

# Industrial Policy and Local Economic Transformation: Evidence From the U.S. Rust Belt

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## Abstract

State and local governments frequently invest in policies aimed at stimulating the growth of new industries, but studies of industrial policy and related economic development initiatives cast doubt on their effectiveness. This article examines the role of state-level industrial policies in contributing to the different economic trajectories of two U.S. metro areas—Pittsburgh, Pennsylvania, and Cleveland, Ohio—as they adapted to the decline of their legacy industries. Comparative case studies show that industrial policies in Pittsburgh, which empowered research universities as local economic leaders, contributed to the transformation of the local economy. In Cleveland, by contrast, state industrial policies invested in making incremental improvements, particularly in legacy sectors. The article concludes that by empowering new local economic actors—such as universities—industrial policies can foment political change that enables structural economic change to follow.

## Keywords

industrial policy, legacy industries, universities, economic development

Between 1980 and 2015, as U.S. manufacturing industries declined and technology-intensive service industries grew, the economic geography of the United States changed dramatically (Autor, 2010; Autor & Dorn, 2013; Moretti, 2012). During this period, metropolitan areas with a legacy of manufacturing in the Midwest—the region often referred to as the Rust Belt—frequently lagged behind the rest of the country in income and employment growth as the region’s population stagnated (Autor, 2019; Autor et al., 2013; Berry & Glaeser, 2005; Ganong & Shoag, 2017). By contrast, metro areas with a concentration of high-skilled workers and innovative firms, such as San Jose, CA and Boston, MA, have experienced substantial economic growth. Economist Enrico Moretti referred to this growing gap between struggling places and thriving ones as “The Great Divergence” (Moretti, 2012, p. 5). The question facing Rust Belt metros has been how can local economies grappling with the decline of legacy industries transform to create high-wage jobs in new sectors?

This article explores how—if at all—government interventions aimed at stimulating economic activity in advanced technology industries have contributed to local economic transformation. Since the 1980s, governments in the Rust Belt have invested in a similar set of advanced technology policies aimed at attracting investment in growing industries by supporting university-industry research partnerships, investing in start-up companies, and creating training programs, among other activities (Atkinson, 1991; Jones, 1986;

The Carnegie Commission on Science, Technology, and Government, 1992). These government interventions fit within the category of industrial policies, or government interventions, aiming to “stimulate specific economic activities and promote structural change” (Goldstein, 1986; Rodrik, 2008, p. 2). Policy scholars and advocates continue to propose policies like these as solutions for left-behind places in the United States (B. Austin et al., 2018; Hendrickson et al., 2018). However, research examining economic development policies at the state and local levels has not found evidence that they have much influence on the trajectory of local economies (Bresnahan et al., 2001; Chatterji et al., 2014; Storper et al., 2015; Wolman et al., 2017; Wolman & Spitzley, 1996). Instead, explanations for why some local economies perform better than others have focused primarily on the importance of a region’s historical endowments like human capital and anchor institutions, as well as a region’s exposure to exogenous shocks like import competition from China (Autor et al., 2013; S. M. Breznitz, 2014; Feldman, 2003; Glaeser, 2005; Glaeser et al., 2014; Markusen, 1996; O’Mara, 2005; Storper, 2010).

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The ineffectiveness of state and local industrial policy has been attributed to the challenge of picking winners, or selecting individual firms or industries for the government to support (Goldstein, 1986; Schultze, 1983). While it is possible in principle for industrial policies to stimulate local economic development (Krugman, 1993), studies of industrial policies in practice have found that political motivations—such as the desire to claim short-term credit for policy achievements—can interfere with the implementation of industrial policy in the long term (Dewar, 1998; Wolman & Spitzley, 1996). One suggested remedy for industrial policies in the United States was to make the process more technical and less political (Dewar, 1986). After all, cases of industrial policy success from East Asia emphasized the important role that expert bureaucracies can play to “midwife” or “discipline” private-sector activity as part of implementing industrial policy (Amsden, 1989, p. 14; Evans, 1995, p. 13; Johnson, 1982). However, U.S. state and local governments lacked an extensive professional bureaucracy to implement industrial policy and instead relied on public–private partnerships to achieve economic development priorities (Stone, 1989, 1993). Thus, it was unclear how U.S. states could replicate the example of industrial policy in “developmental states” like Japan or South Korea (Evans, 1995).

There are two reasons to reconsider the role that industrial policies have played in shaping the economic trajectories of Rust Belt metros. First, although past research has emphasized how political motivations have been an obstacle to economic transformation, there is evidence from outside the United States that political choices enabled economic transformation (D. Breznitz, 2007). In places where legacy industries presented “obstacles to innovation” and economic change, industrial policy played a role in identifying new areas of economic specialization (Grabher, 1993, p. 256; Hausmann & Rodrik, 2002). Second, a group of Rust Belt metros has experienced economic transformations consistent with the goals of the advanced technology policies that they adopted in the 1980s (Muro et al., 2016; Porter, 2018). Although factors unrelated to industrial policy might explain these economic changes, it is important, given the continued popularity of state and local industrial policies, to explore the hypothesis that, under some conditions, government interventions can contribute to local economic transformation.

This article examines that hypothesis using case studies of Pittsburgh, PA and Cleveland, OH, a pair of Rust Belt metro areas that shared many historical similarities and adopted similar industrial policies in the 1980s but followed different economic trajectories thereafter. Pittsburgh experienced substantially higher levels of personal income per capita and employment rate growth than Cleveland between 1980 and 2015. Although there is a plethora of differences between two large metro areas with rich histories, a series of prominent studies used comparative case studies as a method of generating and testing hypotheses about regional economic

