

Digital Entrepreneurship and Local Economic Development:
Strategies for Inclusive Growth

by

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ABSTRACT

Digital transformation has fundamentally altered how businesses are created and operated, offering new pathways for economic participation and growth. While digitalization blurs the geographic boundaries of entrepreneurship, the development of digital businesses remains rooted in local contexts, with important implications for local economic development policy. This dissertation examines how local and regional governments can support digital entrepreneurship, utilizing novel data sources to highlight traditionally underrepresented entrepreneurs who leverage technology to establish and grow their businesses.

Comprising three essays, this research explores how policy interventions, local environments, and business owner characteristics shape digital entrepreneurial activities across diverse communities. The first essay investigates the impact of Community Development Block Grant (CDBG) investments on digital economic activity within low-and-moderate income communities, pairing geo-located HUD data and domain-name data from GoDaddy. Drawing on web-scraped data from Etsy, the second essay examines the "maker movement" in Arizona, analyzing how environmental conditions foster creative, online micro-manufacturers. The third essay explores the characteristics, practices, and needs of resource-constrained digital entrepreneurs, utilizing annual surveys conducted by GoDaddy. Collectively, these studies provide methodological and theoretical contributions to public policy and entrepreneurship literature, while offering practical insights for local policymakers reimagining inclusive economic development in the digital age.

DEDICATION

To my husband, David, whose encouragement and sacrifices made this dissertation possible. One wedding, two moves, one dog, and two babies later, here we are. Thank you for believing in me, for your endless patience, and for your constant support through it all. I couldn't have done this without you.

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CHAPTER 1

INTRODUCTION

Widespread digitalization has transformed how goods and services are produced, distributed, and consumed, fundamentally altering the landscape of entrepreneurship. Digital technologies have not only reduced barriers to entry for nascent business owners, but have expanded the capacities, capabilities, and opportunities for established firms (Belitski et al. 2021; Nambisan et al. 2019; OECD 2019).

These changes have heralded “a new era in entrepreneurship” (Nambisan 2017, 1047), garnering the attention of researchers and policymakers alike. With the acceleration of digital transformation during the COVID-19 pandemic, digital entrepreneurship is no longer limited to “Silicon Valley” and other tech hubs but is emerging in historically marginalized and under-connected communities, including rural, Tribal, and low-income urban areas. Drawing on innovative data sources, this dissertation sheds new light on traditionally underrepresented entrepreneurs who leverage technology to start and operate businesses, including home-based start-ups, informal “side gigs,” and micro-businesses. These studies highlight their growing economic impact and potential to advance inclusive economic growth.

This dissertation, comprising three essays, is organized into five chapters. This introductory chapter outlines the key concepts and themes connecting the three essays and their contributions to entrepreneurship and economic development scholarship. Chapters 2, 3, and 4, include three essays that explore how policy interventions, local

environments, and the characteristics of business owners shape digital entrepreneurial activities. Chapter 5 integrates the findings and offers insights for local economic development policy as well as directions for future research.

Digital Transformation of Entrepreneurship

Though in its infancy, an emerging body of literature on “digital entrepreneurship” seeks to understand the impact of digitalization on entrepreneurial phenomena (Sahut et al 2021; Sussan and Acs 2017; Song 2019). While definitions vary, digital entrepreneurship broadly refers to the process of “identifying and exploiting opportunities through digital technologies, resulting in new and flexible ways of conducting business and creating value” (Yáñez-Valdés and Guerrero 2024). Sussan and Acs (2017) define a digital entrepreneur as “any agent that is engaged in any sort of venture be it commercial, social, government, or corporate that uses digital technologies.” These definitions include both “Schumpeterian entrepreneurs” (Schumpeter 1911) who create digital companies and innovative products (e.g., Silicon Valley) as well as “Kirznerian entrepreneurs” (Kirzner 1973) who take advantage of existing digital opportunities (e.g., an e-commerce seller, an Airbnb host). Similarly, the European Commission’s definition of digital entrepreneurship embraces “all new ventures and the transformation of existing businesses that drive economic and/or social value by creating and using novel digital technologies. . . to improve business operations, invent new business models, sharpen business intelligence, and engage with customers and stakeholders” (European Commission 2015, 1).

