Capturing the next economy: Pittsburgh's rise as a global innovation city

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The Anne T. and Robert M. Bass Initiative
on Innovation and Placemaking

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About The Anne T. and Robert M. Bass Initiative on Innovation and Placemaking

The Anne T. and Robert M. Bass Initiative on Innovation and Placemaking is a collaboration between the Brookings Institution and Project for Public Spaces to support a city-driven and place-led world. Using research, on-the-ground projects, and analytic and policy tools, the initiative aims to catalyze a new form of city building that fosters cross-disciplinary approaches to urban growth and development.

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The Centennial Scholar Initiative cultivates a new style of scholarship at Brookings, fostering work that is cross-program, inter-disciplinary, international, and intensely focused on impact. As the inaugural Brookings Centennial Scholar, Bruce Katz brings this type of integrated problem-solving to the issues arising from global urbanization and the challenges of a city-driven century. The goal is to inform and propel new patterns of urban growth, new forms of urban finance, and new norms of urban governance that are concrete, imaginative, integrated and, ultimately, transferable.

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Cover Image: Aerial view of downtown Pittsburgh.
Photo credit: Urban Redevelopment Authority of Pittsburgh.

Executive Summary

Few cities have experienced the economic upheaval that Pittsburgh did in the 1970s and 1980s—and come back. During the country's industrial heyday, the city swelled in population and income. Yet by 1980, global economic forces had shuttered much of the U.S. steel industry, and Pittsburgh's unemployment rate reached 18 percent as Western Pennsylvania effectively experienced a second Great Depression.

Today, the competitive advantage of the region is no longer its rivers and raw materials but its high-skilled workers, world-class research institutions, and technology-intense advanced manufacturing. In 2016, for example, the region's per capita university research and development (R&D) spending was nearly two and a half times the national average. While these assets are considerable, they also place Pittsburgh in competition with a number of other innovation cities that are rapidly investing billions in a suite of new technologies and industries poised to reshape the global economy.

As in the past, the cities at the forefront of these economy-shaping technologies will be the focal points of global capital, talent attraction, and firm growth. If approached correctly, follow-along economic activity and investment will in turn lead to more and better-paying jobs—with varying skill-level needs and across multiple sectors of the economy—and higher revenues that can be reinvested in education, workforce development, infrastructure, and neighborhood revitalization.

However, Pittsburgh's scientific and technical strengths have not fully translated into broad-based economic activity. In fact, if the region had the same share of high-tech employment as university research, it would employ 9,000 more in the software industry and 5,500 more workers in drug development, not to mention tens of thousands of workers in related jobs. Instead, the city currently has seven percent fewer jobs in high-wage, high-tech advanced industries than it did in 2000.

Without a robust platform of jobs at all skill levels, the city's significant research and technical strengths will fuel only a small portion of the region's economy and leave many workers and families behind.

