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**Building a 21st Century NYC Metropolitan Economy:
The Creation of Economic and Political Institutions to
Encourage Diversification & Tech Entrepreneurialism**

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ABSTRACT:

This article analyzes the forces that fundamentally shifted the institutional trajectory of the New York City economy over the 21st century. The new institutional trajectory has shifted away from a small number of cyclical industries to a broadly diversified, technological and entrepreneurial knowledge-based economic system. The institutions that underlie this new economic system strategically target long-term sustained economic growth by investing in biotechnology, applied sciences, high tech educational programs, new media centers, and broad based entrepreneurialism. From the start of Michael Bloomberg's tenure as the 108th Mayor of New York City, there was a strong recognition that the NYC economy was overly dependent on the financial sector to support local economic development, real estate growth, and local businesses. As a result, a new set of economic and political institutions were created and diversified the NYC economy. The creation of the new institutions, however, were not simply the result of well-designed blueprints by local political leaders but organically evolved over time through repeated exogenous shocks, successful state-market relationships, a burgeoning entrepreneurial community, and the explosion of new innovations and technology. Together, these forces converged and new inclusive institutions were created that aligned the incentives of a broad base of economic actors and facilitated local engines of prosperity. The paper's central thesis is empirically supported by conversations with leaders at the New York City Economic Development Corporation and a database on all NYC government programs, initiatives, and support efforts. The findings presented in this paper advance our understanding of how economic and political institutions emerge, why institutions need to include broad actors from local communities, and how can institutions align incentives to facilitate sustainable growth in metropolitan economies.

The comparative advantage of global metropolitan regions has become increasingly dependent on local economic and political institutions to manage the changing inputs to the economic system and sustain long-term economic growth.¹ In particular, institutions operating at the metropolitan region are increasingly responsible to do the heavy work needed to coordinate individual, firm, and government actions, and to manage the changing inputs from the underlying economy and society. Recent empirical literature in the social sciences has shown that metropolitan economic systems are being confronted with historic shifts in the underlying demographics, economic structures, and technologies. For example, global cities are experiencing: 1) a historic shift of people from the rural to urban sector; 2) a historic shift away from a manufacturing based economic system to a service based economy; 3) a historic shift away from traditional banking institutions to new financial markets; 4) a historic shift away from brick and mortar economic organizations to online local communities and digital marketplaces; 5) a historic wave of new college graduates who are trading in lucrative careers in traditional industries for a chance at entrepreneurialism and technology startups. In addition to the changing inputs to the metropolitan economy, there have been fundamental shifts to the technological building blocks that are allowing the new digital and service-based economies to rise—which have become a dominant form of organizing economic exchange in competitive global cities (Economist, 2014). Taken together, the historic shifts to the underlying economy and society, and the technological advancements, are forcing local economic and political institutions to quickly evolve in an effort to compete on a global scale (Nee, 2012).

The institutional scholarship is in agreement that all institutions—whether they are social, economic, and political—are created by society, and that man-made institutions are the most important causal force in explaining the economic success and failure of geographic regions over time. Acemoglu and Robinson (2012) have empirically shown, through careful economic and historical analysis, that the

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differences among the wealth of nations are due to the *politics* that create different institutional trajectories. In particular, they find that “countries differ in their success because of their different institutions, the rules influencing how the economy works, and the incentives that motivate people” (Acemoglu and Robinson 2012, 73). According to Acemoglu and Robinson, a central distinction that needs to be observed is whether the economic and political institutions that are created—at a given time and geographic location—are *extractive* or *inclusive*. Inclusive economic institutions are those that “allow and encourage participation by the great mass of people in economic activities and make best use of the talents and skills and that enable individuals to make the choices they wish” (Acemoglu and Robinson 2012, 74). Extractive institutions are simply the opposite, and are designed to extract incomes and wealth from one subset of society to benefit a different subset—particular examples are feudalism, colonialism, socialist political elites, or the military ruling class. They conclude that the selection of whether a nation or geographic region ends up with inclusive or extractive institutions is the result of politics. After all, politics is the process by which a society chooses the rules that will govern it and how to structure society.

With the similar theoretical goal to understand the institutional foundations that drive economic growth and sustainable development, Nee and Opper (2012) have found that the central causal force is not simply politics and the political institutions that structure society—albeit inclusive or extractive—but the relations between the larger institutional environment and social structures that exist in the local economic system. In particular, they state “the challenge to demystify markets calls for examining the relationship between norms embedded in informal social processes and the formal rules mandated and enforced by the state” (Nee and Opper 2012, 18-19). Based on the systematic analysis of micro and meso-level longitudinal data, they find that the *formal rules* that are created and enforced by the institutional environment—government agencies, legal and regulatory structures—and the *informal norms* of the local economic actors *interact* on a daily basis in the marketplace to shape economic behavior and change economic outcomes. Most importantly, what determines economic success or failure is the alignment between

individual interests and preferences with the incentives structured in the intuitional environment. Nee and Opper (2012) conclude that it is only if this alignment is achieved that a sustainable—self-reproducing—economic engine can be created.

These two empirically tested models—along with their understanding of the role of institutions in economic systems and what is required for economic success—will be used in this paper as “analytical themes” to better understand the institutional workings of the New York City (NYC) metropolitan region and how they have created sustainable economic growth over the 21st century. The NYC metropolitan region was selected as a lab experiment because it contains a broad range of strategic initiatives, stable institutional environment, thriving entrepreneurial community, active political leadership, and has achieved remarkable economic growth. In fact, the NYC metropolitan region has achieved economic success during one of the worst economic recessions since the Great Depression, and has rebuild a new economy in the face of systemic changes to its local economy and society and repeated exogenous shocks. The exogenous shocks that directly impacted the NYC metropolitan economy over the last decade are: 1) the historic dot.com collapse that wiped out a burgeoning tech ecosystem; 2) the historic terrorist attack that closed financial markets and devastated the local real estate market; and 3) the historic financial crisis that fundamentally changed the conventional landscape of Wall Street—and the organizations that controlled the local economy. These historical shocks were the cauldron that forged the structures of new economic and political institutions, the objectives of NYC’s political leadership, and the direction of new entrepreneurial ventures. The metropolitan region’s success in dealing with these exogenous shocks gives us insight into how economic and political institutions emerge, and how they drive the new diversified and entrepreneurial economy.

The remainder of this paper is organized as follows. Section one takes a step back and reviews how impressive NYC’s economic recovery and growth have been over the last decade—paying particular attention to the post financial crisis period. The economic growth rates and success stories of firms verify that NYC has become one of the leading metropolitan regions in the United States. For example, NYC has become a leader in tech entrepreneurship (second only to Silicon Valley & San

Francisco), venture capital backed startups, and the number of new tech-related organizations. In the second section, I review the historical and political landscape that influenced the institutional trajectory of NYC over the last decade. I describe the affects of three exogenous shocks—critical junctures—on the local economic and political institutions, and show how responses by the political leaders and entrepreneurs changed the type of new institutions that were enacted in the local economic system. In section three, I use the institutional insights developed by Acemoglu and Robinson (2012) and Nee and Opper (2012) to evaluate and understand why the government initiatives and programs—approximately 100 programs and initiatives—were created and what allowed for success over the last decade. At a general level, the New York City Economic Development Corporation (NYCEDC), the New York City Mayor’s office, and a large number of private firms managed to create sustainable self-reinforcing economic growth engines through new inclusive institutions. Strategic targets were made to support biotechnology, life sciences and applied sciences. Strategic investments were made to build up the entrepreneurial community through funding competitions, creating networks of business incubators, and supporting shared entrepreneurial workspaces. In the final section, I discuss the implications of these research findings for debates throughout the social sciences on the role of economic and political institutions in regional economies and successful economic development. My analysis suggests that economically successful metropolitan economies must increasingly rely on active institutions to align the incentives of private firms and entrepreneurs, support local engines of economic prosperity through institutional design, and embrace new technologies.

