate in equitable community development (captured by the term "the anchor mission") are sometimes seen as in tension with anchor-led neighborhood transformation and economic development initiatives.[11] More recent work has focused on the role of anchor institutions in driving economic growth that is equitable, addresses past discrimination, and takes the voice of community members into account.[12] The host of issues associated with anchor institutions as they engage in community and economic development invites a more precise account of their regional economic impact, which the Anchor Economy Dashboard provides.

The Anchor Economy Dashboard[13]

The Anchor Economy Initiative at the Philadelphia Fed has created the Anchor Economy Dashboard, a first-ever national data set that captures the economic importance of anchor institutions in their regions.[14] For the purposes

[10] See, for example, Davarian L. Baldwin, *In the Shadow of the Ivory Tower*, New York: Bold Type Books, 2021, and Meagan M. Ehlenz, "Neighborhood Revitalization and the Anchor Institution: Assessing the Impact of the University of Pennsylvania's West Philadelphia Initiatives on University City," *Urban Affairs Review*, 52:5 (2016), pp. 714–50.

[11] Beth Dever, Omar Blaik, George Smith, and George McCarthy express this as a tension between the "corporate goals of the anchor institution and the economic and social development goals of the municipality," in "(Re)Defining Successful Anchor Strategies," Lincoln Institute of Land Policy working paper, 2014, www.jstor.com/stable/resrep18471.1.

[12] Baldwin provides examples of universities focusing on wealth-building for residents of university neighborhoods; the Healthcare Anchor Network has a focus on using hospital endowments for regional social impact investing.

[13] In August 2013, the Democracy Collaborative released *The Anchor Dashboard: Aligning Institutional Practice to Meet Low-Income Community Needs*. The Anchor Dashboard described in that report concentrates on one element of anchor institutions' economic impact — their ability to impact low-income communities — and describes the metrics best used to measure that impact without calculating that impact for communities. The Philadelphia Federal Reserve's Anchor Economy Dashboard, in contrast with the Democracy Collaborative's Anchor Dashboard, calculates the economic contribution of higher education institutions and hospitals in 524 regions and serves as a foundation for research and action in multiple areas of concern to regions with a strong presence of anchor institutions, including, but not limited to, anchors' contributions to wealth-building in low-income communities.

[14] The Federal Reserve Bank of Philadelphia worked with Oxford Economics to gather the inputs for the economic impact analysis and to run the IMPLAN models for 524 regions.

of this study, anchor institutions include higher education institutions and hospitals. Higher education institutions are those with a NAICS code of either 6112 (junior and community colleges) or 6113 (colleges, universities, and professional schools). Hospitals are those institutions with a NAICS code of 622 and do not include nursing or residential care facilities or doctors' offices. The data are presented by region, and regions are based on the Bureau of Labor Statistics' (BLS) designation of 394 metropolitan regions and 130 nonmetropolitan regions in the United States.[15] All data in the dashboard are from 2019, the most recent year unaffected by the COVID-19 pandemic. Additional data and methodology details are available in Appendix A and at the Anchor Economy Dashboard website.

We briefly describe our key measures and data sources here, and we will explore them in greater detail in subsequent sections.

ANCHOR INSTITUTION CHARACTERISTICS

We have collected metrics associated with higher education institutions and hospitals that allow us to quantify and characterize their presence in each region. The size and activity of hospitals and higher education institutions are captured in measures of employment, wages, operational expenditures, and capital expenditures. Additional metrics provide insight into the character of the regional higher education and hospital sectors and include Carnegie Classifications for higher education institutions, National Institutes of Health (NIH) and National Science Foundation (NSF) funding received by anchor institutions, and endowment size for anchor institutions.

ECONOMIC IMPACT

The goal of economic impact is to measure the total contribution of anchor institutions to the regional economy. We measure this in terms of equivalent employment, income, and gross value added (GVA) contributed by higher education institutions and hospitals. These regional anchor impacts are calculated separately for each region with the IMPLAN input-output model, which follows the flow of spending from higher education institutions and hospitals through an economy. Impacts are assessed at three levels — direct, indirect, and induced — and added together to capture total economic impacts. Direct impacts derive from the direct purchases and employment by hospitals and higher education institutions. Indirect impacts result from the additional purchases and hiring businesses in anchor institutions' supply chain conduct. Induced impacts capture economic activity supported by those directly or indirectly employed by higher education and hospitals, who spend their disposable income on goods and services in the regional economy. It is worth emphasizing that these economic impacts will exceed those measured by actual employment in higher education and hospitals, which we will capture in the form of a "multiplier" that has been extensively studied in the economic development literature.

RELIANCE INDEX

The reliance index provides a summary measure of how dependent a regional economy is on higher education institutions and hospitals. It differs from economic impact in two important ways. First, it adjusts economic impact by the size of the regional economy, allowing us to compare the role of anchors in regional economies of various sizes. Second, it incorporates measures of impact in terms of employment, income, and GVA, which are separate measures within economic impact analysis. The reliance index is an average of each region's location quotients — measures of the concentration of economic activity in a region relative to the country as a whole — that are separately calculated for employment, income, and GVA.[16]

Anchor Institution Characteristics

We begin by describing the features of anchor institutions in regions and the diversity among those institutions.

[15] The list of 524 regions included in this study is included in Appendix B. To see the counties included in each of the 524 regions, please refer to the Anchor Economy Dashboard region-county crosswalk on the website. For a number of nonmetropolitan regions, data across a state are combined owing to data suppression issues in regions with few institutions. Further information on the definition of BLS regions can be found on the BLS's website.

[16] Specifically, the reliance index is calculated by dividing each region's employment, income, and GVA impact from anchor institutions by its total regional employment, income, and GVA from all sectors in the regional economy. Each of these ratios is then divided by the equivalent ratio calculated for the U.S. economy as a whole, yielding a separate location quotient for employment, income, and GVA. The location quotients are then averaged together to yield the reliance index.

Across the 524 regions in the US, there are 24,155 total anchor institutions in the Anchor Economy Dashboard, according to the data sources described previously. Just under half (11,719 or 48.5 percent) of these are higher education institutions and just over half (12,436 or 51.5 percent) are hospital institutions.[17] The presence of these institutions and their economic impacts vary greatly across regions, as we will explore in subsequent sections.

First, though, it is worth considering differences across the types of anchor institutions themselves. The term *anchor institution* often connotes large, well-funded, research-intensive institutions. However, the types of anchor institutions we study here are much more heterogeneous. For example, across the 524 regions, around 31 percent have at least one "high research" doctoral university and 8 percent have at least one other (not high research) doctoral university.[18] In 32 percent of regions, the highest degree awarded by any higher education institution is a master's degree, in 16 percent of regions the highest degree awarded is a bachelor's degree, and in 9 percent the highest degree awarded is an associate's degree. In the remaining 4 percent of regions, there are no degree-granting institutions, but there are establishments that offer postsecondary certificates.

We can similarly consider differences across regions in the amount of research funding awarded to the higher education institutions and hospitals in those regions.[19] Across the 524 regions, 58 percent report zero research funding from the National Science Foundation (NSF) or National Institutes of Health (NIH). Twenty percent report more than zero but less than $10 million in research funding, 13 percent report $10 million to $100 million, 6 percent report $100 million to $500 million, and only 3 percent of regions report research funding of more than $500 million.

Together, the results confirm that there are substantial differences in the types of anchor institutions and in their locations across regions. The diversity of anchor institutions across regions helps determine what educational and

[17] To be more specific, these are counts of establishments in each region as recorded by the Bureau of Labor Statistics. These counts could therefore differ from counts of institutions from other sources, such as the Integrated Postsecondary Education Data System (IPEDS), if some institutions have multiple establishments in different locations. An example would be a state higher education system in which a single institution may have multiple establishments in different locations.

[18] All higher education types discussed here are from the Carnegie Classifications available in the IPEDS data.

[19] Specifically, we calculate total research funding as the research funding from the NIH and NSF reported by all higher education institutions and hospitals in each region.

At the national level, the overall impact of anchor institutions — which includes direct, indirect, and induced effects — is equal to more than 18 million jobs, $1.1 trillion in income, and $1.7 trillion in GVA.

18.2 million
National Anchor Employment Impact

$1.1 trillion
National Anchor Income Impact

$1.7 trillion
National Anchor GVA Impact

health-care services are available locally and the types of community and economic development activities anchor institutions can and do engage in.

Anchor Institution Presence

Here, we describe actual employment in anchor institutions, which is a key component of their overall economic impact. As we noted at the outset, one of the reasons higher education and health-care institutions are such critical forces in regional economies is because of the labor-intensive nature of their operations. They are often among the top employers within their regions. Table 1 shows employment figures for higher education and hospitals for regions of various population sizes. The first row of Table 1 shows that anchor institutions employ 9.96 million people across the nation. It also shows that the higher education sector employs 3.6 million people (36 percent of the total) and the hospital sector employs the remaining 6.4 million people (64 percent of the total). It is notable that while the portion of higher education and hospital establishments in the dashboard is nearly equal (51.5 percent and 48.5 percent, respectively), employment is skewed much more toward hospital establishments, consistent with the fact that hospital institutions are more labor-intensive than higher education institutions.

The remaining rows are organized into separate panels by region population category. Within each panel, we show the regions with the largest, median, and smallest total anchor institution employment. Total anchor institution employment is broken out by higher education and hospitals in separate columns. While the measure of anchor institutions' presence focuses here on employment, the Anchor Economy Dashboard includes other measures of anchor institutions' presence in each region, namely income, operational expenditures, and capital expenditures.

Looking at anchor employment by region, we find substantial differences in the presence of anchor institutions. In some cases, this is explained by differences in population, for example in New York, where the region's large population correlates with large anchor employment figures. However, in other cases, population does not play a role. For example, among the midsize regions of 500,000 to 1 million population, anchor employment ranges from a low of 7,700 in nonmetropolitan North Georgia to a high of 69,000 in Durham-Chapel Hill. This is an almost 10-fold anchor employment difference, despite a population difference of just 7 percent. Regions also differ in the extent to which anchor presence is driven by higher education or hospitals. While in general, hospital employment tends to be the larger segment of anchor employment in most regions, in State College, PA (home to Penn State University), anchor employment is dominated by a higher education institution.[20]

> "The term anchor institution often connotes large, well-funded, research-intensive institutions. However, the types of anchor institutions we study here are much more heterogeneous.

The Regional Economic Impacts of Anchor Institutions

In this section, we describe our new measures of the regional economic impacts of anchor institutions. We focus here on the impact measured in terms of employment and income, although results when measured by GVA are generally similar and are available at the Anchor Economy Dashboard website. The economic impacts capture overall impact of anchor institutions on regional employment, income, and GVA and are the sum of direct effects (for example, employment at universities and hospitals), indirect effects (those employed by regional firms that provide services to hospitals and higher education, such as accountants and IT specialists), and induced effects (for

[20] It is notable that Penn State's medical school and medical center are located in the Harrisburg, PA, region, where hospital employment far exceeds higher education employment.