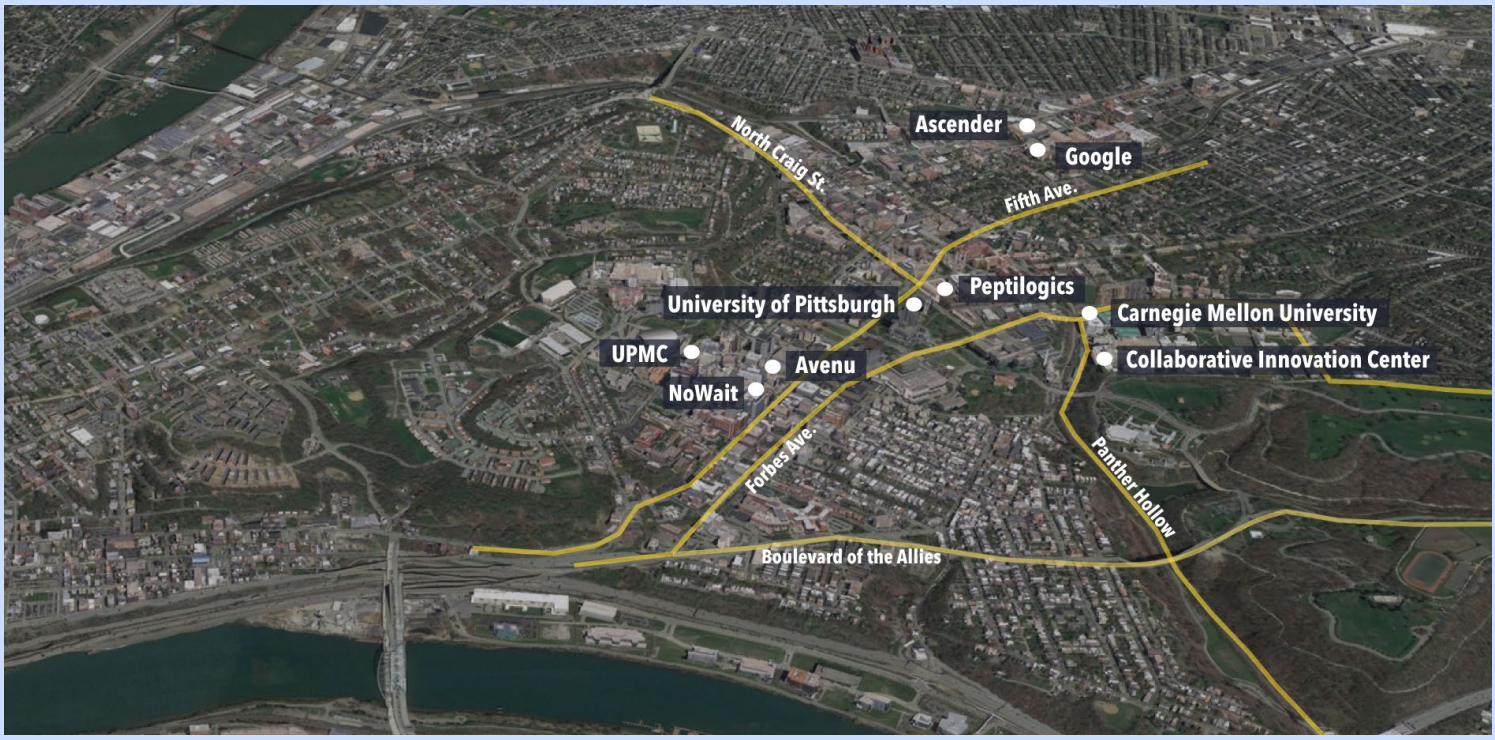
Today, Pittsburgh is once again at the precipice of a new competitive reality. In the 1980s, the city was on the losing end of shifts in the global economy. Now, in the modern, innovation economy, the city can choose its own fate. Success or failure will be determined by the speed and scale of actions taken by public, private, and civic leaders.

The Oakland Innovation District

Just as Pittsburgh's opportunity is contextualized by a changing global economy, the spatial geography of innovation is changing as well. Cities in both the United States and abroad are witnessing the emergence of dense hubs of economic activity where innovation, entrepreneurship, creativity, and placemaking intersect. At the advanced, research-led end of the economy, innovation districts are developing around anchor institutions (such as universities, medical centers, and large firms) that are in close proximity to talent and firms.

Few cities have such a naturally occurring innovation district as Pittsburgh's greater Oakland neighborhood. It is home to two world-class research institutions, the University of Pittsburgh and Carnegie Mellon University (CMU), dozens of startup companies, co-working spaces, and the University of Pittsburgh Medical Center (UPMC).

Although it encompasses only about three percent of the city's land area, the Oakland district accounts for ten percent of residents and 29 percent of jobs, concentrated in the city's growing education and health care sectors. The 1.7-square-mile district constitutes over one-third of the entire state of Pennsylvania's university research output.



The Oakland innovation district. Photo credit: Google Earth

As with most innovation districts, Oakland is also surrounded by neighborhoods with some of the highest rates of long-term unemployment and poverty in the city. While the growth of the Oakland innovation district is creating significant economic opportunities within these communities, much more is needed to connect residents to the district through better transit, training, jobs, and shared amenities.