Success of the NYC Metropolitan Economy

NYC has experienced exceptional economic growth in the metropolitan region—relative to other competitive metropolitan regions and the broader national economy—over the last decade and has transitioned to a well-diversified economic system that embraces its historical legacy industries while harnessing innovative industries, tech entrepreneurship and a thriving tech ecosystem. In fact, New York

City has outperformed the national economy and almost all national metropolitan areas on key economic and labor market metrics. The following is a list of just a few highlights from New York City's new diversified economy with an emphasis on the growing importance of its innovative tech-related economy—which emerged after the Great Recession:

- New York City has created jobs at a rate six times that of the rest of the nation—resulting in a record-high number of private-sector jobs in the five boroughs. As of 2012, New York City's share of the U.S. private sector jobs had risen to its highest level since 1992. (Mandel, 2013)
- While the financial sector, including real estate, is the most single important engine of the New York economy, the tech/information sector is now number two, surpassing the private health care sector. (Mandel, 2013)
- Since 2007, when the Great Recession started, New York City's tech & information sector has grown by 11 percent, or some 26,000 jobs, adding \$5.8 billion in additional wages to the economy. Indeed, these wage gains accounted for two-thirds of the growth in private sector wages over that stretch. (Mandel, 2013)
- New York City's tech ecosystem employs 291,000 people or 7% of the 4.27 million people working in New York City. To put this figure into context, the retail sector employs 354,000 people or 8% of total workers, while healthcare employs 665,000 people or 16% of total workers. ([Tech-Ecosystem Report](#))
- From 2003 to 2013, the New York City tech ecosystem added 45,000 jobs, growing faster than both total New York City employment and total U.S. employment. ([Tech-Ecosystem Report](#))
- With \$2.6 billion in venture capital invested in 2013, New York's technology startup ecosystem is currently 87 percent larger than that of Massachusetts and 28 percent the size of Silicon Valley. ([TechCrunch](#))
- New York has had 27 exits over \$500 million since 2001, 59 percent more than Massachusetts and 31 percent the number of Silicon Valley. ([TechCrunch](#))

- Judged by either the amount of venture capital invested or the number of large exits, as of 2013 New York has emerged pretty definitively as the second-largest technology startup ecosystem in the country. ([TechCrunch](#))
- In May of 2013, New York City witnessed its first billion-dollar exit of a tech startup with Tumblr's acquisition by Yahoo.
- The New York City tech ecosystem generates approximately 541,000 jobs, \$50.6 billion in annual compensation, and \$124.7 billion in annual output. ([Tech-Ecosystem Report](#))
- The New York City tech ecosystem generates over \$5.6 billion in annual tax revenues to the City, representing 12.3% of the City's 2013 tax revenue. ([Tech-Ecosystem Report](#))

Exogenous Shocks and the Institutional Response

As of January 2000, the New York City metropolitan region had begun to establish a reputation as a technology powerhouse. The city's tech sector was booming and large amounts of financial capital were being injected into Silicon Alley—originally centered in the Flatiron District and straddled Midtown and Lower Manhattan. Tech related companies were emerging out of the city's legacy industries such as global news media, advertising, communications, and finance. Deal flow—the rate at which investment offers are presented to funding institutions—during this time period was soaring to unseen levels and capital was flowing to new tech startups—even though many did not have strong business plans or reference to when profitability would be achieved. The new tech startups that made up the core of this new burgeoning ecosystem were firms called Razorfish, Kozmo.com, Medscape, Agency.com, and The Mining Company—which would later become About.com.

In March 2000, the successful and growing technology-based economy was all but obliterated by the dotcom collapse. What had become known as Silicon Alley was no longer. Over the course of the next year, the NASDAQ Composite lost 78% of its value as it fell from 5046.86 to 1114.11. Companies that were being thrown money during the height of the technology bubble in 1999 were now insolvent, forced into

bankruptcy, and had to close down their startups. NYC startups went out of business by the day during this time period as a result of the exogenous shocks from the broader technology bubble collapse in Silicon Valley and the collapse of the NASDAQ exchange—headquartered in New York City. The venture capital that had been flowing into the growing NYC technology sectors dramatically declined from 10 percent to 6 percent of the national total; deal-flow volume fell from a peak of 10 percent to 7 percent—hitting a low of 6 percent in 2005. Similarly, the rush to bring internet and technology related companies public slowed to a crawl by the end of 2001. For example, there were 457 IPOs in 1999—heavily dominated by internet and technology related startups. Of those 457 IPOs, 117 doubled in price on the first day of trading. In 2001, however, the number of IPOs dwindled to 76 and none of them doubled on the first day of trading (Beattie, 2012).

Adding insult to injury, the NYC economy not only had to deal with the exogenous shock of the dotcom collapse and free-fall of the tech related equity markets but also the devastation brought on by the 9/11 terrorist attacks—which occurred approximately 18 months after the dotcom collapse. The terrorist attacks on September 11th, 2001 devastated the local economy and community. All major stock exchanges—the lifeblood of the metropolitan region—in NYC did not open on September 11, 2001 and remained closed for six days. On September 17th, the reopening of the exchanges brought on a collapse in the Dow Jones Industrial Average (DJIA), which dropped 684 points or 7.1% a record-setting one-day point decline (Barnhart, 2001). By the end of the week, the DJIA had fallen 1,369.7 points or 14.3%, which at the time was the largest one-week point drop in history (Fernandez, 2001). In 2001 dollars, U.S. stocks lost \$1.4 trillion in valuation for the week. In NYC, about 430,000 job-months and \$2.8 billion dollars in wages were lost in the three months after the attacks. NYC's GDP was estimated to have declined by \$27.3 billion for the last three months of 2001 and all of 2002. The U.S. government provided \$11.2 billion in immediate assistance to the Government of New York City in September 2001, and \$10.5 billion in early 2002 for economic development and infrastructure needs (Makinen, 2002). Small businesses in Lower Manhattan near the World Trade Center were devastated. For example, 18,000 small businesses were destroyed or displaced,

and approximately 31,900,000 square feet of Lower Manhattan office space was damaged or destroyed (Hensell, 2001).

