

EVIDENCE-BASED ECONOMIC DEVELOPMENT POLICY

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Investing in economic capabilities that enhance firms' ability to innovate and compete on the world stage has become an important national and local policy focus. This type of investment occurs in specific communities and jurisdictions, often providing the foundation for regional economic development. The ability to extend economic prosperity depends on decision-makers' understanding of how and whether such investments contribute to innovative regional economies. Armed with this knowledge, decision-makers can evaluate obstacles to innovation more effectively, and in the process they can tweak, adjust, and—when necessary—redirect scarce policy resources in ways that extend the benefits of innovation more widely.

For this to occur, however, it is important that federal, state, and local policymakers use accurate and timely data to shape public investment decisions and policy priorities, monitor progress, and suggest pivots and improvements. While strategies of entrepreneurship and innovation are widely adopted with the assumption that they will benefit society, there are many instances in which public and private investments in innovative activities have failed to achieve their goal of promoting regional development and broadly shared prosperity. The failure of these investments may be attributed in no small part to competing and unreconciled visions of economic development; unreal-

istic expectations about the foresight of government agencies; and a dearth of timely information on the status of local economies, particularly updates on local firms that provide jobs and increase productivity. Analysts lack the timely micro-level data they need to diagnose their regions' economic challenges and opportunities accurately, and policymakers lack tested principles to compare across, and act upon, suggested remedies. In the absence of useful data and other key information, policymakers are often left to adopt programs and policies that they believe have worked well in other places. However, policymakers tend to copy policy actions from regions that have very

different characteristics and circumstances from where they are working, thereby hoping for good results without understanding what their own economic and business communities need. Until analysts have access to more accurate data and information, policymakers will continue to make decisions based on anecdotes, intuition, and hope, rather than on empirically sound evidence.

Our objective is to advance the use of data in making decisions about economic development investment and planning projects to support innovation and entrepreneurship. This requires rethinking the way we approach the analysis of innovative regional economies. Despite significant public resources devoted to promoting innovation and entrepreneurship, there is little agreement about how to measure and advance outcomes to achieve the larger objectives of economic development. This paper starts by defining economic development, especially in relation to entrepreneurship and innovation, and then considers how government can intervene to support new and innovative firms and activities. We argue that public policy should focus on building individual and regional capacities that are beyond the market's ability to provide. We also advocate for government as a builder of capacities that enable economic agents—in this case entrepreneurial founders and firms—to realize their innovative potential.

DEFINING ECONOMIC DEVELOPMENT

While this paper focuses on policy that supports entrepreneurship and innovation, it is useful to contextualize that effort within a larger conceptualization of economic development. Material prosperity and high quality of life are universal goals for democratically elected governments (Feldman, Hadjimichael, Kemeny, & Lanahan, 2016). However, the way to achieve these goals most effectively is the subject of considerable debate. Policy agendas are dominated at times by macroeconomic considerations that favor austerity, yet there is widespread recognition that the long-term growth of advanced economies relies on active intervention in support of innovation, entrepreneurship, production, and workforce development—decidedly microeconomic concerns. Unfortunately, although these topics have gained currency, they remain only one element in a chaotic and divisive debate on the role of government in the economy, and in particular in supporting economic growth. To provide greater background, this section draws on prior work from Feldman et al. (2016), Feldman & Storper (2016), and Lowe & Wolf-Powers (2017).

The policy debate is particularly confused because it lacks a clear, shared understanding of what we mean when we talk about economic development. Policy dis-

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cussions on economic development frequently conflate economic growth with economic development, as if the two concepts are interchangeable. In designing evidence-based policy, it is first important to examine the difference between the two concepts, and to differentiate the objectives of economic development policy. Economic growth is the more straightforward concept, and it is easier to calculate and compare across locations. Economic growth is traditionally measured by aggregate changes in rather well-defined, quantifiable concepts, such as gross national product. Economic growth is also the primary concern of the branch of economics known as macroeconomics.

Economic development is a more difficult concept to pin down. Most scholars associate economic development with some form of qualitative socioeconomic change, although debate remains over what form that change should take (Fitzgerald & Green-Leigh, 2001; Malizia & Feser, 1998). We broadly define economic development as a transformative process that contributes to qualitative improvement of a range of economic actors and organizations within a regional economy. Economic development is not just producing more of the same thing, such as more jobs, more patents, more entrepreneurial firms. Rather, economic development results in improved quality of life (Feldman et al. 2016) and, where economic benefits extend across society, benefits those with more limited economic resources and power (Feldman et al. 2016; Lowe & Wolf-Powers, 2017).

