2025

THE ECONOMIC IMPACT

OF VANDERBILT UNIVERSITY AND VANDERBILT UNIVERSITY MEDICAL CENTER

Key Construction Projects from 2019–2024

- Completion of West End Neighborhood project
- Completion of Jim Ayers Tower
- The Broadview student housing public-private partnership
- Owen Graduate School of Management expansion and renovation project
- Garland Hall expansion and renovation project
- Peabody neighborhood project renovations
- Launched Vandy United projects in the Frist Athletics Village

Analysis by: TXP, Inc. | 1310 South 1st Street, #105 | Austin, Texas 78704 | www.txp.com

Summary

Since its founding in 1873, Vanderbilt University (VU) and the Vanderbilt University Medical Center (VUMC) have provided enormous social and economic benefits to the state, nation and rest of the world. These benefits manifest themselves in a variety of ways. First, direct Vanderbilt institutional spending on construction creates sales for companies located in Nashville and elsewhere throughout Tennessee (Construction Impact). Annual operational spending on payroll, equipment and general procurement by VU and VUMC combines with spending by students and out-of-town visitors off-campus to bring additional revenue to local businesses (Annual Static Impact). Beyond these direct injections, Vanderbilt also plays an important role in local economic development by providing labor force and research commercialization (Annual Dynamic Impact). Finally, students, faculty and staff of Vanderbilt contribute thousands of hours of community service each year, promoting health, literacy, education, culture and overall regional quality of life.

The Economic Impact of Vanderbilt Construction 2019–24 ($Millions)

	Direct Spend	Output	Value-Added	Earnings	Jobs
All Construction	$2,229.43	$4,720.81	$2,753.34	$1,617.67	26,469

The Annual Static Economic Impacts ($Millions)

	Direct Spend	Output	Value-Added	Earnings	Jobs
VU Operations	$1,578.32	$3,824.31	$2,362.50	$1,425.96	16,552
VUMC Operations	$7,628.22	$17,366.41	$10,240.89	$5,757.02	97,704
Students	$225.71	$342.77	$203.98	$99.56	2,112
Visitors	$299.21	$600.14	$363.14	$178.21	4,122
TOTALS	**$9,731.46**	**$22,113.63**	**$13,170.54**	**$7,460.75**	**120,490**

The Annual Dynamic Impact of VU ($Millions)

	Direct Spend	Output	Value-Added	Earnings	Jobs
VU Additional	$173.14	$596.08	$354.72	$173.14	3,673

Source: TXP, Inc.

Traditional economic development focuses on attracting and retaining activity from elsewhere. While this remains crucial, other factors are increasingly important. Specifically, growing regions such as the Nashville area require a highly capable workforce, innovation and entrepreneurship, clusters in knowledge industries and superior quality of life. Vanderbilt makes integral contributions to each, and the impact is growing. Put differently, the principal determinant of modern economic success is the ability to acquire, process and apply knowledge. For over 150 years, Vanderbilt has been a laboratory where this key element of the state (and nation's) comparative advantage is incubated. Tennessee is fortunate to have such a strong asset in the economic development portfolio.

The Roberts Academy and Dyslexia Center opened in fall 2023 in its temporary location. The permanent location broke ground in early 2025.

Overview

Vanderbilt University, located in Nashville, Tennessee, is a private research university and associated medical center that offers a full range of undergraduate, graduate and professional degrees. Founded in 1873, the school provides an invigorating atmosphere where students tailor their education to meet their goals and researchers collaborate to solve complex questions affecting health, culture and society.

In Spring 2016, Vanderbilt University Medical Center (VUMC) became a fully independent, nonprofit entity, separate legally and financially from Vanderbilt University. This transition positioned VUMC for future growth and investment, while preserving its tightly woven connections to the University in research and teaching. Teaching and research collaboration and connections between the University and the Medical Center remain a strategic priority for both institutions. For discussion purposes in this study, the two institutions (the University and VUMC) collectively comprise "Vanderbilt," though the impact of each is analyzed separately.

For FY 2024, Vanderbilt had an annual full-time enrollment of 7,221 undergraduates and 6,419 graduate and professional students, for a total enrollment of 13,640. Consistently among the top-ranked universities in the nation, Vanderbilt draws students from all 50 states, with about one in ten coming from overseas.

As an independent, privately supported university and medical center employing approximately 50,000 full- and part-time staff members, Vanderbilt is the largest private employer in the Nashville area and the second largest private employer based in the state. Not only do Vanderbilt operations have a significant economic impact, but its students and graduates increase the state's economic development competitiveness and productivity by gaining knowledge, improving technical skills and commanding a higher salary when entering the job market.

VUMC also plays an important part in improving Tennessee's overall quality of life and economic vitality beyond its direct role in the economy. In FY 2024, for example, the total value of charity care, community benefits and other unrecovered costs provided by VUMC was $952 million.

A wide range of visitors, including prospective students, parents, graduates, sport fans and business leaders, travel to Nashville to take advantage of conferences, alumni events, sporting events and medical services associated with Vanderbilt. Out-of-town visitors help support cultural institutions and entertainment attractions that improve the quality of life for local residents who do not directly interact with the University. The direct spending by these guests also provides revenue to local businesses.

The purpose of this assessment is to quantify the total annual economic and tax revenue impact of Vanderbilt. Building upon existing studies and datasets, this analysis highlights the importance of Vanderbilt in terms of economic activity, jobs, wages and taxes.

HeroWear, a wearable technology company that is developing a suite of assistive clothing solutions that reduce fatigue and physical strain on workers.

From 2018 to 2024, total jobs attributable to the economic impact of Vanderbilt increased from 73,403 to 120,490—a growth of over 64 percent.

Graduates who stayed in Nashville and Middle TN over the last five years fuel the economy and go to work at Vanderbilt or VUMC, Metro Nashville Public Schools, Teach for America, Optum, KPMG, AllianceBernstein, Williamson County Schools, Cigna, Asurion, UBS Financial Services, State of Tennessee, InfoWorks, Amazon, Oracle and HCA Healthcare to name a few.

Through the Vanderbilt Health Affiliated Network, VUMC works with more than **65 hospitals and 7,000 clinicians** across Tennessee and five neighboring states to share best practices and bring value-driven and cost-effective health care to the Mid-South.