TABLE 1

Regions by Anchor Institution Presence

Region	Anchor Employment Statistic	Anchor Employment Rank	Anchor Employment	Higher Education Employment	Hospital Employment	Population
United States						
United States			9,960,233	3,589,289	6,370,944	330,043,548
Regions >2 Million Population						
New York-Newark-Jersey City, NY-NJ-PA	Max	1	622,524	194,460	428,064	20,734,396
Minneapolis-St. Paul-Bloomington, MN-WI	Median	17	112,069	39,755	72,314	3,684,422
Las Vegas-Henderson-Paradise, NV	Min	35	34,065	7,491	26,573	2,233,370
Regions 1–2 Million Population						
Nashville-Davidson–Murfreesboro–Franklin, TN	Max	1	77,210	22,978	54,232	1,986,693
Louisville/Jefferson County, KY-IN	Median	10	43,537	11,398	32,139	1,314,207
Tulsa, OK	Min	21	27,140	7,209	19,931	1,008,485
Regions 500,000–1 Million Population						
Durham-Chapel Hill, NC	Max	1	69,115	27,866	41,249	583,042
Portland-South Portland, ME	Median	34	19,003	6,263	12,740	547,993
North Georgia nonmetropolitan area	Min	68	7,690	2,500	5,190	545,214
Regions 250,000–500,000 Population						
Ann Arbor, MI	Max	1	52,739	17,655	35,085	373,457
Northeastern Wisconsin nonmetropolitan area	Median	75	9,083	4,689	4,394	484,932
Nevada nonmetropolitan area	Min	150	2,589	400	2,188	286,612
Regions <250,000 Population						
State College, PA	Max	1	25,957	23,522	2,434	159,039
Albany, GA	Median	125	4,063	1,235	2,828	152,830
Massachusetts nonmetropolitan area	Min	250	292	0	292	13,802

Notes

Anchor employment is the sum of higher education and hospital employment. Higher education and hospital employment reflect actual employment in those industries from publicly available QCEW data. Data and industry details are in Appendix A. Source: Authors' calculations from data available in the Anchor Economy Dashboard.

example, the jobs in restaurants and retail establishments that those working at or visiting hospitals and higher education institutions support through their purchases). We focus on overall economic impacts and will study direct, indirect, and induced effects separately in future reports.

The first row of Table 2 shows that in the nation, anchor institutions contribute around 18 million equivalent jobs through the sum of the direct, indirect, and induced effects. These total employment impacts are larger than the counts of actual employment in anchor institutions because of

TABLE 2

Regions by Anchor Institution Total Employment Impacts

Region	Employment Impact Statistic	Employment Impact Rank	Employment Impact	Anchor Actual Employment	Employment Multiplier	Income Impact (millions of $)	Anchor Actual Income (millions of $)	Income Multiplier	Population
United States									
United States			18,166,961	9,960,233	1.82	1,166,058	747,854	1.56	330,043,548
Regions >2 Million Population									
New York-Newark-Jersey City, NY-NJ-PA	Max	1	1,203,553	622,524	1.93	97,088	59,812	1.62	20,734,396
Seattle-Tacoma-Bellevue, WA	Median	17	198,149	114,129	1.74	15,596	10,353	1.51	3,982,231
Las Vegas-Henderson-Paradise, NV	Min	35	67,930	34,065	1.99	4,523	2,950	1.53	2,233,370
Regions 1–2 Million Population									
Nashville-Davidson–Murfreesboro–Franklin, TN	Max	1	167,165	77,210	2.17	10,297	5,835	1.76	1,986,693
New Orleans-Metairie, LA	Median	10	85,754	45,881	1.87	5,156	3,405	1.51	1,272,745
Fresno, CA	Min	21	51,548	28,408	1.81	3,415	2,373	1.44	1,004,547
Regions 500,000–1 Million Population									
Durham-Chapel Hill, NC	Max	1	103,677	69,115	1.50	6,998	5,216	1.34	583,042
Northeast Mississippi nonmetropolitan area	Median	34	34,457	21,264	1.62	1,766	1,227	1.44	581,636
North Georgia nonmetropolitan area	Min	68	12,434	7,690	1.62	602	424	1.42	545,214
Regions 250,000–500,000 Population									
Ann Arbor, MI	Max	1	73,410	52,739	1.39	5,077	3,975	1.28	373,457
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	Median	75	14,855	8,710	1.71	847	599	1.41	475,657
Nevada nonmetropolitan area	Min	150	3,979	2,589	1.54	247	184	1.34	286,612
Regions <250,000 Population									
State College, PA	Max	1	35,653	25,957	1.37	1,783	1,218	1.46	159,039
Cumberland, MD-WV	Median	125	6,862	3,986	1.72	401	277	1.45	95,754
Massachusetts nonmetropolitan area	Min	250	499	292	1.71	42	32	1.29	13,802

Notes

Employment and income impacts in Table 2 reflect the sum of all direct, indirect, and induced employment and income from both higher education and hospitals. Variations in indirect and induced impacts by region can shed light on local supply chains in regions supporting higher education and hospitals, and these breakouts for employment, income, and GVA can be found at the Anchor Economy Dashboard website. Each multiplier is found by dividing the anchor total economic impact (measured in terms of employment or income) by the anchor actual employment or income. [1]

[1] The GVA multiplier is not available because we do not have data for anchor institution actual GVA.

According to our results,

the total economic impact of anchor institutions is equal to around 9 percent of total U.S. employment, 6.3 percent of total U.S. income, and 8.1 percent of total U.S. GVA.

the inclusion of indirect and induced effects. The ratio of the economic impact to actual employment yields a multiplier that is also included in Table 2 for each region. The national multiplier for anchor institutions is 1.82, implying that for every one job in an anchor institution, there are 0.82 additional equivalent jobs in the economy related to that job. Table 2 also includes anchor economic impacts measured in income, actual anchor income, and income multipliers.

Across the 524 regions, the total employment impact of anchor institutions ranges from a low of 500 in a rural portion of Massachusetts to a high of 1.2 million in the New York metropolitan area. The other rows show, within each population category, the regions with the highest, median, and lowest employment impact. For example, the panel "Regions > 2 Million Population" shows that among these 35 regions, the New York region has the largest impact (1.2 million equivalent jobs created), the Seattle region has the median impact (198,000), and Las Vegas has the smallest impact (just 68,000). Overall, there is substantial heterogeneity in the economic impacts and multipliers across regions, consistent with the heterogeneity in anchor institution characteristics and presence discussed previously.

Several patterns can be observed in Table 2. Larger regions tend to have larger employment and income multipliers, partly because the economies of larger regions present more opportunities for anchor institutions to buy goods and services within that same region. It is also notable that employment multipliers are larger than income multipliers, indicating that the jobs supported by higher education and hospitals are, in general, lower-income jobs than those at those institutions themselves. Finally, we see how what we think of as college towns — homes to major research and land grant universities such as Durham-Chapel Hill, NC (University of North Carolina and Duke University); Ann Arbor, MI (University of Michigan); and State College, PA (Penn State University) — all have the largest employment and income impacts within regions of their population size. Employment and income multipliers in these college towns are actually smaller than those for similarly sized regions with smaller employment and income impacts, perhaps owing to the lack of industry diversity within regions dominated by anchor institutions. A more thorough study of these multipliers and the different ways of measuring economic impacts, as well as breakouts of these impacts by direct, indirect, and induced effects, will be the subject of a future Anchor Economy Initiative report.

Reliance on Anchor Institutions

Anchor institutions' impacts on regional employment (as well as on income and GVA) tell us the amount of economic activity these institutions generate, but they do not answer the question of how reliant regional economies are on these institutions. To do so, we calculate a reliance index that captures the share of total regional economic activity from all sectors that is created by the anchor institution economic impacts.[21] The reliance index allows us to understand whether anchor institutions' contributions to each regional economy are unusually large or small relative to their contributions to the U.S. economy overall, and thus whether each region is more or less reliant on the higher education and hospitals sectors.

Each region's reliance index value represents how significant higher education institutions and hospitals are in supporting jobs, wages, and economic output in a region relative to all other regions and the country as a whole. A reliance index equal to 1 indicates that anchor institutions

[21] As described previously, the reliance index is calculated by dividing each region's employment, income, and GVA impact from anchor institutions by its total regional employment, income, and GVA from all sectors in the regional economy. Each of these ratios is then divided by the equivalent ratio calculated for the U.S. economy as a whole, yielding a separate location quotient for employment, income, and GVA. The location quotients are then averaged together to yield the reliance index.

in a given region contribute to that regional economy in the same proportion as anchor institutions in the nation contribute to the national economy.[22] An index value greater than 1 indicates that a region's economy is more driven by, or more reliant on, anchor institutions than is the nation's economy. For example, a region with a 1.5 on the reliance index has an economy in which anchor institutions contribute 50 percent more to the regional economy than the average region (or equivalently, than the national economy). Conversely, regions with index values less than 1 are less reliant on anchor institutions. Empirically, we find a wide range of reliance index values across the 524 regions in the United States. The highest reliance index value belongs to Ithaca, NY, at 3.71, and the lowest index value belongs to Midland, TX, at 0.17.

We emphasize that the reliance index does not carry any particular salience for the overall economic health of a region. A high or low index value is not necessarily a positive or negative for a region. Rather, it is a signal that a region has an unusually high or low amount of economic activity concentrated in the higher education and hospital sectors. In future reports, we will explore in detail which regional characteristics, such as demographic characteristics and economic conditions, are associated with more or less reliance on anchor institutions.

Table 3 describes the reliance index and its components nationally and in selected regions. The first row shows that the reliance index for the United States is equal to 1, which is by construction. It also shows anchor institutions' contribution to the national economy as measured by employment, income, and GVA. The total economic impact of anchor institutions is equal to around 9 percent of total U.S. employment, 6.3 percent of total U.S. income, and 8.1 percent of total U.S. GVA.

The remaining rows are again organized into panels by regional population category. The rows within each panel show the regions with the highest, median, and lowest reliance index among all regions in that population category. For each region, we also include the economic contribution shares that are the key inputs to the reliance index. For example, "Anchor Employment Impact Share of Regional Employment" is the region's anchor employment impact divided by the regional total employment. Dividing this value for a region by the same value for the United States yields that region's location quotient. Similar location quotients can be calculated for income and GVA. Averaging these three location quotients yields that region's reliance index.

There are several patterns evident in Table 3. Larger regions high on the reliance index — Rochester, NY, and Cleveland-Elyria, OH — are places where higher education institutions and hospitals anchor the economy as other industry sectors have left. Smaller regions ranking high on the reliance index are, by contrast, college towns — Durham-Chapel Hill, NC; Ann Arbor, MI; and Ithaca, NY — where a regional economy has essentially been built around the anchor institutions that have been placed there. In the United States as a whole, anchors contribute around 9 percent of economic activity measured in terms of employment, although these values range from a low of 2.2 percent to a high of 29.2 percent, with smaller regions showing more extreme values.