But economic development is also a collection of interventions that help increase the capacity of a regional economy to support qualitative, transformative, and inclusionary improvements. In this regard, economic development is neither faceless nor predetermined but enacted; it is shaped and reshaped by actors who intervene to build the capacity to promote

a higher standard of life. In this paper, we are particularly interested in interventions that enhance regional capacity to support innovation through entrepreneurship. With that in mind, we draw on work by Feldman et al. (2016) that conceptualizes four overlapping and mutually reinforcing dimensions of regional capacity. Each contributes to the overall innovative capacity of the region and is a potential target for interventions that support entrepreneurial development:

- **Community capacity:** The existing and well-established physical (i.e., location), social, educational, and environmental assets of a region or community
- **Firm and industry capacity:** The assets relevant to forming firms and developing industry, including facilities and equipment, organizational know-how, and supply-chain connections
- **Entrepreneurial capacity:** The potential for generating new small businesses, including a risk-taking culture, networks, and access to financial capital and a skilled workforce
- **Innovative infrastructure capacity:** Regional capacity to support new products, processes, and organizations in terms of facilities, support services, and willingness to encourage creativity; this capacity relies on multiple, reinforcing organizations

Other categories are certainly possible, especially when other targets for economic development are involved, but these four represent broad yet interconnected constructs that governments could support, track, and align in their efforts to promote regional innovation and entrepreneurial capacity. An initial assessment of these capacities also provides a resource for diagnosing the prospects for future innovation and entrepreneurship. It can indicate where capacity is strong or increasing, and highlight where additional investigation and intervention might be

needed to understand and overcome roadblocks, information gaps, or underlying tensions.

Capacity-building in a jurisdiction is beyond the mandate of any private firm, industry association, or other economic institution. Hence, capacity can be thought of as a key public good that is also the basis for economic development policy. Capacity-building requires an active public sector, but it also necessarily involves a range of additional collective actors or organizations. In this regard, we do not limit our focus to policymakers or professional planners, as we also recognize the involvement of other economic and institutional actors within a regional setting (Lowe & Feldman, in press). Their contribution to expanding micro-capacities for themselves and others can also enhance region-wide capacity to support creativity, resilience, and advancements in product and process innovation. They help create a relationship between the new microeconomics of economic development and desirable economy-wide macro outcomes (Feldman & Storper, 2016).

What, then, is the role of government in economic development? Among institutions, the public sector is arguably the best-equipped actor in the economy, with the necessary long-term perspective, a sufficient command of resources to make large-scale investments in infrastructure and education, and the ability to effectively coordinate economic systems in support of innovation. Moreover, government—as the agent for its citizens—has a mandate to ensure that the benefits resulting from these investments are widely and fairly distributed. At a fundamental level, the government’s role in economic development is to strike a balance between realizing potential and maintaining incentives for creative and collective action; to provide scaffolding for economic transactions without over-regulating; and to make investments that

advance the public interest and encourage the full participation of private individuals and organizations, meanwhile avoiding corporatism, cronyism, and the promotion of entrenched special interests.

Private-sector objectives are more easily defined as maximizing profits and organizational survival, although we increasingly find examples where environmental or social impact have been added to the mix. However, there is less consensus in government, and articulating a set of broad policy objectives is more difficult due to competing logic and interests. In the absence of a consensus vision, it is too easy for government to give in to short-term demands or to privilege one objective at the expense of others. An articulated vision for government not only requires reconciling diverse perspectives and temporal horizons, but sometimes also making difficult decisions that might initially appear unprofitable for businesses. This is also true within the policy realm of innovation and entrepreneurship, which in certain regional economies has been enacted in ways that undermine concurrent objectives to promote inclusion and equity (see, e.g., Lowe & Wolf-Powers, 2017). This suggests that economic development policy is not simply a case of favoring certain objectives, but that it also requires building regional capacity to integrate and align multiple economic and social objectives, including identifying and working through the underlying frictions or tensions that might hinder policy progress (Ashei, Boschma, & Cooke, 2011; Lowe & Wolf-Powers, 2017; Pike, Rodríguez-Pose, & Tomaney, 2007).