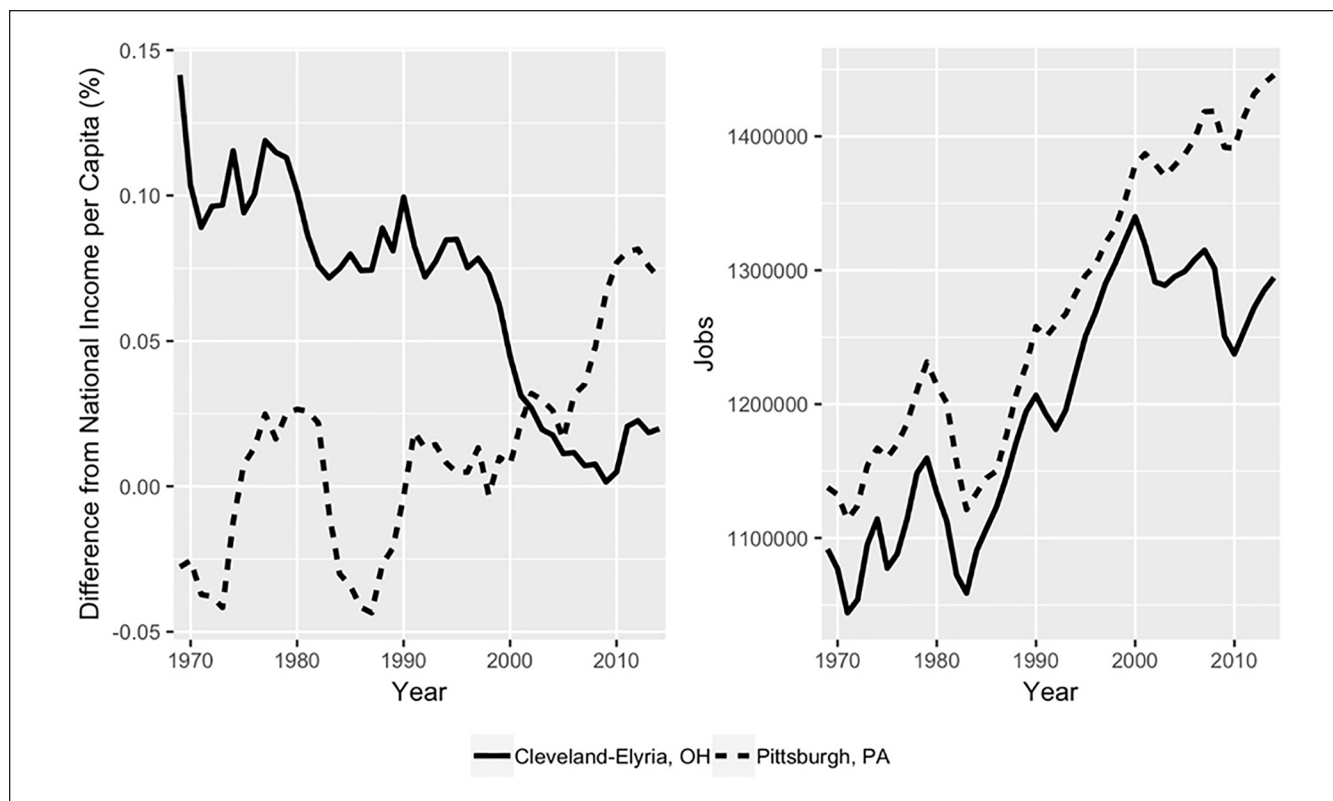
variation (Moretti, 2012; Putnam et al., 1994; Safford, 2009; Saxenian, 1996; Storper et al., 2015). The case comparison aims to evaluate the hypothesis that industrial policy played a role in the different economic trajectories of the two metro areas against leading alternative explanations, such as the strength of anchor institutions and exposure to exogenous economic shocks. If industrial policy played a role, it seeks to identify what about industrial policy in Pittsburgh made it more successful than industrial policy in Cleveland.

The comparison finds that industrial policies contributed to local economic transformation in Pittsburgh, whereas similar industrial policies do not appear to have affected Cleveland’s economic trajectory. Government interventions were successful in Pittsburgh because the Pennsylvania governor’s office built a political coalition to implement the state’s advanced technology priorities. The governor’s administration was able to accomplish this by empowering new local actors—particularly Pittsburgh’s two main universities—as economic leaders alongside the business community. The Pittsburgh case highlights how political action forging new public–private partnerships has the potential to facilitate economic transformation.

### **Why Pittsburgh, Not Cleveland**

Approximately 130 miles apart, Pittsburgh and Cleveland have been the subject of economic comparison for almost a century (Duffus, 1930; Jezierski, 1988; Magnuson & Green, 1980; Miller, 2018; Smith, 1985). Studies of the two cities and their surrounding metro areas have highlighted similarities and differences over time. Both were among the largest U.S. cities in the first half of the 20th century recognized for their industrial prowess (Duffus, 1927a, 1927b). In 1980, the majority of the top-10, most-concentrated industries in both metro areas with over 5,000 workers were manufacturing related (see online supplementary Appendix Table A.1). Nonetheless, the manufacturing sectors that thrived in Pittsburgh were different than those that concentrated in Cleveland. Whereas Pittsburgh’s industrial base was dominated by primary metals, Cleveland’s manufacturing employment was spread across more diverse industries (Chinitz, 1961). Despite this difference, it was not obvious in the early 1980s, as U.S. manufacturing employment suffered a sharp decline, which local economy was best prepared to recover.

Both places suffered population and job losses around the 1981 to 1982 recession. From 1980 to 1985, Pittsburgh lost 6% of its jobs and 4% of its population as “more than 100,000 workers in steel and related industries” lost their jobs (Bureau of Economic Analysis, n.d.-a; Hymowitz & O’Boyle, 1984). Cleveland lost 2% of its jobs and 2% of its population between 1980 and 1985 (Bureau of Economic Analysis, n.d.-a). Although manufacturing layoffs in Cleveland were less severe during this period, the City of Cleveland was still recovering from a fiscal crisis during the late 1970s



**Figure 1.** Income and job growth in Pittsburgh and Cleveland (1969 to 2014).

(“Cleveland Area Has Lost,” 1984). As legacy manufacturing employment declined, state governments in Pennsylvania and Ohio both invested public money in industrial policies aimed at stimulating the growth of advanced technology industries in Pittsburgh and Cleveland.

In the decades following the recession, the economic trajectories of Pittsburgh and Cleveland differed substantially (see Figure 1). Between 1980 and 2015, the Pittsburgh metro area experienced growth in personal per capita income that was in the upper quartile for U.S. metro areas, whereas Cleveland’s growth in per capita income was below the median. Pittsburgh’s growth in employment (measured as jobs/population) was also in the upper quartile for U.S. metros and outpaced Cleveland’s employment growth. The Pittsburgh metro ranked second among 50 large metros in intergenerational mobility (the predicted income percentile in 2011 to 2012 of children born at the 25th percentile of the income distribution in 1980 to 1982), whereas Cleveland ranked 40th (Chetty et al., 2014; see Table 1).