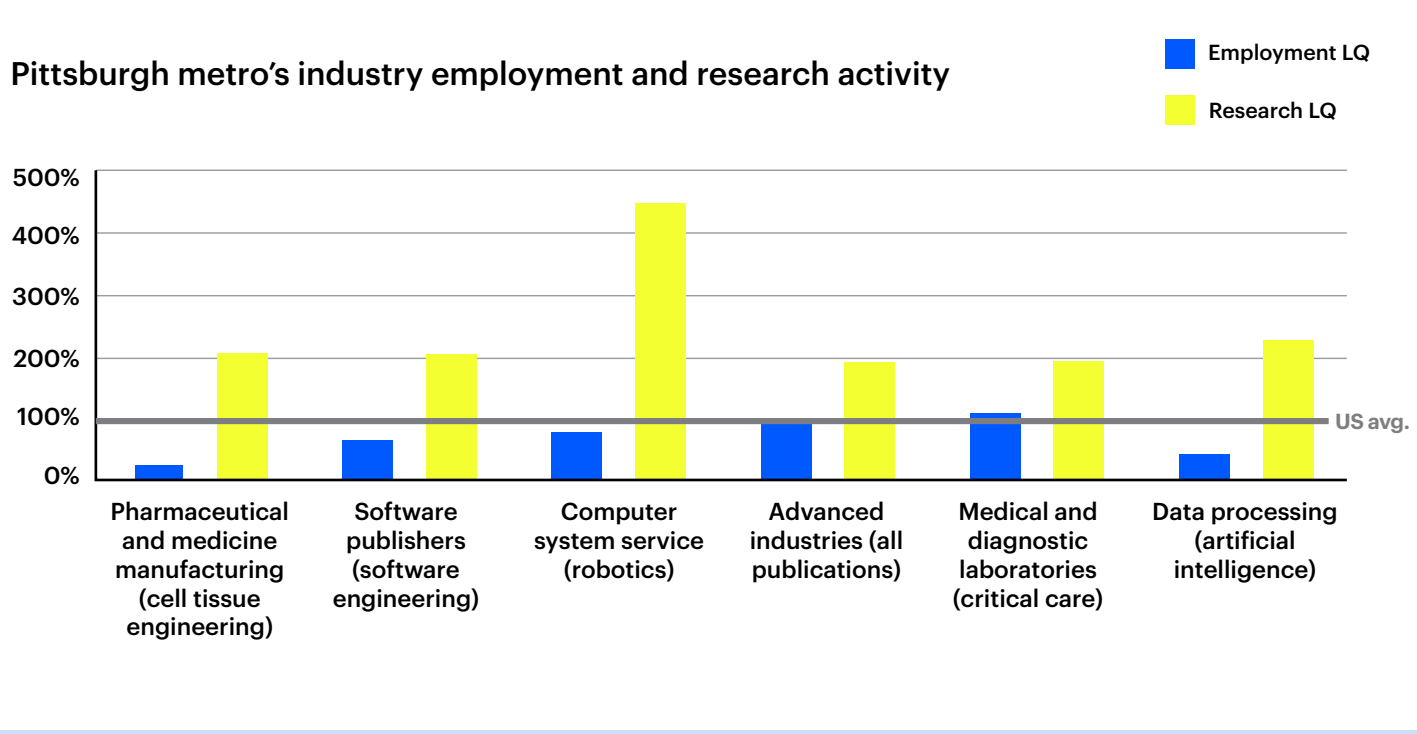
Pittsburgh possesses significant innovation assets

Pittsburgh is home to a number of advanced industries that are comprised of companies of all sizes, ranging from startups to global headquarters. Firms like PNC, UPMC, Google, Uber, Alcoa, Bayer, Allegheny Technologies, Duolingo, and hundreds of others are investing in technology and leveraging the city's innovation capacity. In broad terms, three advanced industry clusters—manufacturing, technology, and health care—represent critical pieces of the city's economic future.

Firms in these clusters rely on the strength of the university sector. On a number of metrics, the region punches far above its weight in academic activity. The metropolitan area ranks ninth among the largest 100 cities for the amount of university R&D, given the size of its economy and is a powerhouse in fields like robotics, gerontology, critical care, artificial intelligence, cell and tissue engineering, neurotrauma, and software.

At the same time, growth in the city's startup support systems—mentorship, flexible workspaces, capital, and talent attraction—are fueling a new generation of high-value firms. Startups like NoWait are leveraging the full pipeline of entrepreneurial services to attract investment and grow. Finally, many workforce development institutions in the region are improving access to the innovation economy for all workers.

However, despite its significant assets, Pittsburgh's technological strengths have not yet translated into broad-based economic opportunity or growth.