Thus, to construct our definition further, economic development requires policy-making through institutional integration, and where that integration helps promote consensus in support of openness and access, tolerance for risk, appreciation of diversity, and confidence in the realization of mutual gain for citizens and for

the private sectors (Feldman et al., 2016). Institutional integration provides the foundation for building basic capabilities for sustainable economic development. It helps sustain the increasing prosperity and quality of life that will be realized through innovation, lower transaction costs, and by applying innovative capabilities to the responsible production and diffusion of goods and services. Yet institutions are the result of interactions with entrepreneurs over time and are socially constructed, making them difficult to study (see Lowe & Feldman, in press). However, due to the availability of digital data sources, the time is ripe for detailed research on the interactions of institutions and their role in entrepreneurship and economic development (Feldman & Lowe, 2015).

RECLAIMING POLICY

As indicated above, government agencies provide essential support and guidance for regional innovation, yet in that capacity they often struggle with significant gaps in knowledge. This policy paradox once led mainstream economists to recommend that governments take a backseat to private investors and entrepreneurial firms in developing novel and innovative technologies, the core assumption being that market signals are superior to government indicators in determining when, whether, and where to invest.

In recent years, a compelling counterargument has emerged that challenges this perspective and recognizes the deeper social and environmental benefits of industrial policy, especially the role government agencies play in nurturing technologies long before they are viable for private-sector investment (Block, 2008; Lazonick & Mazzucato, 2013; Mazzucato, 2014; Rodrik, 2014; Schrank & Whitford, 2009). In this capacity, government does not simply step into the fray once private investors have evaluated and denied sup-

port for a nascent, potentially important technology. Motivated by long-term policy concerns and societal needs rather than by more immediate profitability, government agencies combine organizational capacity and technical expertise to exercise control over a new technology (Mazzucato, 2014). In other words, government is not simply responding to an obvious market failure; it is also acting as a forward-thinking catalytic force to support mission-oriented innovation (Mazzucato, 2015).

This revisionist stance—which has gained strong academic and policy support in the wake of the Great Recession and ultimately helped reignite an earlier policy debate (Audretsch & Fritsch, 2002)—has led U.S. researchers to document the pioneering role of federal government funding for essential platform technologies, including the Internet, GPS, high-performance lithium batteries, biotechnology, the Human Genome Project, and numerous clean-technology applications (Block & Keller, 2011; Fuchs, 2011; Rodrik, 2014). Early government leadership in these technology areas certainly has helped spur profitable and competitive industries, along with phenomenal entrepreneurial success stories (e.g., Apple, Google, and Tesla), but more broadly it has created opportunities to draw in and guide private investment and encourage the formation of public-private partnerships to help solve challenging social, environmental, and medical problems.

Still, with this supportive turn toward industrial policy comes growing recognition that public-sector agencies need more accurate, timely, and precise information, not simply to track and publicize the progress and potential of technologies over time but to tweak, adjust, and, when necessary, redirect public resources and support (Rodrik, 2014). Somewhat ironically, data gaps of this kind are rarely solved with existing public datasets, in large part because of lengthy time lags,

confidentiality requirements, and restrictive access (Feldman & Lowe, 2015). Evaluations by academic researchers and consulting firms are also limited, as they tend to focus on the impact of one government-funded program in isolation from others. This risks obscuring the role earlier institutional support played in helping to nurture and produce a successful technology, which suggests the need for alternative approaches to data analysis and collection. This includes real-time sources that can help government agencies make better informed, more expedient decisions in support of technology processes and mission-oriented objectives.

We believe this challenge is particularly pronounced among state and local governments, which have been surprisingly absent from current research on U.S. industrial policy. While federal agencies tend to support technology development through investments in basic and applied research, state and local government programs position themselves further downstream, where they help promote the commercialization of technology by actively engaging with entrepreneurial firms and founders. As recent scholarship on new industrial policy has noted, federal agencies that support technology and innovation often benefit from high-level elected officials' willingness to run interference when ideological challenges are mounted by vocal critics of industrial policy (Block, 2008). Their involvement helps build longevity and momentum in federal policy, which in turn creates breathing room to experiment with and adapt policy. However, these protective buffers tend to remain at the federal level, which suggests that state and local economic development agencies might be especially vulnerable to shifting political perspectives and preferences, and to the resulting cuts or challenges to local government funding and institutional support.

Reinforcing this view, many state and local economic development practitioners face added pressure to prioritize strategies that generate immediate political payoffs for local politicians, including those associated with high-profile ribbon-cutting events and those that promise more immediate gains in employment—events that are less likely to involve small entrepreneurial firms in the early stages of technology development and commercialization (Lowe & Feldman, 2015). This often makes it harder for local practitioners to sustain support of innovation and technology, especially as such public investments can take years, if not decades, to pay off.

