

November 2022

HOW THE CHIPS AND SCIENCE ACT WILL MAKE INCLUSIVE INNOVATION POSSIBLE

By Michelle Burris, Andrew Stettner, and Laura Valle-Gutierrez



Urban
Manufacturing
Alliance



THE CENTURY
FOUNDATION

Table of Contents

04 Key Takeaways: Analysis and Recommendations

- 04 The CHIPS and Science Act enhances the role of HBCUs in research and technological economic development
- 05 Significant investments in place-based economic development programs can catalyze technology and manufacturing entrepreneurship
- 06 The CHIPS Act can trigger diverse participation in the semiconductor supply chain
- 07 CHIPS Act investments in manufacturing and science programs provide entrepreneurship opportunities

08 Understanding the Lack of Diversity among Manufacturing Entrepreneurs

10 Key Inclusive Entrepreneurship Policies in the CHIPS and Science Act

- 11 New Investments in HBCU Research Capacity and an Expanded Role in Economic Development
 - 11 Recommendations for HBCU Provisions
- 15 Big Investments in Place-Based Economic Development Can Turbocharge Technology and Manufacturing Entrepreneurship
 - 16 Regional Technology Hub Program
 - 17 RECOMPETE Program
 - 18 Recommendations for Place-Based Programs
- 20 CHIPS Act Can Incentivize Diverse Participation in Semiconductor Manufacturing and Its Supply Chains
 - 20 Recommendations for CHIPS Programs
- 22 CHIPS Act Investments in Manufacturing and Science Programs Can Unlock Entrepreneurship
 - 22 Manufacturing Extension Partnership
 - 23 New National Science Foundation TIP Directorate and Manufacturing USA
 - 23 Recommendations for MEP, TIP, and Manufacturing USA Programs

25 Conclusion

The passage of the bipartisan **CHIPS and Science Act**¹ puts into motion the largest investment in American industrial policy in the past fifty years, and includes vast new resources to support entrepreneurship in technology and manufacturing. The 1,054-page bill directly appropriates \$52 billion to address the lack of U.S. semiconductor manufacturing, a shortage that has spiked prices on goods ranging from automobiles to refrigerators. It authorizes historic investments in place-based economic development funding, aiming to create regional ecosystems as vibrant as Silicon Valley across the country, churning out new inventions and job creating businesses in the technologies of today and tomorrow. It represents the largest surge of investment in American innovation capacity since the Space Race, with bulked-up programs at the National Science Foundation focused anew on applied technological research.² Moreover, the CHIPS and Science Act doubles down on the idea that technologies invented at American universities and companies can lead to “Made-in-America” goods, and increases investments in institutions like the Manufacturing Extension Partnerships and Manufacturing USA.

U.S. Department of Commerce **Secretary Gina Raimondo**³ summarized the act as a once-in-a-lifetime opportunity for revitalizing American manufacturing, innovation, research, and development. The bill has the stated ambition of leaving no American behind, and to make sure the new investments don’t only benefit those who gain the most from geographic, technological, and social stratification. For example, not only does the CHIPS and Science Act supersize scientific investment: it also promises new resources and policies to allow historically Black colleges and universities (HBCUs) and other minority-serving institutions (MSIs) to participate equitably and genuinely in this research funding, and in the entrepreneurship and wealth creation it can create.

The bill’s priority on inclusive innovation is needed. Especially when it comes to manufacturing, the United

States has a long way to go toward achieving racial parity in entrepreneurship. According to the U.S. Census Bureau, 90 percent of manufacturing firms are white owned, 4.6 percent are Hispanic owned, 4.5 percent are Asian owned, and less than 1 percent are Black owned. Among that tiny fraction, Black-owned manufacturing firms are more likely to be new (less than three years old), and employ fewer workers per firm.

The purpose of this report is to highlight some of the most important aspects of the law, and to recommend supplements to or enhancements of its policies that will help ensure the law addresses the equity gaps in manufacturing and technology entrepreneurship in the United States. Like most federal investments, the CHIPS and Science Act will be largely implemented outside of Washington, D.C. and not by the federal government. The recommendations in this report are thus both for the federal government and for those who want reliable pathways for advocates to influence the actions of the companies, colleges and universities, and state and regional agencies who receive support from the CHIPS and Science Act.

This report is the third in a series written in a collaboration between The Century Foundation and the Urban Manufacturing Alliance, supported by the Marion and Ewing Kauffman Foundation, in which the partners seek policy levers that complement on-the-ground efforts to promote manufacturing entrepreneurship, especially through **access to capital**.

Key Takeaways: Analysis and Recommendations

THE CHIPS AND SCIENCE ACT ENHANCES THE ROLE OF HBCUS IN RESEARCH AND TECHNOLOGICAL ECONOMIC DEVELOPMENT

It is well-established that HBCUs are hubs for producing entrepreneurs; however, the distribution of funding to HBCUs has been drastically inequitable. In 2019, less than 1 percent of federal science expenditures went to HBCUs, and this lack of investment means a loss of entrepreneurs who can convert scientific research into new technology and manufacturing businesses. The Senate voted unanimously on a **motion by Senator Raphael Warnock** to increase the capacity of HBCUs and other minority-serving institutions to participate in federally funded science and technology. Accordingly, the act takes a multi-faceted approach to rectifying inequities in funding HBCUs, including requiring a study

by the U.S. Government Accountability Office (GAO), new policies from the Office of Science Technology, and a new capacity-building program that will make it possible for HBCUs (and other under-resourced minority-serving institutions) to compete for federal science and technology dollars. Furthermore, the act encourages the federal government to include HBCUs in the new place-based economic development programs meant to convert research into new businesses and jobs.

The CHIPS and Science Act's HBCU goals can be enhanced through the following recommendations:

Expedite the bill's HBCU-related provisions: The Biden administration should expedite the GAO review and associated policy recommendations that flow from it, and Congress should prioritize appropriations for new capacity-building programs.

Integrate measurable entrepreneurial education benchmarks into workforce development and curricula, especially at HBCUs: science, technology, engineering, and math (STEM) education and technical training should be delivered with a commitment to developing the next generation of business owners from today's engineers and technicians.

SIGNIFICANT INVESTMENTS IN PLACED-BASED ECONOMIC DEVELOPMENT PROGRAMS CAN CATALYZE TECHNOLOGY AND MANUFACTURING ENTREPRENEURSHIP

The act authorizes historically significant place-based economic development investments and places a major emphasis on technology transfer—commercializing science into new technologies, manufacturing businesses, and jobs. The programs in the act seek to unleash this type of entrepreneurship through technology transfer as well as through entrepreneurial training, partnerships with HBCUs, increases in private capital investment, subsidies to manufacturing, support for productivity enhancements, and applied scientific research.

The goal of the CHIPS and Science Act’s place-based economic development programs is to spur technology development outside of the coastal hubs like Silicon Valley and Boston, and in ways that

prioritize economically disadvantaged Americans, rural Americans, women, and minority-owned businesses. The centerpiece of this approach is the \$10 billion **Regional Technology Hubs**⁴ program, which seeks to build regional innovation ecosystems in scores of communities, and the \$1 billion **RECOMPETE**⁵ pilot grant program, which seeks to redevelop areas that have persistently low incomes and employment. Congressional leadership ensured that these programs would have language that broadly prioritizes the participation of under-represented communities in the economic activity supported by these programs.