The Nashville Innovation Alliance has brought together public, private, civic and education institutions to collaborate on improving the region's ecosystem for innovation and research.

Static Economic Impacts

Methodology

Translation of direct spending/activity into the total economic impact is done, in this case, through an input-output model of the Nashville MSA economy that allows measurement of the secondary, or "ripple" effects. The process is relatively straightforward; identify the correct inputs (in this case, direct spending attributable to the University, the Medical Center, students and visitors) and apply the correct multipliers for the regional economy to determine the total economic impacts. This model reflects the current structure of the local economy (related to patterns of procurement and consumption among and between industries) and as a result is referred to here as "static."

The model produces a number of statistics that describe regional economic activity. Four common measures are:

- **Output** (also known as Economic Activity and equivalent to top-line revenue), which describes total economic activity and is equivalent to a firm's gross sales or top-line;
- **Value Added** which equals gross output of an industry or a sector less its intermediate inputs or purchases from other firms used in the production process;
- **Labor Income** which corresponds to wages and benefits; and
- **Employment** which refers to jobs that have been created in the local economy.

Three Types of Effects

In an input-output analysis of new economic activity, it is useful to distinguish three types of expenditure effects: direct, indirect and induced.

Direct effects are production changes associated with the immediate effects or final demand changes. Spending by Vanderbilt for janitorial services is an example of a direct effect.

Indirect effects are production changes in backward-linked industries caused by the changing input needs of directly affected industries – typically, additional purchases to produce additional output. The janitorial services company will have to purchase cleaning supplies to provide service. These downstream purchases affect the economic status of other local merchants and workers.

Induced effects are the changes in regional household spending patterns caused by changes in household income generated from the direct and indirect effects. Both the university and the janitorial service employees realize increased income, for example, as do other providers and their workers.

The interdependence between different sectors of the economy is reflected in the concept of a "multiplier." An output multiplier of 2.5, for example, means that for every $1,000 injected into the economy, all other sectors produce an additional $1,500 in top-line revenue. The larger the multiplier, the greater the economic impact.

Construction Impacts

Information from Vanderbilt indicates direct construction spending across VU and VUMC over the past five years of over $2.2 billion, broken down as follows:

$1.45B
by Vanderbilt University

$787M
by Vanderbilt University Medical Center

This injection translates into the following total economic impacts. Since the spending associated with facilities construction is finite, once the project is completed, these impacts come to an end.

The Total Economic Impact of Vanderbilt Construction 2019–24

$2.23B	$4.72B	$2.75B	$1.62B
Total Direct Spend	Output	Value-Added	Earnings

26,469 Jobs

See Appendix One, Table A.1 for more detailed results.

Vanderbilt University (VU) Operations

VU reported total annual operations spending for 2024 of just under $1.7 billion, which is just under $1.6 billion net of depreciation. for a net injection of just under $1.6 billion. Of this amount, approximately 60 percent was personnel/payroll-related, with the balance going for procurement, interest expenses and grants, etc. to local not-for-profits.

Annual Static Impact of VU Operations

$1.58B	$3.82B	$2.36B	$1.43B
Total Direct Spend	Output	Value-Added	Earnings

16,552 Jobs

See Appendix One, Table A.2 for more detailed results.

Vanderbilt University Medical Center plays a crucial role in improving Tennessee's overall quality of life and economic vitality. In FY 2024, the total value of charity care, community benefits and other unrecovered costs provided by VUMC was $952 million.

Vanderbilt University Medical Center (VUMC) Operations

VUMC reported total annual operations spending for 2024 of just over $7.6 billion.

Annual Static Impact of VUMC

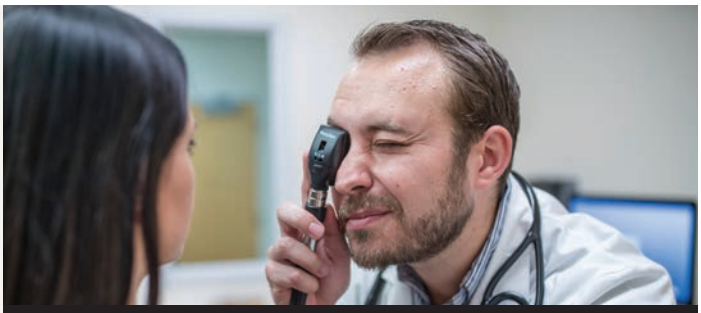
$7.63B
Total Direct Spend

$17.37B
Output

$10.24B
Value-Added

$5.76B
Earnings

97,704 Jobs



FY 2024 patient care statistics

- 3.3M annual patient visits
- 80,000 hospital discharges
- 81,000 surgical cases
- 213,000 emergency department visits
- 3,400 LifeFlight air transports
- 4,930 clinicians employed
- 1,200+ resident physicians

See Appendix One, Table A.3 for more detailed results.

Student Spending

Enrolled students (graduate and undergraduate) have a positive impact on the local economy by supporting businesses such as restaurants, music venues, rental housing and other retail establishments. The assumption is that all undergraduates live in university-provided housing and spend an average of $4,590 per person on outside local expenses. At the same time, graduate and professional students are assumed to live off-campus, with a per person annual local spend of $30,000 (based on local rents and assuming that rent accounts for 40 percent of total local per capita spending). The combination is $225.71 million per year, a blended average across 13,640 total students of $16,548 per person.

Annual Static Impact of VU Student Spending

$226M
Total Direct Spend

$343M
Output

$204M
Value-Added

$100M
Earnings

2,112 Jobs

See Appendix One, Table A.4 for more detailed results.