Timely, more immediate data sources are therefore needed to help state and local development agencies justify ongoing support for entrepreneurship and technology development, and to know when and whether to double-down their efforts when a promising firm or technology is not achieving its full potential. In the next section, we discuss a specific type of data needed to motivate and monitor the development of innovative and entrepreneurial capacities over time.

ARTICULATING THE NEED FOR DATA

New policy imperatives focus on innovation, entrepreneurship, and emerging technological industries—concerns that were not important when legacy economic data systems—such as those collected by government statistical agencies—were designed. Innovation is not always visible through new products, but it can be observed through improvements to production or design processes (Clark, 2013; Doussard & Schrock, 2015; Feldman & Ronzio, 2001; Pisano & Shih, 2012). Entrepreneurship and the formation and growth of new firms are important sources of employment growth, but it is difficult to capture changes in their prod-

uct focus, as technology has become fluid and defies industrial classification schemes. Economic activity does not conform to the boundaries of political jurisdictions or administrative data, but instead expands organically with transportation links, available space, and opportunity, making it particularly confounding to effective policymaking. The dynamic geography of innovative places defies the way we typically collect data to provide the evidence required for effective policy design and implementation, or to monitor investments and progress.

Investment analysts on Wall Street and decision-makers in the private sector rely heavily on data to inform their decisions. Seeking the highest rate of return on their money and leaving nothing to chance, sophisticated and up-to-the-minute information tracks the movement of stocks, which is summarized in charts and synthesized into oft-quoted indices, like the Dow Industrial Average. All these data inform investment decisions.

Contrast this situation to the information typically used when making public investment decisions, specifically investments in economic development that affect the wealth of local economies. Economic development practitioners have limited access to the timely information that can help them make the best investment decisions. Our efforts to build and maintain regional economic advantage often involve some combination of bottom-up efforts by regional public and private actors and top-down resources invested by the federal and state governments. These efforts are far more scattershot than would be the case if the actors involved were able to access significantly improved data and information.

In this time of economic volatility and vulnerability to global competition, many existing data products are not sufficient for generating intelligent public and private economic investment decisions.

Typical data products aggregate the number of businesses, jobs, and workers into summary tables for jurisdictions that are defined for other purposes, but firms do not follow the contours of either political jurisdictions or statistical regions; they instead locate along transportation links where space is available and near other interesting firms. Legacy federal economic data do not meet users' regional data needs because the traditional mission of federal economic statistics agencies has been to support federal macroeconomic policy and guide the distribution of federal funds to political jurisdictions with particular economic characteristics, such as high unemployment.

Innovative sources of economic data, however, offer analysts new ways of understanding regional economic activity. A regional economy is the collection of economic transactions among firms and social relationships among people, which are best understood with microdata. Microdata at the level of firms and individuals can be used not only to track the actions of individual institutions, entrepreneurs, investors, and workers over time and geographic space, but also to provide information about the relationships among these actors and the outcomes of their relationships. While federal agencies restrict access to administrative data, there is a variety of digital data sources that provide a wealth of timely and disaggregated information. Consequently, data sources like LinkedIn and Wanted Analytics have far greater capacity to provide immediate insights into how regional economies work than more traditional data products (see Feldman et al., 2012). These contemporary and digital sources in turn facilitate better informed private and public actions to create jobs, income, and profits.

Most importantly, the communities most relevant for regional analysis do not fit neatly within predetermined boundaries. Areas such as Silicon Valley, Route 128,

and the NC Research Triangle—the archetypes of successful regional economies—have complex, organically evolved geographic shapes. These regional economies are built on the location of prominent institutions and firms, are influenced by existing transportation routes and land-use patterns, and expand out of seemingly idiosyncratic and serendipitous events. Their spatial patterns do not acknowledge political jurisdictions or census geography, but instead follow a logic that motivates firms to locate near others with similar products, markets, and employees who have the requisite workforce skills.

Regional economies not only blithely ignore town and county boundaries, they disregard state boundaries as well. Furthermore, the geographic clustering of innovative, creative firms in small places such as multitenant buildings, neighborhoods, or adjacent industrial parks is often invisible when data are available only for larger, rigidly defined political units, such as counties. Data that suggest a cluster at the county level may indeed mask several geographically and often technologically distinct clusters grounded in distinct social relationships, which operate based on unique needs, production logics, and positions in the value chain. The use of aggregate data often overlooks promising early-stage activity and micro-geographies.