The following recommendations can ensure the programs realize their equity goals:

Deploy resources for business development among women and entrepreneurs of color: Federal policy and guidance should ensure that funds dedicated to entrepreneurial development are specifically directed toward Black, female, and other diverse new owners.

Maximize the flexibility of loan guarantees and other credit supports: CHIPS and Science Act funds should be used to unlock the additional sources of capital needed to start and grow manufacturing businesses.

Coordinate closely with SSBCI functions, including but not limited to venture capital development: CHIPS and Science Act entrepreneurial development activities should tap into the \$10 billion State Small Business Credit Initiative (SSBCI), which provides a ready source of government-supported investment capital dedicated by Congress to growing businesses owned by socially and economically disadvantaged individuals.

Promote employee ownership: Employee ownership capitalizes on the skills and commitment of factory workers by promoting shared business ownership. The CHIPS and Science Act specified support for employee ownership as an allowable business development activity, and the federal government should encourage state and regional partners to use this option.

THE CHIPS ACT CAN TRIGGER DIVERSE PARTICIPATION IN THE SEMICONDUCTOR SUPPLY CHAIN

The CHIPS Act's semiconductor manufacturing investments will flow through direct subsidies to corporations, and have already spurred companies like Micron and Intel to build **large-scale** chip factories in the United States.⁶ Moreover, **the bill's signature investment in domestic computer chip production**⁷ also has provisions that encourage the participation of women and minority-owned businesses in

semiconductor supply chains. The administration has set expectations with its **CHIPS Act implementation strategy**, calling on the localities benefiting from CHIPS Act subsidies to match it with local resources, and by focusing on an ecosystem of development and equitable results from federal subsidies. Additional steps that the administration and recipients could take include the following:

Utilize metrics and data to track progress toward diverse entrepreneurship: Federal agencies should develop new tools to analyze the reach of CHIPS and Science Act to existing women and minority-owned businesses as well as diverse entrepreneurs.

Connect with supplier development organizations: Organizations like the National Minority Supplier Development Council have successfully integrated certified minority- and women-owned businesses into public and private supply chains, and can be a key resource in achieving the business equity goals of the CHIPS and Science Act.

CHIPS ACT INVESTMENTS IN MANUFACTURING AND SCIENCE PROGRAMS PROVIDE ENTREPRENEURSHIP OPPORTUNITIES

There are numerous other provisions and programs authorized by the law as part of the “and Science” part of the CHIPS and Science Act. Like the programs above, they too can be utilized as a tool to provide access to capital and support for entrepreneurship. Critically, the law triples funding for the federally funded

state **Manufacturing Extension Partnerships**, whose mission is to support small manufacturers, including through access to capital.⁸ As one of many increases in federal investments in scientific research, the CHIPS and Science Act should do the following:

Focus on anchor institutions and their ability to support local procurement: Strategizing around anchor institutions means considering the positive economic development role that larger higher education (and other) institutions can play in the broader local community through procurement, investment, and other levers. Anchor strategies provide another way for CHIPS and Science Act recipients to drive diverse entrepreneurship.

Increase representation in staff, board directors, and industry partners among key manufacturing institutions and industry leaders: Aspiring entrepreneurs need to see leaders that look like them to believe they can succeed in the manufacturing sector.

Disseminate information about the bill in an accessible and dynamic manner: Conceptualize and implement a communications strategy that summarizes the CHIPS and Science Act into concise, clear language for mass audiences. Consider authentic multimedia and multilingual approaches to direct distribution of pertinent information by and within Black, Indigenous, and people of color (BIPOC) communities.

The success of this act in fostering increased diversity of entrepreneurship will depend on an unrelenting attention to equity goals among the federal agencies and their regional and state partners in government, higher education, industry, finance, and nonprofit organizations.

Efforts will need to connect entrepreneurs and budding businesses to the new sources of capital they need to initiate and expand.

Understanding the Lack of Diversity among Manufacturing Entrepreneurs

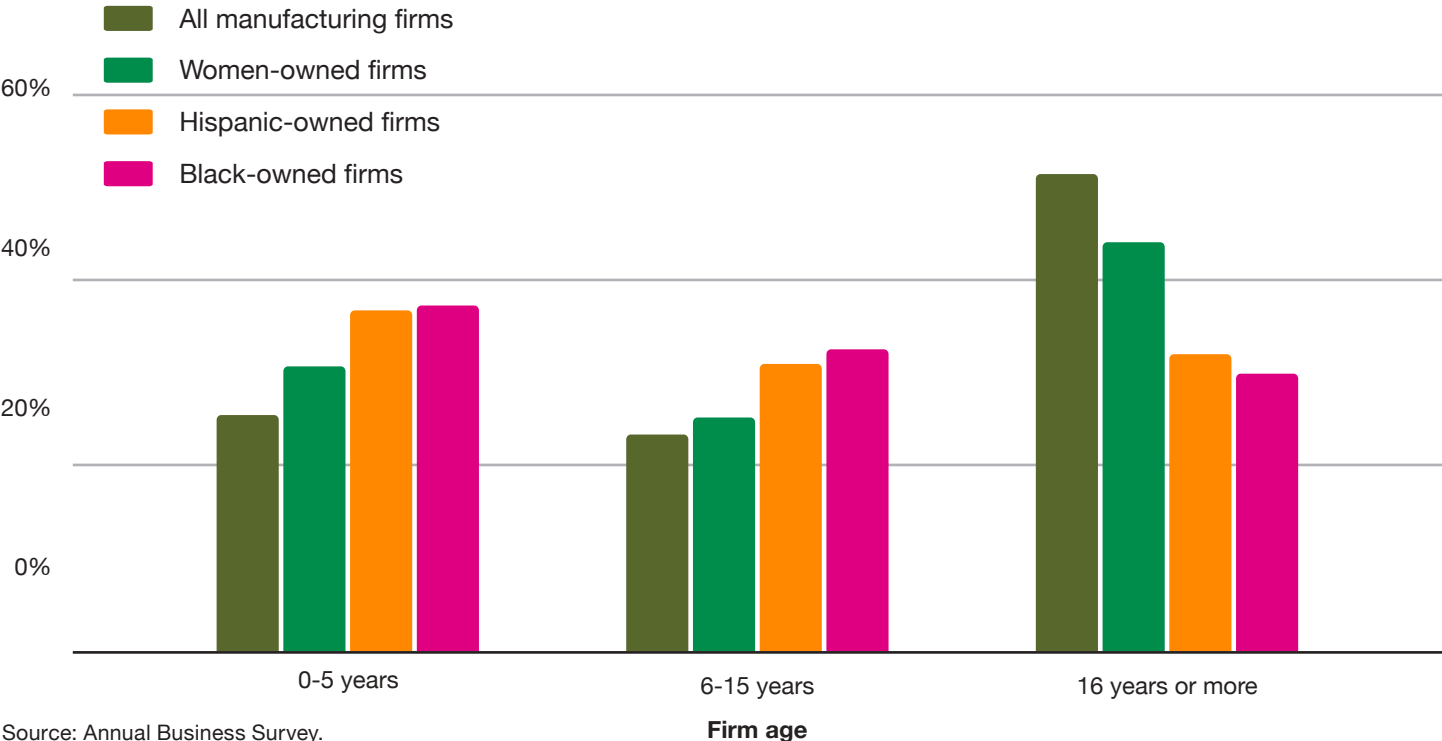
There are limited data on business ownership by race, ethnicity, and gender by sector. The analyses below rely on the 2020 **Annual Business Survey (ABS)**,⁹ which is conducted by the U.S. Census Bureau, the National Science Foundation, and the National Center for Science and Engineering Statistics. Available data can be analyzed at the industry level using North American Industry Classification System (NAICS) codes. The **NAICS code for manufacturing**¹⁰ includes a wide range of subsectors, from electronics manufacturing to milk bottling, but ABS data is not broken out by subsector.