In fact, Table 3 shows that for high reliance regions with smaller populations, anchor institutions are responsible for a significant portion of regional employment, income, and GVA. In regions with fewer than 500,000 residents, high reliance on higher education and hospitals means one-fifth or more of regional employment, income, and GVA is generated by anchor institutions. In contrast, for larger regions with populations over 1 million, high reliance means closer to 15 percent of regional economic activity is attributable to higher education and hospitals. Looking at all 524 regions, high reliance emerges as a more common characteristic of smaller regions. Of the 53 regions in the top 10 percentile of reliance (above 1.67), 37 are small regions with populations under 250,000.

It is also interesting to consider the geographic distribution of the reliance index across regions, as this may provide some suggestions about what explains high or low reliance. Figure 1 shows all 524 regions in the U.S. grouped into five categories by their reliance index values. It reveals that low reliance characterizes a number of rural

[22] We can say, therefore, that 1 on the reliance index represents anchor institutions' contribution to the national economy and is equivalent to the average region's anchor contribution to the average regional economy.

TABLE 3

Regions by Anchor Institution Reliance

Region	Reliance Index Statistic	Reliance Index Rank	Reliance Index	Anchor Employment Impact Share of Regional Employment	Anchor Income Impact Share of Regional Income	Anchor GVA Impact Share of Regional GVA	Population
United States							
United States			1	9.0%	6.3%	8.1%	330,043,548
Regions >2 Million Population							
Cleveland-Elyria, OH	Max	1	1.72	14.7%	11.3%	14.0%	2,089,550
Orlando-Kissimmee-Sanford, FL	Median	17	0.96	7.8%	6.6%	7.8%	2,641,912
San Francisco-Oakland-Hayward, CA	Min	35	0.60	5.8%	3.8%	4.4%	4,764,147
Regions 1–2 Million Population							
Rochester, NY	Max	1	1.88	16.7%	11.8%	15.5%	1,089,837
New Orleans-Metairie, LA	Median	10	1.16	10.5%	7.4%	9.3%	1,272,745
Raleigh, NC	Min	21	0.78	7.2%	4.9%	6.1%	1,389,157
Regions 500,000–1 Million Population							
Durham-Chapel Hill, NC	Max	1	2.86	24.4%	21.4%	20.1%	583,042
Des Moines-West Des Moines, IA	Median	34	0.95	8.9%	6.5%	6.8%	664,502
West Texas Region of Texas nonmetropolitan area	Min	68	0.36	4.1%	2.9%	1.3%	534,629
Regions 250,000–500,000 Population							
Ann Arbor, MI	Max	1	3.23	26.7%	22.6%	25.5%	373,457
Middle Georgia nonmetropolitan area	Median	75	0.88	7.5%	5.5%	7.5%	362,577
Nevada nonmetropolitan area	Min	150	0.29	2.9%	1.8%	2.2%	286,612
Regions <250,000 Population							
Ithaca, NY	Max	1	3.71	29.2%	27.0%	29.1%	105,431
Parkersburg-Vienna, WV	Median	125	0.90	8.9%	4.8%	7.8%	90,123
Midland, TX	Min	250	0.18	2.2%	1.0%	1.0%	174,248

Notes

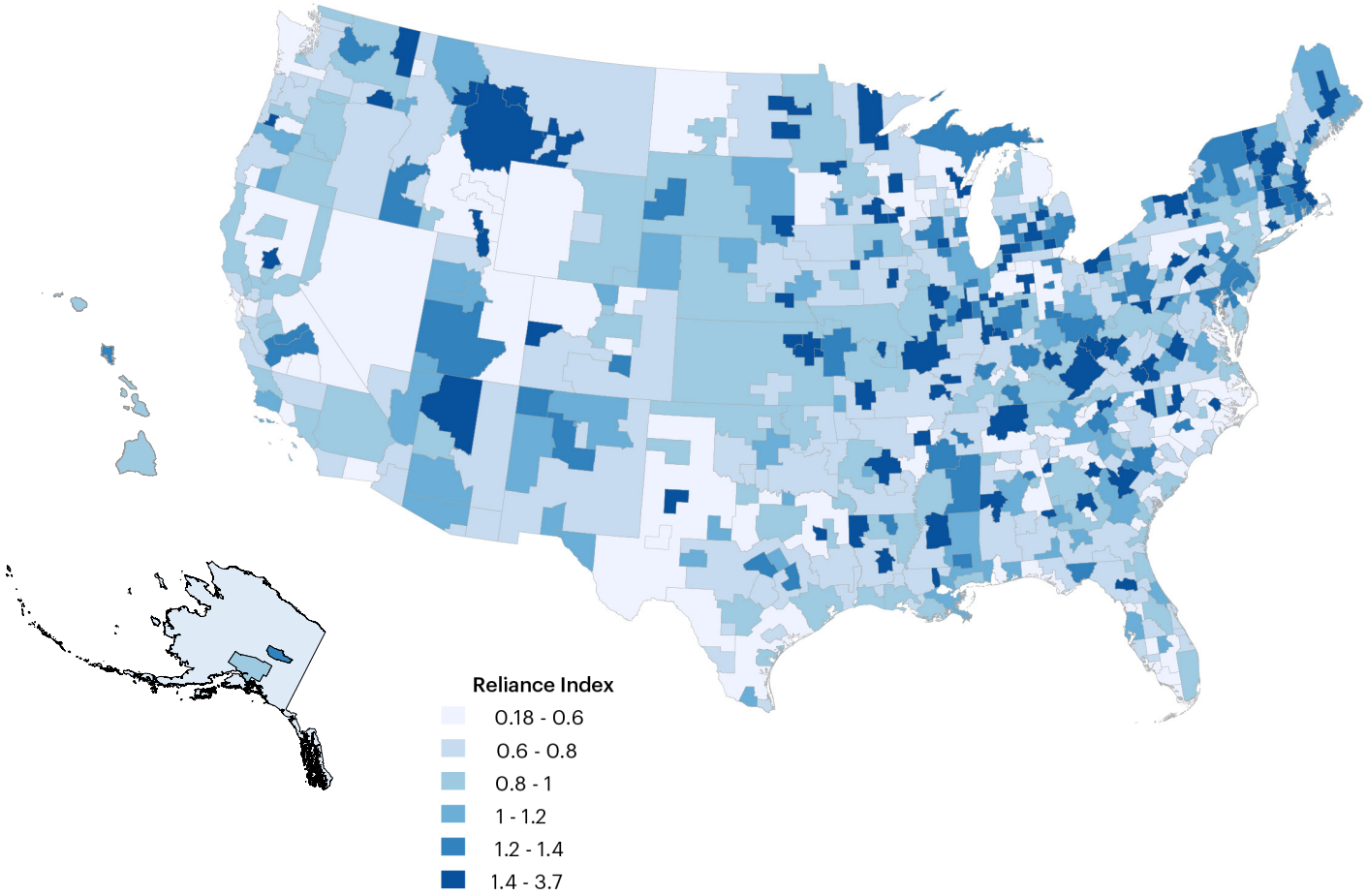
The reliance index is calculated by dividing each region's employment, income, and GVA impact from anchor institutions by its total regional employment, income, and GVA from all sectors in the regional economy. Each of these ratios is then divided by the equivalent ratio calculated for the U.S. economy as a whole, yielding a separate location quotient for employment, income, and GVA. The location quotients are then averaged together to yield the reliance index. Source: Authors' calculations from data available in the Anchor Economy Dashboard.

regions in the Plains States and metro regions in the Rust Belt. Regions categorized as high reliance appear in the South, Midwest, and Northeast. Anchor reliance and its interaction with other regional characteristics, such as population change, presents an area for future analysis, especially as it relates to anchors' role in driving growth in some regions rather than others.

Identifying Peer Regions and Comparing Measures with the Philadelphia Region as an Example

One of the contributions of the Anchor Economy Dashboard is its national scope, which allows regions to see peer relationships along a number of dimensions, leading to more opportunities to understand, evaluate, and act on the economic and policy implications of the presence of

FIGURE 1 Geography of Anchor Institution Reliance



Notes

The map shows all 524 metropolitan and nonmetropolitan regions in the United States categorized by their reliance index values. The categories are 0.18 (the minimum across all regions) to 0.6, 0.6 to 0.8, 0.8 to 1, 1 to 1.2, 1.2 to 1.4, and 1.4 to 3.7 (the maximum across all regions). Source: Authors' calculations from data available in the Anchor Economy Dashboard.

anchor institutions in a regional economy. In this section, we consider each of the anchor institution measures discussed so far (anchor institution employment, anchor institution employment impact, and the reliance index) in the context of Philadelphia and its nearest peer regions among all the 124 regions in the U.S. with a population above 500,000.[23]

Table 4 shows the results. Panel A considers Philadelphia and its peers by anchor employment. Philadelphia is ranked fifth in anchor employment among all regions with a population of 500,000 or more. The nearest peers in this ranking are, unsurprisingly, other large regions, as anchor employment is highly correlated with population. Panel B identifies Philadelphia's peers by anchor employment impact. Philadelphia is again ranked fifth, and its peers are similar to those in Panel A. Last, Panel C considers Philadelphia's peers by reliance index. Here, the results are more interesting because, as discussed before, the reliance index is mostly uncorrelated with population. Philadelphia is ranked 16th in reliance index among the 124 regions with a population of 500,000 or more, showing that Philadelphia's regional economy is much more reliant on higher education and hospitals than the typical large region. Among Philadelphia's peers according to the reliance index, some are other large regions with similar populations such as Boston, Pittsburgh, and Baltimore. However, many are also midsize regions with much smaller populations, such as Toledo, OH; Milwaukee; and Grand Rapids, MI. That many of these peers are in postindustrial regions suggests that examining the role anchors play in stabilizing postindustrial regions may be a fruitful area for

[23] For each measure, we consider the nearest peers as the five regions ranked just before Philadelphia and the five regions ranked just after. For measures where there are not five peers ranked before or after Philadelphia (for example, where Philadelphia is ranked fifth and there are only four peers ranked before Philadelphia), there may be fewer than 10 peers total.