Locating market actors across real economic space requires access to data that facilitate flexible, user-determined analysis of salient characteristics. Such data may be drawn easily from standard records, scraped from the Web, pulled from voluminous documents through text analysis, found on an open-data platform, purchased from a third party, and integrated with other digital datasets. There is more data available than ever before, and it is now possible for researchers to link and analyze microdata to explore economic relationships within

unique, self-defined economic boundaries.

Successful efforts to build new companies often result in an infusion of venture capital, a merger or acquisition, or some other change in ownership that induces relocation. As a result, successful economic development may have a negative impact on local employment in the near term. Alternately stated, success in growing one particular company may, by certain metrics, appear to be a “failure” for the region. In reality, however, the locality has benefited from the example of what an entrepreneurial company can accomplish. This could persuade others to start companies or invest in early stage activity; additional company founders may stay in the region and become serial entrepreneurs; and key employees will have learned skills that will benefit their next employer. The economic development effort that was mistakenly judged to be a failure in terms of local employment may thus increase the region’s capacity in future rounds of development.

As firms struggle to survive, they often modify their products or services, but there is no time or incentive for them to update their industrial classification codes or North American Industry Classification System, the mechanism used most often to understand industrial activity. The innovative firms driving regional economies are in fact fluid and difficult to classify. The catalytic nature of economic development can be understood by demonstrating that projects that translate research results into practical applications can create not only new firms but entire new industries. These new industries create platforms that have the potential to transform regional economies, thus putting them on higher growth trajectories, changing the types of jobs offered and the skills required, paying higher wages, and providing better products at lower prices for customers.

Both patents and product announcements provide information on the economic future of firms. Patent documents provide an idea of where a company is headed with its inventive activity, while new product announcements help to explain where in the market a firm is placing its bets. Understanding forward-moving industrial activity requires classification schema that are fluid and malleable, and perhaps based on algorithmic text-mining programming to define relational attributes. Static classification schemes will never provide an understanding of the emerging technologies that have the greatest promise for building new industries and setting regions on a new growth trajectory. The time lag inherent in the collection of traditional data sources means that an analysis is consistently retrospective and lagging behind the current reality we are trying to analyze. These limitations reflect the technologies of a time before we had Internet access to current administrative data and the computing power to manipulate them at our fingertips.

Traditional datasets and industrial classifications do not describe the relationships between organizations and across space; however, innovative data sources allow the identification of networks and social relationships among firms, between firms and institutions, and between their connections both inside and outside the region. This enables analysts to determine points of leverage for economic expansion. These relationships are particularly relevant for institutions such as universities, trade associations, business services, and other quasi-governmental entities that are important to innovative activity and provide the foundation for regional economic vitality.

Longstanding forms of economic data also impede analysts' ability to view market actors' behavior over time. Analysis of regional innovation systems, for instance, has been limited to looking at a series of

disconnected snapshots, which can easily lead to inappropriate or incomplete conclusions that ignore the complexity of these endogenously and historically path-dependent systems. Although case study narratives provide insights, they lack both analytical power and generalizability. However, using advanced IT, researchers can now construct longitudinal microdata that enable them to follow the dynamics of emerging and mature industries, understand the theoretically important links between firms and institutions, and measure the employment outcomes of different approaches to education.

Innovative data sources—based on advanced IT, new statistical methods, and nontraditional research topics—offer the opportunity to fill this knowledge gap. Realizing this opportunity will require research organizations, federal decision-makers, philanthropic foundations, entrepreneurs and private investors, and economic and workforce development agencies to do the following:

- Support, demand, and create a market for these innovative data sources
- Continually redefine the state of the art
- Bring to bear the degree of creativity, risk-taking, and entrepreneurship being asked of regional economic actors

A plethora of innovative regional data sources and tools are emerging from federal statistical and mission agencies, commercial firms, universities, and nonprofit research organizations. These data sources have the potential to greatly increase governments' and advocacy organizations' ability to understand and respond to issues and opportunities in a timely manner. These data also provide the resources needed to understand the nature of regional economies, including the factors that influence competitiveness. Moreover, tracking regional economies in real time makes it possible to design

national and regional policies and programs to promote economic development, growth, and prosperity.