Visitor Spending

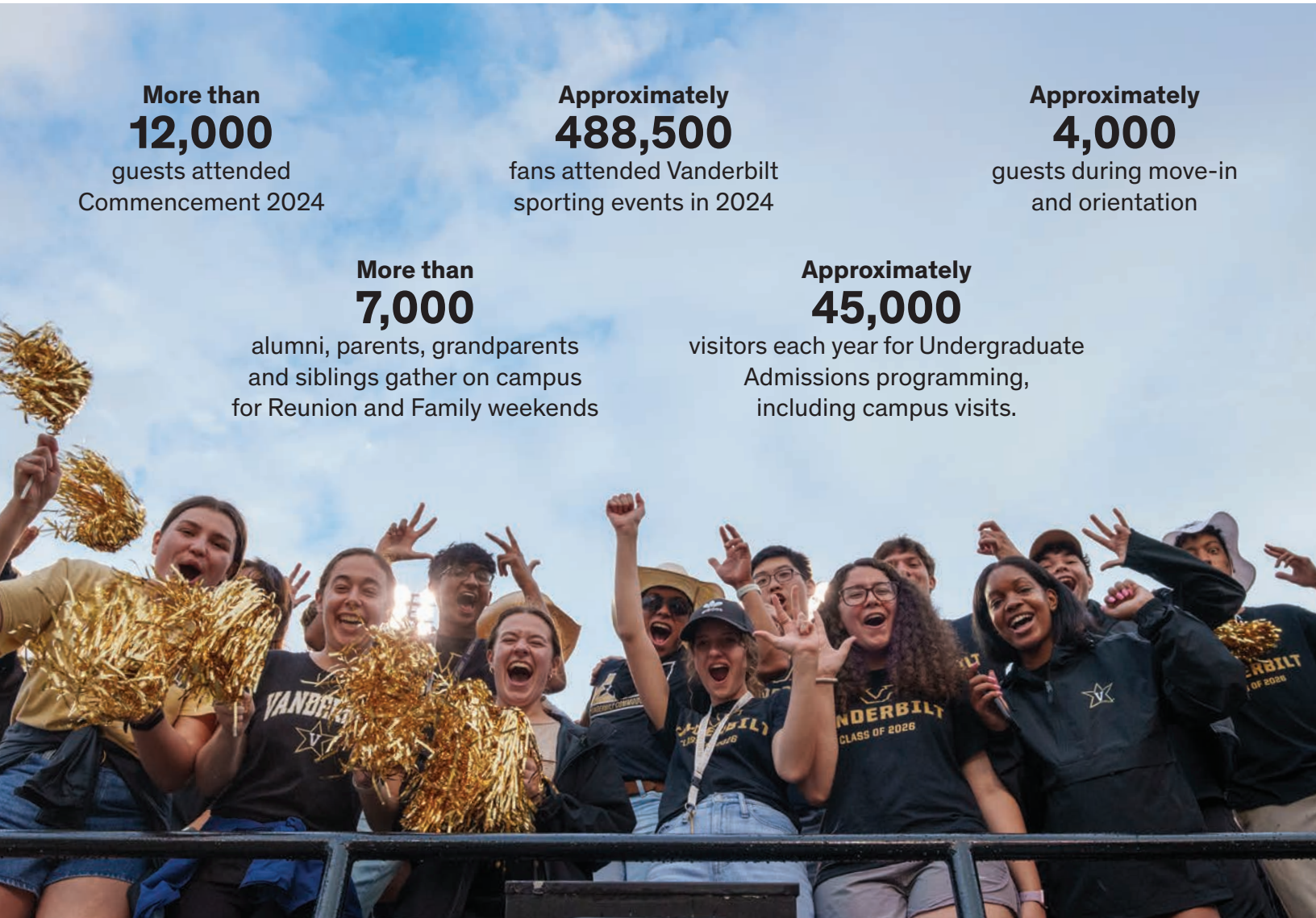
At the same time, visitors also inject funds into the local economy. According to Vanderbilt, more than half a million families, friends, conference participants, those visiting VUMC patients and sporting events attendees come to the area each year. Tourism Economics reports that just under $10 billion was directly spent by visitors in the Nashville area last year, spread across lodging, food and beverage, recreation, shopping and local transportation. Based on a literature review and the information from Vanderbilt, the assumption was made that Vanderbilt-related activity draws the equivalent of 3 percent of the direct visitor spending in the Nashville MSA, which translated into $299.21 million last year.

Annual Static Impact of Vanderbilt Visitor Spending

$299M	$600M	$363M	$178M
Total Direct Spend	**Output**	**Value-Added**	**Earnings**

4,122 Jobs

See Appendix One, Table A.5 for more detailed results.



Total Annual Static Impacts

Vanderbilt-related activity accounted for almost **$10 billion being directly spent in the Nashville area** last year, the largest share of which is associated with VUMC. This creates a significant impact on the local economy, yielding a total of **$22.13 billion in output, $13.17 billion in value-added** (the local equivalent of GDP), **earnings of $7.46 billion** and **more than 120,000 jobs.**

To put these figures in context, Davidson County (where the vast majority of Vanderbilt-related impact is felt) had total value-added of $106.1 billion during 2023, meaning that Vanderbilt likely accounted for at least 10 percent. This is reinforced by the employment statistics; total MSA employment averaged 1.16 million during 2024.

Vanderbilt represented a little over 10 percent of regional employment.

Total Annual Static Impacts ($Millions)

	Direct Spend	Output	Value-Added	Earnings	Jobs
VU Operations	$1,578.32	$3,824.31	$2,362.50	$1,425.96	16,552
VUMC Operations	$7,628.22	$17,366.41	$10,240.89	$5,757.02	97,704
Students	$225.71	$342.77	$203.98	$99.56	2,112
Visitors	$299.21	$600.14	$363.14	$178.21	4,122
TOTALS	**$9,731.46**	**$22,133.63**	**$13,170.54**	**$7,460.75**	**120,490**

Source: TXP, Inc.

State of Tennessee Tax Revenue Impact

As a not-for-profit, Vanderbilt itself is not subject to state and local taxes. However, tax revenue does accrue from activity associated with the indirect and induced economic effects described and measured above. To provide an "order of magnitude" estimate for state tax revenue attributable to Vanderbilt, the analysis used the ratio of state government tax collections to state GDP. Two datasets were used to derive the ratio: 1) U.S. Department of Commerce Bureau of Economic Analysis GDP estimates by metropolitan area; and 2) the U.S. Census Bureau State Government Tax Collections (STC) report. A brief description of the STC data collection methodology follows:

> **In this survey, "taxes" are defined as all compulsory contributions exacted by a government for public purposes, except employer and employee assessments for retirement and social insurance purposes, which are classified as insurance trust revenue. Outside the scope of this collection are data on the unemployment compensation "taxes" imposed by each of the state governments. However, all receipts from licenses and compulsory fees, including those that are imposed for regulatory purposes, as well as those designated to provide revenue, are included.**

State of Tennessee Tax Revenue and GDP ($Billions)

Tennessee	2019	2020	2021	2022	2023
Tax Revenue ($M)	$15.37	$15.10	$18.38	$20.90	$22.04
GDP	$385.83	$391.56	$441.95	$488.67	$523.03
Tax Rev as % GDP	**4.0%**	**3.9%**	**4.2%**	**4.3%**	**4.2%**

Over the past five years, the average state tax revenue as a percent of state GDP was 4.1 percent. Applying this percentage to total value added (or GDP) attributable to the total economic impact associated with Vanderbilt.