Differences in industrial composition and high-technology business attraction underscore the economic variation between Pittsburgh and Cleveland in the 21st century. Whereas the two metro areas were similarly concentrated in manufacturing industries in 1980 (see online supplementary Appendix Table A.1), Pittsburgh’s most concentrated

industries had shifted by 2015, while Cleveland’s most concentrated industries remained primarily in manufacturing. Pittsburgh also attracted higher concentrations of employment in higher education and in research and development than Cleveland; Cleveland increased its concentration of manufacturing jobs relative to the national average (see online supplementary Appendix Tables A.2 and A.3). And finally, since 2010, leading technology companies such as Google, Apple, Facebook, Amazon, and Uber have established offices in Pittsburgh. In 2009, then-President Obama said that Pittsburgh “has transformed itself from the city of steel to a center for high-tech innovation—including green technology, education and training, and research and development” (Brusk, 2009). The question for this article is *how* exactly the economy of the Pittsburgh metro area transformed during the decades following 1980, while the economy of the Cleveland metro area did not.

The primary hypothesis is that industrial policies emphasizing advanced technology industries in Pennsylvania helped Pittsburgh become a center for high-tech innovation, whereas similar policies in Cleveland did not play a substantial role in the local economy. The hypothesis is not that state intervention was the only factor, but, that in the absence of industrial policy, Pittsburgh would have been unlikely to experience such a significant economic transformation as

**Table 1.** Pittsburgh and Cleveland Metro Areas in 1980 and 2015.

Geography	Pittsburgh MSA			Cleveland–Elyria MSA		
	1980	2015	Change (%)	1980	2015	Change (%)
Year						
Personal per capita income (in 2015 dollars)	\$28,552	\$50,756	78	\$30,631	\$47,783	56
Employment rate % (jobs/population)	46	64	18	52	62	10
Population (millions)	2.65	2.35	-11	2.17	2.06	-5
% College graduates	14	33	19	15	29	14
% Manufacturing employment	26	6	-20	30	10	-20
Intergenerational mobility (expected income percentile of child born between 1980 and 1982 to parents at 25th income percentile)		42.3%			36.4%	

Note. The change in personal per capita income and population is measured as a percentage change  $([2015 \text{ measure} - 1980 \text{ measure}] / 1980 \text{ measure})$ , whereas the change reported for other variables is a percentage point change  $([2015 \text{ measure} (\%) - 1980 \text{ measure} (\%)])$ . MSA = Metropolitan Statistical Area.

Source. Per capita personal income; population; employment rate; % manufacturing employment (Bureau of Economic Analysis, n.d.-a, n.d.-b, 1969, 2000); % college graduates (U.S. Census Bureau, 2015a; U.S. Department of Agriculture Economic Research Service, n.d.); intergenerational mobility (Chetty et al., 2014).

manufacturing declined. Past research and historical data on the two metro areas offer two alternative hypotheses: the first is that Pittsburgh's historical strengths made its local economy more likely to transform and thrive than Cleveland's; the second is that exogenous shocks to the U.S. manufacturing economy advantaged Pittsburgh more than Cleveland. Elements of these alternative hypotheses are valid, but they do not discount the role of industrial policy in explaining the differences between the cases.

## The Role of State Industrial Policy

In the early 1980s, Pennsylvania and Ohio passed similar statewide industrial policies—the Ben Franklin Partnership in Pennsylvania (Franklin Partnership); the Thomas Edison Program in Ohio (Edison Program)—to stimulate the growth of advanced technology industries and jobs. Although the definition of what qualified as “advanced technology” was not always clear, both programs sought to build stronger ties between industry and local universities with the goal of promoting applied research and new technology development. The Franklin Partnership sought to connect “private and educational resources, particularly research capabilities, to make traditional industry more competitive in the international marketplace” (Pennsylvania Department of Commerce Accomplishments, 1986). The strategy of Ohio's Edison Program was “to stimulate working partnerships between business and academia and thus set free entrepreneurial impulses latent in both” (Ohio's Thomas Edison Program, n.d.). The two state programs provided funding for technology centers that sought to achieve their purposes.

Both states also set aside funding for the promotion of entrepreneurship at local start-up incubators. In the first 4 years of the programs, the Edison Program received slightly more public funding (\$100 million) than did the Franklin Partnership (\$76 million; Ashyk, 1987). In both cases, the state government did not plan to carry out these programs on their own through the state bureaucracy. They entrusted the

implementation to local partners who submitted proposals for technology centers and incubators to the state for funding. Despite these similarities, the states' industrial policies differed in which local actors shaped the implementation of industrial policy, as well as how the funds were invested. As a result, the extent to which industrial policy investments changed the status quo of the local economy also differed.

## Pittsburgh

State industrial policies in Pittsburgh consisted of two principal initiatives: the Franklin Partnership and Strategy 21. In 1983, the state government approved funding for the regional hub of the Franklin Partnership in Pittsburgh, the Western Pennsylvania Advanced Technology Center (WPATC). The metro area's two primary research universities, Carnegie Mellon University (CMU) and the University of Pittsburgh (Pitt), applied to manage the WPATC jointly. The WPATC had a relatively small budget to support collaborations between universities and businesses with the goal of creating new jobs in the region (WPATC, n.d.). In 1985, a coalition of government and university leaders in Pittsburgh introduced Strategy 21, a plan for economic revitalization that listed a series of proposed high-technology projects, as well as more traditional infrastructure projects in the region, such as investment in highways and renovation to the airport (Caliguiri et al., 1985).

Then-Pennsylvania Governor Richard Thornburgh's staff linked the Franklin Partnership and Strategy 21. As one advisor to the governor wrote, “it is reasonable to assume that without the Ben Franklin Partnership and the active support of the Thornburgh administration,” the various high-technology projects included in Strategy 21 “would not be topics of discussion” (Werner, 1985). The Thornburgh Administration, with support from the state legislature, invested in the region's proposed Strategy 21 and lobbied for additional federal support for local high-technology initiatives. By 1988, the state government had allocated more than \$280 million to

Strategy 21 projects (Lubove, 1996, p. 290), which included the following:

1. The Pittsburgh Technology Center, now a 48-acre research park on the Monongahela River featuring CMU and Pitt research facilities alongside industry offices;
2. A software engineering institute based at CMU and funded by the U.S. Department of Defense;
3. A supercomputer center sponsored jointly by CMU, Pitt, and Westinghouse with funding from the National Science Foundation, making Pittsburgh a regional hub for computing infrastructure; and
4. The University of Pittsburgh Applied Research Center and Technology Park on the former site of Gulf Oil research laboratories in Harmarville, PA.