Information is one of the most essential and cost-effective policy tools at government's disposal. Both policymakers and market participants require current, accurate, detailed economic statistics to monitor, assess, and respond to competitiveness issues and opportunities. Addressing these needs is a relatively low-cost endeavor that increases the function of markets and highlights both opportunities and potential problems. The availability of economic data and the tools to analyze them has never been greater, yet federal economic policy and data collection have remained tied to traditional business-cycle management tools, with a focus on data useful for fiscal and monetary policy. As a result, the need for coherent, evidence-based regional policy is an important unaddressed need.

THE PROBLEMS OF ATTRIBUTION AND WHY BUILDING CAPACITY IS THE THING THAT MATTERS

The highest scientific standard is to discern causality: if A, then B. Isolating the effect of a treatment is the gold standard in science and policy. For example, some quasi-experiments examine the impact subsidized medical insurance has on health outcomes, while others explore the effects of individual choices, such as the effect attending college has on lifetime earnings. At the firm level, it is impossible to attribute an outcome—for example, an increase in sales of exported goods—to one specific program. There are no pure treatment effects for economic development activity in general. This section identifies some of the measurement problems inherent in evaluating economic development programs in order to cement the need for an alternative, more expansive approach.

Case studies of the development of regional economies reveal a complex process in which public investment is only one of many important elements. Optimizing the performance of any one component of such a complex system will not necessarily optimize or even improve the performance of the system overall, as the returns to economic development are affected by multiple individual decisions and the influence of multiple actors. Regional development is also affected by macroeconomic policy changes that, while exogenous, certainly affect outcomes in ways that are not entirely predictable. However, regional economies have interrelated sequences and processes that make it difficult to link economic development investments to outcomes with any degree of precision.

Moreover, the amount of funding provided for economic development, while important to recipients, is miniscule relative to the size of a regional economy. Attributing good outcomes to specific programs, investments, or events is probably more about good luck, publicity, and hype than true causality demonstrated by sound economic analysis. Communities that apply for economic development funding appear to be better organized than the average, and the community organizations that lead funded projects usually are connected to professional networks and aware of funding opportunities. This heightened awareness, combined with a higher level of social capital, certainly differentiates projects that receive funding from those that do not even apply for support.

Economic development engages a wide range of activities, from building infrastructure to developing businesses. This variety is warranted because the projects serve heterogeneous communities and technologies. Evaluating outcomes is easiest when comparing similar programs or inputs; it would in fact be facilitated if projects offered identical services, but

that would not advance the mission of local economic development officials.

Edwin Mansfield (1991) noted that the temporal lag between an academic research discovery and new product innovation is seven years. Many other economists have tried various approaches to estimating the temporal lag between investment in R&D and the realization of benefits. The consensus is that the time lag between investment in research and realized commercial advances is lengthy, uncertain, and varies significantly between fields. In fact, a 2001 National Academy of Sciences report observed that “history . . . shows us how often basic research in science and engineering leads to outcomes that were unexpected or took many years or even decades to emerge.” Perhaps the best way to invest in local economic development is simply to make steady progress on a variety of measures of increased capacity. Monitoring real-time data on a region provides an ability to spot trends and direct attention to correcting deficits and remediating problems.

BUILDING AN EVIDENCE BASE: THE EXAMPLE OF THE RESEARCH TRIANGLE

Seven years ago, we began developing a database that provides a 50-year perspective on technology-intensive entrepreneurial activity in North Carolina’s Research Triangle (Feldman & Lowe, 2015). Funding from the National Science Foundation, the Kauffman Foundation, and the University of North Carolina has supported the development of this database, which provides a unique resource for studying the temporal dynamics of a regional economy using a firm-centric analytical framework while also considering the institutional richness of the regional support system. Our methodological approach has been to study the development of a regional entrepreneur-

ial economy over time while providing a comprehensive analysis of its constituent organizations and institutions. Our study region is defined as the spatial configuration of firms in the 13-county Research Triangle region. In addition to the entrepreneurial firms we study, this region contains large multinational and multi-jurisdictional firms that were recruited to join the Research Triangle Park as early as 1962. Over time, mergers, acquisitions, and other startup activity have resulted in thousands of technology-intensive entrepreneurial firms populating the area adjacent to the Research Triangle Park. Our database draws from more than 30 distinct sources to capture the entrepreneurial development of this region, and includes details on company founders, annual firm employment, and engagement with the entrepreneurial ecosystem. The result of this multifaceted data-collection approach is a unique platform that provides a data resource that is useful to state and local policymakers, entrepreneurial support agencies, and local business media.