The state received $530.23 million in total tax revenue for FY 2023–24.

Annual Dynamic Economic Impacts

As stated above, the economic impact results outlined above are predicated on a model of the Nashville regional economy that relies on current patterns of buying and selling. However, that structure doesn't account for the impacts of expansion, relocation and entrepreneurship, which is exactly the pattern currently at work locally. A 2014 paper entitled "Knowledge Spillovers from Research Universities: Evidence from Endowment Value Shocks" by Shawn Kantor and Alexander Whalley (professors at MIT and Harvard at the time) states that "we still have little understanding of the causal role that research university activities play in contributing to broad-based regional economic development or the extent to which they facilitate knowledge-based agglomeration."[1] Their investigation suggests the following:

> **Our estimates indicate that a 10% increase in higher education spending in an urban county increases the average worker's income in the non-education sector labor income by 0.8%. Put another way, a $1 increase in university spending generates a $0.89 increase in non-education labor income. We also find that these effects are persistent, at least measured out five years, thus suggesting that an expenditure shock to a university produces something more profound than a simple fiscal multiplier effect.**

Application here indicates that the $1.58 billion in annual VU spending would generate an additional $1.40 billion in labor income (earnings) locally. To avoid double-counting, subtract the $1.23 billion in earnings already identified from university operations, leaving $173.14 million in additional annual earnings in the local economy. Given current relationships, that would translate annually into $596.08 million in Output (top-line revenue); $354.72 million in value-added (equivalent of local GDP); earnings (essentially, wages plus proprietor's income) of $173.14 million, and 3,673 FTEs.

[1] *Shawn Kantor, Alexander Whalley; "Knowledge Spillovers from Research Universities: Evidence from Endowment Value Shocks." The Review of Economics and Statistics 2014; 96 (1): 171–188. doi: https://doi.org/10.1162/REST_a_00357*

Annual Dynamic Impact of VU

$173M
Total Direct Spend

$596M
Output

$354M
Value-Added

$173M
Earnings

3,673 Jobs

How VU's spending impacts the broader economy
VU spending generates an additional **$173M** in annual earnings for the local economy.

A Sample of startups in Tennessee

- **Life Science:** Advance Therapeutics and Vasowatch
- **Industrials, Manufacturing Tech:** HeroWear
- **AI & ML, Mobility:** Mobius AI, Inc.
- **Beauty Tech:** Finally Skincare
- **Health Tech:** Heartvue.ai
- **Education:** AIDA

More than 700 Vanderbilt alumni are actively contributing to the growth of the local economy in Tennessee with founding and leadership roles in companies that directly stimulate new business development.

Additional Impacts

There are likely to be further dynamic impacts beyond the implications for talent and recruitment & attraction of associated firms to the region. The knowledge economy is driven significantly by the interplay between universities, firms, entrepreneurs, research labs and independent inventors who draw strength from each other in virtuous cycles of innovation, typically in geographically dense clusters. "What you find is there's a lot of externalities or spillovers between these firms," said Pia Orrenius, a labor economist at the Federal Reserve Bank of Dallas. "Initially they can start very small and there's not a lot of momentum, but once these clusters expand there's more of a labor pool for that particular industry and then that becomes an attractor to more industries to come into the area."[2]

Economic theory suggests that this environment is more conducive to the commercialization/monetization of ideas than an isolated or suburban academic context, as proximity to modern factors of production should enhance outcomes. This is borne out by the findings of "Hidden in Plain Sight: The Oversized Impact of Downtown Universities" by Scott Andes that compares the commercial outcomes of research universities located within employment-dense neighborhoods (e.g., midtowns and downtowns) in the 100 largest cities to the average research university.[3] The study finds that, compared to their peers located in smaller towns or in suburbs or rural areas on a per-student basis, "downtown" universities:

- Produce 80 percent more licensing deals
- Disclose 123 percent more inventions
- Receive 222 percent more income from licensing agreements
- Create 71 percent more startups
- Invest $22,044 per student on research and development annually compared to $12,633 among their peers
- Specialize in the STEM (science, technology, engineering and math) fields and less in the social sciences and the arts
- Receive a greater share of funding from nonprofits than their peers but a smaller share from the private sector and state and local government

Investing in these regions pays off. In their 2020 working paper "A Calculation of the Social Returns to Innovation," Benjamin F. Jones and Lawrence H. Summers provide a "conservative estimate" that "$1 invested in innovation results in $5 and maybe as much as $20 in social benefits."

While academic research doesn't translate into products and companies without planning and effort, the findings above suggest that conditions will be ripe for the growth of economic activity well beyond the results outlined in this economic impact study.

[2] *Ibid.*
[3] *https://www.brookings.edu/articles/hidden-in-plain-sight-the-oversized-impact-of-downtown-universities*

Conclusions

Vanderbilt is a foundational element of the local and state economy, as tens of thousands of Tennesseans are employed, directly or indirectly, because of its presence. However, the impact extends far beyond these calculations, as the University has a direct role in creating new products and companies in the local economy and beyond. For example, over the past decade, Vanderbilt researchers and their innovations have helped to position the University as a world leader in numerous medical research sectors such as medical technology and imaging, personalized medicine, and drug discovery and development. The commercialization of these results over the past five years is impressive:

32
startups

402
U.S. patents issued

582
licenses & options executed

$258,022,297
in revenue generated from Vanderbilt licenses since 2019

Vanderbilt is a cornerstone element of the modern Tennessee economy. Traditional economic development focuses on attracting and retaining new production facilities or company headquarters. While these elements remain a crucial piece of the puzzle, other factors play an increasing role in the mix. Specifically, growing regions require a highly capable workforce, innovation and entrepreneurship, clusters in knowledge industries and superior quality of life. Vanderbilt makes integral contributions to each of these factors every year, and the impact is growing. Put differently, **the principal determinant of modern economic success is the ability to acquire, process and apply knowledge. Vanderbilt is a laboratory where this key element of the state's (and nation's) comparative advantage is incubated, both in terms of preparing the future labor force and via research that ultimately leads to new or improved products and services.** Tennessee is fortunate to have such a strong asset in its economic development portfolio.