Black ownership of manufacturing businesses makes up an extremely small share of the total sector: less than

1 percent of all manufacturing businesses have Black owners. In 2019, the United States had roughly 1,600 Black-owned manufacturing businesses employing over 20,000 individuals. Furthermore, an overwhelming 90 percent of manufacturing businesses are owned by white individuals. The next largest group is Hispanic owners, which comprise 4.6 percent of all manufacturing firms. Lastly, Asian Americans make up 4.5 percent of all manufacturing firm owners.

The manufacturing sector fares a little bit better in terms of gender equity, with 16 percent of businesses having women owners. However, Black women own a mere 1.2 percent of all women-owned businesses, while 92

Age of Manufacturing Firms, By Subgroup



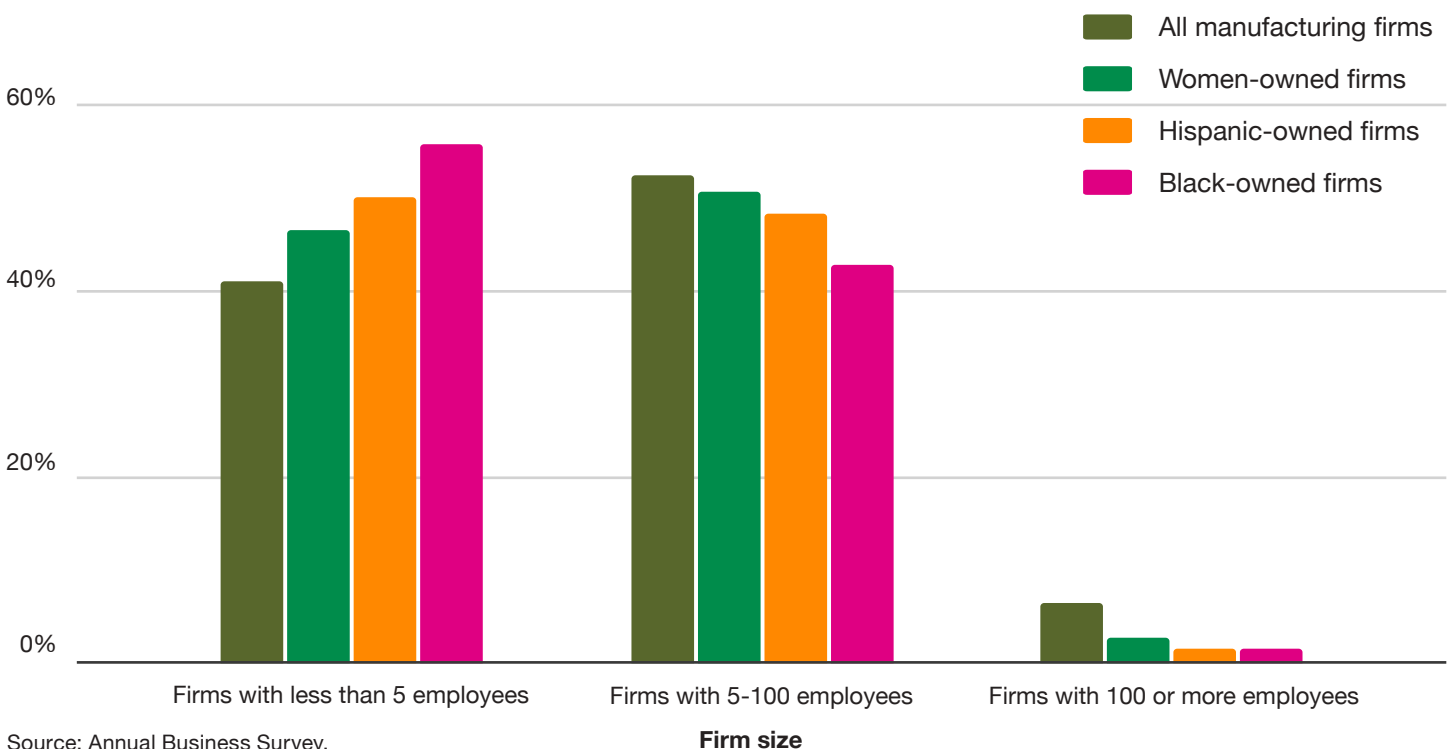
percent of all women-owned manufacturing businesses are owned by white women. So a racial gap persists even within women-owned manufacturing firms.

In terms of entrepreneurship, the best data to look at within the ABS are the datasets concerned with the age of a business. Black manufacturing firms are more likely to be less than three years old as compared to other groups, illustrating a healthy push toward recent entrepreneurship. However, Black owned firms are underrepresented among older established firms. That’s likely a combination of historical barriers to entrepreneurship, and challenges for these firms in scaling and growing.

Lastly, one interesting point of comparison can be made on firm size when measured by number of employees. Over 86 percent of all manufacturing firms are small businesses with fewer than fifty employees. However, when compared to all manufacturing firms, Black-owned firms are much more likely to have fewer than five

employees, and are the most likely, out of all the groups represented in our analysis, to have no employees at all. These inequities line up with the greater likelihood of Black-owned firms being younger in their life-cycle, and facing struggles to survive for longer or upscale their activities. Many of these businesses are among those that the Urban Manufacturing Alliance has worked with in its **Pathways to Patient Capital**¹¹ project and other programs. The firms are typically innovators and creators who produce products for sale themselves or with a small number of employees, but struggle to access the capital necessary for expansion. The CHIPS and Science Act has provisions that can help to provide these resources, and so can help both to increase the number of Black entrepreneurs in manufacturing and develop the ecosystem that can support them.

Size of Manufacturing Firms, by Subgroup



Key Inclusive Entrepreneurship Policies in the CHIPS and Science Act

The CHIPS and Science Act authorizes more than \$200 billion in funding across multiple federal agencies engaged in technology and manufacturing, many of which touch fields where there will be the creation and support of new business opportunities. There are three main provisions in the law. First, the act immediately appropriates \$52 billion to address the semiconductor supply chain crisis. Second, it authorizes a historic expansion in place-based economic development programs. Third, it significantly increases the nation's

commitment to applied and basic scientific research. (The second and third of these priorities are subject to future appropriations.) All three of these priority areas contain critical opportunities for bolstering diverse entrepreneurs in manufacturing, the sciences, and related supply chains.