One final lesson we learned during this project was the fact that some entrepreneurs have selective recall when interviewed about their participation in early support programs. While many studies of entrepreneurial economies depend on interviews with founders, a comparison of our interview results with our database records demonstrates that interviewees tend to under-report their company’s engagement with institutions. Individuals simply do not remember the institutions they worked with in the early days of their firm, or the people who worked with those institutions have moved on. This finding highlights the value of using a mixed-methods approach.

The Feldman-Lowe “Circling the Triangle” database includes more than 5,000 technology-oriented firms in the 13-county Research Triangle region (see Feldman & Lowe, 2015, for detailed infor-

mation on database construction, data sources, and content validation). We capture detailed information on the dates firms were founded, the company histories, products and product development, and firm location. For entrepreneurial ventures in particular, the database contains detailed information on key milestones, including initial public offerings; patent applications and grants; new product announcements; infusions of venture capital; funding from the Small Business Innovation Research and Small Business Technology Transfer programs and other federal grants; liquidity events such as mergers, acquisitions, and bankruptcies; and, finally, annual employment and sales revenue, the latter drawn from the National Establishment Times Series dataset (for a discussion on the use of this as a database for entrepreneurial studies, see Donegan, 2016). Rather than relying on any one dataset, we triangulate different sources to test consistency and accuracy in the descriptions of the stages of firm development and sequence of events. Our database offers a standard by which other data sources can be evaluated and new tools vetted to automate data collection, so that this analysis method can be used to study other regions.

We have partnered with local organizations to provide detailed information on a wide array of institutional supports provided by state and local economic development agencies, including the North Carolina Biotechnology Center and the Council for Entrepreneurial Development. We also integrated detailed information on a variety of institutional supports, such as participation in incubators, accelerators, and business plan competitions; entrepreneurial coaching programs and grants; and low-cost loans provided by state and local economic development agencies. Rather than taking any one source at face value, we collect multiple sources and make comparisons to ensure accuracy. This triangulation

between different sources enables us to validate information, reconcile discrepancies, and provide a clear understanding of firm progress and the sources of bias in certain cases.

In addition to firm-level data, we have collected career histories and educational background information on entrepreneurial company founders, some of whom were academics who leveraged technologies identified through research conducted at one of the region's three R1 universities. Social media sources, especially LinkedIn, have proven useful for compiling detailed career timelines and educational profiles. In the process of data collection, we have amassed archival materials from quasi-public, private, and nonprofit organizations located in the region. These documents range from organizational directories and annual reports to meeting minutes for committees tasked with designing technology support policies and programs. We treat these data sources as equally valuable to the study of regional innovation, as a resource for contextualizing statistical patterns and econometric relationships, and for supporting our mixed-method research design. Our research team also has conducted in-depth interviews and structured focus groups or salons with more than one hundred local life science entrepreneurs or key representatives from regional support organizations.

Our methodological contribution contrasts with cross-sectional studies that make comparisons between places and often draw conclusions that gloss over differences in industry composition and specialization, a point made by Kenney and Von Berg (1999), including stages of development in an industry life cycle (Eisingerich, Falck, Hebllich, & Kretschmer, 2008), and structural or institutional differences or changes that might cause inflection points or reverse trends (Murmman, 2003). Many studies examine one industry across multiple

regions to draw conclusions about the region, but Kenney and Von Berg (1999) provide a cautionary note about this approach, as there is great heterogeneity across industries. Our approach is to construct a detailed temporal investigation of a regional economy.

POLICY FOLLOWS

The future of the nation's prosperity is substantially determined by activities at the local level. Some economists are skeptical of place-based economic development strategies, arguing that there is a tradeoff between local gains and national welfare. Their contention is that resources are simply being redistributed from one local economy to another, to the detriment of overall national welfare. A 2009 World Bank report advocates for a spatially blind (or people-based) approach rather than a place-based one as the most effective way to generate efficiency, guarantee equal opportunities, and improve the lives of individuals where they live and work. The report asserts that encouraging mobility enables people to live in places where they likely will be more economically productive, which in turn increases individual incomes, productivity, and aggregate growth and leads to a more even geographical distribution of wealth. On the other hand, proponents of place-based approaches to economic development argue that it is necessary to fully understand the local and regional context in order to create development policies that will succeed in a particular area (Barca, McCann, & Rodriguez-Pose, 2012). The place-based approach asserts that one-size-fits-all policies fail to consider regional contexts. But at this point, neither theoretical nor empirical economics can address the question of how to promote economic prosperity most effectively.