Appendix One: Detailed Results

Table A.1: The Economic Impact of Vanderbilt Construction 2019–24 ($Millions)

Industry Sector	Output	Value-Added	Earnings	Jobs
Agriculture, etc.	$2.90	$1.11	$0.89	24
Mining	$6.47	$3.57	$1.11	19
Utilities	$40.35	$25.42	$6.47	53
Construction	$2,250.60	$1,332.30	$928.33	12,966
Durable Manufacturing	$259.51	$104.56	$53.06	877
Non-Durable Manufacturing	$100.77	$36.56	$16.72	270
Wholesale Trade	$279.12	$159.85	$62.87	738
Retail Trade	$191.73	$122.40	$56.63	1,543
Transportation & Warehousing	$118.16	$59.97	$35.89	692
Information	$82.71	$46.59	$17.17	252
Finance & Insurance	$250.14	$133.32	$61.09	1,264
Real Estate	$362.28	$249.92	$58.19	1,734
Professional Services	$131.54	$90.07	$62.65	785
Management of Firms	$59.75	$39.01	$28.09	275
Admin. & Waste Services	$89.40	$51.05	$34.11	844
Educational Services	$30.54	$20.73	$14.05	358
Health Services	$236.32	$146.03	$100.10	1,587
Arts/Entertainment/Recreation	$27.20	$16.27	$10.03	245
Accommodation	$27.87	$17.39	$7.36	167
Food Services	$82.93	$44.59	$26.08	857
Other Services	$90.51	$50.83	$35.00	811
Households	NA	NA	$1.78	108
Total 2019-24	**$4,720.81**	**$2,753.34**	**$1,617.67**	**26,469**

Source: TXP, Inc.

Table A.2: The 2024 Annual Operations Economic Impact of VU ($Millions)

Industry Sector	Output	Value-Added	Earnings	Jobs
Agriculture, etc.	$2.05	$1.10	$0.47	14
Mining	$1.26	$0.95	$0.16	3
Utilities	$38.67	$29.99	$6.31	52
Construction	$34.72	$16.57	$14.36	209
Durable Manufacturing	$37.41	$15.31	$6.79	105
Non-Durable Manufacturing	$75.60	$35.67	$12.47	218
Wholesale Trade	$98.33	$61.24	$22.10	260
Retail Trade	$138.10	$91.07	$40.88	1,139
Transportation & Warehousing	$58.24	$33.30	$18.15	370
Information	$65.03	$50.98	$13.42	197
Finance & Insurance	$207.55	$103.38	$51.14	1,050
Real Estate	$436.25	$340.13	$68.50	2,142
Professional Services	$82.07	$62.34	$39.62	507
Management of Firms	$56.82	$21.78	$26.67	261
Admin. & Waste Services	$71.97	$51.14	$27.15	672
Educational Services	$2,031.97	$1,234.63	$929.27	6,268
Health Services	$179.93	$97.54	$76.23	1,208
Arts/Entertainment/Recreation	$28.73	$12.63	$11.84	240
Accommodation	$26.67	$16.73	$6.94	159
Food Services	$70.39	$32.36	$22.57	739
Other Services	$82.55	$51.93	$29.67	655
Households	NA	NA	$1.26	83
Total Annual	**$3,824.31**	**$2,362.50**	**$1,425.96**	**16,552**

Source: TXP, Inc.

Table A.3: The 2024 Annual Operations Economic Impact of VUMC ($Millions)

Industry Sector	Output	Value-Added	Earnings	Jobs
Agriculture, etc.	$8.39	$3.05	$1.53	59
Mining	$5.34	$3.05	$0.76	14
Utilities	$171.63	$107.56	$26.70	223
Construction	$106.03	$54.92	$43.48	638
Durable Manufacturing	$211.30	$81.62	$40.43	598
Non-Durable Manufacturing	$349.37	$128.92	$59.50	1,015
Wholesale Trade	$595.76	$340.98	$134.26	1,574
Retail Trade	$643.82	$409.64	$189.94	5,289
Transport & Warehousing	$345.56	$181.55	$112.13	2,449
Information	$341.74	$192.23	$72.47	1,017
Finance & Insurance	$1,208.31	$649.16	$293.69	5,921
Real Estate	$1,836.88	$1,276.96	$287.58	8,945
Professional Services	$753.67	$527.11	$375.31	4,841
Management of Firms	$273.09	$177.74	$128.15	1,256
Admin. & Waste Services	$710.19	$421.08	$283.77	6,940
Educational Services	$112.13	$76.28	$51.11	1,313
Health Services	$8,664.13	$5,014.79	$3,291.58	45,772
Arts/Enter/Recreation	$109.85	$67.13	$39.67	947
Accommodation	$113.66	$70.94	$29.75	680
Food Services	$412.69	$227.32	$134.26	4,318
Other Services	$392.85	$222.74	$154.85	3,511
Households	NA	NA	$6.10	386
Total Annual	**$17,366.41**	**$10,240.89**	**$5,757.02**	**97,704**

Source: TXP, Inc.