THE CHIPS AND SCIENCE ACT

- 1. IMMEDIATELY APPROPRIATES \$52 BILLION TO ADDRESS THE SEMICONDUCTOR SUPPLY CHAIN CRISIS.**
- 2. AUTHORIZES A HISTORIC EXPANSION IN PLACE-BASED ECONOMIC DEVELOPMENT PROGRAMS.**
- 3. SIGNIFICANTLY INCREASES THE NATION'S COMMITMENT TO APPLIED AND BASIC SCIENTIFIC RESEARCH.**

NEW INVESTMENTS IN HBCU RESEARCH CAPACITY AND AN EXPANDED ROLE IN ECONOMIC DEVELOPMENT

The act takes a serious and comprehensive approach to addressing the under-utilization of HBCUs and MSI in federal science research, starting with “**Subtitle C—MSI STEM Achievement**,”¹² which is concerned with initiatives by federal research agencies that targeted HBCUs and other minority-serving institutions. In implementation, the directors of federal agencies and the director of the Office of Science and Technology Policy will coordinate to develop uniform guidelines that “increase clarity, transparency, and accountability for Federal research agency investments in STEM

education and research activities at HBCUs, TCUs, and MSIs.” These policy recommendations will coincide with a new \$1 billion program that will increase the capacity of HBCUs to compete equitably for grants, contracts, and cooperative agreements. As discussed below, the legislation also directs the U.S. Department of Commerce to consider the role of these institutions in regional technology hub programs and RECOMPETES, and to increase direct communications with HBCUs in general.

Recommendations for HBCU Provisions

These investments will enable HBCUs to prepare the next generation of scientific leaders. The surge of investment provided by the CHIPS and Science Act provides a once-in-a-lifetime chance to nurture these scientists into founders and owners of technology and manufacturing businesses. The act’s emphasis on technology transfer and place-based economic development resources (especially access to capital) will unleash the ingenuity of Black scientists and engineers in new businesses that can build wealth for themselves and for Black communities in general.

RECOMMENDATION

INVESTING IN HBCUS COULD IMPROVE RACIAL DIVERSITY IN MANUFACTURING.

Reversing the very low levels of Black entrepreneurship in manufacturing requires greater investment in historically Black colleges and universities. In 2021, the president of the United Negro College Fund reminded us in *The Atlantic*¹³ that large federal research grants are the least likely to go to HBCUs. A 2016 study from the *Journal of Negro Education*¹⁴ study found that John Hopkins alone had received \$1.6 billion in federal, local, and state grants and contracts, while all of the 102 HBCUs combined had only received \$1.2 billion. And in their most recent data, only 7.4 percent of awards from the National Science Foundation (NSF) went to Black and Latino innovators, and only 0.5 percent went to Indigenous innovators. **The Brookings Institution**¹⁵ found that 91 percent of recipients from NSF are white. At the signing of the CHIPS and Science Act, President Biden indicated his commitment to rectifying such long-standing inequities.

“We’re going to make sure we include all of America, supporting entrepreneurs and technological hubs all across America, including historically Black colleges and universities, minority-serving institutions, Tribal colleges.”

Increasing scientific investment in HBCUs can unleash diverse entrepreneurship sciences, as well as converting those scientific advances into commercial products through manufacturing. Dubbed the **incubators of innovators**,¹⁶ HBCUs are driving the **entrepreneurial ecosystem** through formal entrepreneurial education, the building of entrepreneurial networks, and technical assistance for new ventures.

Research and manufacturing entrepreneurship are closely tied together. Professors supported by a federal research grant might invent a new industrial polymer, and a HBCU project can help them access capital and equipment to help them incubate it into a company. HBCUs can partner closely with existing businesses through research, and help Black- and women-owned businesses grow. In practice, HBCUs such as Morgan State University have the opportunity to unlock this opportunity in real time. A day after the passage of the CHIPS and Science Act, Morgan State University made an **announcement** that they are trying to become the country’s only R1 HBCU.¹⁷ (Howard University previously had this designation.)

In July 2022, Morgan State created the National Center for Equitable Artificial Intelligence and Machine Learning Systems. Morgan State also invested \$20 million to begin designing a science center, and is competing to land a \$120 million Department of Defense–affiliated research center. The university can further partner with industries and students seeking entrepreneurial opportunities in artificial intelligence. Their research and data will inform local neighborhoods, particularly businesses, and their specialized training can employ students of color in STEM industries. Morgan State is not the only HBCU making these moves. Five days before its passage, Clark Atlanta University made **history**¹⁸ as the first HBCU to receive a \$10 million award from the National Science Foundation, including the establishment of the National Data Science Alliance. This alliance will facilitate engagement among HBCUs across the country through industry and academic collaboration, and the data they generate will inform local and diverse businesses on growth opportunities.

With drastic enrollment **increases**¹⁹ during the pandemic, and a higher likelihood of Black-owned businesses being community-centered,²⁰ HBCUs are primed for producing the next generation of Black business owners and creating intergenerational wealth. Researchers at **Third Way**²¹ found 93 percent of the 102 HBCUs across the country have an option for undergraduates to major in business, 72 percent have opportunities for students and alumni to build networks on entrepreneurship (integral for owners of color to have access to capital, with Black owners currently acquiring only a third of the capital that white owners do), and 57 percent offer technical assistance to entrepreneurs. Examples include the **Louisiana-based Southern University System**,²² the only HBCU system in the nation. Their Small Business Development Center

and Technology and Entrepreneurship Clinic received funding from the Minority Business and Development Agency (MBDA) to help minority-owned firms compete in the global marketplace and compete for public and private contracts. The Southern University System also has a small business incubator that helps rising entrepreneurs with business certifications, office space, and coaching.

The issue is not just one of Black entrepreneurship. Latino-owned businesses²³ are starting at a faster rate than any other racial group—44 percent for the Latino community, compared to 4 percent for non-Latino-owned firms. Industry leaders such as NASA²⁴ have already begun funding minority-serving institutions to help solve supply chain disruptions in the aerospace subsector and build diverse manufacturing ecosystems. The networks are partly focused on Tribal businesses to increase interest in related entrepreneurship opportunities. There are nearly 30,000 Indigenous-owned businesses, and Native Americans have the highest poverty rate among communities of color.²⁵ Partnerships with Tribal colleges can open doors for Indigenous students to explore entrepreneurship opportunities and research, and become sources of wealth in their communities.

Too often college students are told they can become anything, but their professional trajectories in actuality are shaped by the caliber, endowment, and resources of their educational institutions. The CHIPS and Science Act should fulfill its language of inclusive innovation and ensure pursuing and thriving in the spirit of entrepreneurship is not limited to only those of racial and economic privilege.

RECOMMENDATION

INTEGRATE ENTREPRENEURIAL EDUCATION INTO WORKFORCE DEVELOPMENT AND EDUCATION, ESPECIALLY AT HBCUS.

