

AN EXPLAINER:  
**BOSTON AND DURHAM-CHAPEL HILL LEAD AMERICA'S TOP CITIES FOR  
UNIVERSITY INNOVATION IMPACT**

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February 2024

*The George W. Bush Institute-SMU Economic Growth Initiative [ranks the innovation impact of universities and academic medical centers by U.S. metro areas.](#)*

## HOW UNIVERSITY INNOVATION CONTRIBUTES TO PROSPERITY AND OPPORTUNITY IN AMERICA'S CITIES

Metro areas with high university innovation impact outperform other metros on multiple measures associated with innovation: business sector research and development (R&D) spending, venture capital investment, life science jobs, and a composite index of metro-area innovation we've created.

[Technology spillovers](#) from university research to the private sector disproportionately occur locally, which helps explain the strong links between university research and local innovation. [Citations](#) of a university's work in patents and other academic papers are more likely to come from other researchers or companies located relatively close to the university. One reason for this is that [face-to-face interactions](#) lead to some of the best exchanges of knowledge and ideas among researchers.

In addition, high-skill jobs resulting from new ideas tend to be concentrated in the locality where the innovation originates, while associated lower-skilled jobs spread more widely, according to recent [research](#) by Stanford University economist Nicholas Bloom and colleagues.

Private-sector innovation is becoming more dependent on eds and meds research, as universities and academic medical centers conduct more and more of the nation's basic research.

- Private industry conducts 15% of basic science research today, down from 30% in the 1950s, based on National Center for Science and Engineering Statistics data.
- The private sector's falling role in science reflects the decline or closure of once-great industry research centers like Bell Labs and Xerox Park.
- Nonfederal eds and meds institutions, meanwhile, now do about [half of U.S. basic research](#), up from 35% in the 1950s.

Median incomes tend to be higher and upward mobility better in metros with stronger than average eds and meds institutions, the report shows. Metros with universities that have outsized innovation impact also excel in building social capital – the trust, social connectedness, and civic engagement that make communities tick.

Eds and med schools institutions have played a pivotal role in emerging urban turnaround stories like Pittsburgh; in the growth of Sun Belt boomtowns like Austin, Texas; Nashville, Tennessee; and Raleigh, North Carolina and in the relatively strong economic performance over the last decade of college towns like Durham, North Carolina; Madison, Wisconsin; and College Station, Texas.

## WHY SOME METROS OUTPERFORM OTHERS FOR UNIVERSITY INNOVATION IMPACT

- Cities in which local eds and med schools institutions have relatively large research budgets predictably experience better-than-average innovation impact. Endowment size and other measures of university scale, on the other hand, aren't predictive of how a metro's institutions perform for innovation impact, once one controls for research spending.
- Cities in which immigrants constitute a relatively large share of the local population also tend to rank above average for university innovation impact. This reflects the crucial contribution of foreign-born people to research, innovation, and entrepreneurship in U.S. cities.
- Finally, cities that outperform for university innovation impact tend to be ones in which leading eds and med schools institutions have developed over many decades with substantial support from local philanthropists and, in most cases, state and local governments. The takeaway: It takes a long time to build great universities and academic medical centers.

## TOP PERFORMERS

*Boston:* The Boston metropolitan area performs ahead of all other U.S. metros for the innovation impact of its universities and academic medical centers, the report shows.

*Durham-Chapel Hill, North Carolina:* The Durham-Chapel Hill metro area, meanwhile, ranks first among the nation's 100 largest metros for university innovation impact per resident. The North Carolina Research Triangle's eds and med schools institutions have outsized economic impact despite the region's relatively small size.

## THE NUTS AND BOLTS

Cities with strong, innovative eds and med schools institutions see greater prosperity and opportunity than other cities, the report shows. That's because the economic spillovers of a university's research disproportionately benefit its local economy.

- The report bases its metro-area rankings on composite innovation impact scores for 177 individual universities and academic medical centers. Our innovation impact scores quantify the impact of each university's research and innovation beyond its walls.
- The report measures impact based on innovation outputs like patents, technology licenses, licensing income, startup companies, STEM graduates, and citations in other researchers' academic papers and patents.
- Scores for metro areas represent add-ups of the innovation impact scores for all the eds and med schools institutions in each metro.

At a time when public trust in higher education institutions has experienced significant declines, it is vital to cities and regions throughout the United States that the nation's research institutions sustain and even strengthen their world-leading role in basic science and technological innovation.

## RANKINGS

While very large metros tend to lead the rankings for total university innovation impact in view of their many eds and meds institutions, a handful of metros – Boston, San Francisco, Pittsburgh, and Baltimore – perform far better for their “BushEds” composite scores than their size would predict, as Table 1 shows. Innovation output scores per resident in the right-hand column in Table 1 – BushEds per capita – illustrate how these metros punch above their weight.