Table A.4: The Annual Economic Impact of Student Spending ($Millions)

Industry Sector	Output	Value-Added	Earnings	Jobs
Agriculture, etc.	$0.36	$0.14	$0.09	3
Mining	$0.20	$0.11	$0.05	0
Utilities	$5.48	$3.48	$0.88	7
Construction	$3.45	$1.83	$1.44	21
Durable Manufacturing	$7.47	$2.55	$1.31	20
Non-Durable Manufacturing	$13.07	$5.01	$2.21	37
Wholesale Trade	$18.67	$10.74	$4.24	50
Retail Trade	$34.94	$22.26	$10.36	290
Transportation & Warehousing	$10.81	$5.55	$3.34	70
Information	$13.02	$7.34	$2.69	40
Finance & Insurance	$44.01	$22.80	$10.68	231
Real Estate	$61.64	$43.04	$9.71	303
Professional Services	$14.63	$10.16	$7.11	93
Management of Firms	$6.59	$4.29	$3.09	30
Admin. & Waste Services	$12.30	$6.91	$4.60	114
Educational Services	$6.03	$4.11	$2.75	71
Health Services	$47.54	$29.32	$20.13	319
Arts/Entertainment/Recreation	$5.08	$3.02	$1.85	47
Accommodation	$5.24	$3.25	$1.38	31
Food Services	$16.05	$8.62	$5.03	166
Other Services	$16.18	$9.12	$6.27	148
Households	NA	NA	$0.34	22
Total Annual	**$342.77**	**$203.98**	**$99.56**	**2,112**

Source: TXP, Inc.

Table A.5: The Annual Economic Impact of Visitor Spending ($Millions)

Industry Sector	Output	Value-Added	Earnings	Jobs
Agriculture, etc.	$0.39	$0.14	$0.08	3
Mining	$0.27	$0.15	$0.04	1
Utilities	$7.33	$4.62	$1.16	10
Construction	$4.42	$2.31	$1.84	27
Durable Manufacturing	$7.03	$2.54	$1.31	24
Non-Durable Manufacturing	$17.16	$5.93	$2.81	50
Wholesale Trade	$21.03	$12.04	$4.74	55
Retail Trade	$32.27	$20.89	$10.92	313
Transportation & Warehousing	$11.79	$6.24	$3.83	75
Information	$14.30	$7.99	$3.32	43
Finance & Insurance	$38.80	$21.21	$9.51	182
Real Estate	$78.66	$50.83	$15.19	239
Professional Services	$18.72	$12.96	$8.87	114
Management of Firms	$19.71	$12.86	$9.29	87
Admin. & Waste Services	$16.54	$9.43	$6.29	157
Educational Services	$3.64	$2.50	$1.68	43
Health Services	$25.79	$16.09	$11.04	180
Arts/Entertainment/Recreation	$56.74	$37.72	$17.53	510
Accommodation	$127.90	$79.72	$33.51	765
Food Services	$84.60	$49.51	$30.06	887
Other Services	$13.02	$7.28	$4.99	345
Households	NA	NA	$0.18	12
Total Annual	**$600.14**	**$363.14**	**$178.21**	**4,122**

Source: TXP, Inc.

Appendix Two

Extractions from "Knowledge Spillovers from Research Universities: Evidence from Endowment Value Shocks" by Shawn Kantor and Alexander Whalley

The geographic concentration of economic activity is a salient feature of modern economies. There are a number of reasons to suspect that the positive externalities associated with the clustering of labor and capital in urban areas accounts for the dramatic economic density we observe. For example, density allows producers to access suppliers more easily and inexpensively, enables them to reach customers more efficiently and raises the prospects of hiring high quality workers in a thick labor market. Furthermore, the thick labor market that a city offers mutually benefits workers, who can mitigate their unemployment risk and raise their own chances for a quality employer match. Economists have also devoted significant attention to understanding the importance that knowledge spillovers play in contributing to the increasing returns of geographic density.

In this paper we demonstrate that university activity generates persistent spillovers to local firms and workers…Our empirical analysis reveals that research university activity results in modest but statistically significant productivity spillovers to other industries. Our IV estimates indicate that a 10% increase in higher education spending in an urban county increases the average worker's income in the noneducation sector labor income by 0.8%. Put another way, a $1 increase in university spending generates an 89 cent increase in non-education labor income. We also find that these effects are persistent, at least measured out five years, thus suggesting that an expenditure shock to a university produces something more profound than a simple fiscal multiplier effect. We find evidence that the spillovers are larger when local universities are more intensively focused on research and when research universities are technologically closer to local firms, in the sense that they share a labor market with higher education and are more likely to cite university patents. In our models estimating the spillover effect over five years, we found that firms in these technologically closer industries enjoy a spillover that is double that of the typical firm that is not close. Our findings tend to confirm previous research that knowledge spillovers from universities tend to be concentrated on particular local industries, such as pharmaceuticals or electronics, and are not broad based.

While the broad spillover effects from universities appear rather modest, we further investigate whether the intensity of university research or closer economic links between universities and local industries magnify the effect, as the prior literature on academic research spillovers would suggest. We first show that the impact of university expenditure on the wages paid by other local firms is nearly three times larger in counties with above-median fractions of graduate students at the local universities than in those with lower levels of graduate students. We then consider three linkage measures. First, we examine whether industries that pool labor markets with the higher education sector receive larger spillovers. Second, we look at how frequently industry patents cite a patent issued by a university to measure industry-specific utilization of higher education knowledge. Finally, we measure the degree to which each industry employs college graduates, the other primary output of local universities. We find that the impact on labor income in industries that used university knowledge (patents) more intensively, that were more likely to share a labor market with universities, or that hired more college graduates was between 20% and 100% greater than the impact in industries that were technologically more distant from universities.

While our empirical results indicate a causal link between university research activities and productivity gains in neighboring firms, future work would benefit from a careful analysis of the mechanism that generates such productivity gains. Understanding how industries that are closely related to higher education in terms of innovation and shared labor markets respond to the presence of nearby university activity would help to shed light on the pathways through which university activity affects its neighbors and help to address fundamental public policy questions with respect to public support for research universities. The findings provide a rationale for place-based university policies so long as they focus on industry fundamentals. Our results also suggest that the longer-term effects that universities have on their local economies may grow over time as the composition of local industries evolves to take advantage of the knowledge spillovers we identify.

Extractions from "Hidden in Plain Sight: The Oversized Impact of Downtown Universities" by Scott Andes

Research universities are the crown jewels of the American innovation economy. Thirty-six of the world's top 50 research universities are located within the United States. Not only do these institutions push the frontiers of science, they are anchors of regional economic growth, supporting their cities by providing a steady stream of high-skilled workers, attracting faculty research entrepreneurs, encouraging private-sector research and development (R&D) partnerships and leading core regional technical capabilities.