The scale of these industrial policy investments was substantial, but the capital projects and programs that they supported were not transformative on their own.<sup>1</sup>

The lasting impact of industrial policy in Pittsburgh traces back to how the Franklin Partnership and Strategy 21 changed the role of universities in the local economy. The state government's investments in industrial policy empowered universities in three ways. First, the policies established university administrators as local leaders alongside the Pittsburgh business community. Second, the process of implementing the policies prompted CMU and Pitt to cooperate on major research and planning initiatives. Third, the Strategy 21 process led CMU to treat local economic development as an institutional priority. These three changes were departures from the status quo prior to 1980. The growth of Pittsburgh's universities as direct employers and magnets for high-technology employment has been linked to the metro area's economic transformation (Andes et al., 2017; Kurutz, 2017).

The Thornburgh Administration made a political choice to empower Pittsburgh's universities as part of state industrial policy. In 1979, Governor Thornburgh launched an economic planning initiative called Choices for Pennsylvanians to identify what Pennsylvania's economic priorities should be for the 1980s. Part of this process included discussions with university leaders in the state, including leaders from CMU and Pitt, who recommended ways that universities could contribute to the state's economic growth (Office of the President, Carnegie-Mellon University, 1984). The eventual Franklin Partnership was structured around participation from universities in local economic development. Pittsburgh's two main universities led the local branch of the state's Franklin Partnership, and the chief executives of CMU and Pitt worked alongside the mayor of Pittsburgh and local county commissioners to author Strategy 21.

Identifying universities as leaders in shaping economic development policy was a sharp break from the past. When

Thornburgh ran for governor in 1978, the main actors that he discussed as part of his economic policy were industry and labor, not universities (MILRITE Act [Economic Development System], 1978; Thornburgh for Governor, 1978). In Pittsburgh, the most prominent economic development initiatives before Strategy 21 were downtown redevelopment efforts known as Renaissance I and Renaissance II—partnerships between the Allegheny Conference on Community Development (representing the business community) and the city government (Stewman & Tarr, 1982). For Strategy 21, the Allegheny Conference played a role in facilitating discussions between university leaders and elected officials, but no industry representative was listed as an author of the eventual plan (Ahlbrandt & Weaver, 1987; Caliguiri et al., 1985; Lubove, 1996). One potential explanation for industry's less active role in this process is that the Allegheny Conference had specialized in physical improvement projects rather than job creation on a large scale, which was the goal of Strategy 21. Moreover, the Allegheny Conference included firms that had “disinvested significantly in the region” (Ahlbrandt & Weaver, 1987, p. 449). A survey of Pittsburgh executives at the time suggested that local business leaders were not particularly focused on advocating for local interests (Ahlbrandt & Coleman, 1987). Nonetheless, the Allegheny Conference continued to be a prominent local organization during and after Strategy 21. The lasting contribution of Strategy 21 was the empowerment of Pittsburgh's universities as local economic leaders alongside the business community.

The second lasting contribution of the Franklin Partnership and Strategy 21 was that it helped forge cooperation between CMU and Pitt. The structure of the state's industrial policy helped convene the two universities as regional economic partners. By allocating funding to only one hub per region and requiring that local partners commit funding to match the state government's commitment, the Franklin Partnership incentivized more local partners to buy into a shared vision (Ahlbrandt & Weaver, 1987). A member of the Franklin Partnership Board said, at the outset of the program in 1983, that “one of the greatest things we have done is to force those two universities to come in with a joint proposal and now to have to work together” (Thomas, 1983). More than three decades later, a former aide to Governor Thornburgh agreed, recalling that the partnership between CMU and Pitt was among the most important legacies of the Franklin Partnership for Pittsburgh (R. Stafford, personal communication, 2016). This partnership was significant because Pittsburgh's universities had previously resisted cooperating with government and with one another.

In the 1960s, the two universities had formed the Mellon-Pittsburgh Corporation, which aimed to advance the economic progress of the community, but ultimately frustrated leaders at the Carnegie Institute of Technology (that would later become CMU) because they feared becoming an

unwilling follower of projects that Pitt designed and led (The Problem, n.d.; Warner, 1962). In the 1970s and early 1980s, the leaders of the two universities, President Richard Cyert at CMU and Chancellor Wesley Posvar at Pitt, had personal disagreements. A former state government official reported that Cyert and Posvar did not get along (R. Stafford, personal communication, July 9, 2014), and their challenges working together came through in writing. In response to disagreements at one 1978 meeting, Cyert wrote that public institutions like Pitt adopt “lower standards” to appeal to “state legislators” (“Corrections to Minutes of PCHE Presidents’ Meeting of November 21, 1978,” n.d.). Despite these past conflicts, under the leadership of Cyert and Posvar, the universities cooperated in implementing the WPATC and in pursuing joint projects as part of Strategy 21.

The third lasting contribution of industrial policy in Pittsburgh was to change how the universities themselves approached local economic development. Before the state’s industrial policy interventions, CMU presented itself as a private institution with priorities that were separate from the state. In 1922, the president of the Carnegie Institute of Technology wrote to the incoming governor of Pennsylvania that the institute “asks no aid whatever from the Legislature, and so far as I know, has no intention of doing so” (Baker, 1922). In the 1980s, before CMU’s participation in the Franklin Partnership, Cyert wrote to Governor Thornburgh in support of state legislation that would allow private universities to issue tax-free bonds to finance their expansion. His case for the legislation emphasized that CMU was private and did not seek to depend on the state. “We will exist and prosper without help from the State,” he wrote (Cyert, 1981). However, during its participation in the Franklin Partnership and the Strategy 21 effort, CMU’s discussion of local economic development changed. One possible outcome of the Franklin Partnership and Strategy 21 was that the Thornburgh administration would empower universities, lead them to cooperate, then fund university priorities that did not contribute to local economic development. One board member of the Franklin Partnership said, “[w]e don’t want these universities just to use this money for their own research they would be doing anyway” (Thomas, 1983). Despite these concerns, Carnegie Mellon evolved from an institution skeptical of engaging with the state government before the Thornburgh Administration’s industrial policy initiatives to a leading advocate of local economic development priorities in the decades thereafter.