The dotcom collapse and the 9/11 terrorist attacks had devastating impact on the once thriving technology ecosystem. The emerging social, economic, and political institutions that had developed to bring together the NYC tech community were torn apart. Over the course of 2000-2003, the Silicon Alley Reporter, a widely read trade publication, was closed and the New York New Media Association, a central institution for the tech community during the boom, quietly closed its doors. Scott Heiferman, founder of I-Traffic in 1995 and Meetup.com in 2002, stated "In 2002 it was definitely embarrassing to say you were doing Internet stuff. It seemed so passé." (St. John, 2006)

In the grips of this these exogenous shocks, the city elected Michael Bloomberg as its 108th Mayor of New York City. Bloomberg, the successful entrepreneur and chairman and CEO of Bloomberg L.P., brought with him to the Mayor's Office the experiences of a veteran of entrepreneurship, insight from founding his own technology based startup, financial wealth, strong relationships with the investment community, and an empirical approach to leadership that focused on objective measures of success. Bloomberg came into office with a strong vision of turning the city around and pledged that under his administration they will not repeat the mistakes made in the 1970s and 1980s, when the city balanced its budget by cutting investment in new infrastructure, failed to maintain existing infrastructure, and did very little to support entrepreneurship and new small businesses. The old cost cutting and short-term strategy that dominated NYC politics proved disastrous, costing billions and taking decades to reverse. Under the Bloomberg administration, large investments were made in turning the city's crumbling infrastructure and telecommunications network into the best in world. For example, NYC made capital commitments totaling about \$40 billion, which is close to a historical record level of spending for large infrastructure improvements (NYCEDC, 2013).

Under the Bloomberg administration, the New York City Economic Development Corporation (NYCEDC) evolved into the government's primary economic engine, and was the organization in charge of implementing Bloomberg's

economic development strategy—creating actionable initiatives and empirically measuring the success or failure of these initiatives. The NYCEDC primarily leveraged the city’s assets—which manages, maintains, and leases over 20 million square feet of property with an estimated value of \$1 billion—to implement the mayor’s economic programs, drive metropolitan growth, create local jobs, and improve quality of life through out the five boroughs. The NYCEDC was formed in 2012 as a result of the merger of New York City Economic Development Corporation into New York City Economic Growth Corporation. The prior New York City Economic Development Corporation was the result of a 1991 merger of two not-for-profit corporations that performed economic development services, and was part of NYC’s plan to consolidate the various providers of economic development services. Each corporation involved in the 1991 merger had been responsible for a wide range of projects and initiatives, all of which had the overarching goal of fostering economic development in the city.

Throughout the Bloomberg Administration’s first term in office—2002 to 2006—they initiated a broad set of diversification strategies to try to move the economy away from the dominant financial sector by spreading its economic base among a diverse set of industries and workforce—focused on biotechnology, tech, and entrepreneurship. By 2006, the administration was proud that the regional economy had 3.1 million private sector workers employed in over a dozen industries and sub-sectors across the five boroughs. In fact, ten industry sectors each employed more than 100,000 people, with no one sector accounting for more than 18% of total employment. Even with the gains made in diversifying the broader economic system, however, four industries—finance and insurance, professional and business services, health and social assistance, and retail and wholesale trade—still generated more than three quarters of NYC’s private sector payroll, which accounted for approximately \$196 billion of the citywide total of \$262 billion (NYCEDC, 2009).

In September 2008, Lehman Brothers, a highly interconnected global investment bank headquartered in NYC collapsed and almost brought down the world’s financial system. The collapse forced the New York Federal Reserve to step into negotiate a deal with congress to help back a historic federally funded taxpayer-financed bail-out to shore up the industry and save the economy from a depression.

Even with Congress and the NY Federal Reserve's emergency measures, the ensuing credit crunch turned what was already a historic downturn into the worst recession in 80 years. The NYC metropolitan region directly felt the impact of this exogenous shock to the local financial system. The crisis once again tested the people, firms, and institutions throughout region, and altered the city's economic landscape.

The financial crisis had devastating effects on the traditional legacy industries in the NYC metropolitan region—finance, insurance, business services, real estate, retails. Reports by the New York City Mayor's Office and the New York State Department of Labor highlighted four important ways the financial crisis impacted the NYC economy, and should be accounted for in future policies. First, direct employment losses in the regional economy's financial sector peaked at just over 125,000, and total employment losses (direct plus ripple effects) due to the financial meltdown for all of New York State were almost 300,000 by 2011, with more than 250,000 occurring in New York City by then (NY State Department of Labor, 2009). Second, the brunt of the region's financial sector meltdown was felt in New York City, with the city accounting for the over 80 percent of the financial sector losses in the region (NY State Department of Labor, 2009). Third, projected employment and wage declines in the securities industry are the largest contributor to future economic uncertainty in the New York State and New York City economies. Finally, the NYC regional economy's financial sector is expected to experience cyclical change over the next few years as financial firms sharply reduce staffing levels. Significant structural change was also projected to occur as firms employ less financial leverage, and will likely reduce both risk and profitability going forward.

The third exogenous shock to the regional economy in a matter of 8 years further highlighted the need for the administration to further wean NYC from its long-standing dependence on a small number of cyclical industries that are subject to booms and busts. In response, Bloomberg and the NYCEDC reinforced its long-term, strategic economic development vision for New York City through the use of the Five Borough Economic Opportunity Plan and the Applied Sciences Initiative. The Five Borough Plan was a comprehensive strategy to bring New York City through the economic downturn as fast as possible. It focused on three major areas: creating jobs

for New Yorkers in 2008, implementing a long-term vision for growing the city's future economy, and building affordable and attractive neighborhoods in every borough ([NYCEDC Five Borough Plan](#)).

Creating Institutions that Encourage Diversification & Entrepreneurialism

At a general level, it is important to understand how state agencies and private firms are intertwined within the local NYC economy. First, the state is responsible for new and existing infrastructure development but is also involved in the coordination of private firms who are responsible for the majority of the telecommunication and connectivity networks throughout the NYC regional economy. For example, over the last five years NYC agencies have invested \$1.1 billion of federal stimulus funds into projects in all five boroughs, including \$261 million that improved and expanded the transportation network and supported the growing private telecommunications infrastructure. Second, the state encourages small businesses in innovative and legacy industries, and helps growing technology startups in NYC. For example, over the last five years NYC agencies have increased the availability of seed funding to early stage entrepreneurs by more than 25%, and expanded the Capital Access Loan Program to help existing firms and entrepreneurs find the money to meet operational expenses. Third, the state targets diversification of the regional economy by supporting the industries of the future. For example, over the last five years NYC agencies have created public-private partnership to develop and grow the bioscience and life science industries at locations such as BioBAT in Brooklyn and the East River Science Park. This simple act created jobs through public-private investments in green infrastructure, including the nation's first multi-story green industrial building at the Brooklyn Navy Yard—which created 1,700 new permanent jobs and 800 construction jobs. Finally, the state targets small business initiatives for each of the five boroughs in the NYC regional economy. For example, over the last ten years NYC agencies have partnered with the private sector to spur investment in West, Central and East Harlem through the expansion of Columbia University—which created 6,000 permanent jobs and 14,000 construction jobs.