TABLE 4

Philadelphia Peer Regions by Different Anchor Measures

Panel A: Peers by Anchor Employment			
Region	Anchor Employment	Anchor Employment Rank	Total Population
New York-Newark-Jersey City, NY-NJ-PA	622,524	1	20,734,396
Los Angeles-Long Beach-Anaheim, CA	358,023	2	13,255,164
Chicago-Naperville-Elgin, IL-IN-WI	320,500	3	9,640,083
Boston-Cambridge-Newton, MA-NH	269,950	4	4,909,848
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	250,866	5	6,223,216
Dallas-Fort Worth-Arlington, TX	178,491	6	7,605,485
Houston-The Woodlands-Sugar Land, TX	176,697	7	7,044,138
Washington-Arlington-Alexandria, DC-VA-MD-WV	159,684	8	6,322,643
Miami-Fort Lauderdale-West Palm Beach, FL	158,761	9	6,131,312
Detroit-Warren-Dearborn, MI	143,517	10	4,396,122

Panel B: Peers by Employment Impact			
Region	Employment Impact	Employment Impact Rank	Total Population
New York-Newark-Jersey City, NY-NJ-PA	1,203,553	1	20,734,396
Los Angeles-Long Beach-Anaheim, CA	677,880	2	13,255,164
Chicago-Naperville-Elgin, IL-IN-WI	656,484	3	9,640,083
Boston-Cambridge-Newton, MA-NH	507,477	4	4,909,848
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	495,735	5	6,223,216
Dallas-Fort Worth-Arlington, TX	361,809	6	7,605,485
Houston-The Woodlands-Sugar Land, TX	341,426	7	7,044,138
Miami-Fort Lauderdale-West Palm Beach, FL	320,887	8	6,131,312
Detroit-Warren-Dearborn, MI	303,183	9	4,396,122
Atlanta-Sandy Springs-Roswell, GA	296,588	10	6,032,427
Panel C: Peers by Reliance Index			
Region	Reliance Index	Reliance Index Rank	Total Population
Boston-Cambridge-Newton, MA-NH	1.50	11	4,909,848
Nashville-Davidson–Murfreesboro–Franklin, TN	1.47	12	1,986,693
Spokane-Spokane Valley, WA	1.46	13	591,438
Harrisburg-Carlisle, PA	1.45	14	587,291
Augusta-Richmond County, GA-SC	1.41	15	607,477
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	1.39	16	6,223,216
Milwaukee-Waukesha-West Allis, WI	1.37	17	1,574,513
Toledo, OH	1.36	18	606,557
Pittsburgh, PA	1.36	19	2,370,861
Baltimore-Columbia-Towson, MD	1.35	20	2,843,075
Grand Rapids-Wyoming, MI	1.33	21	1,077,995

Notes

The regions in Table 4 are all among the 124 regions in the U.S. with populations over 500,000. Rankings presented in Table 4 represent rankings within the cohort of all 124 regions in the U.S. with populations over 500,000.

future research. Overall, we believe the results in Panel C support the validity of the reliance index (by identifying peers we might expect for Philadelphia, such as Pittsburgh, Baltimore, and Milwaukee) and also show the potential for the Anchor Economy Dashboard to reveal new peers that may foster new collaborations across regions.

Implications and Directions for Future Research

This introduction to the Anchor Economy Dashboard merely scratches the surface of the kind of insight this new resource provides. Institutional characteristics, economic contribution, and the reliance index provide distinct lenses through which to understand the role of higher education and hospitals in regional economies. Looking at these metrics individually, in relation to each other, and in relation to other data available in regions will allow us to explore and answer critical questions related to how these sectors of the economy shape and impact regions. The dashboard also provides institutional leaders, regional planners, and those who study the impacts of institutions on place with new tools and insights to guide their work. We highlight a few areas in which the Anchor Economy Dashboard can shed light on the relationship between the economy and the presence of higher education and health-care institutions in regions.

THE ECONOMIC CONSEQUENCES OF ANCHOR INSTITUTIONS FOR REGIONS

There is substantial research that focuses on anchors stabilizing communities through their large employment effects and ability to resist economic shocks,[24] as well as their role in driving economic growth through innovation and the attraction of capital and talent.[25] The Anchor Economy Dashboard provides an additional tool to analyze the impacts of higher education institutions and hospitals on regional economies by calculating these sectors' economic impact for regions across the country. Population change, the presence or absence of related industry sectors, and geographic differences between metropolitan and rural regions are just some of the factors that can be analyzed in relation to anchor institutions' economic impact and reliance, deepening our understanding of how higher education institutions and hospitals are associated with regional economic conditions.

DISRUPTIONS IN HIGHER EDUCATION ~~AND HE~~ALTH CARE

By creating a reliance index for regions across the country, we have improved insight into places that may be particularly affected by demographic, technological, and policy changes surrounding higher education and health care. For instance, as legislators and policymakers consider issues related to higher education and health-care finance — everything from student loan forgiveness to Medicare reimbursements — the Anchor Economy Dashboard sheds light on the regions where these changes are likely to have the most impact. Technological change and shifting demographics will impact institutions that are locally serving, in some instances positively by increasing the efficiency of service delivery and the opportunity to expand markets beyond the local through technology.[26] In other cases, these forces will pose challenges for regions with high reliance on higher education and hospitals and shrinking populations. And, these changes may have more impact in smaller and rural communities than in large metropolitan ones because, as the Anchor Economy Dashboard shows, the more reliant regions are disproportionately smaller regions.

[24] Greg Howard, Russell Weinstein, and Yuhao Yang, "Do Universities Improve Local Economic Resilience," IZA Discussion Paper No. 14422, 2022; and Rajashri Chakrabarti, Nicole Gorton, and Michael F. Lovenheim, "State Investment in Higher Education: Effects on Human Capital Formation, Student Debt, and Long-Term Financial Outcomes of Students," Staff Report No. 941, Federal Reserve Bank of New York.

[25] Michael J. Andrews, "How Do Institutions of Higher Education Affect Local Invention? Evidence from the Establishment of U.S. Colleges," *American Economic Journal* (forthcoming); Kevin Bryan and Jorge Guzman, "Entrepreneurial Migration," working paper, 2021, available at ssrn.com/abstract=3914010 or dx.doi.org/10.2139/ssrn.3914010; Martina Fromhold-Eisebith and Claudia Werker, "Universities' Functions in Knowledge Transfer: A Geographical Perspective," *Annals of Regional Science* 51 (2013), pp. 621–43, available at doi.org/10.1007/s00168-013-0559-z.

[26] The National Student Clearinghouse Research Center shows that declining college enrollments would be significantly steeper if you took Arizona State University, Western Governors University, and Southern New Hampshire University enrollment out of the national figures.

ANCHOR INSTITUTIONS AND ECONOMIC EQUITY

Higher education institutions and hospitals are central to efforts to drive economic equity in communities for a number of reasons: They are often partners in or funders of community development efforts,[27] their missions are intertwined with the goal of achieving equity in communities,[28] and, as large employers and purchasers, they provide economic opportunity for residents and businesses. The Anchor Economy Dashboard provides new insights for communities and anchor institutions working to advance economic equity goals. Metrics on indirect and induced impacts from higher education institutions and hospitals, which capture the institutions' local supply chains, provide baselines for regions with equity-focused local purchasing initiatives.[29] Having the impact of anchors quantified in terms of employment and income provides a foundation for anchors and communities to take a deeper dive into who in the community (and outside of it) is employed by anchor institutions and measure the impact of strategies to increase diversity and inclusion within local anchor employment. The reliance index highlights communities where anchor institutions are likely to be critical to achieving community development goals and can provide the impetus to invite more anchors to community development conversations and activities.

The Anchor Economy Dashboard is a tool to examine the nature of regional dependence on higher education and hospitals and serves as a foundation for directing both community and economic development initiatives and future research with this dependence in mind. Regarding the latter, the Anchor Economy Initiative at the Philadelphia Fed will foster studies that use dashboard data to answer questions such as: What regional characteristics are most commonly associated with a high reliance on higher education and hospitals? How can regions dependent on higher education and hospitals anticipate and plan for change in the health-care and higher education sectors? And, what are the best practices for anchors using their significant economic impacts to drive equitable and inclusive economic outcomes? We look forward to working with researchers and practitioners throughout the country to answer these and other previously unanswerable questions in the months and years ahead.

[27] For multiple examples of descriptions of anchor engagement in community development, see *Urban and Metropolitan Universities: The Transformative Power of Anchor Institutions*, 30:1 (2019), *Metropolitan Universities Journal and Anchor Institutions Task Force Literature Review*, Vol. 1, 2015. See also, Hannah Savage and Eileen Divringi, *Exploring Hospital Investments in Community Development*, Philadelphia: Federal Reserve Bank of Philadelphia, 2020.

[28] Rita Axelroth Hodges and Steve Dubb, *The Road Half-Traveled: University Engagement at a Crossroads*, East Lansing, MI: Michigan State University Press, 2012.

[29] Local anchor institution procurement programs are proliferating, and their stated goals include supporting local businesses, especially minority-owned businesses, in order to build wealth in local communities. The Healthcare Anchor Network provides a toolkit, developed while part of the Democracy Collaborative, for local purchasing initiatives as well as case studies highlighting the impacts of these initiatives.

1. Industry Definitions

For the purposes of this study, the following North American Industry Classification System (NAICS) industry codes are used to define the higher education and hospital sectors, respectively:

- Hospitals are defined using NAICS code 622.
- Higher education is defined using NAICS codes 6112 and 6113.

The industry codes selected are consistent with the numerous government data sources that are used throughout this study. It is worth noting that specific industries related to higher education and hospitals are not considered as part of this study, including those industries within the broader health-care and social assistance sector (NAICS 62):

- Ambulatory health-care services (NAICS 621)
  - Offices of physicians
  - Offices of dentists
  - Offices of other health practitioners
- Nursing and residential care facilities (NAICS 623)
- Social assistance (NAICS 624)

As well as those industries within the broader educational services sector (NAICS 61):

- Elementary and secondary schools (NAICS 6111)
- Business schools and computer and management training (NAICS 6114)
- Technical and trade schools (NAICS 6115)
- Other schools and instruction (NAICS 6116)
- Educational support services (NAICS 6117)

2. Data Inputs

2.1 Data Requirements

The primary data inputs include government data sets available through sources such as the Bureau of Labor Statistics (BLS), the Bureau of Economic Analysis (BEA), and the Department of Education (DOE). However, these do not provide the full level of detail needed for this study and are insufficient to fully capture some of the economic activity generated in the U.S., such as visitor spending. Therefore, it is necessary to bridge together multiple data sources in order to produce best estimates of higher education and hospital employment and operational expenditures by geographic location while also imputing values for use in the input-output model. The following list comprises the primary data inputs used in the input-output modeling:

1. BLS Quarterly Census of Employment and Wages (QCEW): The QCEW is a comprehensive data set that reports employment and wages broken out by detailed NAICS code down to the county level. Fundamentally, the data set provides administrative records of employment and wages paid to employees, as well as the number of establishments located in each county across the U.S. for all NAICS codes. The employment and wage data are collected through the unemployment insurance (UI) system and reported to the BLS at the establishment level (as opposed to the firm level). Therefore, the respective data inputs from this source account for cases in which a business operates multiple establishments in more than one location.

2. DOE Integrated Postsecondary Education Data System (IPEDS): The IPEDS database compiles detailed education institution data for every postsecondary institution that participates in any federal financial assistance program authorized by Title IV of the Higher Education Act. This data set provides a detailed indication of the establishment location of postsecondary institutions, financial, and faculty/staff salaries — which has been overlaid with the QCEW as needed. IPEDS also reports student enrollment, which enables an estimate of student spending (i.e., ancillary spending) in a given geography.

3. BEA National and Regional accounts: The BEA produces a range of vital statistics that Oxford Economics used for this project, including industry investment, input-output tables, and regional multipliers. OE compiled the necessary data for each respective industry, identified by their NAICS codes mentioned previously. The BEA's benchmark I-O tables serve as the source of production functions in IMPLAN's software, which is described in section 3.3.