Nambisan (2017) argues that digitalization challenges extant assumptions of entrepreneurial behavior in two key ways. First, the proliferation of digital technologies has meant less bound and more fluid entrepreneurial processes and outcomes. Once conceptualized as fixed and stable, the structural boundaries of entrepreneurial activities, such as the inputs, features, and market reach of a product, have been blurred by the digitization of products and services. Further, cloud and network technologies, e-commerce platforms, and cashless payment systems have redefined the temporal and spatial boundaries of entrepreneurship, altering when and where business activities can take place. Second, with the rise of crowdfunding and social media platforms, digitalization has shifted the locus of entrepreneurial agency away from a singular agent to include a broader and more diverse set of actors and institutions that generate entrepreneurial activities collectively (Nambisan 2017; Aldrich 2014).

These trends gained significant momentum during the COVID-19 pandemic, as physical distancing measures pushed many economic activities into virtual environments. This shift rapidly accelerated prior trends of digital transformation, with information and communication technologies (ICTs) such as video-conferencing software, websites, and peer-to-peer platforms providing vital infrastructure to maintain social and economic exchange (Kenney and Zysman 2020; Mishrif and Khan 2023). As entrepreneurs responded to the shock of the pandemic, ICTs not only provided the means to adapt processes and shift services online but also created and enabled the pursuit of new business opportunities (Kuckertz and Brandle 2021). In 2020, the U.S. Census Bureau reported a record high of 4.4 million new business applications in the United States.

These new firms were concentrated in the non-store (or online) retail sector and were more likely to be operated by self-employed entrepreneurs (Djankov and Zhang 2021; Haltiwanger 2021). This surge in digital entrepreneurship was also evident on online marketplaces such as Etsy, Amazon, and Shopify, which saw a sharp increase in new seller registrations and consumer activity during the pandemic (Dartnell and Kish 2021).

Inclusive Growth in the Digital Era

These trends carry important implications for public policy, particularly in the context of local economic development. To capture the economic benefits of new technologies, regional and local governments have historically prioritized attracting and retaining high-tech firms and IT workers. This is evidenced by high-profile efforts like the Amazon HQ2 search and the competition among cities to become technology hubs through tax incentives, infrastructure investments, and workforce development programs (Goodman and Robyn 2019).

While these strategies remain important, research increasingly suggests that the use of digital technologies by businesses both large and small contributes to the prosperity and resilience of local economies (Mossberger LaCombe, and Tolbert 2021; Mossberger et al. 2023; Li et al. 2016; Vadana et al. 2019). Notably, Mossberger et al. found that U.S. metros with a greater density of digitally-enabled businesses had better economic outcomes and perceptions during the first year of the COVID-19 pandemic (2023). At the same time, the pandemic exposed long-standing digital divides, with disparities in digital economic participation especially in low-income communities (Mossberger, Tolbert, and LaCombe 2021; Fairlie 2020).

Investing in the creation of digital firms and expanding the digital capabilities of existing businesses presents not only an opportunity for improving economic outcomes but also a pathway to achieving inclusive growth. Originally applied in the context of developing economies, the concept of inclusive growth has gained traction in the U.S. and has been adopted by many cities and regions striving to address economic disparities (Lee 2019). While specific aims vary by institution, inclusive growth emphasizes both prosperity and equity, seeking to expand opportunities, ensure balanced distribution of economic growth, and improve economic participation among underrepresented segments of the population (Lee 2019, Ranieri and Ramos 2013).

Realizing this potential, however, requires strategic support for digital entrepreneurs, particularly through place-based investments, industry-specific initiatives, and targeted programs tailored to the needs of business owners (OECD 2019).

Entrepreneurial Ecosystems and Public Policy

Though the digital economy imbues a sense of placelessness, the creation and growth of digital entrepreneurs remain rooted in local contexts (Sussan and Acs 2017). The “entrepreneurial ecosystem” perspective provides a theoretical foundation for understanding how public policy can support digital entrepreneurship and the role local and regional governments play in this process. This framework recognizes not only individual agency in entrepreneurial development and success, but also interdependent relationships with social, cultural, institutional, and economic forces in the environment (Aldrich 1990; Nijkamp 2003; Stam & Van de Ven 2021; Stam 2015; Spigel 2017; Acs et al. 2017).