Moving beyond these general observations of state-market interaction in the local economy, it is important to investigate the specific initiatives and programs implemented in order to understand why particular economic and political institutions were created, and how they have been able to sustain economic growth. In particular, I analyze a database on government initiatives and programs—approximately 100 programs and initiatives—and conceptualize what is taking place using the theoretical insights developed by Acemoglu and Robinson (2012) and Nee and Opper (2012). Through careful analysis of the database and application of the theoretical insights, I have uncovered the institutional foundations and institutional mechanisms that are responsible for NYC’s economic success. In particular, the institutional foundation of NYC’s economic success is the following: 1) the creation of new inclusive institutions throughout the five boroughs; 2) the inclusion of a broad group of public and private actors to participate in the creation of local economic engines of prosperity; and 3) the alignment of incentives for private entrepreneurs and firms to fund sustainable growth industries that are capital intensive and have long-term returns on investment. Further analysis reveals that there are three specific institutional mechanisms that were created, and increasingly responsible for doing the majority of the heavy work needed for self-reproducing economic growth. For example, the analysis has found the following institutional mechanisms: 1) *public-private property partnership*; 2) *cluster-model organizational structures*; and 3) *tech & entrepreneurial incubators*. Each of these mechanisms creates a self-reproducing social structure that targets what Nee and Opper (2012) describe as the linchpin of sustainable economic growth: the alignment between individual interests and preferences with the incentives structured in the intuitional environment.

The database was built from an extensive review of all initiatives and programs targeting tech, entrepreneurship, and economic diversification from 2002-2013. These initiatives and programs were implemented by the NYC Mayor’s Office, Bloomberg Administration, New York City Economic Development Corporation (NYCEDC), Department of Information Technology & Telecommunications (DoITT), Department of Parks and Recreation, the Department of Education, Mayor’s Office of Media and Entertainment, and the Office of the Chief Digital Officer. The database was

constructed at the Center for the Study of Economy and Society at Cornell University during the summer of 2014.

Instead of reviewing all initiatives and programs implemented over the last decade, this paper focuses on those examples that make up the new institutional design of the local economy, and those that are capable of sustained, self-reproducing economic growth. Thus, while there are a number of initiatives in the database that support local entrepreneurship and diverse industries through one time financial contributions, they were not selected because they do not represent institutional innovations and cannot create long-term sustain engines of prosperity. The extensive list of all initiatives and programs over the last decade is provided in the **DATA APPENDIX**.

Institutional Foundations of Engines of Prosperity: Biotech and Applied

Upon close examination of the database on initiatives and programs, the first discernible trend in the data is that a large number of *public-private partnership agreements*—which bring together state and city level agencies with private firms and investors—have been created throughout the five boroughs to drive local economic engines. The logic of these public-private property partnership agreements is to allow the city to leverage its extensive real estate holdings and form lasting, durable relationships with the entrepreneurial community and to pave the way for long-term growth in the technology and education industries—which are the driving force behind the new economy. For example, one initiative in Harlem allowed the city to contribute its extensive real estate assets into a joint partnership with private firms to fund a new highly successful biotechnology venture. Through these public-private partnerships, institutions were created to facilitate of new innovative ways to use unused land (or inefficiently used) and align the incentives for private firms—which have financial difficulty investing in projects that are capital-intensive with long-term returns on investment. The Bloomberg Administration and the NYCEDC have emphasized that the biotechnology and applied sciences industries are central to the NYC metropolitan regional economy becoming a world-class engine for

economic growth in the 21st century economy, and as a result are willing to make long-term strategic partnerships and leverage its real estate to support growth in those areas.

An early and very successful example of the use of this institutional mechanism—the public-private property partnership agreement—can be found in the partnership that created the Audubon Biomedical Science and Technology Park at Columbia University Medical Center. The goals of the Audubon Biomedical Science and Technology Park were to bring medical advances from the laboratory to the bedside through the development of pioneering biotechnology—new medical treatments, technologies, and therapies. As New York City’s first university-related research park, Audubon supplies the structure and organization to facilitate developments in biotechnology that ensures improved health care, while contributing to economic growth through the creation of private sector research collaborations and a generation of new bio-medically related businesses. The Audubon Center is a 100,000 square foot, state of the art, research facility that is managed by Columbia University but developed in partnership with the City of New York and the State of New York—who together covered the development costs in excess of \$400 million. The initiative was designed to house early stage, private research and development companies. The center is located in Audubon Biomedical Science and Technology Park, a proposed 1 million square foot development at the eastern end of Columbia University Medical Center. Audubon Biomedical Science and Technology Park is comprised of the Mary Woodard Lasker Biomedical Research Building, which houses the Audubon Business and Technology Center, and the Russ Berrie Medical Science Pavilion. The Berrie Pavilion houses a comprehensive diabetes center, genetics research and a research program in pediatrics. The third building in Audubon Park, the Irving Cancer Research Center, opened in May 2005. The Irving Center houses research on cancer, genetics, and cell biology.

Further analyses of the data reveal that this institutional mechanism has been used repeatedly throughout the metropolitan region to support the biotechnology industry and has been designed to work in conjunction with another key institutional mechanism: the *tech & entrepreneurial incubator*. For example, the SUNY Downstate

Medical Center was established in Brooklyn as a center for biotech research and development. The partnership is an agreement between SUNY Downstate, and the NYC and NY state government. The cornerstone of the biotechnology initiative is the Downstate Biotechnology Park, which currently includes a biotechnology incubator for start-ups and early-stage biotech companies, and a 13,000 sq. ft. commercial synthetic chemistry facility. The biotechnology incubator offers wet laboratory, office space, and access to a wide range of university resources. This site targets small companies that need to be in close proximity to the university community—which allows for collaborations among scientists, access to medical and scientific libraries, access to students for internships, and populations willing to conduct clinical trials. The institutionally innovative feature of this initiative is that as companies outgrow the biotechnology incubator, they are able to maintain local relationships and moved into the research and manufacturing space at BioBAT in the nearby Brooklyn Army Terminal.

The Brooklyn Army Terminal is a Cass Gilbert-designed facility on the Brooklyn waterfront, owned by New York City and managed by NYCEDC. BioBAT is intended for more mature biotech companies: It spans 524,000 sq. ft. and is intended for tenants that require between 5,000 to 150,000 sq. ft. of space. BioBAT, Inc., a nonprofit corporation made up of the Research Foundation of the State University of New York on behalf of SUNY Downstate Medical Center and NYCEDC. It was established to foster the development of commercial bioscience research, development, and manufacturing space in Brooklyn. The NYC government invested \$12 million and state senate, and worked closely with SUNY Downstate and NYC administration to secure an additional \$48 million in state funding to facilitate the project. The Brooklyn Army Terminal is already home to the International AIDS Vaccine Initiative, which developed and occupied 36,000 square feet of space for its AIDS Vaccine Design and Development Laboratory. BioBAT is a cutting-edge, high-tech, research and bio-manufacturing facility, one of the largest on the East coast and extends the biotech park—which has the potential to make Brooklyn the ‘Silicon Valley’ of the biotech industry.

Not only does BioBAT represent the direct economic investment by the state and city level governments into the Brooklyn area, but it also demonstrates how new initiatives can bring high quality, cutting edge institutions to previously underserved neighborhoods. The development of nearly 500,000 square feet of space dedicated to bioscience research will ensure that Brooklyn's industrial waterfront remains vibrant, creates jobs, and continues to progress. According to the former NYCEDC President Pinsky, "the development of BioBAT is an important step in the evolution of the biotech industry in New York City. The addition of nearly 500,000 square feet of commercial lab space on the Brooklyn waterfront means that more of the talented scientists and researchers coming out of our academic institutions can develop their innovations here and create good jobs" (NYCEDC, 2009).