Policymakers cannot afford to wait. As Kline and Moretti (2013) conclude,

“Second best may, in practice, be very attractive relative to the status quo” (p. 34). With this in mind, we conclude with some brief reflections on the policy implications of our research. From a regional policymaking perspective, there is clearly value in capturing a more complete picture of entrepreneurial experience within a regional economy. Why is this? For starters, economic development as a professional practice often supports transformative economic and institutional change on multiple fronts (Feldman & Lowe, 2011; Feldman & Storper, 2016). This involves a mix of concurrent interventions designed to support and benefit a wide range of economic actors and establishments (Lowe & Wolf-Powers, 2017; Markusen & Schrock, 2006). New firm formation and entrepreneurial survival is of course one key objective for regional economic development. But even within the entrepreneurial support community (as opposed to other supports that target well-established or large corporations), other goals are often in play, including job creation, improved job quality, job access, increased educational attainment, innovation, environmental sustainability, or increased government revenue. Policymakers and practitioners of economic development rarely optimize on one front, as they need to satisfy multiple constituencies (Kupers & Colander, 2014). Even in cases where individual practitioners (or development agencies) specialize in one area—say, promoting education to support entrepreneurship or new venture financing, technology transfer, business management, or networking—they typically participate within a larger regional network that is pushing for progress on multiple economic fronts. Obviously, only a limited set of development goals will be attainable at the individual firm level, but this nevertheless suggests that, in aggregate terms, a diverse regional entrepreneurial community can contribute to multiple intersecting economic development objectives. And, by

default, the full array of entrepreneurial firms in the region should be well understood by—and within sight of—regional practitioners.

Recognizing this, some regions have intentionally adopted what scholars have described as a portfolio approach to economic development policy (Markusen & Schrock, 2006; Rodrik, 2014). In this policy environment, the goal is not simply to have parallel yet independent policy tracks. It is also important to identify and seek out opportunities for integrating entrepreneurial supports in ways that balance and combine multiple developmental objectives. This policy logic is also outlined in the call for “smart specialization” in Europe, which strongly emphasizes supporting entrepreneurship through combined goals of innovation, equity, and environment. It also reflects recommendations from researchers of state and local policy in the United States to embrace economic development planning as more than competing public investment choices (Kupers & Colander, 2014). Rather, it should include an integrating policy platform for both layering and combining multiple objectives (Lowe & Feldman 2015).

A portfolio policy approach also means managing a range of projects and business investments in support of innovation (Rodrik, 2014). This is especially relevant for interventions in support of entrepreneurship, which involve inherent risk, not just for the firm and its founder/s but for the host region. In evolving economic or technological environments, certain kinds of entrepreneurial opportunities and ventures could disappear altogether. But that risk is not just economic; it can also emerge in a political form—something we are currently witnessing in North Carolina under conservative leadership. With shifting political environments and priorities, certain pathways for entrepreneurship may be foreclosed, which suggests that gains can be made by

simultaneously pursuing a wide array of entrepreneurial and organizational types.

A related final point: privileging one form of entrepreneurship or the portal that helps to create it can blind us to the way entrepreneurship, as one of many economic activities, intersects with other aspects of regional economic life. As one example, large corporate anchors that spawn entrepreneurial firms might be influenced by non-entrepreneurial policies that support large firms, including efforts to recruit them to a region (Feldman & Lowe, 2016; Lowe & Feldman 2015). This means seemingly unrelated decisions about which firms to recruit (or not) can later have an effect on regional entrepreneurial development by influencing which types of apprenticeship exist in a region. Some large firms are extremely nurturing of entrepreneurial opportunities, helping their employees gain access to technology, finance, and networks to support a new venture (Mayer, 2011). In our study region, Glaxo Smith Kline is but one. But this is not always the case, which suggests that entrepreneurship practitioners might do well to influence upstream decision-making around industrial recruitment—assuming this is not just a competing use of economic development funding but a potential resource for shaping entrepreneurial opportunity and success. But these interconnections also have implications in terms of labor market disruption, especially when large firms shed workers as a result of downsizing, restructuring, or relocating. Practitioners of entrepreneurial development must be well positioned to respond to this kind of event, ready to offer support in ways that allow workers who lose their jobs to assess whether entrepreneurial success is viable and, if so, to help them launch new ventures on a solid, stable foundation.

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