Recent literature on “digital entrepreneurial ecosystems” extends the ecosystem perspective to include the role of digital citizenship and digital infrastructure governance, highlighting the importance of citizen participation in the digital economy as well as the provision of physical infrastructure and institutional policies that support digital economic exchange (Sussan and Acs 2017). Local and regional governments, therefore, occupy a central position in shaping these ecosystems and providing an environment for digital businesses to thrive. Understanding how local environments, policy interventions, and the characteristics of business owners influence digital entrepreneurial activities emerge as an important area of inquiry and is the central motivator of this dissertation.

Dissertation Overview

This dissertation is organized into three essays with implications for place-based, industry-specific, and people-centered economic development strategies:

1. The first study, *Place-Based Policy and Digital Economic Activity: Impacts of the Community Development Block Grant Program*, examines the relationship between targeted CDBG investments and digital economic activity in low-and-moderate income communities. This paper draws on publicly available geo-located data from the U.S. Department of Housing and Urban Development as well as commercial domain-name data from GoDaddy.
2. The second study, *Environmental Drivers of the Maker Movement: A Case Study of Arizona Etsy Sellers*, explores how environmental conditions support local “maker” economies (small-scale, creative enterprises). This paper draws on firm-level data scraped from the e-commerce platform, Etsy.

3. The third study, Resource-Constrained Entrepreneurship in the Digital Economy, examines the characteristics, business practices, and motivations of low-income digital entrepreneurs. This is a descriptive analysis drawing on annual surveys of domain owners conducted by GoDaddy.

This dissertation makes both methodological and theoretical contributions to economic development and public policy literature, with practical implications for local policymakers and practitioners. The use of innovative data sources, such as commercial domain-name data and surveys from GoDaddy and web-scraped data on Etsy sellers, enable analyses of aspects of the economy often overlooked in publicly available government datasets. Further, with both empirical and exploratory objectives, these essays advance theoretical development on the micro and macro conditions that influence digital entrepreneurial activities. Finally, this dissertation offers actionable insights for local practitioners aiming to support digital businesses and promote inclusive growth within their communities.

CHAPTER 2

PLACE-BASED POLICY AND DIGITAL ECONOMIC ACTIVITY: IMPACTS OF THE COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM

Introduction

In an increasingly digitized economy, the utilization of information and communication technologies (ICTs) is vital for firm survival and growth, and for the strength of local economies. Despite improvements in broadband and ICT infrastructure, spatial gaps in business participation in the digital economy persist, most notably in low-income neighborhoods (Mossberger, LaCombe and Tolbert 2022).

The COVID-19 pandemic heightened awareness of the “digital divide,” and prompted many local governments to make targeted efforts to address disparities in their cities (Lai and Widmar 2020). As such, there is a need to better understand the local conditions that encourage digital economic participation and the policies that best support entrepreneurs in the digital age. Geolocated data on the Community Development Block Grant (CDBG), a longstanding, place-based program spanning activities such as economic development, infrastructure, housing, and public services, provides an opportunity to explore the impacts of locally-led investments on digital economic activity.

Drawing on ZIP-code level CDBG activity data alongside commercial data on over 20 million domain name hosts, this paper examines the extent to which CDBG activities improve digital economic participation in low-and-moderate-income (LMI) communities, and which investments matter most. Surveys reveal that three out of four

domain name hosts are used for commercial purposes, with over 90 percent supporting online microbusinesses that have less than 10 employees (Venture Forward 2022). These data are available monthly at the ZIP code level, and in the aggregate, provide a unique measure of digital economic activity. By influencing key drivers of digital entrepreneurship such as access to capital, ICT infrastructure, and skills training, eligible CDBG activities have the potential to positively impact business participation in the digital economy.

Using panel data on nearly all U.S. ZIP codes across the United States and two-way fixed effects methods, this study provides evidence that targeted CDBG activities, when combined with broadband adoption, positively impact digital economic activity in LMI communities. Additionally, the study's findings suggest that the type of place-based investment matters for digital economic growth, with varying impacts for activities relating to infrastructure, public services, and business services.