In 1985, Cyert’s communications indicated that he had transformed from being reticent to partner with the state to articulating local innovation and economic development as one of CMU’s institutional priorities. Having recently won federal funding for a Software Engineering Institute (SEI), Cyert wrote to Governor Thornburgh that he had asked the co-director of the WPATC “to develop a proposal for leveraging our recent SEI accomplishment for the greater benefit

of the region” (Cyert, 1985). In the same letter, he asserted, “CMU is now poised to be a powerful factor in stimulating the transition of Pittsburgh from relying on heavy industry to being a national center for advanced technology.” Cyert was later quoted as saying: “You can’t have a great university in a city that is decaying” (Hershey, 1987). He came to recognize through the course of implementing industrial policy how the university’s priorities could align with the priorities of the Thornburgh Administration.

CMU leaders after Cyert have maintained a commitment to supporting local economic development. In the 1990s, CMU President Robert Mehrabian helped spearhead an effort to promote job creation in the region called the Working Together Consortium (Mehrabian, 1993; Working Together Consortium, 1998). According to a former administrator, CMU’s School of Computer Science made a strategic decision to support an ecosystem of technology companies locally in Pittsburgh, rather than fundraise globally. If the school is to be a top institution in 50 years, the administrator said, it will need to be situated in a thriving local economy (personal communication, September 2017). The university’s policies toward faculty and intellectual property reflect its commitment to the local economy. Former CMU Dean of Computer Science Andrew Moore reported that “every year, between five and 15 faculty members take a leave of absence for one or two or up to four years. Some never come back. Most do” (Loizos, 2016). The university has also adopted an approach to intellectual property that makes it more flexible for faculty to commercialize new technologies (“An Ecosystem of Entrepreneurship,” 2012).

Accounts of Pittsburgh’s transformation since 2009 consistently point to the region’s universities as the source of the city’s revitalization. In 2014, Pittsburgh Mayor Bill Peduto suggested that the city’s universities had become the “factories churning out the talent” to attract companies like Google in a “new economy” (Carpenter & Todd, 2014). A 2017 Brookings Institution report listed the city’s world-class research institutions as one of the region’s competitive advantages (Andes et al., 2017). The universities’ role as an engine of local economic development in Pittsburgh was the culmination of a state industrial policy in the 1980s that gave them new authority to cultivate economic development strategy and helped them realize that their institutional priorities could align with the state’s priorities for industrial policy.

### *Cleveland*

When Ohio Governor Richard Celeste’s administration launched the Edison Program, its plan was to fund partnerships between universities and the private sector to manage technology centers focused on certain industry areas. In his 1984 State of the State address, Governor Celeste declared that the Edison Program “will draw together Ohio’s universities and businesses to foster the kind of climate which gave

birth to North Carolina's Research Triangle and California's Silicon Valley" (Celeste, 1984). *The New York Times* report indicated that, alongside Pennsylvania's Franklin Partnership and New Jersey's industrial policy initiatives, the "Edison Program is considered by specialists in the field to be among the nation's most innovative" (Schneider, 1987). Walt Plosila, a policy expert who contributed to the formation of the Franklin Partnership, reported that the Edison Program "is recognized . . . as a pioneering endeavor to improve Ohio's competitive position" (Mittelstaedt, 1989). The Edison Program effort was sensitive to concerns that industrial policy could become too political. The director of the Edison Program explicitly decried what he called "peanut butter politics," or attempts to spread funding evenly across the state to satisfy political demands (Coburn, 1987). The Celeste Administration's aspiration for the Edison Program was to focus on excellence (Thomas Edison Program FY 88-89 Budget Issue Paper, n.d.). In Cleveland, the Edison Program funded technology centers in advanced manufacturing and biotechnology. Both projects had the potential to attract investment and stimulate local economic growth that resembled Celeste's vision.

In 1984, the Edison Program allocated \$4 million to establish the Cleveland Advanced Manufacturing Program, or CAMP. Its goal, consistent with the Edison Program, was "to develop increased university-industry research cooperation within the Cleveland area and to strengthen Cleveland universities' research capabilities" (Cleveland Advanced Manufacturing Program, 1985). CAMP initially developed applied research centers at three Cleveland universities. However, over time CAMP's university affiliations dissolved and the program focused more on serving industry (Cleveland nonprofit executive, personal communication, August 1, 2014). In 1988, only 4 years after it was established, CAMP responded to questions from the Edison Program emphasizing that "CAMP is an industry driven program . . . formed by an industry group, Cleveland Tomorrow" (CAMP and Industry [Response to Letter to Robert Brown], 1988). More than a decade later, CAMP was described as a "nonprofit group that helps manufacturers modernize their operations" (Prizinsky, 2002). CAMP had the potential to build on the strengths of local colleges and universities as the Franklin Partnership and Strategy 21 had in Pittsburgh. However, CAMP's shift over time from a center for new technological development to a consulting organization focused on improving existing manufacturers suggests that industrial policy in Cleveland was reinvesting in legacy firms.

In 1987, the Edison Program allocated \$1.5 million to the Edison Biotechnology Center (EBTC), a partnership between Case Western Reserve University (and its affiliated University Hospitals) and the Cleveland Clinic. The proposed aim of the EBTC was to manage research programs that would benefit the local biotechnology industry. However,

the center never appears to have fulfilled that purpose. In 1988, amid disagreements over how to manage the EBTC partnership, Cleveland's two main medical institutions, University Hospitals and the Cleveland Clinic, announced investments in separate research facilities totaling more than \$100 million (Wilson, 1988). The EBTC was renamed Omeris in 2002; it was renamed BioOhio in 2007, which is now an industry association focused on attracting biotechnology firms to Ohio.