Currently, people of color and women in manufacturing are far less likely to be represented in positions other than ownership (i.e. sales, administration, engineering, and production). One strategy to foster diverse entrepreneurship in manufacturing is to encourage workers in these companies to start their own manufacturing business, or even to purchase the company they work at. The seeds of entrepreneurship should be planted at every level of manufacturing education from K–12, to apprenticeship and community colleges, adult workforce programs, and four-year education. Manufacturing suffers from an enthusiasm gap among communities of color, who may perceive the field as a repetitive, dangerous job without upward mobility. Promoting the wealth-building possibilities and intentionally shifting the narrative about manufacturing can help to alter this perception.

As stated above, HBCUs have played a large historical role in fostering Black entrepreneurship. Recently, the Biden administration issued a proclamation commemorating the contribution and legacy of HBCUs. The regions receiving CHIPS Act funding, and companies participating in CHIPS Act-funded programs, should work to integrate entrepreneurship education into STEM career initiatives in engineering and other fields. That education should include extended mentorship from diverse business owners, as well as from leaders in technology and manufacturing companies. Successful efforts to increase HBCU participation in research and development should be closely coordinated with efforts to create stronger regional capital investment networks, enabling researchers at HBCUs to commercialize their research into job-creating activities. These technology transfer opportunities should be within the scope of the GAO review, and subsequent recommendations from the White House Office on Science and Technology Policy (OSTP), on HBCU involvement in scientific research.



BIG INVESTMENTS IN PLACE-BASED ECONOMIC DEVELOPMENT CAN TURBOCHARGE TECHNOLOGY AND MANUFACTURING ENTREPRENEURSHIP

MIT professors Simon Johnson and Jonathan Gruber’s book, *Jump-Starting America: How Breakthrough Science Can Revive Economic Growth and the American Dream*,²⁶ demonstrates how government investment in basic science research in the World War II era powered job creation in industries like aviation and electronics, and continued to successfully produce technology job markets like Silicon Valley in California. The same researchers also identified the location of the best technology jobs today—disproportionately located in “superstar cities” on the East and West coasts: Boston, New York, Washington, Seattle, San Francisco, and Los Angeles—with only two HBCUs located in these cities: the University of the District of Columbia and Howard University. In contrast, researchers also identified more than 100 urban communities that are prime for being next-generation tech hubs and acquiring talent in technology. These communities are more equitably distributed across the country, and home to 80 million Americans in thirty-six states. The hub locations identified are: Florida, Ohio, Alabama, Tennessee, and Texas, with thirty-nine HBCUs located in these states combined. The problem is that these states are primarily concentrated in the South, and private enterprises continue to build headquarters in Northern and coastal cities that are already thriving.

The CHIPS and Science Act’s place-based economic development programs marry Johnson and Gruber’s insights with a growing body of **successful regional innovation initiatives**²⁷ that create an ecosystem conducive to the growth of new enterprises, especially small businesses. These initiatives foster a culture supportive of entrepreneurialism and deliver a set of shared resources like access to capital, innovation and technology, and skilled workers. The most successful ecosystem efforts are “predicated on a deep understanding of the location,”²⁸ building on economic strengths and shoring up weaknesses. This place-based economic development approach has been increasingly embraced by the federal government in programs like the Investing in Manufacturing Communities Partnership, the Defense Manufacturing Communities Partnership, and the Build Back Better Challenge. The CHIPS and Science Act makes major new investments in this approach, especially the Regional Tech Hub Program, the RECOMPETE pilot program, and the Regional Innovation Engines at the National Science Foundation. With support from the Economic Development Administration, the American Manufacturing Communities Collaborative is building a community of practice among these federally funded efforts.

Regional Technology Hub Program

The Regional Technology Hub program represents the largest investment yet in an ecosystem approach to technology development. The \$10 billion authorized program would increase the geographic diversity of innovation, benefiting underserved communities in the manufacturing workforce through job creation and commercialization. Partnerships can be created among industries, workforce boards, nonprofits, and educational institutions, including HBCUs. Two levels of grants would go to consortiums led by higher education, government, or industry, and the program will benefit at least eighty communities.

Business and entrepreneurial development is one of four key uses of the funds that will be awarded to states and can include training of entrepreneurs, support for technology commercialization, development of local and regional capital networks, and entrepreneurial mentorship.²⁹ A major focus of these hubs will be to help convert scientific research at regional higher education institutions (and other entities like national laboratories) into new entrepreneurial small businesses. The language of the Regional Technology Hub provision includes a major focus on inclusive innovation and entrepreneurship.

The law gives the program an explicit overall goal of promoting the “benefits of technology development and innovation for all Americans, including underserved communities and vulnerable communities,” which should give the U.S. Department of Commerce the impetus to include strong equity components in its grant-making and oversight.³⁰

The bill sets out required and optional members of the economic development consortium, several of which can spur inclusive entrepreneurship. This list includes “organizations that contribute to increasing the participation of underserved populations in science, technology, innovation, and entrepreneurship.” Community development finance institutions (CDFIs) and minority depository institutions are also eligible members of the consortium.

The language in the bill encourages regional technology hubs to develop “regional and local capital networks to attract additional private capital.” The involvement of CDFIs in these networks, in particular, is one way that these hubs can support capital-constrained people of color entrepreneurs. The Urban Manufacturing Alliance’s **Pathways to Patient Capital** cohort illustrated the productive role that CDFIs can play in supporting diverse manufacturing entrepreneurs, and the technology hubs should embrace the participation of CDFIs in capital networks.

The law also goes out of its way to highlight employee-owned businesses as a type of entity that can be supported through the tech hub’s business development activities. **Employee-owned businesses**³¹ provide their workers with a share of the business, either as part of a cooperative or through stock, in addition to compensation. Regional technology hubs can follow through

on the law's recommendations by partnering with one of many regional employee ownership organizations as well as specialized investors and advisers that assist these businesses.

RECOMPETE Program

The \$1 billion RECOMPETE pilot program is another significant place-based economic development program. Based on legislation introduced by Representative Derek Kilmer (D-WA) and inspired by the research of Timothy Bartik at the Upjohn Institute,³² this legislation targets the many American regions that persistently suffer from a lack of good jobs in general, and that have especially failed to benefit from advanced technologies. Eligible areas (those that have a prime-age employment gap of at least 2.5 percentage points compared to the national average, or per capita income of below \$75,000) will receive flexible long-term economic development grants of at least \$20 million.

Recipients will have the ability to align specific workforce or economic development activities to an economic development plan funded by the grant. Given the focus on job creation, and the need to spur new home-grown businesses in these labor markets, entrepreneurial support is likely to be a key activity for these grants. Funded activities within the act emphasize “business advice to small and medium-sized local businesses and entrepreneurs, including manufacturing extension services, small business development centers, centers to help businesses bid for federal procurement contracts, and entrepreneurial assistance programs that link entrepreneurs with available public and private resources.”³³

The business assistance in the RECOMPETE programs is intended for general job creation, not just technology jobs. This assistance can be especially powerful for individual makers and creators of foodstuffs, as well as for garment or craft products that need financial assistance to scale into a multi-person enterprise. Because the funds are well targeted to low-income areas, this program could go a long way to supporting diverse entrepreneurs if the right partners are engaged.

Recommendations for Place-Based Programs

Well-implemented place-based economic development can break through the barriers that have held back diverse entrepreneurship in manufacturing. The following are recommendations to achieve that goal.