However, some universities are better positioned than others to drive economic growth. This paper finds that research universities located in the downtowns and midtowns of large cities punch above their weight in terms of commercial outcomes: they produce more patents (often twice as many), licensing agreements, licensing revenue and startups, given the size of their student populations, than those located in smaller "college towns" and in suburban and rural areas. As cities seek to distinguish themselves within crowded global markets, downtown universities are emerging as competitive differentiators, linking longstanding economic strengths that exist within urban cores with market-ready science and technology.

Universities that focus particularly on research (as compared to liberal arts schools) help move cities up the value chain by solving scientific problems for local companies, generating technology for export and creating high-growth entrepreneurs. Valeros and Van Reenen found that the impact on regional GDP is higher if a university is "research-intensive," and Hausman found that, for each new university patent, 15 additional jobs are created outside the university.

These results remained consistent over a 20-year period and increased with proximity to the university, suggesting that research universities represent a stable feature of long run employment growth. Other studies have found that the quality of a university's research and faculty is a predictor of employment in high-tech and scientific sectors within a city. While this finding may seem obvious, it points to an important relationship between research universities and the private sector: firms and cities that have industries at the technological frontiers tend to benefit the most from research universities. Economists refer to this feature as "agglomeration." Agglomeration is the process in which firms located near one another and other relevant institutions (like universities) gain additional benefits from their proximity. Beginning with observations made by Alfred Marshall in 1826, over the last century hundreds of studies have proved the benefits of density and proximity for innovation. If the geographic concentration of firms, entrepreneurs, corporate research centers and labs improves the translation of research into new products and services, then one would expect research universities located in employment centers of cities to have stronger commercialization outcomes. But do they? There are many examples of universities located outside of cities that have strong private-sector partnerships and that have been successful translating science into market-ready ideas.

However, this paper finds that research universities in cities have above-average commercial outcomes, generally outperforming schools with similarly sized student populations. Specifically, full-time students in urban schools made up a quarter of the total enrollment within research universities, but these institutions were responsible for 37 percent of startups and patents, 43 percent of invention disclosures and 52 percent of licensing income. Breaking down these technology transfer metrics shows the considerable commercial strength of downtown universities. At the beginning of the commercialization process, faculty and graduate students with research discoveries that may have market value "disclose" these discoveries to their technology transfer office. If the discovery is deemed to have market value, the university will patent the technology to protect its intellectual property. Economic research has shown that in many academic areas patents are the leading indicator of the economic impact of research. In both invention disclosures and patents, downtown universities outperform their peers. The number of invention disclosures at downtown universities as a portion of full-time students is 223 percent that of non-downtown schools, and downtown universities received 2.3 patents for every 1,000 students compared to 1.0 at non-downtown schools.

Invention disclosures and patents lay the groundwork for commercial activity, but they are still just inputs and alone do not represent the full economic impact of universities. Licensing deals, in which a university forms a contractual relationship with a firm that allows that firm to use (not own) the patented technology, the income from licensing deals, and new startups at universities are better outcome metrics because these represent actual relationships with companies or development of new companies. Between 2013 and 2015, downtown universities made 180 percent as many licensing deals per student and received roughly three times the revenue ($1,125 in licensing revenue per student compared to $350) as did their non-urban peers.

Invention disclosures, patents and licensing represent an important pathway for universities to commercialize research and influence the local economy. But for many scientific discoveries, creating a new company is a better strategy than licensing. According to the Kauffman Foundation, since the end of the 2009 recession, high-growth, young firms represented over half the new jobs created in the United States. Successful technology startups are a leading indicator of the interplay between university research and the broader ecosystem within a city because, unlike as in licensing deals, universities give successful research entrepreneurs only their start—they are on their own for capital, mentorship, customers, workers and opportunities to reach markets, and all of these demand strong connective tissue between universities and the city.

Downtown universities create a third more startups from faculty and student research than other research universities, given their student populations. Between 2013 and 2015, urban schools established 220 new companies. As helpful as traditional technology transfer metrics are, they represent only a portion of the engagements universities have with the private sector. Research by MIT and others shows that research partnerships, mentorship, technical consulting and other activities are also critical ways universities support regional economic growth. Unfortunately, national data on those activities do not exist. Nonetheless, in many areas of the economy—particularly those on the technological frontier—invention disclosures, patents, licensing agreements and revenue, and startup activity are important precursors to the commercial application of academic research. Ideas spawned in the lab must be carried forward by inventors, entrepreneurs and firms to create new products and services and smarter business models and practices. Following the economic research on the value of proximity to innovation, the research here shows that universities co-located near employment hubs in large cities have far greater commercial outcomes than the average school.

Lessons for Downtown Universities

Schools already located in urban areas should take advantage of their location by creating policies, practices and physical spaces that induce greater collaboration between researchers, students and businesses. To this end, downtown universities should:

1. **Accelerate commercialization through industry-aligned, pre-competitive collaboration.** Technology transfer between universities and firms doesn't happen serendipitously, no matter how closely located they are. Many universities located blocks away from major corporate research centers fail to achieve the full benefits of their geography. In order to increase commercialization, universities should create or partner with pre-competitive consortia to address industry-wide technology barriers. These partnerships should have simple, flexible and clear intellectual property arrangements or work in areas such as shared data that generally don't generate monetarily valuable patents. For example, the Indiana Biosciences Research Institute connects both academic and industry partners around metabolic disease and nutrition. Partners include life science companies such as Eli Lilly, Roche, Dow Chemical, Cook Medical (Indiana University), Purdue University and Notre Dame. Research is both basic (i.e., largely pre-competitive) and applied, but the industry partners have developed a framework to identify rules around shared intellectual property. The initiative is already capitalized at $150 million from industry and philanthropy.