Whereas industrial policy in Pittsburgh appeared to make a lasting contribution by empowering new local actors as leaders in economic development and helping to forge new partnerships among those leaders, industrial policy in Cleveland relied on preexisting private-sector leadership that invested in downtown redevelopment and the metro area's legacy industries. Despite opportunities for the Edison Program to empower universities and build new economic coalitions in Cleveland, it appears to have reinforced the status quo in three ways. First, the Edison Program delegated implementation of its Cleveland initiatives to a business group, Cleveland Tomorrow, that had previously established its own local economic development agenda. Although Cleveland Tomorrow was a comparatively new organization, its leadership reflected the local economic and political leadership of the region in 1980. Second, the Edison Program investments—particularly in biotechnology—were unable to overcome conflicting objectives of business, government, and university actors. Third, although the state's Edison Program emphasized the involvement of research universities, Cleveland's universities did not appear to change their role in the local economy while participating in it. These three factors highlight how similarly designed industrial policies were implemented differently in Pittsburgh and Cleveland.

In 1981, 2 years before the Edison Program officially launched, business leaders in Cleveland commissioned a study from the consulting firm McKinsey & Company to recommend strategies for the city's economic recovery (Hill, 1997). The report identified five programs to stimulate economic recovery, including a venture capital firm focused on supporting local start-up businesses and a productivity center responsible for helping local manufacturers improve their technological capabilities (The Cleveland Tomorrow Committee, 1981). When the Edison Program began funding local initiatives in advanced technology, Cleveland Tomorrow was charged with managing CAMP, even though it had already developed its own strategy for local economic development.

Cleveland Tomorrow's leadership reflected the city's business elite during the early 1980s. In the late 1970s, the City of Cleveland was politically divided. Mayor Dennis Kucinich was vocally antibusiness, claiming that he did not think government should be a "gas station for the rich" (Marschall, 1979). In 1978, a year after Kucinich assumed

office, he narrowly survived a recall election. In 1979, the city underwent a fiscal crisis (Schumacher, 1979). The Cleveland business community responded by recruiting pro-business Republican George Voinovich to run for mayor (Magnet, 1989). In 1980, Voinovich defeated Kucinich. E. Mandell de Windt, chairman of the manufacturing firm Eaton Corporation and the “unofficial dean of Cleveland businessmen,” helped recruit Voinovich and was also among the founding members of Cleveland Tomorrow (Magnet, 1989; The Cleveland Tomorrow Committee, 1981).

Cleveland Tomorrow’s activities ranged from advanced technology initiatives like those that the Edison Center funded to downtown redevelopment projects like the development of new sports facilities, the transformation of a downtown office complex, and construction of the Rock & Roll Hall of Fame (Case Western Reserve University, 2018). The group’s investments in downtown redevelopment paralleled the historical downtown redevelopment projects of Pittsburgh’s Allegheny Conference (Renaissance I and II) to which Cleveland Tomorrow was explicitly compared (Brown, 1986). Accounts of the Cleveland economy from the 1990s emphasized the city’s progress in redeveloping its downtown and recovering from fiscal crisis during the 1980s and early 1990s. Cleveland Tomorrow, according to these studies, represented a new form of business leadership that helped spur a recovery or turnaround in Cleveland (J. E. Austin, 1998; Hill, 1997; Shatten, 1995). However, the group’s investments did not focus on transforming the structure of the local economy by investing in new industries; instead, they appeared to focus on making improvements to the assets that already existed in the local economy.

The exception to this pattern of economic development investments was the Edison Program’s support for EBTC. Cleveland Tomorrow did not directly manage EBTC. Instead, a consortium of Case Western Reserve, Cleveland Clinic, and Enterprise Development Inc.—of which Cleveland Tomorrow was a part—applied to the Edison Program for funds to launch the biotechnology initiative. For EBTC to fulfill its mission, actors from state government, the business community (Cleveland Tomorrow), and research institutions (Case Western and the Cleveland Clinic) would all have had to agree on a mission for the joint venture. However, conflicts arose between the partners over how EBTC should pursue biotechnology research and development.

There were two principal obstacles to the success of the EBTC. The first was an internal conflict over how to handle intellectual property. In 1988, the manager of the proposed EBTC said that its objective was to develop new technologies that would benefit its fee-paying member companies. He described the EBTC’s programming as “short-range research projects with commercial paybacks” (Prizinsky, 1988). Case Western’s Dean Thomas Moss offered a similar perspective regarding the center’s intellectual property policies. He said they would need to work to the advantage of

participating companies, giving them “a specific edge” (Prizinsky, 1988). Representatives of the state government articulated a different vision. The director of the Edison Program said that the state government sought to “create institutional capacity that will endure over time” (Prizinsky, 1988). A member of the board evaluating Edison Centers said that the state’s industrial policy should focus on investing in “precompetitive” research rather than performing research that benefits select firms (Prizinsky, 1988). The second obstacle was that the design of the EBTC relied on the participation of member companies specializing in biotechnology; however, there was not a critical mass of biotechnology ventures in Cleveland during the 1980s (Industrial Technology and Enterprise Advisory Board, 1988). The assumption that the EBTC would need to serve existing firms was inconsistent with the Edison Program’s goals of generating economic activity in areas where it was not already present. This approach is in contrast to the Ben Franklin Partnership and Strategy 21, which focused on university assets first, even if there was not a preexisting concentration of firms in related fields.

In Cleveland, Case Western and the Cleveland Clinic did not assume a leadership role in economic development similar to their institutional counterparts in Pittsburgh. Where universities did participate in Edison Centers, it was through faculty who were asked to support research initiatives and not necessarily administrators guiding the overall direction of Cleveland’s economic development. For example, the president of Case Western framed the university as a passive beneficiary of state support in an annual report: “In an exceptional illustration of cooperation with other institutions and with industry, faculty research groups were selected to participate in three of six Advanced Technology Application Centers financed jointly by the State of Ohio and industry” (Case Western Reserve University, n.d.). While faculty researchers were recruited to participate in the Edison Program, universities reportedly did not put up their own funding as part of their participation in CAMP (Cleveland nonprofit executive, personal communication, August 1, 2014). The Edison Program critiqued the universities’ lack of “emphasis on applied research” as a weakness, and critiqued that while academic researchers were capable, they were “tied to the universities rather than CAMP as a whole” (Industrial Technology and Enterprise Advisory Board, 1988).