This paper begins with a discussion of spatial gaps in digital economic activity and the role of place-based policies like the Community Development Block Grant. This is followed by a discussion of the study's theoretical framework, research design, and findings. The paper concludes with implications for local policymakers and practitioners.

Literature Review

Spatial gaps in digital economic activity

Digital economic activity broadly refers to economic processes, such as the creation, exchange, and consumption of goods and services, enabled or conducted using digital tools, networks, and platforms (Barefoot et al. 2019; Williams 2021). Measures of

the digital economy have traditionally relied on metrics such as e-commerce spending or the proportion of the economy in the information sector (Jackson et al. 2018; Moretti 2012). However, these indicators fail to capture the breadth of digital engagement across different sectors and business types. For instance, the adoption of digital marketing and communication strategies by brick-and-mortar stores, as well as the online activities of platform-based and micro-businesses often overlooked in government survey data. The use of commercial data, such as domain names, offers a novel lens through which digital economic activities can be more comprehensively measured. Domain names are governed by the global Internet Corporation for Assigned Names and Numbers (ICANN) and function as the “underlying address book of the internet” (Mossberger, LaCombe and Tolbert 2022).

Early research using geo-located domain name data emerged in the 1990s (Kolko 1999; Moss and Townsend 1997) and has experienced a scholarly resurgence in the early 2020s as proprietary commercial data has been made available by domain registrar, GoDaddy (Mossberger et al. 2023; Mossberger, LaCombe and Tolbert 2022). Beyond domain registrations, these data incorporate information on domain redirects and activity. Further, customer surveys conducted by GoDaddy offer a richer understanding of how domains are used and by whom. These surveys indicate that domain names, used by both large and small businesses, primarily serve to host websites but also function for email and security purposes. Moreover, domain data captures not only purely digital enterprises but also the online presence of traditional brick-and-mortar establishments.

In the aggregate, domain data provides a unique measure of digital economic activity across space, revealing hotspots as well as disparities within and across regions. The drivers of these digital divides are contextual and multifaceted, with factors spanning technology access, literacy and skills, and trust (Van Deursen et al. 2017; Helsper 2021). Bridging these gaps often requires holistic investments that extend beyond the provision of digital infrastructure. Bengali and Yu's (2021) study of online microbusiness formation, for instance, observed greater digital economic activity in areas equipped not only with broadband, but with access to training, skilled labor, and capital.

Historically, place-based policies have been the primary vehicle through which local governments address economic and social disparities within specific geographic areas. Place-based interventions range from direct business assistance to broader social and infrastructural improvements, all aimed at revitalizing distressed and stagnant areas and improving living conditions for residents (Neumark and Simpson 2015; Shambaugh and Nunn 2018). In the wake of the COVID-19 pandemic, new attention has been brought to the importance of digital inclusion for accessing essential services and supporting local economies, and is increasingly becoming a key feature of local development strategies (Anderson, Burke, and Gottlieb 2021; Mossberger et al. 2021). As such, it is crucial to understand the local conditions that encourage digital economic participation and the policies that best support entrepreneurs in the digital age. The Community Development Block Grant (CDBG) program, one of the longest-running place-based intergovernmental grant programs, presents an opportunity to investigate how different types of local investments can support digital economic activity.

Community Development Block Grant Program

Established under the Housing and Community Development Act of 1974, the Community Development Block Grant (CDBG) was designed to reduce redundancy in existing categorical development programs and provide local governments with more flexibility in addressing their specific development needs. Each fiscal year, CDBG funds are appropriated by Congress and allocated by the Department of Housing and Urban Development to “entitlement communities” based on population, housing stock, and concentration of poverty. Entitlement communities include cities with a minimum population of 50,000 or counties with a minimum population of 200,000. In addition to direct funding to entitlement communities, state governments are allocated a portion of CDBG funds to distribute to “non-entitlement communities” whose populations fall below these thresholds (HUD 2025).

While local governments set priorities for funding, the use of CDBG dollars must 1) benefit low-and-moderate income (LMI) individuals, 2) eliminate or prevent slum and blight conditions, or 3) meet other urgent needs such as natural disasters. Seventy percent of CDBG dollars must meet LMI objectives, with funded activities occurring in service areas with at least 51% of the population earning less than 80% of the Area Median Income (AMI) (HUD 2007). CDBG funds can be spent on a wide range of community development activities that fall into six categories, including 1) property and land acquisition/demolition, 2) economic development, 3) housing rehabilitation, 4) public services, 5) public improvements, and 6) administration.