Vanderbilt's collaborative efforts to enhance the region's innovation ecosystem

- Nashville Innovation Alliance
- Convoy Conference
- SE Venture showcase
- Life Science Showcase
- Greater Nashville Venture Capital Association
- Nashville Entrepreneur Center: Vanderbilt startups practicum

2. **Connect university research with corporate research centers.** As private-sector R&D moves further from basic science and closer to the market, the need for strong partnerships between academic and applied research is growing. As such, many firms are moving their corporate research centers nearer to research universities. In order to attract and take full advantage of corporate research centers, downtown universities should align academic strengths with specific private-sector partners. This should happen through smart programming that brings applied research to

the doorsteps of firms as well as through physical space. Over the last half decade, Midtown Atlanta—home to Georgia Tech—has probably been the most successful area at attracting corporate research centers: in the last several years firms have set up research centers within the eight-block area around the midtown innovation district, called Tech Square. Part of Atlanta's success is driven by the strong partnership between the Midtown Atlanta business improvement district and Georgia Tech. They have worked together to develop an independent nonprofit to think strategically about how the physical space around Georgia Tech can support connections between corporate research and the university. On the programming side, Georgia Tech's incubator, the Advanced Technology Development Center, helps create successful startups by connecting entrepreneurs to mentors, capital and customers. And its Industry Connects program links university startups with Fortune 1000 companies.

Examples of Recent Vanderbilt Innovation Events

- Vanderbilt Discover Accelerator
- Vanderbilt Policy Accelerator
- Corporate sponsorships with Nissan, Bridgestone, Amazon, Deloitte, FirstBank, Oracle and more
- Leader of NSF I-Corps Mid-South regional hub

3. **Develop programming and incentives for entrepreneurship.** Generating new companies is a critical commercial output of university research. However, developing an ecosystem within the university to support startups requires the appropriate programming, support mechanisms and physical space. Faculty and students must have the freedom and incentives to start new companies around their research and the necessary support system to succeed. Drexel University's College of Media Arts & Design has made "economic contributions" (which can include creating a company or coordinating with industry) one of four criteria that can be used in tenure and promotion decisions.

4. **Invest endowment dollars in strategic connections to the city.** Universities often deploy their endowment dollars within the traditional boundaries of their campuses to improve existing disciplines and climb in the academic rankings. Of course, improving academic strength is their primary mission, but schools can meet that mission while also creating stronger links with cities through real estate activities that promote private-sector connections. Strategically placed mixed-use amenities—those that increase the critical mass of talent, not simply retail and restaurants—can connect research to commercialization within the community. For example, Harvard University is in the planning stage for building out the Allston neighborhood portion of its campus into a new "enterprise research zone." The plan is to develop a neighborhood where companies and institutions can locate to leverage research from Harvard, MIT, Boston University and other institutions.

Lessons for Public and Civic Leaders in Cities

Urbanizing and connecting the nation's research universities with business centers in the heart of the city is important because it promotes commercialization and grows regional economies. Thus, mayors and other city leaders should see downtown universities as strategic assets for growth and inclusion and should therefore:

1. **Make university-based economic development a priority.** Local leaders should use their bully pulpit to position universities as anchors of technology-based economic development. Often these institutions (along with national labs and military bases) are viewed as gated communities responsible solely to their faculty and students. But as entities that don't pay taxes, universities have an obligation to enhance regional economic growth, and mayors can help position these organizations to do so by making them central partners in workforce development, entrepreneurial and economic development initiatives.

2. **Connect downtown universities to regional economic clusters.** Universities are best able to support economic growth when they are addressing the needs of local industry. While this may seem obvious, often longstanding academic strengths are not the best fit for industry needs. Provosts of research will always want to align with business around the university's core competencies, but mayors and other city leaders can help reframe the partnership around the city's economic clusters. For example, in Houston an organization called Pumps & Pipes works to link the city's research institutions around three economic clusters—health care, oil and gas and aerospace. Beginning in 2007 the partnership brought together researchers from the University of Houston, Houston

Methodist Hospital, ExxonMobil and NASA to develop cross-cutting technologies. Through insights from imaging technology on offshore wells, the coalition was able to develop the Heartbeat Simulator System for testing and imaging cardiovascular devices. Pumps & Pipes' motto is "use the other guy's toolbox."

3. **Tie the economic success of downtown universities to inclusive growth in nearby neighborhoods.** Economic growth that flows from universities and other research labs needs to benefit the entire city, not just faculty and students. Mayors should work to connect research universities with low- and medium-skilled workers. As some of the largest employers within the city, universities have the potential to upskill huge swaths of the population through internal workforce development programs. This is particularly true for research universities that are affiliated with academic medical centers, because teaching hospitals offer a variety of occupations—including medical transcriptionists, nursing and information technology managers—that do not require four-year degrees. To help community members take advantage of these positions, city leadership can sit in-between universities and the workforce to ensure an inclusive, steady stream of trained workers. For example, the West Philadelphia Skills Initiative is a coordinated program between the University of Pennsylvania, Drexel University and Children's Hospital of Philadelphia aimed at training low-skilled workers to gain employment within universities and hospitals in occupations with high turnover rates. To date, the program has placed 124 workers from the neighborhood, increasing income by an average 32 percent.

In a time of stagnant economic growth and mounting global competition, the United States needs new engines of growth. Yet fiscal and ideological pressure in Washington and many state legislatures is threatening the funding pipeline of America's research institutions. Universities need new strategies to meet these funding challenges. Some universities are doubling down on legacy strengths within by increasing pressure to publish and jostling over national rankings. Others are taking a different approach and tying their institution's future to that of their regional economies.

The nation's downtown universities are at the forefront of the latter trend. New development projects that connect traditional academic research with firms, coupled with novel programming, are underway at downtown universities in Pittsburgh, Chicago, Indianapolis, Atlanta, Austin, New York, Houston, Los Angeles, Providence and Oklahoma City. Many of these cities have defined the developing area around their academic anchor institutions as innovation districts, though others have not. What's important is that in each city these institutions are using the built environment to maximize the impact of research.

However, colleges and universities located outside of major city centers are also beginning to recognize that they can achieve better commercial outcomes by co-locating around economic activity in nearby cities. In many cases these institutions have moved strategic assets off their main campuses into the innovation districts of adjacent cities. Examples include Arizona State University's Downtown Phoenix Initiative, the University of Illinois Urbana-Champaign's engineering presence at the Chicago Innovation Exchange in Hyde Park, Duke's entrepreneurial hub "The Bullpen" in downtown Durham and Cornell Tech's Roosevelt Island campus. Going forward, universities located in cities should follow what leading research institutions around the country are already doing and position themselves as central nodes of innovation and stewards of their urban economies.

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