RECOMMENDATION

DEPLOY RESOURCES FOR BUSINESS DEVELOPMENT AMONG WOMEN AND PEOPLE OF COLOR ENTREPRENEURS.

CHIPS and Science Act programs like the Regional Technology Hub Program allow for business development and entrepreneurship. Given the low levels of Black manufacturing and scientific entrepreneurship, the federal government and the states should focus intentional energy on fostering new entrepreneurs.

A natural place to start are partnerships with Minority Business Development Agency centers, **especially the four centers selected to focus on advanced manufacturing.**³⁴ There is also a much larger set of institutions with a deep background in supporting diverse entrepreneurship, including state-level minority business development centers and community development financial institutions, but many of them have not had the support or opportunity to develop manufacturing entrepreneurs. Business development efforts across the CHIPS Act portfolio should forge partnerships with these entities to increase the interest and success of people of color in manufacturing entrepreneurship.

Lastly, many advanced manufacturing and technology firms have the potential for scaling that can attract venture capital. States implementing CHIPS and Science Act business development programs should work hard to create relationships with venture capital firms that have women and people of color as principals or key staff. These diverse investors are going to be in the best position to forge effective relationships with diverse technologists who could take their scientific discoveries to scale as manufactured products.

RECOMMENDATION

MAXIMIZE FLEXIBILITY TOWARD LOAN GUARANTEES AND OTHER CREDIT SUPPORTS.

Manufacturing requires higher capital requirements for entry than service business. With people of color generally having less access to personal or investment capital, this represents a significant barrier to entry. When at all possible, federal agencies and their state partners should directly use CHIPS and Science Act dollars as sources of capital. For example, CHIPS and Science funds could be used as a way to see revolving loan funds or other forms of credit support for credit constrained businesses. Moreover, business technical assistance should focus on credit development, legal support, and accounting services that can help people of color entrepreneurs access private capital.

RECOMMENDATION

COORDINATE CLOSELY WITH SSBCI FUNCTIONS, INCLUDING BUT NOT LIMITED TO VENTURE CAPITAL DEVELOPMENT.

The CHIPS and Science Act comes on the heels of the implementation of the \$10 billion State Small Business Credit Initiative,³⁵ which the administration has targeted to support manufacturing and critical supply chains.³⁶ The Department of Treasury has established a working group of states focused on connecting manufacturing and SSBCI. The tools within SSBCI include venture capital, capital access programs, collateral support programs, loan participation programs, and loan guarantees. Furthermore, SSBCI has specific requirements about the delivery of its capital to businesses owned by socially and economically disadvantaged individuals (SEDI). The federal government should direct applicants for CHIPS and Science Act funding to coordinate their business development activities with SSBCI, and to maximize the impact of these funds on the growth of small business in these technology and manufacturing business supply chains.

CHIPS ACT CAN INCENTIVIZE DIVERSE PARTICIPATION IN SEMICONDUCTOR MANUFACTURING AND ITS SUPPLY CHAINS

The CHIPS Act appropriates \$52 billion in a variety of programs to support the semiconductor supply chain. While the largest component of this program will be direct incentives to support the construction of semiconductor manufacturing facilities, the Department of Commerce has issued a preliminary implementation strategy that advises states that they will need to match federal support with incentives that ensure the development of semiconductor supply chain ecosystems and workforce development pipelines. In the **strategy**, the Department of Commerce indicates that they will be seeking “measurable benefits to small and underrepresented businesses, including minority-owned, veteran-owned and women-owned businesses, and businesses in rural areas.” The implementation

strategy suggests robust outreach plans, contracting and subcontracting processes that encourage participation, using services of the Minority Business Development Association, and for construction, operation, and procurement.

There will be opportunities to support existing minority entrepreneurs in the construction of these facilities and to support entrepreneurship in every aspect of the supply chains needed to rebuild U.S. semiconductor manufacturing, from day-to-day supplies to the invention of new microcomputing technologies that can be scaled.

Recommendations for CHIPS Programs

Advocates for inclusive entrepreneurship should closely watch the continued rollout of these subsidies to ensure that the Department of Commerce’s goals can be realized on the ground.

RECOMMENDATION

CONNECT WITH SUPPLIER DEVELOPMENT ORGANIZATIONS.

Organizations like the **National Minority Supplier Development Council** certify and support minority-owned small businesses and promote them to larger businesses seeking to expand the diversity of their own suppliers. The federal government could play a key convening role between supplier development organizations and major manufacturers supported by the CHIPS and Science Act, starting with the semiconductor manufacturing industry. An added benefit of engagement will be the ability to expose minority and women entrepreneurs who may be engaged in other supply chains that have more diverse ownership, like construction or services, and to explore purchasing or developing small businesses in resurgent manufacturing supply chains.

RECOMMENDATION

USE METRICS AND DATA.

The CHIPS implementation strategy states that the federal government will “ensure that CHIPS investments result in measurable benefits to small and underrepresented businesses, including minority-owned, veteran-owned and women-owned businesses, and businesses in rural areas.” The Department of Commerce (and other agencies, like the National Science Foundation and Department of Energy) should provide CHIPS and Science Act recipients with technical assistance and guidance on how to track the impact of CHIPS funding on women and minority-owned small business participation and creation. This work can build on extensive efforts by the Department of the Treasury during the development of the SSBCI program on how to guide states in tracking data on diverse entrepreneurship.

CHIPS ACT INVESTMENTS IN MANUFACTURING AND SCIENCE PROGRAMS CAN UNLOCK ENTREPRENEURSHIP

The provisions for minority-serving institutions, place-based economic development programs, and semiconductor manufacturing would alone go a long way to revive U.S. manufacturing and provide resources for more inclusive innovation. There are numerous other provisions and programs authorized by the law as part

of the “and Science” part of the CHIPS and Science Act. Like the programs above, they too can be utilized as a tool to provide access to capital and support for entrepreneurship.

Manufacturing Extension Partnership

The CHIPS and Science Act authorizes \$2.23 billion for manufacturing extension partnerships (MEPs), which nearly triples their available funding. MEPs currently operate in all fifty states, and provide customized technical assistance to manufacturers. Their most commonly known role is in process and technology improvements, but they offer wide ranging assistance including support around access to capital. MEP centers are a key part of the manufacturing ecosystem, and the CHIPS and Science Act gets them closer to being able to provide the level of support that occurs among our competitors, including a more effective role in supporting capital constrained manufacturers and diverse entrepreneurs. MEP centers can be an important resource for small businesses seeking access to capital, especially when it comes to the expense of acquiring new productivity enhancing technologies (several MEP centers provided grants or low-cost loans for this equipment).

The expansion of the MEP program under CHIPS and Science will be at least in part focused on targeted initiatives rather than a generalized application. The Awards Pilot Program outlined in Section 10251 of the act specifically mentions entrepreneurship training as one of the targeted uses for funds. Moreover, Section 10252 updates MEPs being required to conduct outreach to underserved communities, and positions MEPs to provide additional support for existing manufacturers and owners of color, and to entrepreneurs.