The use of these institutional mechanisms can be found not only in the biotechnology industry but also in the life sciences where they have been used in conjunction with a *cluster-model organizational structure*. The Alexandria Center for Science and Technology is a state-of-the-art research and development campus that was built to support and expand life science initiatives in New York City. The new 310,000-square-foot, 15-floor facility was the first of three buildings to be developed as part of Alexandria's newest life science cluster campus. The Center is designed to connect and foster unique and innovative collaborations among New York City's world-renowned academic and medical institutions, support preeminent scientific talent, increase access to venture capital funds, and grow the commercial life science industry. The center is built around a "cluster model" and provides the entrepreneurial and collaborative environments needed to advance scientific discoveries and commercialization by bringing together pharmaceutical, biotech companies, academic institutions, government organizations, and venture capitalists in one location.

The Alexandria Center is an excellent example of a public-private partnership to diversify and develop previously underdeveloped areas of the city. The Alexandria Center is located on a three-acre city-owned site and the NYCEDC provided \$13.4 million in capital funds for its construction. The State of New York provided \$27 million for infrastructure work in connection with the project, and Manhattan

Borough President Scott Stringer contributed \$500,000. Additionally, the New York City Investment Fund, the economic development arm of the Partnership for New York City, provided \$15 million in funding to be used for tenant improvements. Approximately \$2 million in funds were provided by the U.S. Economic Development Administration for the project. The Center is managed by Alexandria Real Estate Equities, which is the largest real estate investment trust focused principally on science-driven cluster formations.

The final empirical example of how these institutional mechanisms converge to create self-reproducing economic engines of prosperity in the biotechnology and applied sciences industries is found in the Applied Sciences NYC initiative. The goal of this government initiative was to create a global challenge to the top education and research institutions to build a new applied sciences and engineering campus in New York City. The incentives for this initiative were to provide the winner of the competition city-owned land on Roosevelt Island, a substantial seed investment by NYC, and strong support in the development process. Cornell University, with partner Technion-Israel Institute of Technology, was named the first Applied Sciences winner and allocated \$100 million in capital funding and a long-term lease agreement for land on Roosevelt Island to develop their \$2 billion, two-million-square foot applied science and engineering graduate campus. In addition to the historical agreement with Cornell University, the government signed public-private partnership agreements with NYU and NYU Poly to develop the Center for Urban Science and Progress (CUSP)—which will use data to address critical challenges facing cities with support from private partners IBM and Cisco. Finally, the city formed partnerships with Columbia University to develop their Institute for Data Sciences and Engineering. These campuses will more than double both the number of full-time graduate engineering students and faculty in New York City. The Applied Sciences initiative is projected to generate more than \$33 billion in overall economic impact, add over 48,000 jobs, and launch nearly 1,000 spin-off companies over the next three decades.

Institutional Foundations of Engines of Prosperity: Tech Entrepreneurialism

Based on the data on government initiatives and programs, and reinforced in my interviews with the leadership teams at the NYCEDC, one of the largest difficulties that NYC entrepreneurs had when starting up new businesses and tech startups was finding affordable real estate and staying connected to local engineering talent. In response, a large number of initiatives and programs were launch in 2009 to help create a *network of tech & entrepreneurial incubators*. Through these networks of incubators, the government provided free and low-cost office space, as well as training and networking opportunities to hundreds of start-ups and small businesses. As for 2013, more than 550 start-up businesses were located in this network of incubators—which were sponsored by the NYCEDC and have raised more than \$90 million in investor funding. 56 of these startups have graduated into market-rate space and continue to expand through out the NYC metropolitan region. More than 900 employees currently work in the city’s network of tech & entrepreneurial incubators. The network includes the following incubators: Varick Street, the city’s first incubator; the Hive at 55, a co-working facility for freelancers in Manhattan; General Assembly, a technology and design campus in the Flatiron District; and Bronx Sunshine, located in Hunts Point.

- General Assembly—in January 2011, The Bloomberg Administration joined partners at General Assembly in opening a new technology and design campus in Manhattan’s Flatiron District designed to incubate new businesses. The incubator is currently operating at full capacity, with more than 130 communal members and 80 dedicated members. This facility houses event space, seminar rooms, a state-of-the art media facility, and work areas to provide start-ups with affordable workspace. In addition, thanks to a \$200,000 grant from NYCEDC, General Assembly offers a series of seminars and workshops on topics ranging from graphic design to accounting that are free and open to the public.

- Varick Street Incubator—the School of Engineering and the City of New York launched the Varick Street Incubator as part of the city’s Five Borough Economic Opportunity Plan in July 2009. The incubator is an integral component of the School of Engineering’s i2e philosophy (invention, innovation, and entrepreneurship). The Varick Street Incubator is the first city sponsored incubator for high-tech startups. Business Insider called the space the “top place in NYC for new entrepreneurs to call home.” As of 2012, Varick Street has helped to support and launch 22 companies.
- The Hive at 55—in July 2009, the Bloomberg Administration announced the MediaNYC 2020 program, a series of initiatives to support and promote the city’s media and technology industries. Included in this announcement was a “freelancer hive” offering affordable workspace to sustain small business and start-ups. In December 2009, the Hive at 55 officially opened in NYC’s Information Technology Center, 55 Broad Street, in the heart of Lower Manhattan. The Hive is an initiative of the Alliance for Downtown New York, the business improvement district for Lower Manhattan. The Alliance provides many services that make the neighborhood a better place to live, work, and visit. With a grant from the NYCEDC, the Hive partners with the local community and the city’s greater technology and media communities—such as Pace University, the Freelancers Union, GuruLoft, Girl in Tech, and the Hatchery. The Hive offers 3 private conference rooms, desks, a lounge, a kitchen with coffee and tea, hi-speed wireless and wired internet, and a printer/scanner/copier/fax machine. Members can use the Hive as their primary mailing address and store items in their lockers. The Hive hosts informative workshops, seminars, Meetups every week, and monthly lunches and happy hours just for members.
- The DUMBO Incubator—formerly a manufacturing area, DUMBO has become an established hub for New York City technology and digital media startup

businesses—earning the nicknames “Digital District,” “Silicon Beach,” and “Brooklyn’s Madison Avenue.” To meet growing demand in the area, NYCEDC partnered with NYU-Poly and Two Trees Management to launch a tech startup incubator in DUMBO in 2011. Located at 20 Jay Street, the DUMBO Incubator caters to technology-focused entrepreneurs from across various industries including financial services, media, green, bioscience, and fashion. Tenants are able to use approximately 30 dedicated workstations and additional co-working stations, as well as access educational programming and services such as business counseling sessions, workshops, and networking events. NYCEDC provided a \$250,000 grant to establish the incubator. NYU-Poly, the facility operator, leased the incubator space for three years from Two Trees Management, which provided the space at a discounted rate. NYU-Poly is currently the operator of the Varick Street Incubator, the first city-sponsored incubator for high-tech startups that launched in 2009.