Early scholarship on the CDBG focused primarily on program implementation and the political dynamics shaping local spending decisions. Tensions between local discretion and federal oversight and questions of “who benefits” have been core controversies of the CDBG program, motivating much of the initial research on the program (Rosenfeld et al. 1995). While there is extensive literature on the politics and implementation of the CDBG program, few studies have examined its measurable economic and social impacts in targeted communities (Galster et al. 2004; Walker et al. 2002). This small body of literature has found positive impacts in terms of property values (Galster et al. 2004; Pooley 2014; Stokan and Overton 2020; Overton and Stokan 2023), mortgage amount and approval rates (Galster et al. 2004; Walker et al. 2002), and number of businesses and number of jobs in neighborhoods (Zuo 2020; Galster et al. 2004; McCullough 2024). Additionally, these studies find that impacts often take several years to emerge, with observable effects anywhere from three years (Galster et al. 2004; Stokan and Overton 2020) to ten years after a CDBG activity occurred (Pooley 2014; Zuo 2020). Further, prior research suggests that the magnitude of the impact depends on the size of CDBG investment and the socioeconomic characteristics of the service area. For instance, Galster et al. (2004), Pooley (2014), and Zuo (2020), found greater economic returns when CDBG investments are above median in expenditures and Zuo (2020) and McCullough (2024) found greater job creation and business development in less disadvantaged areas, respectively.

While prior evaluations of the CDBG program suggest that place-based investments can stimulate economic activity in targeted neighborhoods, they largely focus on traditional business and housing outcomes. Rapid digital transformation of the economy, however, highlights the need to understand the program's role in supporting digital economic activity in targeted communities and the conditions in which this impact is likely to occur.

To address this gap, this paper investigates the following research questions:

1. What are the impacts of CDBG investments on digital economic activity at the ZIP code level?
2. What are the impacts of different types of CDBG investments on digital economic activity at the ZIP code level?
3. How does broadband adoption interact with CDBG investment to support digital economic activity at the ZIP code level?

Theoretical Framework

This study draws on multiple literatures to investigate the relationship between place-based investments and digital economic activity in LMI communities, including digital entrepreneurial ecosystems, resource-constrained entrepreneurship, and digital inequality scholarship.

The 1980s marked a shift in entrepreneurship scholarship away from individual, personality-based research towards more holistic, ecosystem-based perspectives that consider the role of local and regional actors, institutions, and resources on business

development (Stam and Van de Ven 2019). The proliferation of digital technologies and their use for economic activities has further evolved this perspective with frameworks such as the “digital entrepreneurial ecosystem” (DEE) that reimagine traditional entrepreneurial environments in a digital context.

The DEE, introduced by Sussan and Acs and later refined by Song (2019), suggests that the creation and sustainability of digital economic activity is dependent upon four factors: Digital User Citizenship, Digital Entrepreneurship, Digital Marketplace, and Digital Infrastructure Governance. Digital user citizenship concerns the “community of digital users that partake in online activities,” including both business owners and customers (Song 2019). Digital entrepreneurship refers to “any agent that is engaged in any sort of venture be it commercial, social, government, or corporate that uses digital technologies” (Sussan and Acs 2017). This definition encompasses both Schumpeterian-style entrepreneurs who create innovative digital products as well as entrepreneurs who leverage digital technologies for routine business processes. Digital marketplace, later reconceptualized as digital multi-sided platforms (Song 2019), refers to “intermediaries or matchmakers whose core competency is in reducing or eliminating transaction costs” (e.g., a website, app, e-commerce platform). Finally, digital infrastructure governance refers to the provision of physical infrastructure as well as institutional policies that support digital economic exchange (Sussan and Acs 2017).

DEEs are marked by both global and local spatial dimensions. Though digitalization has broadened the geographic bounds of entrepreneurship, business development and digital access remain local phenomena (Song 2019). Local environments matter for digital economic activity and participation can vary significantly

across neighborhoods and regions. Even with gains in broadband access and technology use (Pew Research 2021), disparities in business participation in the digital economy persist in both urban and rural settings, particularly in low-income communities (Mossberger, Tolbert, and LaCombe 2021).