Source: Brookings and TEConomy analysis of National Science Foundation, Higher Education Research and Development Survey; BLS, QCEW enhanced file from IMPLAN; and U.S. Census Bureau. Note: LQ = regional location quotient.

Critical competitive challenges threaten Pittsburgh's opportunity

Three areas stand out as constraints to the city's economy:

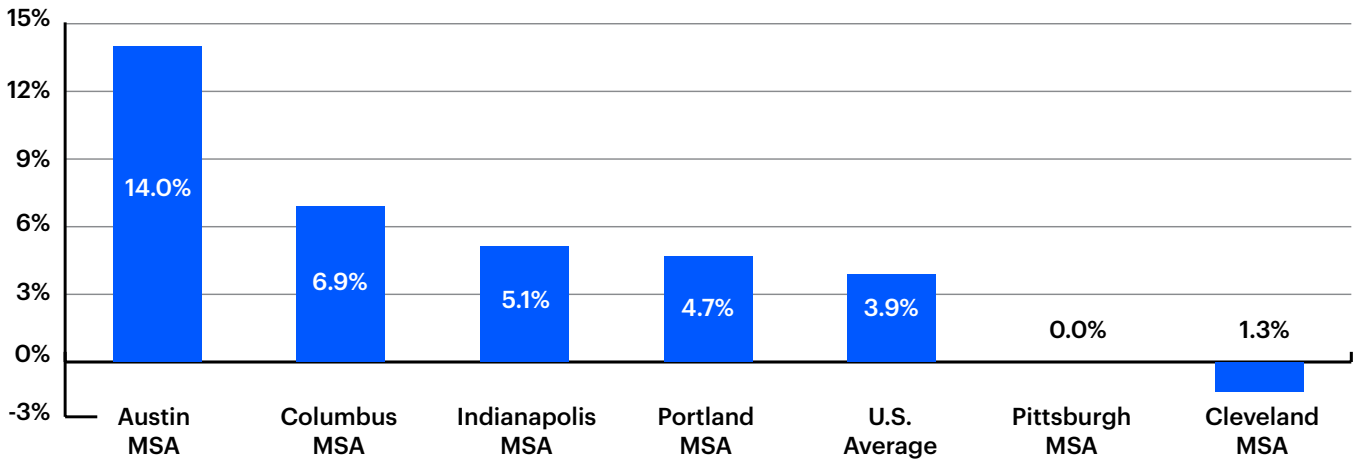
1. **The connection between research and industry strengths is weak and is dampening the region's potential.** Pittsburgh has yet to see the economic activity in advanced industries expected given its robust academic and research strengths. The difference between the level of innovation inputs (such as patents and R&D investments) and the level of economic outputs (jobs, GDP, and firms in advanced industries) is stark. For example, compared to the national average, the region performs 204 percent more research in medical science but employs 91 percent fewer workers in pharmaceutical preparations. Similarly, the region performs 225 percent above the national average in computer science research but has 36 percent fewer jobs in software and 59 percent fewer in data processing.

2. **The entrepreneurial ecosystem has yet to produce a significant number of high-growth startups.** Pittsburgh's physical and programmatic strengths are significant, yet they are insufficient to compete with Denver, Austin, Atlanta, Copenhagen and other global peers. The reality is that these cities all have serial entrepreneurs who have built high-growth companies that employ large numbers of workers. Pittsburgh has many "shots on goal" in terms of new startups, but too few are scaling to the point of being regional employment drivers. As one local entrepreneur put it, "entrepreneurship in Pittsburgh in many ways is within its first cohort. Version 1.0 was about developing capacity to generate a lot of startups. Version 2.0 will be about growth and employment generation."

3. **Demographic and skills headwinds threaten Pittsburgh's ability to create the workforce it needs to compete—both within its innovation district and beyond.** Pittsburgh faces significant demographic and competitive pressures to its innovation workforce that will stymie the region's growth if left unaddressed. Between 2009 and 2014, Pittsburgh's population remained stagnant while peer cities grew by double digits. At the same time, the average worker in Pittsburgh is older than the national average, with a quarter million people expected to retire over the next decade.