- Sunshine Bronx Business Incubator—the Bronx Business Incubator is the first city-sponsored business incubator to help develop new startup businesses in the Bronx. The incubator can accommodate up to 400 entrepreneurs from the Bronx and across New York City over the next three years. NYCEDC provided a \$250,000 grant to establish the incubator. Located in the historic BankNote Building at 890 Garrison Avenue in Hunts Point, the nearly 11,000-square-foot Bronx Business Incubator provides approximately 180 workstations—split between desks and co-working space for freelancers—targeted to startup businesses and entrepreneurs across industries including finance, new media, technology, green finance and technology, biomedicine, and healthcare. Tenants are able to lease space on a month-to-month basis. The incubator also offers conference rooms, bi-weekly networking events with tenants across all locations in New York City, and support services including mentoring, coaching, and business training through a partnership with Baruch College.

- Harlem Biospace Incubator—Harlem Biospace (Hb) is a new biotech incubator that provides up to 24 competitively-selected, early-stage life science companies access to affordable wet-lab, microbench space, specialized laboratory equipment, mentorship, business support, and programming. Its goal is to create a thriving biotech community in New York City that helps turn revolutionary biotech ideas into products that solve real health problems. The Harlem Biospace is located at 423 West 127th Street in a 2,300 SF ground-floor space near Columbia University, Columbia's new Manhattanville campus, and City College, and is easily accessible to New York City's major academic and research institutions. NYCEDC developed this incubator in partnership with Sam Sia, PhD, an entrepreneur and faculty member at Columbia University's Department of Biomedical Engineering and Founder of Harlem Biospace. Its advisory board consists of leading life science companies and venture capital firms including Pfizer, Johnson & Johnson, GlaxoSmithKline, New Leaf Ventures, OrbiMed, and Siemens Healthcare Diagnostics.

Institutional Foundations of Engines of Prosperity: Entrepreneurial Funding

In a series of semi-structure interviews with the leadership team at the NYCEDC, it was revealed that while NYC is known for being the financial capital of the world it had difficulties financing the early stages of the tech economy and tech ecosystem. In fact, the timing and flow of capital into the NYC tech ecosystem took approximately 8 years to recover from its pre-dotcom collapse levels—as described in Section 2. The availability of venture capital in the post-financial crisis era was very difficult to come by for NYC entrepreneurs, and forced the local government to step into to coordinate a public-private funding partnership agreement that created institutionalized financial support for new entrepreneurs.

One of the central initiatives that institutionalized funding for local entrepreneurship in the metropolitan region was the creation of the NYC Entrepreneurial Fund (NYCEF). Created in 2009, NYCEF provides promising New York City-based technology startup companies with up to \$750,000 in early-stage

capital. The city created the \$22 million fund—the first of its kind outside Silicon Valley—through a public-private partnership between the New York City Economic Development Corporation (who contributed \$3 million) and FirstMark Capital, a leading New York City-based venture capital firm (who contributed an additional \$19 million). FirstMark Capital provides industry insight, proprietary relationships and the operational expertise needed to ensure the seeded companies reach their ultimate potential. FirstMark is also responsible for sourcing and evaluating potential investments, negotiating terms and conditions, and closing each seed investment. The partnership specifies that the private firm will monitor the performance of the companies it funds and in which the NYC Entrepreneurial Funds are invested, and it will actively work with other leading venture firms and seed investors in New York City to co-invest in these opportunities. As of 2013, The Fund has made investments in five cutting-edge companies—MyCityWay, Jiraffe, Medico, InVision and Zipments—and has allocated \$1 million of the \$3 million committed from the original fund. The NYCEDC will continue providing this critical seed funding to many more innovative start-ups throughout the five boroughs.

In addition to having a commercially viable business model, entrepreneurs and firms interested in the NYCEF must meet the following criteria to qualify for financing: 1) the firm must have its headquarters in New York City and be subject to corporate taxation as a resident of New York City; 2) the most senior executive officer must work primarily in New York City; 3) the firm must be a “technology” or “technology enabled company”; and 4) the firm must not engage in any illegal activity, or engage in the business of firearms, gambling, alcohol, tobacco, or other lines of businesses that would preclude procurement by the City of New York.

In 2009, the NYCEDC implemented another program to institutionalize funding for local entrepreneurship in the metropolitan region through its NYC Capital Access Loan Guarantee Program. This program used a reoccurring institutional mechanism of a public-private partnership agreement with private banks to help micro and small businesses experiencing difficulty accessing conventional bank loans to obtain loans and lines of credit up to \$250,000 for working capital, leasehold improvements, and equipment purchases. The program has made more than \$11.4

million in working capital and capital expenditure loans available to more than 333 companies across the five boroughs. The program provides critical funds to NYC micro (fewer than 20 employees) and small (21 to 100 employees) businesses affected by the economic downturn and experiencing difficulty in accessing loans. In total, more than 90% of these loans were made to businesses with fewer than 20 employees.

Institutional Foundations of Engines of Prosperity: The Tech Ecosystem

Over the course of the last decade, the NYCEDC and Bloomberg Administration have embraced the empirical reality that the local economic system is becoming increasingly reliant on technology, and that they will need to harness new technologies throughout all industries if they are to compete at a global level. To achieve this goal, the local government is working to provide the city's talented workforce with the resources that it needs to succeed as tech entrepreneurs, and provide institutionalized access to training, networking, mentoring, and affordable workspaces. The city has made every effort to make these resources available not only to those segments of the city's workforce who have traditionally excelled as entrepreneurs, but also to more disadvantaged segments of the workforce throughout the regional economy and boroughs. The central initiatives and programs that show how this institutionalized support for the tech ecosystem is being implemented on the ground are the following:

- NYC Generation Tech—Generation Tech is a technology, entrepreneurship and mentorship program for disadvantaged youth developed in partnership with the Network for Teaching Entrepreneurship (NFTE), which serves promising high school students from across New York City. This program offers students the opportunity to participate in a tech "boot camp," create their own apps, pair up with a mentor, and enter a tech business plan competition.

- NYC Tech Talent Draft—NYC Tech Talent Draft is a series of on-campus information sessions highlighting NYC tech employment opportunities for computer science and engineering undergraduate students at top schools. Since Spring 2012, a total of 66 executives from 62 different startup companies have reached nearly a thousand students at seven top engineering schools across the Northeast. In the Fall 2013, NYCEDC organized seven successful NYC Tech Talent Draft events at Brown, Carnegie Mellon, Cornell, Harvard, MIT, University of Pennsylvania, and Princeton. Panels featured leaders from companies such as Amicus, Birchbox, Callida Energy, Chartbeat, Gilt Groupe, Harry's, Meetup, Reelio Labs, Rap Genius, Sailthru, Vemno, and Yext.
- NYC Venture Fellows—NYC Venture Fellows is a highly selective, yearlong fellowship program developed in partnership with Fordham University for NYC-based or international entrepreneurs who are the founders or co-founders of innovative organizations with the potential to create significant employment in New York City. Mayor Bloomberg began the program to make it easier for international and local entrepreneurs to launch and grow their businesses in New York City. The inaugural class of Venture Fellows included 21 entrepreneurs from nine countries, including the leaders of Foursquare, Gilt Groupe, and SecondMarket.
- Clean Technology Entrepreneur Center—In January 2013, NYCEDC announced plans to develop a Clean Technology Entrepreneur Center to assist clean energy entrepreneurs. The center will provide affordable workspace, product demonstration and exhibition space, and mentorship programming for entrepreneurs. NYCEDC is expected to open the Clean Technology Entrepreneur Center with partners NYU-Poly in Downtown Brooklyn in Summer 2013.