New National Science Foundation TIP Directorate and Manufacturing USA

The National Science Foundation is organized into directorates that guide its research investment. The CHIPS and Science Act authorizes a \$20 billion investment in the new National Science Foundation Directorate on Technology, Innovation, and Partnerships (TIP). Unlike other NSF directorates focused on basic science, this directorate will have a primary focus on the application of science to commercial business especially manufacturing. The CHIPS and Science Act authorizes additional investments in the TIP Directorate's **Regional Innovation Engine** program, which seeks to spur local innovation ecosystems, and NSF emphasizes inclusive participation in its selection criteria. The engine program is just one example of the opportunities for diverse entrepreneurship that will be supported by the TIP Directorate, with support likely to be delivered in large part to higher education institutions. The TIP Directorate will complement the existing network of applied research centers supported through the Manufacturing USA program. This network, originally started by the **2014 RAMI Act**, will gain \$829 million to open ten new institutes focused on strategic manufacturing technologies. Through its mandate to promote economic and workforce development, the Manufacturing USA program (led by those institutes funded by the Department of Defense) has begun to focus on diversity, equity, and inclusion (DEI) in manufacturing, such as NIIMBL's partnership with HBCUs and LIFT's state-of-the-art workforce training facility in downtown Detroit. The engineers and workers engaged through these programs could be the manufacturing entrepreneurs of tomorrow.

Recommendations for MEP, TIP, and Manufacturing USA Programs

Congress infused CHIPS and Science Act programs like MEP, TIP, and Manufacturing USA with provisions meant to diversify STEM careers and ultimately business ownership. Fulfilling these goals will require close attention to implementation, including pieces of the recommendations above. These investments in university research and support for small business could benefit from the following recommendations:

RECOMMENDATION

INCREASE REPRESENTATION AMONG STAFF, BOARD DIRECTORS, AND INDUSTRY PARTNERS AND IN KEY MANUFACTURING INSTITUTIONS.

When it comes to diversifying the leadership of the next generation of manufacturing businesses, representation matters. The organizations supported by the CHIPS and Science Act, from MEP

centers to Manufacturing USA institutes and place-based economic development organizations, should strive to have diverse leaders on their staff and among the industry partners and stakeholders represented. Not only will this representation strengthen DEI initiatives, it will ensure that potential entrepreneurs can see someone who looks like them at the top of manufacturing institutions.

RECOMMENDATION

FOCUS ON ANCHOR INSTITUTIONS AND THEIR ABILITY TO SUPPORT LOCAL PROCUREMENT.

The CHIPS and Science Act will release billions of dollars to both large manufacturers and large research entities, primarily higher education institutions. As defined by the Democracy Collaborative,³⁷ the anchor mission represents “a commitment to intentionally apply an institution’s place-based economic power and human capital in partnership with the community to mutually benefit the long-term well-being of both.” Federal agencies should use their convening power and guidance to encourage these large organizations to develop strategies that intentionally use their status as anchor institutions and have a positive impact on low-income and diverse populations in their communities. These activities should include but not be limited to investments in community development financial institutions who can provide capital to businesses in these communities. Partners should be encouraged to consider the impacts of large federal investment on all the types of procurement, including both the core scientific missions and all of the ancillary goods and services, such as janitorial and catering needs, that major anchor institutions provide. With the right accountability metrics, technical assistance, and supportive capital, anchor institutions can support community businesses as supplier partners.

Conclusion

After decades of inattention and underinvestment, the CHIPS and Science Act gives the United States a chance to maximize the potential of technology and manufacturing as a source of wealth creation. Congress and the Biden administration should be commended for centering inclusive innovation in this landmark law. The drive for inclusive innovation won't be complete unless it impacts the hundreds or thousands of new businesses created to take advantage of subsidies and research supported by the act. Especially when it comes to manufacturing, only an extremely small share of businesses are currently owned by Black entrepreneurs, and just a slight minority are Hispanic- or Asian-owned. The stars are aligned to change these long-standing disparities. The CHIPS and Science Act contains programs that have the scale and policy provisions to catalyze new business ownership and wealth creation among diverse communities. The Biden administration has already demonstrated its commitment to carefully

implementing these provisions to the maximal effect. Historically Black colleges and universities and other minority serving institutions represent perhaps the most important part of their strategy given their unique ability to develop the next generation of STEM leaders and technology entrepreneurs.

But they cannot do it alone. The companies, state agencies, regional leaders, manufacturing intermediaries, and higher education institutions supported by the act must partner closely with CDFIs and other organizations supporting access to capital and the development of budding entrepreneurs. Together, these elements can move the needle in scientific and manufacturing entrepreneurship and bring a newly diverse sector into the twenty-first century.

Acknowledgments

This report was authored by Michelle Burris and Laura Valle-Gutierrez, fellows at The Century Foundation, and Andrew Stettner, a former fellow of The Century Foundation. The authors would like to thank members of UMA's team who contributed to this report, including Audra Ladd and Jeannine Cook. UMA acknowledges the Surdna Foundation for their continued support of our Pathways to Patient Capital work. This report was funded in part by the Ewing Marion Kauffman Foundation. The contents of this publication are solely the responsibility of the authors.

ENDNOTES

- 1 U.S. Congress, House, House - Appropriations | Senate - Appropriations, *Supreme Court Security Funding Act of 2022*, 117 Cong., H.R.4346, https://science.house.gov/imo/media/doc/the_chips_and_science_act.pdf.
- 2 The CHIPS and Science Act only appropriates funding for the semiconductor manufacturing programs which are being immediately implemented. The other aspects of the law that require new federal funding will only be stood up once appropriations are made.
- 3 Ana Swanson, “Biden Administration Releases Plan for \$50 Billion Investment in Chips,” *New York Times*, September 6, 2022, <https://www.nytimes.com/2022/09/06/business/economy/biden-tech-chips.html?smid=url-share>.
- 4 Mark Muro, “Can the CHIPS Act heal the nation’s economic divides?,” Brookings Institution, August 2, 2022, <https://www.brookings.edu/blog/the-avenue/2022/08/02/can-the-chips-act-heal-the-nations-economic-divides/>.
- 5 Timothy Bartik, Brian Asquith, and Kathleen Bolter, “The CHIPS and Science Act offers funding for place-based policies unparalleled in U.S. history,” W. E. Upjohn Institute for Employment Research, August 8, 2022, <https://www.upjohn.org/research-highlights/chips-and-science-act-offers-funding-place-based-policies-unparalleled-us-history>.
- 6 “How Intel Plans to Rebuild Its Manufacturing Supply Chain,” HPC Wire, September 29, 2022, <https://www.hpcwire.com/2022/09/29/how-intel-plans-to-rebuild-its-manufacturing-supply-chain/>.
- 7 *CHIPS and Science Act of 2022 Section-by-Section Summary*, Washington, D.C., 2022, https://www.bennet.senate.gov/public/_cache/files/4/0/40919cb4-ff63-4434-8ae2-897a4a026b30/7BCDD84F555A6B85BEC800514F1D3AFD.chips-and-science-act-of-2022-section-by-section.pdf (accessed September 13, 2022).
- 8 Tina Reynolds and Markus Gerhard Speidel, “CHIPS and Science Act Makes Available Billions Of Dollars For The United States Science And Technology Sectors,” JDSURPA, August 30, 2022, <https://www.jdsupra.com/legalnews/chips-and-science-act-makes-available-3298039/>.
- 9 *The Annual Business Survey*, United States Census Bureau, 2022, <https://www.census.gov/programs-surveys/abs/about.html>.
- 10 United States Census Bureau, *North American Industry Classification System*, <https://www.census.gov/naics/?input=31&chart=2017&details=31> (accessed September 15, 2022).