Despite the clear and present danger of a tightening labor market, not enough is being done to upskill workers

Change in total population, Pittsburgh and comparison regions, 2009-2014



Source: U.S. Census Bureau, American Community Survey, authors' calculations.

to fill the gaps. For example, 55 percent of occupations in the health care sector require less than a bachelor's degree. One CEO in the tech sector said that "75 percent of the IT jobs in the company don't require a four-year degree." And yet, the Oakland innovation district is adjacent to several poor neighborhoods—including the Hill District, Uptown, and Hazelwood—that could both benefit from jobs created in the innovation district and fill labor shortages. Other low-income neighborhoods, such as Homewood, are only a short bus ride away.

A Path Forward: Governance and Recommendations

Pittsburgh's economy is increasingly driven by innovation, yet existing initiatives and investment levels are not meeting the demands of this new economy. To address the challenges identified, greater investment and activity is needed in four broad areas: **innovation clusters, the Oakland innovation district, high-growth entrepreneurs, and workforce development.**

The road map outlined is significant and will require substantial resources and commitment of the city's leadership. Therefore, Brookings recommends launching a new initiative—the InnovatePGH partnership—to adopt and advocate a new narrative for Pittsburgh's economic future and to issue a call to action. Comprising public, private, and civic leaders, the partnership would rally new and existing resources to support the recommendations in this report and others demanded by the innovation economy.

While the recommendations called for here will likely need to be sequenced over the next decade, much can be also done in the near-term. Efforts should:

- **Build and support Pittsburgh's innovation clusters in advanced manufacturing, life sciences, and autonomous systems:** To increase the linkages between the city's research capacity and the regional economy, city leaders need to adopt a focused technology cluster approach. While there are many candidates (including financial technology ("fintech"), corporate services, and energy), three are clear first priorities given Pittsburgh's technical strengths—robotics and advanced manufacturing, life sciences, and autonomous systems.
- **Define, grow, and connect the Oakland innovation district:** To reach its full economic potential for the city and region, the Oakland innovation district needs to be defined, marketed, and better connected to the regional

economy. In particular, a comprehensive, district-wide strategy is needed to leverage the ongoing investments at CMU, Pitt, and UPMC to grow and attract firms in advanced industries. At the same time, strategies are needed to integrate Oakland with the employment centers nearby, especially toward downtown.

- **Improve the pipeline of high-growth entrepreneurs: Pittsburgh needs greater investment in its high-growth startups.** Young companies need greater access to larger firms through a First Customer Program, stronger support mechanisms around research entrepreneurs, and a global accelerator to grow and attract world-class startups in the health care sector.
- **Create a talent alliance within the Oakland innovation district:** Leveraging existing organizations, a coalition of employers, workforce development organizations, and educational institutions should identify critical occupational gaps within anchor employers, and develop and administer occupation-specific training for underskilled workers in neighborhoods adjacent to the innovation district and throughout the broader region. While a number of workforce programs already exist, the purpose would be to aggregate employment demand in hard-to-fill occupations in health care, research, and education.

Pittsburgh 2030: Innovation Job Generator or "Could-have-been"?

The actions (or inaction) Pittsburgh's leaders undertake today will determine the trajectory of the city for decades to come. At least two scenarios are possible.

In one, the city's economy is aptly described as two Pittsburghs. Here, a minority of jobs are driven by university research, small high-tech firms, and a handful of corporate research centers, while the broader economy (which makes up the majority of workers and families) consists of local services and traditional low- and mid-level manufacturing jobs that, like in much of the Rust Belt, are increasingly automated or outsourced. In this scenario, income and unemployment will vary significantly depending upon the neighborhood.

But in a more dynamic scenario, Pittsburgh's broader economy flourishes. The lines between academic research and industry innovation are indistinguishable as major employers in health care, finance, corporate services, and manufacturing collaborate, adopt, and nimbly deploy technology to stay ahead of global competitors. As such, high-value exports of both goods and services expand, creating a reliable tax base and pool of high-wage jobs. Well-resourced and coordinated education and workforce programs identify and attack unemployment in high-poverty neighborhoods. Getting a lifelong job in a factory with a high school education is as unrealistic in the future as it is today—but unlike today, everyone has options. In this scenario, the innovation economy is Pittsburgh's economy and all benefit.

Both scenarios are realistic. The outcome will be determined by the investments made today.