Beyond overcoming the liability of being small and new, entrepreneurs in low-income neighborhoods often confront non-business pressures and an absence of a safety net. Simultaneously, these entrepreneurs must adeptly navigate a complex digital landscape to stay competitive (Morris 2020; Hui et al. 2018). Within this context, local institutions play a vital role in nurturing digital entrepreneurial ecosystems, particularly in regard to supporting digital user citizenship and ensuring proper digital infrastructure governance in LMI communities.

Place-based investments, through flexible programs like the Community Development Block Grant, offer a pathway for local governments and community organizations to support healthy and sustainable DEEs. These programs can be tailored to meet the specific needs of underserved communities, addressing issues that limit business development and contribute to digital divides. Investments spurred by the CDBG, both directly and indirectly, can lead to improvements in the digital economic landscape of a community. This enhancement comes through the upgrading of infrastructure, the provision of business support, and the offering of public services. Additionally, the interactive effect of CDBG investments with broadband adoption, which captures both digital infrastructure and its use by the community, can further amplify the impact of these investments on the growth of online businesses. As such, this study anticipates that both increased CDBG investments and the interaction between CDBG investments and

broadband will positively impact digital economic activity, as measured by domain name density, within targeted ZIP codes. Specific hypotheses are outlined below.

- H1a: CDBG investments will increase domain name density
- H1b: The interaction between broadband adoption and CDBG investments will increase domain name density
- H2a: Infrastructure investments will increase domain name density
- H2b: The interaction between broadband adoption and infrastructure investments will increase domain name density
- H3a: Business Services investments will increase domain name density
- H3b: The interaction between broadband adoption and business services investments will increase domain name density
- H4a: Public Services investments will increase domain name density
- H4b: The interaction between broadband adoption and public services investments will increase domain name density

Research Design

To examine the impact of Community Development Block Grant investment on digital economic activity, I rely on publicly available data from the Department of Housing and Urban Development (HUD) and proprietary data from domain registrar, GoDaddy, between the years 2019 and 2022. Although GoDaddy has provided domain data to researchers on a quarterly basis since 2019, these years were selected to ensure a balanced dataset, accounting for reporting lags in HUD and U.S. Census data at the time

of analysis. While Census-tract level data would be preferable in capturing neighborhood effects, privacy considerations limit domain data released to researchers to the ZIP code level.

Dependent Variable

The primary dependent variable in this study is ZIP code domain name density, which is measured as the number of registered domain names and their redirects (e.g., SSL, email) per 100 residents in a ZIP code. Domain name data are gathered from the domain registrar, GoDaddy, and are geo-located to customer ZIP codes. Nationally representative customer surveys¹ as well as machine learning analyses conducted by GoDaddy indicate that approximately three out of four domains are used for commercial purposes (Mossberger, LaCombe, and Tolbert 2022).

For the analysis, GoDaddy provided the total number of active domain name hosts in each ZIP code, recorded monthly over the study period. To construct the annual dependent variable, the median monthly count of active domains is normalized by population (domains per 100 residents) and log-transformed using the $\ln(x+1)$ transformation to mitigate skewness and accommodate zero values (Burbidge et al. 1988).

¹ Survey administered by marketing firm Advanis and developed in collaboration with GoDaddy, Arizona State University, and the University of Iowa

Independent Variable

The primary independent variable in this study is CDBG investment, which is measured as total annual CDBG expenditures per 100 residents in a ZIP code. The relationship between CDBG investment and domain name density is examined for total CDBG expenditures, and for specific CDBG activities within three categories, which include infrastructure, business services, and public services.

CDBG investment data is gathered from the Department of Housing and Urban Development's Community Development Block Grant Activity database². This dataset contains information on over 300,000 CDBG activities that have occurred since the 1990s. Each activity is geocoded to the address where the project took place and includes information on the date the activity was completed, the type of activity, and the level of expenditure.