These criticisms of Cleveland’s universities are consistent with research on universities’ role in economic development more broadly, which has suggested that the interests of universities and firms can come into conflict. Industries “prefer less disclosure of research to increase the appropriability of the profits of any . . . innovations that may grow out of the research,” (Cohen et al., 1998, p. 186) but restrictions on disclosure “compromise the norm of open science valued by researchers as an end in itself” (Cohen et al., 1998, p. 191). Universities have also been criticized as unreliable partners.



**Table 2.** Funding and Expenditures in Pittsburgh and Cleveland.

Category	Pittsburgh	Cleveland
State industrial policy spending (Ashyk, 1987)	\$76 Million (~1984-1987)	\$100 Million (~1984-1987)
Federal "Urban Development Action Grants" (Smith, 1985)	\$61 Million (1979-1985)	\$34.5 Million (1980-1985)
Annual university research spending (CMU Sponsored Research FY 84, n.d.; Office of the President, 1987)	\$52.5 Million (1984)	\$74 Million (1986)
Federal R&D funding for universities (Cook & Schechter, 1982)	\$48 Million (1979)	\$30-35 Million (1979)
Other significant industrial policy expenditures (Cleveland Tomorrow, 1988; Lubove, 1996)	\$280 Million (Strategy 21 funding, 1985-1988)	\$4.5 Million direct spending by Cleveland Tomorrow, ~\$160 million in related "regional development spending by corporations, foundations, individuals, unions, and government" (1982-1988)

One research and development executive is quoted as saying about industry partnerships with academia, "[t]he university takes this money, then guts the relationship" (Florida, 1999, p. 69). In the role of its universities, as well as the challenges it faced in forging partnerships between universities, government, and the private sector, Cleveland's experience under the Edison Program appears to reflect the political and practical challenges of state and local industrial policy that industrial policy skeptics have previously identified.

### Alternative Hypotheses

There are two alternative explanations for the different economic trajectories in Pittsburgh and Cleveland. One focuses on the historical endowments of the two places; the other emphasizes exogenous shocks that shaped their economic trajectories. The first hypothesis claims that, even before the 1981 to 1982 recession and the decline of regional manufacturing employment, Pittsburgh had higher quality anchor institutions than Cleveland and was more prepared to transform its economy in response to the decline of U.S. manufacturing jobs. In 1976, CMU's engineering school was listed among the top 10 in the United States, according to a survey of engineering deans (Benic, 1976). The CMU Robotics Institute launched in 1979, in partnership with Westinghouse, to celebratory headlines such as "CMU Guides Robot Revolution" (Hotz, 1980; Krause, n.d.). In 1983, CMU was on the debut list of the top U.S. universities, whereas Case Western was not (John Willingham, 2017). A *Los Angeles Times* comparison of the two cities in 1980 found that Pittsburgh had already begun to transition its economy to service industries, whereas Cleveland had not (Magnuson & Green, 1980). Strategy 21 projects such as the Software Engineering Institute and the Supercomputer Center were federally funded based on the universities' records of excellence. This suggests that industrial policy investments in Pittsburgh were built on the expertise in engineering and computer science that predated the Franklin Partnership.

However, CMU's emerging expertise in engineering and computer science in the 1970s and early 1980s did not mean that Pittsburgh would inevitably attract high-technology jobs in related industries. For example, universities that ranked above CMU in 1983 included Yale University, the University of Chicago, the University of Michigan at Ann Arbor, and the University of Illinois at Urbana-Champaign. These universities and others have long legacies of scientific and engineering expertise without becoming sources of economic transformation near their campuses. Moreover, there is evidence that state industrial policy helped build on the expertise of Pittsburgh's universities. Federal funding for Strategy 21 projects followed active lobbying campaigns by university leaders as well as state and federal political officials. CMU President Cyert coordinated the university's advocacy for the Software Engineering Institute with members of the Thornburgh Administration (Bittenbender, 1984; Cyert, 1984). The Thornburgh Administration's budget also committed state funds to support a permanent facility in the event that CMU won its bid for the institute (Bittenbender, 1984). Cyert and Posvar coordinated to lobby for federal support for the universities' proposed Supercomputer Center. They reached out to Pennsylvania Congressman John Murtha, who monitored the National Science Foundation selection process and reported back periodically to university leaders (Murtha, 1985).

The historical endowments explanation must also reckon with the substantial technical expertise at Case Western Reserve University and the Cleveland Clinic around the time when state industrial policies were implemented. These institutions appeared to have the potential to contribute to local economic transformation in Cleveland. In the early 1980s, Case Western had a slightly larger research budget (\$61 million in 1980 and 1981, \$74 million in 1986) than CMU (\$52.4 million in 1984; Case Western Reserve University, n.d.; Case Western Reserve University, 1980; Office of the President, 1987; see Table 2). In 1982, Case Western announced its focus on technology transfer from its

research operations to the marketplace; in 1986, the university hired a specialist to lead a technology transfer operation through a related entity called University Technologies, Inc. (Gardner, 1986; Shrout, 1982). The Cleveland Clinic was already listed as a top-10 hospital in the United States in 1971. By the mid-1980s, it was an internationally renowned medical center and a leading employer in the Cleveland metro area (“A Clinic That Caters to Foreign Celebrities,” 1984; Hundley, 1988; Prokesch, 1986). It is possible that Cleveland’s expertise in health care and life sciences was less likely to attract investment in related industries than Pittsburgh’s specialization in engineering and computer science. However, there is evidence from other cases, such as the Research Triangle Park in North Carolina and from academic research, that universities with concentrated research expertise in the life sciences have been associated with local innovative activity in related industries (Jaffe, 1989; Link, 1995; Link & Scott, 2003). This evidence suggests that pre-existing expertise at research universities could be necessary, but not sufficient, for attracting high-wage jobs in advanced technology industries.

The second alternative explanation is that exogenous economic shocks to U.S. manufacturing worked to the advantage of Pittsburgh, but to the disadvantage of Cleveland. Recent studies have documented the precipitous decline of U.S. manufacturing employment beginning around 2000, attributing it to a combination of foreign competition and U.S. trade policy (Fort et al., 2018; Houseman, 2018; Pierce & Schott, 2016). By the time this shock to the manufacturing economy began, Pittsburgh’s manufacturing sector was far smaller—and less exposed to the shock—than Cleveland’s. After all, Pittsburgh’s manufacturing sector, historically concentrated around the steel industry, suffered a sharp decline around the 1981 to 1982 recession, which particularly affected the primary metals sector (Nilson, 1984; Sablik, n.d.). The second alternative hypothesis, then, is that the collapse of the steel industry led Pittsburgh to transition to a service-based economy before Cleveland. Data on the growth of women’s participation in the Pittsburgh workforce during the transition to a service economy suggest that this transition—and not necessarily the growth of universities—might have contributed to the region’s employment growth (Deitrick & Briem, 2009).