2.2 Data Considerations

In certain data sets, there are data limitations and disclosure issues that require the imputation or redistribution of certain data points. The BLS may not publish all employment and wage estimates in the QCEW program for a given industry in a given geography to protect the identifiable information of respondents. Similarly, some codes are unknown, either for industry assignment (NAICS) or geography (Federal Information Processing System, or FIPS). To address these issues, we rely on IMPLAN's imputation methods, which are detailed in the following section:

2.2.1 Nondisclosures

As BLS has noted on its website:

In accordance with the BLS's confidentiality policy, data reported under a promise of confidentiality are published in a way so as to protect the identifiable information of respondents. As such, the BLS withholds the publication of UI-covered employment and wage data for any industry level when necessary to protect the identity of employers. Totals at the industry level for the states and the nation include the nondisclosed data suppressed within the detailed tables without revealing those data. QCEW confidentiality concepts and practices are largely based on the Statistical Policy Working Paper 22 developed by the Federal Committee on Statistical Methods.

The main value IMPLAN adds to the raw CEW data is to provide estimates for all nondisclosed records. It provides these estimates using a prioritized hierarchy of data and techniques. IMPLAN's full imputation methodology can be explored in greater detail at support.implan.com/hc/en-us/articles/4414459352475-Estimating-Non-Disclosed-CEW-Values.

2.2.2 Unknown Codes

Where employment is reported in a given industry but a county FIPS code is not assigned (i.e., 999), IMPLAN does not include it in its CEW data. Similarly, where an unknown industry (i.e., 999999) is assigned to a known region, IMPLAN does not include it in its CEW data.

2.2.3 Supplanting CEW with IPEDS

In some cases, significant gaps in the CEW annual estimates were identified as being less than reported employment levels from IPEDS. While these gaps can occur for a variety of reasons, such as centralized human resources reporting systems to state UI programs, misallocation of state employees into state noneducation, and the location of faculty/staff who work remotely, ultimately the following six regions used IPEDS state higher education estimates in place of CEW state higher education estimates.

FIGURE 1 Regions with IPEDS Inputs

Region	Ever Lost Work
State College, PA	Penn State University
Corvallis, OR	Oregon State University
Lawrence, KS	University of Kansas
Champaign-Urbana, IL	University of Illinois
Blacksburg-Christiansburg-Radford, VA	Virginia Tech (State University)
Harrisonburg, VA	James Madison University

3. The Input-Output set as Model and Specification

3.1 Economic Impact Versus Contribution Analysis

Economic impact analysis considers the operational expenditures and the capital expenditures of an industry or organization by calculating the economic contribution an industry or organization makes locally, nationally, or globally. Economic impact analysis is an effective way of measuring the economic contribution of an industry to a region or a country in the event of a policy change, for example.

From a technical standpoint, a contribution analysis measures the impacts of existing industries and business, while impact analysis measures the potential addition of new business operations. Therefore, **we use the contribution approach to modeling.**

According to Watson, et al.:[1]

Economic Contribution is defined as the gross change in economic activity associated with an industry, event, or policy in an existing regional economy.

Economic Impact is defined as the net changes in new economic activity associated with an industry, event, or policy in an existing regional economy.

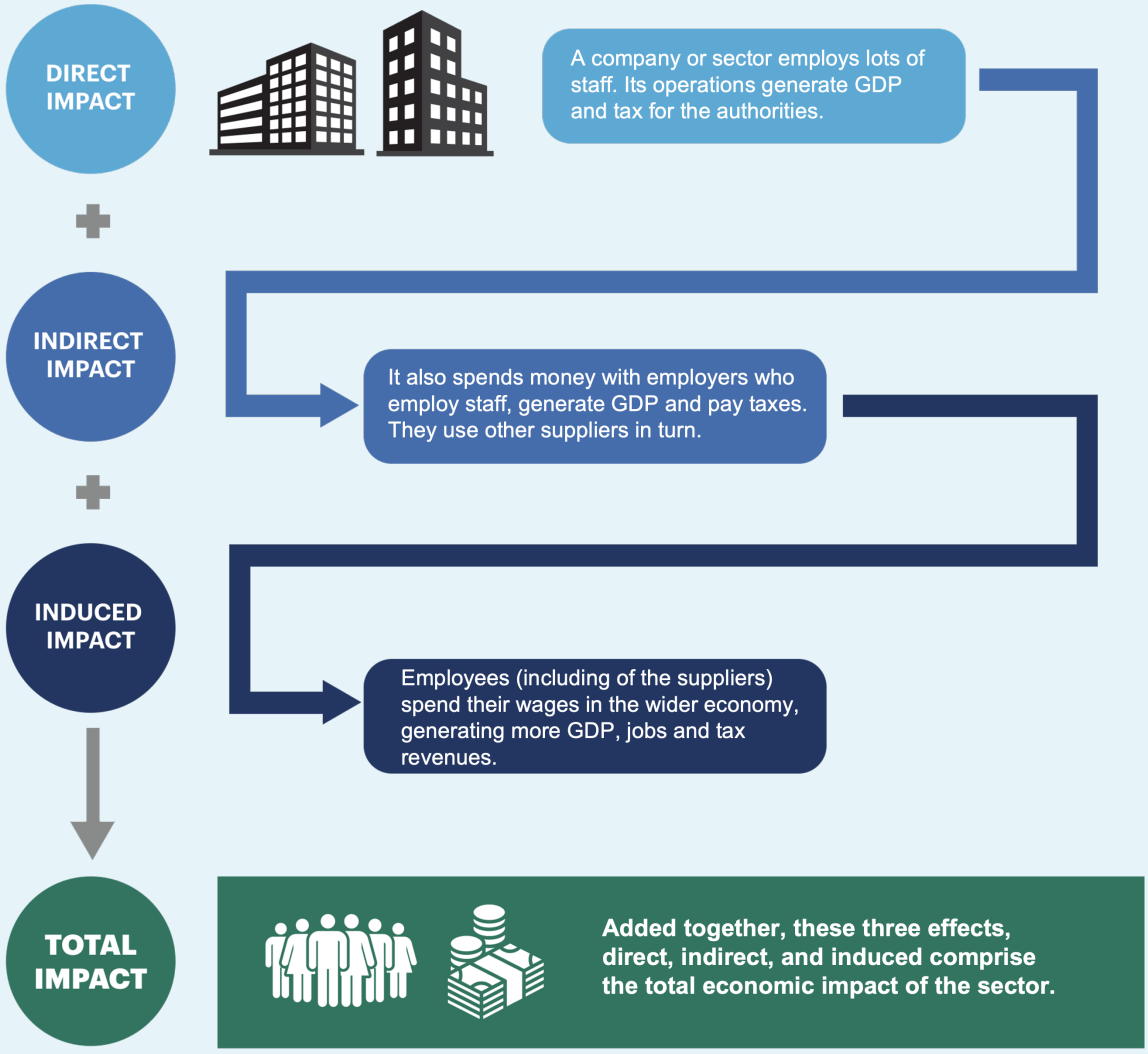
[1] See Philip Watson, Joshua Wilson, Dawn Thilmany, and Susan Winter, "Determining Economic Contributions and Impacts: What Is the Difference and Why Do We Care?" *Journal of Regional Analysis & Policy* 37:2 (2007), pp. 140–6, available at www.ntc.blm.gov/krc/uploads/74/Watson,%20et%20al%20Impacts%20vs%20Contribution%2037-2-6.pdf.

As such, this study sought to measure the economic activity associated with an industry in an existing regional economy. From a technical standpoint, the purpose of using a contribution analysis approach is to avoid double counting the value of higher education and hospitals in a regional economy. For example, when assessing the contribution of an entire sector in a given region (e.g., we assessed the entirety of the higher education and hospital sectors in each respective region), workers in the supply chains as well as workers employed by the sectors will surely use medical and higher education services. We exclude this feedback from indirect and induced effects so as not to add to the existing employment, income, and output impacts of the respective higher education and hospital sectors.

3.2 Input-Output Model

Input-output (I-O) modeling characterizes and follows the flow of spending through an economy, thereby capturing and quantifying effects on supply chains, consumer spending, economic leakages, and even government revenues. The following figure depicts the overarching structure of the model.

FIGURE 2 Summary of the Channels of Economic Impact



Source: Oxford Economics

APPENDIX A

A standard economic impact assessment identifies three channels of impact that stem from an activity. The first channel of impact is the direct effect, the second channel is the indirect effect, and the third channel captures the impact of workers spending their wages on locally produced goods and services. These impacts are described in more detail in the following section.

Additional assessments are further derived from these channels, such as tax effects. These impacts are described in more detail in section 3.2.5. The three channels of impact are further categorized across jobs, GDP, and income, which can be further decomposed across industry sectors.

3.2.1 The Channels of Impact

Direct effects: The first group of impacts to be assessed is the economic activity associated with the U.S. operations of higher education and hospitals. This is defined as the activity supported by the direct employment and sales of the industries. The assumptions for levels of operational expenses will be based on the employment and wage inputs from QCEW and estimated using IMPLAN assumptions. The assumptions for operational expenses and scaling are provided directly by IMPLAN.

Indirect (supply chain) effects: This type of impact identifies linkages between higher education and hospitals and the sectors' respective supply chains. As a result of purchasing goods and services from suppliers, economic value is created beyond the direct operations of the sectors. This includes, for example, jobs supported in a wide variety of activity in publishing, medical equipment manufacturing, and business services sectors (IT, accounting, auditing, etc.). Of critical importance when estimating multipliers is to consider leakage. This concept captures the fact that some purchases will be made outside the region (or even country) and does not add to regional output or employment.

Induced (workers' spending) effects: The induced impact captures economic activity supported by those directly or indirectly employed by higher education and hospitals who spend their disposable income on goods and services in the regional economy. This helps support jobs in the industries that supply goods and services to consumers, including jobs in retail outlets, restaurants, and a range of other service industries. This is also estimated in terms of regional gross value added (GVA) and employment.

3.2.2 How the Channels of Impact Are Measured

The channels of impact (direct, indirect, and induced) are quantified across three primary measures that include employment, income, and GVA. Each category is defined below, and the impacts are calculated across each of the aforementioned channels for each of the 546 IMPLAN industries. The results of the contribution analysis are presented as the summed total of all 546 industries.

Employment: An industry-specific mix of full-time, part-time, and seasonal employment. An annual average that accounts for seasonality and follows the same definition used by the BLS and the BEA. IMPLAN Employment is not equal to full-time equivalents.

Income (labor income): All forms of employment income, including employee compensation (wages and benefits) and proprietor income

GVA: A measure of output less intermediate consumption that represents an industry's contribution to GDP. It is the measure of the value of goods and services produced in a specified region.