*Table 1*

Top Metro Areas for University Innovation Impact  
(of America’s 385 metros)

	<b>Metro Areas</b>	<b>Aggregate BushEds</b>	<b>BushEds per Capita</b>
1	Boston-Cambridge-Newton, MA-NH	115.5	23.6
2	New York-Newark-Jersey City, NY-NJ-PA	79.9	4.0
3	Los Angeles-Long Beach-Anaheim, CA	57.5	4.4
4	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	45.9	7.4
5	San Francisco-Oakland-Berkeley, CA	39.5	8.5
6	Houston-The Woodlands-Sugar Land, TX	39.4	5.5
7	Chicago-Naperville-Elgin, IL-IN-WI	35.6	3.7
8	Pittsburgh, PA	32.6	13.9
9	Baltimore-Columbia-Towson, MD	31.2	11.0
10	Seattle-Tacoma-Bellevue, WA	30.3	7.6

City size doesn’t predict performance on innovation impact per capita, as Table 2 shows. Six of the 10 best-performing metros on this metric rank in the bottom half of the nation’s 100 largest metros for population, while none of America’s 10 largest metros makes this list.

*Table 2*

Top Metro Areas for University Innovation Impact per Capita  
(100 largest metros)

	<b>Metro Areas</b>	<b>BushEds per Capita</b>	<b>Aggregate BushEds</b>
1	Durham-Chapel Hill, NC	43.5	28.5
2	Madison, WI	24.0	16.4
3	Boston-Cambridge-Newton, MA-NH	23.6	115.5
4	New Haven-Milford, CT	17.7	15.3
5	Provo-Orem, UT	15.2	10.6
6	Albuquerque, NM	14.4	13.3
7	Pittsburgh, PA	13.9	32.6
8	Tucson, AZ	13.4	14.1
9	Worcester, MA-CT	13.3	13.1
10	Raleigh-Cary, NC	11.4	16.5
	<b>Average for Top 100 Metros</b>	<b>4.6</b>	<b>10.5</b>

## *Sources and methods*

Scores for U.S. metropolitan areas represent the sum of our composite innovation impact scores for all the universities and academic medical centers based in each metro. Our composite innovation impact scores for individual universities are based on institutions' performance on nine "output" metrics from 2016 to 2020:

- Patents issued per year.
- Intellectual property (IP) licenses signed per year.
- IP license income earned per year.
- Spinout companies formed around university IP per year.
- IP licenses signed with spinout companies per year.
- Citations of papers by university researchers in other academic papers over the period.
- Citations of papers by university researchers in issued patents over the period.
- Number of bachelor's and master's degree graduates in STEM fields over the period.
- Number of Ph.D. graduates in STEM fields over the period.

Data for the first five metrics, plus total research spending for each institution, come from the Association of University Technology Managers dataset. Paper and patent citations come from Google Scholar and Google Patent searches, respectively. STEM graduate numbers come from U.S. Department of Education data on postsecondary institutions.

We standardize scores on each metric by dividing by the standard deviation of the distribution of scores across universities, use weightings from principal component analysis to combine each institution's nine scores into a raw composite score, then recalibrate so that the top-ranking institution (the University of California System) has a score of 100. Our analysis replicates the method we and partners from Opus Faveo Innovation Development employed in a 2020 [report](#) with data from 2013 to 2017.

We calculate total innovation impact scores for whole metropolitan areas – our "BushEds" scores – by summing the output scores for all institutions in a metro area. We calculate BushEds per Capita scores by dividing each metro's aggregate BushEds score by total 2020 population.

See our [full report](#), Appendix 1, for a full explanation of sources and methods used in these rankings.

## **HOW STATE AND LOCAL POLICYMAKERS CAN AMPLIFY THE LOCAL ECONOMIC IMPACT OF UNIVERSITY INNOVATION**

State and local governments can promote the innovation impact of eds and meds institutions in several ways:

- Redirect state funding streams to promote innovative eds and meds research, support technology commercialization initiatives, and foster the growth of innovation districts and other innovation ecosystems.
- Require consistent reporting of innovation impact outcomes by public universities and academic medical centers.
- Mandate commitment to free inquiry and objective research as condition for funding.
- Work with eds and meds institutions on research for social good.
- Convene on local or statewide innovation initiatives.

## THE ROLE OF THE FEDERAL GOVERNMENT

The federal government also has a vital role to play, primarily as a funder, in supporting transformational research by eds and meds institutions and fostering local innovation ecosystems.

- Congress should raise federal investment in R&D by at least 50% to 1% of U.S. GDP, the report argues.
- Congress should also shift funding streams to incentivize more blue-sky, transformational research; fund the true cost of medical research and reduce cross-subsidization by patient care revenues at academic medical centers; and support local innovation ecosystems with evergreen, peer-reviewed funding programs.

## CONCLUSION

Innovative research conducted at America's eds and meds institutions is more important than it's ever been to state and local economies, as well as to the nation's future. But university and academic medical centers need to pursue significant reforms, engage more effectively in surrounding communities, and rebuild public trust. States and localities have a vital interest in ensuring they succeed.

## ABOUT THE GEORGE W. BUSH INSTITUTE

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## GEORGE W. BUSH INSTITUTE-SMU ECONOMIC GROWTH INITIATIVE

*The Bush Institute-SMU Economic Growth Initiative combines the public policy expertise of the George W. Bush Institute and the academic expertise of SMU. The joint initiative draws from economic policy-making experience at the highest levels and from cutting edge academic research to identify ideas for promoting innovation, entrepreneurship, and faster, more inclusive growth through global competitiveness and sound immigration policy.*



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