In Cleveland, by contrast, the decline of local manufacturing was more gradual in the early 1980s. Investments in organizations like CAMP to improve the competitiveness of local manufacturing appeared to represent a plausible path in the 1980s as Cleveland manufacturing firms sought to compete with firms in Japan and elsewhere (Epstein, 1986). Several accounts suggested that Cleveland had experienced a recovery or turnaround by the 1990s (J. E. Austin, 1998; Hill, 1997), and it is possible that it was only after the sharp decline of U.S. manufacturing in the 2000s that Cleveland’s local economy lost ground. It was also in the 2000s that

support for new industries emerged in Cleveland with the formation of a variety of economic development organizations focused on biosciences, entrepreneurship, and technology transfer from the Cleveland Clinic, many of which received support from a revised state industrial policy initiative called The Third Frontier (Soder, 2012; Zicari, 2010). These data suggest that the degree to which legacy industries decline could affect how quickly a metro area transitions to new types of economic activity.

Several elements of the second explanation are plausible. The steep decline of the steel industry in Pittsburgh could have contributed to the local support for investments in new, advanced technology industries. However, the transition was by no means inevitable considering how other metro areas where the steel industry had concentrated, such as Youngstown, OH; Gary, IN; and Buffalo, NY (The Center for Land Use Interpretation, n.d.) have not experienced a transition to high-wage service industries like Pittsburgh. Moreover, the entry of more women into the Pittsburgh workforce could help explain the metro area’s employment rate growth; however, this explanation and the industrial policy hypothesis are not mutually exclusive. Proponents of Cleveland’s turnaround in the 1990s legitimately pointed to substantial investments in its downtown (J. E. Austin, 1998; Shatten, 1995); however, investments in commercial real estate and stadiums in Cleveland were substantially different than Pittsburgh’s industrial policy investments around its universities. Consider if the Thornburgh Administration’s industrial policy had delegated local authority to the Allegheny Conference, as the Celeste Administration did to Cleveland Tomorrow, rather than to the city’s two research universities. It is possible in this scenario that Pittsburgh’s economic trajectory after the decline of steel would have resembled Cleveland’s, with business leaders investing in downtown redevelopment (as they did in Renaissance I and II) and improving the competitiveness of preexisting local industries. The proposed counterfactual adds credibility to the hypothesis that industrial policy in Pittsburgh that empowered local universities changed the metro area’s economic trajectory.

There is less evidence that the China Shock and its associated effects on the U.S. manufacturing economy can sufficiently explain the different economic paths in Pittsburgh and Cleveland. Although the decline of U.S. manufacturing in the early 2000s aligns with Cleveland’s recognition of certain economic challenges (Plain Dealer, 2001), Cleveland was not among the commuting zones most exposed to import competition from China (Autor, 2018; Autor et al., 2013). Moreover, the personal incomes per capita of the two places were already headed in different directions beginning in the mid-1980s, before the second shock to U.S. manufacturing. The 1981 Cleveland Tomorrow report recognized the need to invest in “[fostering] growth industries” through ventures like EBTC, as well as “[assisting] anchor industries” through

programs like CAMP (The Cleveland Tomorrow Committee, 1981). It does not appear that industrial policy in Cleveland would have been considered successful but for an unlucky economic shock. Industrial policies in the early 1980s envisioned local economic transformation but were unable to generate investment in new industries.

## Conclusion

In 2018, the cover of *Crain's Cleveland Business* declared that Pittsburgh had transformed “from the Steel City into a Tech Mecca” (Miller, 2018). The headline then asked: “Can Cleveland do the same?” This article finds that industrial policy helps explain Pittsburgh’s transformation and offers several lessons that might inform future efforts in places like Cleveland. First, industrial policy has the capacity to empower new actors in the local economy. Among the primary differences between industrial policy in Pittsburgh and Cleveland was who led the implementation: universities in Pittsburgh, the business community in Cleveland. Whereas past studies of industrial policy have lamented the challenge of picking winners, these case studies suggest the importance of picking implementers.

Second, in contrast to suggestions that industrial policy should be less political and more technocratic, industrial policy in Pittsburgh was not less political than industrial policy in Cleveland. Instead, it represented a different type of politics. In Ohio, state officials said the Edison Program should not resemble “peanut butter politics.” In Pennsylvania, the governor’s administration and members of the state legislature were actively engaged in the politics of building a local coalition. The Thornburgh Administration was involved in lobbying for and shaping who was involved in industrial policy projects. The implication is that political activities that build new partnerships and support new projects can enable economic transformation rather than hinder it.

Finally, the role of state government in Pittsburgh was as a convener and a monitor—not necessarily as a funder or a policy designer. The Thornburgh Administration’s success does not trace back to a brilliant idea or an outsized investment (indeed, other states invested far more). Instead, the role that the administration appeared to play was convening local actors who would not have otherwise partnered in generating ideas for the local economy and monitoring their projects to ensure that they aligned with the government’s industrial policy objectives and prioritized local economic transformation.

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## Supplemental Material

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## Note

- 1 There are several important clarifications about Strategy 21 capital projects. The first is that the first capital projects listed in the strategy were not high-technology initiatives. Instead, they were more traditional infrastructure projects including an airport renovation and highway improvements. Second, the scale of the high-technology projects included in Strategy 21 do not directly account for the employment growth in high-technology industries that occurred during the 1990s and thereafter. For example, in 2007, approximately 1,000 individuals worked at the Pittsburgh Technology Center complex, which was still reportedly expanding in early 2020 (Pittsburgh Technology Center (LTV), 2007; Urban Redevelopment Authority of Pittsburgh, n.d.). However, this is only a small share of the estimated 65,000+ workers in the Pittsburgh metro area employed in computer and mathematical occupations, architectural and engineering occupations, or life, physical, and social science occupations (Bureau of Labor Statistics, 2016).

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