3.2.3 Capital Expenditure Impacts

Capital investment expenditures (capex) in a given local geography can vary widely year on year — depending on the existing capital stock and planned investment stages for higher education and hospitals within the area. Additionally, data may be missing altogether. The capital investments of an industry for a single year are estimated in the BEA's fixed asset tables and are broken out by structures, equipment, and intellectual property. However, regional estimates for this series are not published. Therefore, the national capex series are allocated geographically using the following indicators:

For hospitals, allocate using:

1. Ownership type (e.g., private, federal, state, local) — data from the QCEW
2. Employment levels from IMPLAN/QCEW

For higher education, allocate using:

1. Ownership type (e.g., private, public) — data available from the QCEW
2. Employment levels from IMPLAN/QCEW

*Universities or colleges that have a significant online program are included in the study; however, the allocation of capex values should be assumed to reflect the location of their employees and not of their students (i.e., notably in areas of real estate, building construction, and operations of a physical campus).

3.2.4 Ancillary Impacts

To the extent possible, we estimate the ancillary spending that occurs at higher education and hospital facilities as a result of conferences and events that draw visitors who are not typically associated with the facilities' operations on a day-to-day basis. In addition, we account for some student spending (excluding spending directly to the university/college on such things as tuition, fees, meal plans, etc.). We segment the visitors at each type of institution, which is described in more detail below:

Hospitals: The ancillary spending (e.g., conferences and events, visitor spending) seeks to measure additional economic value. Note that when evaluating consumer spending by visitors, it would be necessary to exclude those visitors who reside in the immediate geography, as their spending in the regional economy cannot be attributable to a hospital visit necessarily. Therefore, visitor spending is estimated by developing a data estimation framework for nonresident visitors. For hospitals, the consumer spending profile is calculated by:

1. Estimating the ratio of visitors to AHA patient surgeries for visitor headcount and associated consumer retail spending pattern attributable to the local economy (i.e., food, personal care, etc.). We assume approximately 25 percent of surgeries attract four visitors who spend one day or less. This was then multiplied by the average daily spend of "Total all consumers" from the BLS's 2019 Consumer Expenditure Survey on items in personal care and entertainment.
2. Taking the number of health-care practitioners and technical staff from the BLS's Occupational Employment and Wage Statistics (OEWS) per region for conferences. We use medical staff as a proxy for conference activity in place of total employment because of the correlation between research, publishing, and conference activity and the number of doctors, nurses, other researchers, etc. at a given hospital. We assume approximately 25 percent of staff attend conferences in a given year and spend two days at a conference. This is then multiplied by the average daily spend of "Highest education: master's/doctoral" from the BLS's 2019 Consumer Expenditure Survey on items in personal care and entertainment.

Higher education: The ancillary spending for higher education seeks to measure additional value from a range of activities but is estimated here primarily through conferences. For higher education, the consumer spending profile is calculated by:

Taking the number of professors and research staff from IPEDS for conference visitor spending in each region. We assume approximately 25 percent of staff attend conferences in a given year and spend two days at a conference. This was then multiplied by the average daily spend of "Highest education: master's/doctoral" from BLS's 2019 Consumer Expenditure Survey on items in personal care and entertainment.

3.3 IMPLAN Software

This analysis uses IMPLAN economic impact software. IMPLAN is an input-output modeling system used to build models at various levels of geography, including the nation, state, county, and congressional district levels. It allows for adjustable assumptions of supply chain connections and leakages from input data and improves the accuracy of assumptions for missing data. All data are presented in 2019 values.

IMPLAN data contain 546 sectors representing all private industries in the United States (e.g., from grain farming to surgical appliance manufacturing to book publishing) as defined by the North American Industry Classification System (NAICS) codes. The crosswalk from NAICS to IMPLAN industries can be found here.

Employment, employee compensation, industry expenditures, commodity demands, relationships between industries, and more are collected to form IMPLAN's database.

The main data sources for IMPLAN include:

- The U.S. Bureau of Economic Analysis (BEA)
  - National Income and Product Accounts (NIPAs) – serve as governing controls for the majority of data elements (e.g., total U.S. employment, GDP, capital investment, personal consumption expenditure (PCE) spending)
  - Benchmark I-O tables – source of production functions
  - Regional Economic Accounts (REA) – source of employee compensation (EC) and proprietor employment and income
  - GDP-by-State Series – source of output for farming, manufacturing, and other sectors
  - Other data from the BEA: past-year deflators, state-level tax data, county-level personal income, net commuting rates
- The U.S. Department of Agriculture (USDA)
  - Census of Agriculture – source of county-level farm-sector output
  - National Agricultural Statistics Service (NASS) – source of state-level value of production for farm sectors
  - Economic Research Service (ERS) – source of state-level sales for farm sectors
- The U.S. Bureau of Labor Statistics (BLS)
  - Quarterly Covered Employment and Wages (QCEW) Data – source of county-level wage and salary employment and income
  - Consumer Expenditure Survey (CES) – allows breaking out of the NIPA PCE data among IMPLAN's nine household income categories

- The U.S. Census Bureau
  - County Business Patterns (CBP) – source of establishment counts by employment size classes to the zip code level
  - Annual Survey of Manufacturers (ASM) – source of output and inventory for manufacturing sectors
  - U.S.-level construction sector output
  - U.S.-level foreign exports and imports
  - Census of Government Finances – source of revenue and spending by state, county, and city governments

4. Geographic Breakouts

Subnational data are of critical importance, especially when analyzing the differences between rural and urban areas. In order to provide detailed geographic coverage without compromising the data quality, we selected the following areas for geography and modeling from the metro/nonmetro regions defined by the BLS:*

- 393 metro areas
- 131 nonmetro areas

*Owing to data reporting at the county level across several government programs, the regions in New England were adjusted to conform to county-level borders (i.e., subcounty NECTAS were not used in defining the regions). This resulted in the elimination or combination of the following regions:

- Connecticut nonmetropolitan area was merged fully into Torrington, CT (Litchfield County).
- Hopkinton town and Westerly town were removed from Norwich-New London-Westerly, CT-RI and merged into Providence-Warwick, RI-MA.
- The Central, West Central, and Northern nonmetropolitan areas in New Hampshire were merged to create a single nonmetropolitan New Hampshire region.

All other subcounty regions were assigned to their respective counties and ultimately to the regions used in this modeling. A summary table of all geographic areas used in the modeling follows.

U.S. Regions Reported in the Anchor Economy Dashboard

Data and the reliance index in the Anchor Economy Dashboard are at the metro/nonmetro regional level as defined by the BLS. A definition of regions can be found here.

Count	MSA name	Region type
1	Anniston-Oxford-Jacksonville, AL	Metro
2	Auburn-Opelika, AL	Metro
3	Birmingham-Hoover, AL	Metro
4	Columbus, GA-AL	Metro
5	Daphne-Fairhope-Foley, AL	Metro
6	Decatur, AL	Metro
7	Dothan, AL	Metro
8	Florence-Muscle Shoals, AL	Metro
9	Gadsden, AL	Metro
10	Huntsville, AL	Metro
11	Mobile, AL	Metro
12	Montgomery, AL	Metro
13	Tuscaloosa, AL	Metro
14	Northeast Alabama nonmetropolitan area	Nonmetro
15	Northwest Alabama nonmetropolitan area	Nonmetro
16	Southeast Alabama nonmetropolitan area	Nonmetro
17	Southwest Alabama nonmetropolitan area	Nonmetro
18	Anchorage, AK	Metro
19	Fairbanks, AK	Metro
20	Alaska nonmetropolitan area	Nonmetro
21	Flagstaff, AZ	Metro
22	Lake Havasu City-Kingman, AZ	Metro
23	Phoenix-Mesa-Scottsdale, AZ	Metro
24	Prescott, AZ	Metro
25	Sierra Vista-Douglas, AZ	Metro
26	Tucson, AZ	Metro
27	Yuma, AZ	Metro
28	Arizona nonmetropolitan area	Nonmetro
29	Fayetteville-Springdale-Rogers, AR-MO	Metro
30	Fort Smith, AR-OK	Metro
31	Hot Springs, AR	Metro
32	Jonesboro, AR	Metro
33	Little Rock-North Little Rock-Conway, AR	Metro
34	Memphis, TN-MS-AR	Metro
35	Pine Bluff, AR	Metro

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Count	MSA name	Region type
36	Texarkana, TX-AR	Metro
37	East Arkansas nonmetropolitan area	Nonmetro
38	North Arkansas nonmetropolitan area	Nonmetro
39	South Arkansas nonmetropolitan area	Nonmetro
40	West Arkansas nonmetropolitan area	Nonmetro
41	Bakersfield, CA	Metro
42	Chico, CA	Metro
43	El Centro, CA	Metro
44	Fresno, CA	Metro
45	Hanford-Corcoran, CA	Metro
46	Los Angeles-Long Beach-Anaheim, CA	Metro
47	Madera, CA	Metro
48	Merced, CA	Metro
49	Modesto, CA	Metro
50	Napa, CA	Metro
51	Oxnard-Thousand Oaks-Ventura, CA	Metro
52	Redding, CA	Metro
53	Riverside-San Bernardino-Ontario, CA	Metro
54	Sacramento–Roseville–Arden-Arcade, CA	Metro
55	Salinas, CA	Metro
56	San Diego-Carlsbad, CA	Metro
57	San Francisco-Oakland-Hayward, CA	Metro
58	San Jose-Sunnyvale-Santa Clara, CA	Metro
59	San Luis Obispo-Paso Robles-Arroyo Grande, CA	Metro
60	Santa Cruz-Watsonville, CA	Metro
61	Santa Maria-Santa Barbara, CA	Metro
62	Santa Rosa, CA	Metro
63	Stockton-Lodi, CA	Metro
64	Vallejo-Fairfield, CA	Metro
65	Visalia-Porterville, CA	Metro
66	Yuba City, CA	Metro
67	Eastern Sierra-Mother Lode Region of California nonmetropolitan area	Nonmetro
68	North Coast Region of California nonmetropolitan area	Nonmetro
69	North Valley-Northern Mountains Region of California nonmetropolitan area	Nonmetro
70	Boulder, CO	Metro
71	Colorado Springs, CO	Metro
72	Denver-Aurora-Lakewood, CO	Metro
73	Fort Collins, CO	Metro
74	Grand Junction, CO	Metro
75	Greeley, CO	Metro
76	Pueblo, CO	Metro
77	Eastern and Southern Colorado nonmetropolitan area	Nonmetro