- 11 “Pathways to Patient Capital: Multi-Stakeholder Approaches to Capital Deployment,” Urban Manufacturing Alliance, <https://www.urbanmfg.org/project/pathways/>.
- 12 U.S. Congress, House, House - Appropriations | Senate - Appropriations, *Supreme Court Security Funding Act of 2022*, 117 Cong., H.R.4346, <https://www.congress.gov/bill/117th-congress/house-bill/4346/text/eas>.
- 13 Michael Lomax, “How To Launch the Next Great Era of Black Prosperity,” *The Atlantic*, February 21, 2021, <https://www.theatlantic.com/ideas/archive/2021/02/hbcus-black-prosperity/618038/>.
- 14 Ivory A. Toldson, “The Funding Gap between Historically Black Colleges and Universities and Traditionally White Institutions Needs to Be Addressed* (Editor’s Commentary),” *The Journal of Negro Education* 85, no. 2 (2016): 97–100, <https://doi.org/10.7709/jnegroeducation.85.2.0097>.
- 15 Mark Muro, Andre M. Perry, Yang You, Max Niles and Robert Maxim, “Congress needs to prioritize inclusion in our slumping innovation system,” Brookings Institution, August 11, 2021, <https://www.brookings.edu/blog/the-avenue/2021/08/11/congress-needs-to-prioritize-inclusion-in-our-slumping-innovation-system/>.
- 16 Alma Adams and Troy Carter, “HBCUs are incubating an era of innovators,” *The Hill*, March 17, 2022, <https://thehill.com/blogs/congress-blog/education/598695-hbcus-are-incubating-an-era-of-innovators/>.
- 17 Donte Kirby, “Here’s how—and why—Morgan State is trying to become the country’s first public R1 HBCU,” *Technical.ly*, August 16, 2022, <https://technical.ly/civic-news/morgan-state-r1-designation/>.
- 18 “Clark Atlanta University awarded \$10 Million National Science Foundation grant to bring Data Science to HBCUs through National Data Science Alliance (NDSA),” Clark Atlanta University, August 4, 2022, <https://www.cau.edu/news/2022/08/Clark-Atlanta-University-awarded-10%20Million-National-Science-Foundation-grant-to-bring-Data-Science-to-HBCUs-through-National-Data-Science-Alliance-NDSA.html>.
- 19 Qyana M. Stewart, “OPINION: To train the next generation of entrepreneurs, look to HBCUs,” *The Hechinger Report*, June 14, 2022, <https://hechingerreport.org/opinion-to-train-the-next-generation-of-entrepreneurs-look-to-hbcus/>.
- 20 Attica Jaques, “Honoring the legacy of Black-owned businesses in the U.S.,” (blog), February 1, 2021, <https://blog.google/outreach-initiatives/small-business/black-history-month-2021/>.
- 21 Meco Shoulders and Don Cravins, Jr., “How HBCUs Help Shape the Entrepreneurial Ecosystem,” *Third Way*, February, 28, 2022, <https://www.thirdway.org/report/how-hbcus-help-shape-the-entrepreneurial-ecosystem>.
- 22 “Southern University System,” Southern University System, <https://www.sus.edu/>.

- 23 Neil Hare and Arturo Cazares, “New State of Latino Entrepreneurship Report Shows Strong Growth in Tech Sector,” *Forbes*, April 14, 2022, <https://www.forbes.com/sites/allbusiness/2022/04/14/new-state-of-latino-entrepreneurship-report-shows-strong-growth-in-tech-sector/?sh=7fc2113aa555>.
- 24 Eric Gillard, “NASA Awards Nearly \$3 Million to Minority-Serving Institutions Over Three Years,” NASA, April 19, 2022, <https://www.nasa.gov/stem/feature/nasa-awards-nearly-3-million-to-minority-serving-institutions-over-three-years>.
- 25 Dedrick Asante-Muhammad et al., “Racial Wealth Snapshot: Native Americans,” National Community Reinvestment Corporation, February 14, 2022, <https://ncrc.org/racial-wealth-snapshot-native-americans/>.
- 26 Jonathan Gruber and Simon Gruber, *Jump-Starting America: How Breakthrough Science Can Revive Economic Growth and the American Dream* (New York: PublicAffairs, 2019).
- 27 *Ibid.*
- 28 “Innovations in the States,” in *Best Practices in State and Regional Innovation Initiatives: Competing in the 21st Century* (Washington, D.C.: National Academies Press, 2013), 7–25, <https://nap.nationalacademies.org/read/18364/chapter/4>.
- 29 U.S. Congress, House, House - Appropriations | Senate - Appropriations, *Supreme Court Security Funding Act of 2022*, 117 Cong., H.R.4346, <https://www.congress.gov/bill/117th-congress/house-bill/4346/text/eas>.
- 30 CHIPS and Science Act, Section 10621, 29(c)(2), https://science.house.gov/imo/media/doc/the_chips_and_science_act.pdf.
- 31 Grant Olsen, “Here’s Why America Needs More Employee-Owned Companies,” Lendio, July 14, 2021, <https://www.lendio.com/blog/america-needs-employee-owned-companies/>.
- 32 Timothy J. Bartik, “Helping America’s distressed communities recover from the COVID-19 recession and achieve long-term prosperity,” Brookings, September 2020, https://www.brookings.edu/wp-content/uploads/2020/09/20200923_BrookingsMetro_Distressed-Communities-COVID19-Recovery_Bartik_Report.pdf.
- 33 CHIPS and Science Act, Section 10621, 29(c)(2), https://science.house.gov/imo/media/doc/the_chips_and_science_act.pdf.
- 34 Minority Business Development Agency, “Specialty Centers,” U.S. Department of Commerce, <https://www.mbda.gov/mbda-programs/specialty-centers>.

- 35 Andrew Stettner, Michelle Burris, and Lee Wellington, “SSBCI 2.0: A New Capital Tool for Revitalizing and Diversifying Manufacturing,” The Century Foundation, January 21, 2022, <https://tcf.org/content/report/ssbci-2-0-new-capital-tool-revitalizing-diversifying-manufacturing/>.
- 36 “The Biden-Harris Plan to Revitalize American Manufacturing and Secure Critical Supply Chains in 2022,” The White House, February 24, 2022, <https://www.whitehouse.gov/briefing-room/statements-releases/2022/02/24/the-biden-harris-plan-to-revitalize-american-manufacturing-and-secure-critical-supply-chains-in-2022/>.
- 37 Emily Sladek, “Higher Education’s Anchor Mission: Measuring Place-Based Engagement,” Democracy Collaborative, 2017, https://static1.squarespace.com/static/62f41050584b40607baef690/t/63220dee2986091cc5523a40/1663176176184/PUB_Higher+Education%27s+Anchor+Mission.pdf.