- Bio & Health Tech Entrepreneurship Lab NYC—The Bio & Health Tech Entrepreneurship Lab NYC provides extensive support to early-career bio and health tech researchers and engineers, post-docs, and graduate students of science interested in forming new ventures in the areas of therapeutics, medical devices, diagnostics, bioinformatics, research tools, and healthcare IT. Eligible participants must live or work in New York City and show a commitment to developing business skills.
- NYC Next Idea—NYC Next Idea is an annual global business plan competition that encourages international and local entrepreneurs to form new ventures in New York City. The competition, run in partnership with Columbia University's Fu School of Engineering, has two tracks: one for international teams and one for teams with one NYC-based full-time student. The winning teams receive \$17,500 and six months of free office space to use while implementing their business plans. This year's Next Idea competition attracted 222 submissions from 40 countries. Submissions arrived from 14 of the top 16 U.S. universities and 16 of the top 20 international universities, with the winner coming from Germany.

Institutional Foundations of Engines of Prosperity: Infrastructure

The final trend in the database on initiatives and programs to support the diversification of the regional economy and support broad-based tech entrepreneurship is that the government has made systematic attempts to upgrade the city's telecommunications network and increase broadband connectivity. There is explicit recognition that NYC's role in the global economy is defined in terms of its role in the creation, dissemination and application of ideas and information. One of the most important mechanisms to allow NYC to successfully play this role is to have world-class infrastructure and telecommunications networks that connect the city to the world. According to the NYCEDC, the infrastructure and telecommunication networks are "as essential to its economic vitality as the subways that carry New

Yorkers to and from work every day, the highways and bridges over which goods are trucked into and out of the City, and the airports that bring both foreign and domestic travelers to our shores” (NYCEDC, 2005). That being said, however, one of the main difficulties the city faces in maintaining and upgrading NYC’s telecommunications networks is that it is financed, built and maintained almost entirely within the private sector. Ownership is divided among multiple companies that provide services using a variety of technologies, and operating under different types of government regulation.

Given the importance of the city’s telecommunications and the nature of its private financing, local government agencies—NYCEDC, the Department of Information Technology and Telecommunications, the Department of Small Business Services, and the Bloomberg Administration—have formed public-private partnerships with the leading infrastructure and telecommunication providers. For example, in April 2013 the NYCEDC, Mayor’s Office, New York City Chief Information and Innovation Officer, and Verizon launched an innovative pilot program to speed the deployment of fiber optic cabling to businesses and residences across the five boroughs while minimizing construction time, environmental impact and cost. Known as “micro-trenching,” this initiative demonstrated the effectiveness of installing small conduits within the edges of city sidewalks to house fiber optic cabling—which can be used to deliver voice, internet, and cable television services. The excess capacity provided by micro-trenching will be available for use by other communications industry providers, as well as by city agencies—at no cost for the duration of the program. Based upon the results of the program, New York City plans to expand the use of micro-trenching citywide as a construction option available for communications industry providers.

As part of the American Recovery and Reinvestment Act of 2009, the federal government made approximately \$4.7 billion available through the Broadband Technologies Opportunities Program (BTOP). In 2010, the NY DoITT secured approximately \$42 million of this federal stimulus funding for programs to increase access to affordable broadband service across New York City’s underserved communities and among low-income public school students. In total, more than

300,000 New Yorkers have been served through the “NYC Connected Learning,” “NYC Connected Foundations,” and “NYC Connected Communities” BTOP initiatives.

Through these initiatives and partnerships, NYC has created innovative new inclusive institutions to bring broadband access to new locations and populations throughout the five boroughs. For example, NYC Parks WiFi service is provided in more than 50 locations across the five boroughs. Access is available on a free and limited free basis. The Harlem WiFi Network completed in May 2014 is the largest continuous public outdoor WiFi network in New York City, covering over 95 city blocks. The free public network is funded through a generous donation from the Fuhrman Family Foundation to the Mayor’s Fund to Advance New York City and will serve approximately 80,000 Harlem residents, as well as visitors and businesses. The Payphone WiFi initiative uses existing payphone infrastructure to provide free WiFi service at public payphone kiosks across the five boroughs at no cost to taxpayers. The project was developed by the NYCEDC, Van Wagner Communications, Telebeam, and Titan Access. As of 2014, Payphone WiFi is available at more than 25 locations in all five boroughs, with additional hotspots to come.

The NYCEDC is overseeing efforts to design and implement a free, public access Wi-Fi or other emerging technology wireless network corridor in a New York City commercial district. The Wireless Corridor Challenge will provide free wireless Internet access to the chosen commercial district for three years, attracting new businesses and foot traffic to the selected neighborhood. The Wireless Corridor Challenge was awarded to five organizations—Downtown Brooklyn Partnership, Alliance for Downtown New York, Brooklyn Academy of Music, GOWEX, and Flatiron 23rd Street Partnership. The challenge was initially announced in the Mayor’s State of the City address and involved a competitive process that began in the spring of 2013. The program will increase wireless connectivity in New York City commercial and residential districts, which is a critical step in attracting new businesses to a neighborhood, increasing foot traffic and marketing within a business district, connecting residents and visitors within a neighborhood, improving quality of life, and bridging the digital divide. The selected consultants were responsible for developing a neighborhood plan to identify commercial corridor area, potential users

in the area, and projected impact on populations such as businesses, residents and visitors; designing, installing, and launching a wireless network, partnering with sponsors, and marketing the program to users; and operating and maintaining the free, public access wireless network for a minimum of three years.

The Wireless Corridor Challenge will leverage private-sector partnerships to maximize the reach of the program and align the incentives for private firms and local consultants. Targeted impact areas include growing technology centers such as Downtown Brooklyn and Long Island City, more established technology centers like the Flatiron district, cultural and educational centers such as BAM, as well as low- and middle-income areas and NYCHA housing in Fort Greene and Brownsville. NYC's investment will be leveraged by private sector commitments totaling over \$3.4 million dollars, with the city providing a total of \$900,000 in additional funding to assist with the implementation. Each of the selected consultants have developed sustainability plans to insure the continuation of these corridors beyond the city's initial investment.