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Count	MSA name	Region type
78	Northwest Colorado nonmetropolitan area	Nonmetro
79	Southwest Colorado nonmetropolitan area	Nonmetro
80	Bridgeport-Stamford-Norwalk, CT	Metro
81	Hartford-East Hartford-Middletown, CT	Metro
82	New Haven-Milford, CT	Metro
83	Norwich-New London, CT	Metro
84	Torrington, CT	Metro
85	Worcester, MA-CT	Metro
86	Dover, DE	Metro
87	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	Metro
88	Salisbury, MD-DE	Metro
89	Washington-Arlington-Alexandria, DC-VA-MD-WV	Metro
90	Cape Coral-Fort Myers, FL	Metro
91	Crestview-Fort Walton Beach-Destin, FL	Metro
92	Deltona-Daytona Beach-Ormond Beach, FL	Metro
93	Gainesville, FL	Metro
94	Homosassa Springs, FL	Metro
95	Jacksonville, FL	Metro
96	Lakeland-Winter Haven, FL	Metro
97	Miami-Fort Lauderdale-West Palm Beach, FL	Metro
98	Naples-Immokalee-Marco Island, FL	Metro
99	North Port-Sarasota-Bradenton, FL	Metro
100	Ocala, FL	Metro
101	Orlando-Kissimmee-Sanford, FL	Metro
102	Palm Bay-Melbourne-Titusville, FL	Metro
103	Panama City, FL	Metro
104	Pensacola-Ferry Pass-Brent, FL	Metro
105	Port St. Lucie, FL	Metro
106	Punta Gorda, FL	Metro
107	Sebastian-Vero Beach, FL	Metro
108	Sebring, FL	Metro
109	Tallahassee, FL	Metro
110	Tampa-St. Petersburg-Clearwater, FL	Metro
111	The Villages, FL	Metro
112	North Florida nonmetropolitan area	Nonmetro
113	South Florida nonmetropolitan area	Nonmetro
114	Albany, GA	Metro
115	Athens-Clarke County, GA	Metro
116	Atlanta-Sandy Springs-Roswell, GA	Metro
117	Augusta-Richmond County, GA-SC	Metro
118	Brunswick, GA	Metro
119	Chattanooga, TN-GA	Metro

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Count	MSA name	Region type
120	Dalton, GA	Metro
121	Gainesville, GA	Metro
122	Hinesville, GA	Metro
123	Macon, GA	Metro
124	Rome, GA	Metro
125	Savannah, GA	Metro
126	Valdosta, GA	Metro
127	Warner Robins, GA	Metro
128	East Georgia nonmetropolitan area	Nonmetro
129	Middle Georgia nonmetropolitan area	Nonmetro
130	North Georgia nonmetropolitan area	Nonmetro
131	South Georgia nonmetropolitan area	Nonmetro
132	Kahului-Wailuku-Lahaina, HI	Metro
133	Urban Honolulu, HI	Metro
134	Hawaii / Kauai nonmetropolitan area	Nonmetro
135	Boise City, ID	Metro
136	Coeur d'Alene, ID	Metro
137	Idaho Falls, ID	Metro
138	Lewiston, ID-WA	Metro
139	Logan, UT-ID	Metro
140	Pocatello, ID	Metro
141	Twin Falls, ID	Metro
142	Northwestern Idaho nonmetropolitan area	Nonmetro
143	Southeast-Central Idaho nonmetropolitan area	Nonmetro
144	Bloomington, IL	Metro
145	Cape Girardeau, MO-IL	Metro
146	Carbondale-Marion, IL	Metro
147	Champaign-Urbana, IL	Metro
148	Chicago-Naperville-Elgin, IL-IN-WI	Metro
149	Danville, IL	Metro
150	Davenport-Moline-Rock Island, IA-IL	Metro
151	Decatur, IL	Metro
152	Kankakee, IL	Metro
153	Peoria, IL	Metro
154	Rockford, IL	Metro
155	Springfield, IL	Metro
156	St. Louis, MO-IL	Metro
157	East Central Illinois nonmetropolitan area	Nonmetro
158	Northwest Illinois nonmetropolitan area	Nonmetro
159	South Illinois nonmetropolitan area	Nonmetro
160	West Central Illinois nonmetropolitan area	Nonmetro
161	Bloomington, IN	Metro

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Count	MSA name	Region type
162	Cincinnati, OH-KY-IN	Metro
163	Columbus, IN	Metro
164	Elkhart-Goshen, IN	Metro
165	Evansville, IN-KY	Metro
166	Fort Wayne, IN	Metro
167	Indianapolis-Carmel-Anderson, IN	Metro
168	Kokomo, IN	Metro
169	Lafayette-West Lafayette, IN	Metro
170	Louisville/Jefferson County, KY-IN	Metro
171	Michigan City-La Porte, IN	Metro
172	Muncie, IN	Metro
173	South Bend-Mishawaka, IN-MI	Metro
174	Terre Haute, IN	Metro
175	Central Indiana nonmetropolitan area	Nonmetro
176	Northern Indiana nonmetropolitan area	Nonmetro
177	Southern Indiana nonmetropolitan area	Nonmetro
178	Ames, IA	Metro
179	Cedar Rapids, IA	Metro
180	Des Moines-West Des Moines, IA	Metro
181	Dubuque, IA	Metro
182	Iowa City, IA	Metro
183	Omaha-Council Bluffs, NE-IA	Metro
184	Sioux City, IA-NE-SD	Metro
185	Waterloo-Cedar Falls, IA	Metro
186	Northeast Iowa nonmetropolitan area	Nonmetro
187	Northwest Iowa nonmetropolitan area	Nonmetro
188	Southeast Iowa nonmetropolitan area	Nonmetro
189	Southwest Iowa nonmetropolitan area	Nonmetro
190	Kansas City, MO-KS	Metro
191	Lawrence, KS	Metro
192	Manhattan, KS	Metro
193	St. Joseph, MO-KS	Metro
194	Topeka, KS	Metro
195	Wichita, KS	Metro
196	Kansas nonmetropolitan area	Nonmetro
197	Bowling Green, KY	Metro
198	Clarksville, TN-KY	Metro
199	Elizabethtown-Fort Knox, KY	Metro
200	Huntington-Ashland, WV-KY-OH	Metro
201	Lexington-Fayette, KY	Metro
202	Owensboro, KY	Metro
203	Central Kentucky nonmetropolitan area	Nonmetro

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Count	MSA name	Region type
204	East Kentucky nonmetropolitan area	Nonmetro
205	South Central Kentucky nonmetropolitan area	Nonmetro
206	West Kentucky nonmetropolitan area	Nonmetro
207	Alexandria, LA	Metro
208	Baton Rouge, LA	Metro
209	Hammond, LA	Metro
210	Houma-Thibodaux, LA	Metro
211	Lafayette, LA	Metro
212	Lake Charles, LA	Metro
213	Monroe, LA	Metro
214	New Orleans-Metairie, LA	Metro
215	Shreveport-Bossier City, LA	Metro
216	Central Louisiana nonmetropolitan area	Nonmetro
217	Northeast Louisiana nonmetropolitan area	Nonmetro
218	Southwest Louisiana nonmetropolitan area	Nonmetro
219	Augusta-Waterville, ME	Metro
220	Bangor, ME	Metro
221	Lewiston-Auburn, ME	Metro
222	Portland-South Portland, ME	Metro
223	Northeast Maine nonmetropolitan area	Nonmetro
224	Southwest Maine nonmetropolitan area	Nonmetro
225	Baltimore-Columbia-Towson, MD	Metro
226	California-Lexington Park, MD	Metro
227	Cumberland, MD-WV	Metro
228	Hagerstown-Martinsburg, MD-WV	Metro
229	Maryland nonmetropolitan area	Nonmetro
230	Barnstable Town, MA	Metro
231	Boston-Cambridge-Newton, MA-NH	Metro
232	Pittsfield, MA	Metro
233	Providence-Warwick, RI-MA	Metro
234	Springfield, MA	Metro
235	Massachusetts nonmetropolitan area	Nonmetro
236	Vineyard Haven, MA	Nonmetro
237	Ann Arbor, MI	Metro
238	Battle Creek, MI	Metro
239	Bay City, MI	Metro
240	Detroit-Warren-Dearborn, MI	Metro
241	Flint, MI	Metro
242	Grand Rapids-Wyoming, MI	Metro
243	Jackson, MI	Metro
244	Kalamazoo-Portage, MI	Metro
245	Lansing-East Lansing, MI	Metro

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Count	MSA name	Region type
246	Midland, MI	Metro
247	Monroe, MI	Metro
248	Muskegon, MI	Metro
249	Niles-Benton Harbor, MI	Metro
250	Saginaw, MI	Metro
251	Balance of Lower Peninsula of Michigan nonmetropolitan area	Nonmetro
252	Northeast Lower Peninsula of Michigan nonmetropolitan area	Nonmetro
253	Northwest Lower Peninsula of Michigan nonmetropolitan area	Nonmetro
254	Upper Peninsula of Michigan nonmetropolitan area	Nonmetro
255	Duluth, MN-WI	Metro
256	Fargo, ND-MN	Metro
257	Grand Forks, ND-MN	Metro
258	La Crosse-Onalaska, WI-MN	Metro
259	Mankato-North Mankato, MN	Metro
260	Minneapolis-St. Paul-Bloomington, MN-WI	Metro
261	Rochester, MN	Metro
262	St. Cloud, MN	Metro
263	Northeast Minnesota nonmetropolitan area	Nonmetro
264	Northwest Minnesota nonmetropolitan area	Nonmetro
265	Southeast Minnesota nonmetropolitan area	Nonmetro
266	Southwest Minnesota nonmetropolitan area	Nonmetro
267	Gulfport-Biloxi-Pascagoula, MS	Metro
268	Hattiesburg, MS	Metro
269	Jackson, MS	Metro
270	Northeast Mississippi nonmetropolitan area	Nonmetro
271	Northwest Mississippi nonmetropolitan area	Nonmetro
272	Southeast Mississippi nonmetropolitan area	Nonmetro
273	Southwest Mississippi nonmetropolitan area	Nonmetro
274	Columbia, MO	Metro
275	Jefferson City, MO	Metro
276	Joplin, MO	Metro
277	Springfield, MO	Metro
278	Central Missouri nonmetropolitan area	Nonmetro
279	North Missouri nonmetropolitan area	Nonmetro
280	Southeast Missouri nonmetropolitan area	Nonmetro
281	Southwest Missouri nonmetropolitan area	Nonmetro
282	Billings, MT	Metro
283	Great Falls, MT	Metro
284	Missoula, MT	Metro
285	East-Central Montana nonmetropolitan area	Nonmetro
286	Southwest Montana nonmetropolitan area	Nonmetro
287	West Montana nonmetropolitan area	Nonmetro