Discussion & Implications

The New York City metropolitan economy offers important empirical insight into how state, firm, and individual level actors can coordinate behavior through the creation of inclusive economic and political institutions that align incentives and drive self-reinforcing engines of prosperity. The process of creating new inclusive and economically successful institutions, however, is not simply the result of blue prints enacted from above by a strong and all-knowing state. The NYC lab experiment reveals that the evolution of these economic and political institutions takes place in a metropolitan region that has experienced repeated exogenous shocks to the local economy, a changing political landscape that is more open, and shifting inputs from the surrounding economy and society. New institutions were created to work with a large group of private firms and entrepreneurs throughout the five boroughs—heavily focused in Manhattan. These new inclusive institutions were successful because they were embedded in local communities—social structures and organizational structures—through three particular mechanisms. These institutional

mechanisms aligned incentives among the public and private actors involved in the economic action and within the geographic region. Specifically, these mechanisms foster economic growth by making the behavior of local entrepreneurs, firms, and government agencies predictable, and solidified expectations through contractual relations, networks of relationships, and organizational structures. Finally, it is important to emphasize that these inclusive institutions and mechanisms operate within the broader NYC institutional environment that provides a stable set of laws, a state that will protect private property and enforce contracts, and local agencies that provide essential public services—which are often assumed by local economic institutions.

Operating throughout the metropolitan regional economy, I have shown that the New York government involvement—both at the city and state levels—is very important as a facilitator of strategic partnerships with private firms, venture capitalists, and private individuals. The government has been crucial in the fostering, creation, and development of strategically targeted initiatives and programs that helped create the new local institutions that aligned the incentives of all parties involved. The analysis showed that local government action strategically targeted future industries, entrepreneurship, tech ecosystem, and infrastructure. In particular, they targeted: 1) private partnerships and long-term investments in the biotechnology, life sciences & applied science industries; 2) a vast network of entrepreneurial incubators & tech training programs to train new talent and ensure a constant flow of innovation into future industries; 3) capital for entrepreneurial funds & capital access to small businesses to ensure new entrepreneurial ventures are being systemically funded; 4) a vast support network for the broad based development of the NY tech ecosystem; and 5) a world-class metropolitan infrastructure and telecom network—which increased broadband connectivity to all regions of the local economy. The mechanisms that were responsible for doing the institutionalized work needed on a daily basis to create self-reproducing economic engines of prosperity were the public-private property partnership agreement, the research cluster-model organizational structure; and networks of tech & entrepreneurial incubators.

The success of the New York City's economic transformation to a more diversified and technology focused entrepreneurial system has been the result of a confluence of both endogenous and exogenous forces. The central findings of this paper suggest, however, that while global metropolitan regions are at the mercy of large exogenous shocks to their local economies, the role of government is increasingly becoming important in the 21st century economy to help mitigate these shocks to the local economy and endogenously produce sustainable economic growth through the creation of inclusive and properly incentivized local economic and political institutions.

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DATA APPENDIX

Government Initiative	Targeted Industry	Support Type
Audubon Biomedical and Technology Center	biotech, entrepreneurs	private property lease agreement, grant
State University of New York Downstate Medical Center	biotech, entrepreneurs	private property lease agreement, grant
Alexandria Center for Life Science	biotech, entrepreneurs	private property lease agreement, grant
Chashama Incubator	entrepreneurs, art	private property lease agreement, grant
NYC Next Idea	entrepreneurs, technology	private property lease agreement, grant
BIOBAT at Brooklyn Army Terminal	biotech, entrepreneurs	private property lease agreement, grant
Media NYC 2020	media, technology	support
NYC Fashion Info	fashion, technology	support
Capital Access Loan Guarantee Program	finance, technology	grant
NYC BigApps	technology	grant, support
JumpStart New Media	education, technology	grant, office space
FastTrac Training Programs	entrepreneurs, technology	support, office space
Varick Street Incubator	entrepreneurs, technology	private property lease agreement, incubator
Curate NYC	entrepreneurs, art	support
Qualified Emerging Technology Company Incentives	entrepreneurs, finance	tax incentive
BioAccelerate NYC	entrepreneurs, finance, technology	private property lease agreement, grant
Hive at 55	entrepreneurs, technology	private property lease agreement, incubator
Fashion NYC 2020	entrepreneurs, fashion	support
Solar Thermal Pilot Program	infrastructure, technology	grant, support
Emerging Medical Technologies Summit	entrepreneurs, technology	grant
Capturing Carbon Finance Trade	entrepreneurs, finance, technology	grant, support
NYC Entrepreneurial Fund	entrepreneurs, technology	grant
Artist as Entrepreneur	entrepreneurs, art	grant, office space
Green Exchange in Lower Manhattan	entrepreneurs, finance, technology	grant
Small Business Innovative Research program	entrepreneurs	support
NYC Venture Fellows	education, technology	grant, support
NYC Media Lab	entrepreneurs, technology	private property lease agreement, grant
NYC Connected	infrastructure, technology	support

Expanding SecondMarket in Lower Manhattan	entrepreneurs, finance	grant
World to NYC	entrepreneurs, technology	support
NYC Urban Technology Innovation Center	infrastructure, technology	grant, support
General Assembly	education, technology	private property lease agreement, grant
BMW i Ventures	entrepreneurs, technology	office space, incubator
TechSpace	entrepreneurs, technology	office space
Entrepreneur Space	entrepreneurs	private property lease agreement, grant
Industrial Growth Initiative	entrepreneurs, infrastructure, technology	grant, support
Goldman Sachs NYC Food Manufacturing Fund	entrepreneurs, food services	financing
Competition Thrive	entrepreneurs	grant
NYC Public Broadband & Wifi	infrastructure, technology	support
Cornell NYC Tech	education, technology	private property lease agreement, grant
DUMBO	entrepreneurs, technology	private property lease agreement, incubator
Sunshine Bronx Incubator	entrepreneurs, technology	private property lease agreement, incubator
LatAm to NYC	entrepreneurs, technology	support
Office Business Center Association of NY	entrepreneurs	office space
The Center for Urban Science and Progress (CUSP)	education, technology	private property lease agreement, grant
NYC Tech Talent Draft	education, technology	grant, support
CFDA Fashion Incubator	fashion, technology	private property lease agreement, grant
New Institute for Data Sciences and Engineering	education, technology	private property lease agreement, grant
Academy for Software Engineering and Bronx Academy	education, technology	office space
ConnectNYC Fiber Access	infrastructure, technology	grant
LINK Initiatives	entrepreneurs, low income	support, office space
NYC Fashion Fellow	entrepreneurs, fashion	support, office space
NYC Clean Technology Entrepreneur Center	entrepreneurs, technology	private property lease agreement, grant
Bio & Health Tech Entrepreneurship Lab NYC	biotech	private property lease agreement, grant
Urban Future Lab	entrepreneurs, technology	office space
New York's Next Top Makers	entrepreneurs, technology	private property lease agreement, grant
Innovate Health Tech NYC	health, technology	private property lease agreement, grant
Pilot Health Tech NYC	health, technology	grant

New Software Engineering Pilot Program	education, technology	private property lease agreement, grant
WiredNYC	technology	support
Israel to NYC	entrepreneurs, technology	support, office space
"Made in NY" Media Center	media, technology	grant, support
Take the H.E.L.M.	entrepreneurs	support, office space
Harlem Biospace	biotech, entrepreneurs	private property lease agreement, grant
Harlem Garage	entrepreneurs, technology	office space
NYC Broadband Map	technology	support
RISE: NYC	entrepreneurs, infrastructure, technology	grant, support
Berlin to NYC	entrepreneurs, technology	support
NYC Generation Tech NYC	education, technology	grant
Project Pop Up NYC	fashion, technology	grant, office space
Digital.NYC	technology	support