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Count	MSA name	Region type
288	Grand Island, NE	Metro
289	Lincoln, NE	Metro
290	Northeast Nebraska nonmetropolitan area	Nonmetro
291	Northwest Nebraska nonmetropolitan area	Nonmetro
292	South Nebraska nonmetropolitan area	Nonmetro
293	Carson City, NV	Metro
294	Las Vegas-Henderson-Paradise, NV	Metro
295	Reno, NV	Metro
296	Nevada nonmetropolitan area	Nonmetro
297	Berlin, NH	Metro
298	Concord, NH	Metro
299	Keene, NH	Metro
300	Laconia, NH	Metro
301	Lebanon, NH-VT	Metro
302	Manchester-Nashua, NH	Metro
303	New Hampshire nonmetropolitan area	Nonmetro
304	Allentown-Bethlehem-Easton, PA-NJ	Metro
305	Atlantic City-Hammonton, NJ	Metro
306	New York-Newark-Jersey City, NY-NJ-PA	Metro
307	Ocean City, NJ	Metro
308	Trenton, NJ	Metro
309	Vineland-Bridgeton, NJ	Metro
310	Albuquerque, NM	Metro
311	Farmington, NM	Metro
312	Las Cruces, NM	Metro
313	Santa Fe, NM	Metro
314	Eastern New Mexico nonmetropolitan area	Nonmetro
315	Northern New Mexico nonmetropolitan area	Nonmetro
316	Albany-Schenectady-Troy, NY	Metro
317	Binghamton, NY	Metro
318	Buffalo-Cheektowaga-Niagara Falls, NY	Metro
319	Elmira, NY	Metro
320	Glens Falls, NY	Metro
321	Ithaca, NY	Metro
322	Kingston, NY	Metro
323	Rochester, NY	Metro
324	Syracuse, NY	Metro
325	Utica-Rome, NY	Metro
326	Watertown-Fort Drum, NY	Metro
327	Capital/Northern New York nonmetropolitan area	Nonmetro
328	Central East New York nonmetropolitan area	Nonmetro
329	Southwest New York nonmetropolitan area	Nonmetro

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Count	MSA name	Region type
330	Asheville, NC	Metro
331	Burlington, NC	Metro
332	Charlotte-Concord-Gastonia, NC-SC	Metro
333	Durham-Chapel Hill, NC	Metro
334	Fayetteville, NC	Metro
335	Goldsboro, NC	Metro
336	Greensboro-High Point, NC	Metro
337	Greenville, NC	Metro
338	Hickory-Lenoir-Morganton, NC	Metro
339	Jacksonville, NC	Metro
340	Myrtle Beach-Conway-North Myrtle Beach, SC-NC	Metro
341	New Bern, NC	Metro
342	Raleigh, NC	Metro
343	Rocky Mount, NC	Metro
344	Virginia Beach-Norfolk-Newport News, VA-NC	Metro
345	Wilmington, NC	Metro
346	Winston-Salem, NC	Metro
347	Mountain North Carolina nonmetropolitan area	Nonmetro
348	Northeast Coastal North Carolina nonmetropolitan area	Nonmetro
349	Piedmont North Carolina nonmetropolitan area	Nonmetro
350	Southeast Coastal North Carolina nonmetropolitan area	Nonmetro
351	Bismarck, ND	Metro
352	East North Dakota nonmetropolitan area	Nonmetro
353	West North Dakota nonmetropolitan area	Nonmetro
354	Akron, OH	Metro
355	Canton-Massillon, OH	Metro
356	Cleveland-Elyria, OH	Metro
357	Columbus, OH	Metro
358	Dayton, OH	Metro
359	Lima, OH	Metro
360	Mansfield, OH	Metro
361	Springfield, OH	Metro
362	Toledo, OH	Metro
363	Weirton-Steubenville, WV-OH	Metro
364	Wheeling, WV-OH	Metro
365	Youngstown-Warren-Boardman, OH-PA	Metro
366	Eastern Ohio nonmetropolitan area	Nonmetro
367	North Northeastern Ohio nonmetropolitan area (noncontiguous)	Nonmetro
368	Southern Ohio nonmetropolitan area	Nonmetro
369	West Northwestern Ohio nonmetropolitan area	Nonmetro
370	Enid, OK	Metro
371	Lawton, OK	Metro

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Count	MSA name	Region type
372	Oklahoma City, OK	Metro
373	Tulsa, OK	Metro
374	Northeast Oklahoma nonmetropolitan area	Nonmetro
375	Northwest Oklahoma nonmetropolitan area	Nonmetro
376	Southeast Oklahoma nonmetropolitan area	Nonmetro
377	Southwest Oklahoma nonmetropolitan area	Nonmetro
378	Albany, OR	Metro
379	Bend-Redmond, OR	Metro
380	Corvallis, OR	Metro
381	Eugene, OR	Metro
382	Grants Pass, OR	Metro
383	Medford, OR	Metro
384	Portland-Vancouver-Hillsboro, OR-WA	Metro
385	Salem, OR	Metro
386	Central Oregon nonmetropolitan area	Nonmetro
387	Coast Oregon nonmetropolitan area	Nonmetro
388	Eastern Oregon nonmetropolitan area	Nonmetro
389	Altoona, PA	Metro
390	Bloomsburg-Berwick, PA	Metro
391	Chambersburg-Waynesboro, PA	Metro
392	East Stroudsburg, PA	Metro
393	Erie, PA	Metro
394	Gettysburg, PA	Metro
395	Harrisburg-Carlisle, PA	Metro
396	Johnstown, PA	Metro
397	Lancaster, PA	Metro
398	Lebanon, PA	Metro
399	Pittsburgh, PA	Metro
400	Reading, PA	Metro
401	Scranton–Wilkes-Barre–Hazleton, PA	Metro
402	State College, PA	Metro
403	Williamsport, PA	Metro
404	York-Hanover, PA	Metro
405	Northern Pennsylvania nonmetropolitan area	Nonmetro
406	Southern Pennsylvania nonmetropolitan area	Nonmetro
407	Western Pennsylvania nonmetropolitan area	Nonmetro
408	Charleston-North Charleston, SC	Metro
409	Columbia, SC	Metro
410	Florence, SC	Metro
411	Greenville-Anderson-Mauldin, SC	Metro
412	Hilton Head Island-Bluffton-Beaufort, SC	Metro
413	Spartanburg, SC	Metro

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Count	MSA name	Region type
414	Sumter, SC	Metro
415	Lower Savannah South Carolina nonmetropolitan area	Nonmetro
416	Northeast South Carolina nonmetropolitan area	Nonmetro
417	Upper Savannah South Carolina nonmetropolitan area	Nonmetro
418	Rapid City, SD	Metro
419	Sioux Falls, SD	Metro
420	East South Dakota nonmetropolitan area	Nonmetro
421	West South Dakota nonmetropolitan area	Nonmetro
422	Cleveland, TN	Metro
423	Jackson, TN	Metro
424	Johnson City, TN	Metro
425	Kingsport-Bristol-Bristol, TN-VA	Metro
426	Knoxville, TN	Metro
427	Morristown, TN	Metro
428	Nashville-Davidson–Murfreesboro–Franklin, TN	Metro
429	East Tennessee nonmetropolitan area	Nonmetro
430	North Central Tennessee nonmetropolitan area	Nonmetro
431	South Central Tennessee nonmetropolitan area	Nonmetro
432	West Tennessee nonmetropolitan area	Nonmetro
433	Abilene, TX	Metro
434	Amarillo, TX	Metro
435	Austin-Round Rock, TX	Metro
436	Beaumont-Port Arthur, TX	Metro
437	Brownsville-Harlingen, TX	Metro
438	College Station-Bryan, TX	Metro
439	Corpus Christi, TX	Metro
440	Dallas-Fort Worth-Arlington, TX	Metro
441	El Paso, TX	Metro
442	Houston-The Woodlands-Sugar Land, TX	Metro
443	Killeen-Temple, TX	Metro
444	Laredo, TX	Metro
445	Longview, TX	Metro
446	Lubbock, TX	Metro
447	McAllen-Edinburg-Mission, TX	Metro
448	Midland, TX	Metro
449	Odessa, TX	Metro
450	San Angelo, TX	Metro
451	San Antonio-New Braunfels, TX	Metro
452	Sherman-Denison, TX	Metro
453	Tyler, TX	Metro
454	Victoria, TX	Metro
455	Waco, TX	Metro

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Count	MSA name	Region type
456	Wichita Falls, TX	Metro
457	Big Thicket Region of Texas nonmetropolitan area	Nonmetro
458	Border Region of Texas nonmetropolitan area	Nonmetro
459	Coastal Plains Region of Texas nonmetropolitan area	Nonmetro
460	Hill Country Region of Texas nonmetropolitan area	Nonmetro
461	North Texas Region of Texas nonmetropolitan area	Nonmetro
462	West Texas Region of Texas nonmetropolitan area	Nonmetro
463	Ogden-Clearfield, UT	Metro
464	Provo-Orem, UT	Metro
465	Salt Lake City, UT	Metro
466	St. George, UT	Metro
467	Central Utah nonmetropolitan area	Nonmetro
468	Eastern Utah nonmetropolitan area	Nonmetro
469	Barre, VT	Metro
470	Bennington, VT	Metro
471	Burlington-South Burlington, VT	Metro
472	Rutland, VT	Metro
473	Northern Vermont nonmetropolitan area	Nonmetro
474	Southern Vermont nonmetropolitan area	Nonmetro
475	Blacksburg-Christiansburg-Radford, VA	Metro
476	Charlottesville, VA	Metro
477	Harrisonburg, VA	Metro
478	Lynchburg, VA	Metro
479	Richmond, VA	Metro
480	Roanoke, VA	Metro
481	Staunton-Waynesboro, VA	Metro
482	Winchester, VA-WV	Metro
483	Northeast Virginia nonmetropolitan area	Nonmetro
484	Northwest Virginia nonmetropolitan area	Nonmetro
485	Southside Virginia nonmetropolitan area	Nonmetro
486	Southwest Virginia nonmetropolitan area	Nonmetro
487	Bellingham, WA	Metro
488	Bremerton-Silverdale, WA	Metro
489	Kennewick-Richland, WA	Metro
490	Longview, WA	Metro
491	Mount Vernon-Anacortes, WA	Metro
492	Olympia-Tumwater, WA	Metro
493	Seattle-Tacoma-Bellevue, WA	Metro
494	Spokane-Spokane Valley, WA	Metro
495	Walla Walla, WA	Metro
496	Wenatchee, WA	Metro
497	Yakima, WA	Metro

APPENDIX B

Count	MSA name	Region type
498	Eastern Washington nonmetropolitan area	Nonmetro
499	Western Washington nonmetropolitan area	Nonmetro
500	Beckley, WV	Metro
501	Charleston, WV	Metro
502	Morgantown, WV	Metro
503	Parkersburg-Vienna, WV	Metro
504	Northern West Virginia nonmetropolitan area	Nonmetro
505	Southern West Virginia nonmetropolitan area	Nonmetro
506	Appleton, WI	Metro
507	Eau Claire, WI	Metro
508	Fond du Lac, WI	Metro
509	Green Bay, WI	Metro
510	Janesville-Beloit, WI	Metro
511	Madison, WI	Metro
512	Milwaukee-Waukesha-West Allis, WI	Metro
513	Oshkosh-Neenah, WI	Metro
514	Racine, WI	Metro
515	Sheboygan, WI	Metro
516	Wausau, WI	Metro
517	Northeastern Wisconsin nonmetropolitan area	Nonmetro
518	Northwestern Wisconsin nonmetropolitan area	Nonmetro
519	South Central Wisconsin nonmetropolitan area	Nonmetro
520	Western Wisconsin nonmetropolitan area	Nonmetro
521	Casper, WY	Metro
522	Cheyenne, WY	Metro
523	Eastern Wyoming nonmetropolitan area	Nonmetro
524	Western Wyoming nonmetropolitan area	Nonmetro

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