To allow for a two-year lag in the analysis, CDBG activity data between the years 2017 and 2022 is used. For each ZIP code in the sample, CDBG expenditures are aggregated by year and activity type and adjusted for inflation. Like the dependent variable, CDBG spending is normalized by population (dollars spent per 100 residents) and log transformed using the $\ln(x+1)$ transformation (Burbidge et al. 1988).

For the purpose of this study, activities in this CDBG are assigned to three categories, including physical infrastructure, business services, and public services. The "infrastructure" category includes activities such as street improvement, water/sewer improvement, and commercial/residential rehabilitation. The "business services"

² <https://hudgis-hud.opendata.arcgis.com/datasets/HUD::community-development-block-grant-activity/about>

category includes activities such as training and technical assistance and micro-enterprise grants. The “public services” category includes activities such as transportation services, housing services, and employment training. To simplify the analysis, some similar activity types were consolidated (e.g., youth facilities and youth services are “youth services and facilities”). For the full list of activities and their assigned categories, see Table 1A in the appendix.

Control Variables

Control variable data for this study are gathered from the U.S. Census American Community Survey 5-year estimates and are included to account for time-varying factors unique to each ZIP code that may affect digital economic activity. Community characteristics such as employment, education, and income level of residents have been found to influence domain density (Mossberger et al. 2023; Moss and Townsend 1997, Bengali and Yu 2021) and are standard controls in previous research utilizing domain data. As such, this study controls for socioeconomic factors such as median income, and the percentage of the population who are unemployed, living below the poverty level, hold a bachelor’s degree, and identify as part of a racial or ethnic minority group.

Additionally, variables relating to technology are used, including the percentage of the population employed in the information technology sector and percentage of households with a broadband subscription.

Summary of Models

This study employs a two-way fixed effects (TWFE) model to estimate the relationship between CDBG investment and domain name density in a ZIP code. This

approach is consistent with recently published studies of the CDBG program (Overton and Stokan 2023; McCullough 2024). The panel data used in this analysis is balanced, meaning that each ZIP code is observed for every year within the study period (2019 to 2022). Fixed effects and/or random effects models are a standard econometric approach when analyzing longitudinal data (Cunningham 2021).

The models used in this analysis include both unit and time fixed effects as well as lagged effects in the key independent variables. Unit fixed effects control for unobserved time-invariant characteristics unique to each ZIP code that may affect domain density. Year fixed effects control for variables that are constant across all ZIP codes but vary over time. A two-way fixed effects strategy was chosen over a traditional difference-in-difference model given continuous treatment variables as well as variation in treatment status and timing among ZIP codes in the sample (Overton and Stokan 2023; Bertrand, Duflo, and Mullainathan 2004; Angrist and Pischke 2009; Cunningham 2021; Wing et al. 2018).

Consistent with prior studies of the CDBG program, lagged effects are included as it is assumed that block grant activities may not always have an immediate effect (Galster et al. 2004; Stokan and Overton 2020; Overton and Stokan 2023; Zuo 2020, McCullough 2024). For example, direct financial assistance to entrepreneurs may generate more immediate impacts by providing the capital needed to cover startup costs and establish their operations. In contrast, projects aimed at improving broader social conditions (e.g., healthcare services and housing) may take longer to show measurable outcomes as their relationship to economic growth is more indirect and gradual (Anthony 2022; Penghui, Xicang, and Haili 2022; Wardrip, William, and Hague 2011). Following

the lag structure used by Overton and Stokan (2023), both contemporaneous and two year lagged effects are incorporated into the models. While multicollinearity between these lags could be a concern, variance inflation factor (VIF) tests indicated a low level of multicollinearity, with all VIF values below 2.

Last, all models are in log-log functional form and use robust standard errors clustered at the ZIP code level. Clustered standard errors are used to address potential heteroskedasticity and autocorrelation issues that can arise when using longitudinal data (Cunningham 2021). Formally, the models used in this study are expressed as:

Model 1:

$$\begin{aligned} \ln(\text{DomainDensity}_{it}) = & \\ \beta_0 + \ln(\beta_1 \text{TotalCDBG}_{it}) + \ln(\beta_2 \text{TotalCDBG}_{it-1}) + \ln(\beta_3 \text{TotalCDBG}_{it-2}) & \\ + \gamma X_{it} + \alpha_i + \lambda_t + \varepsilon_{it} & \end{aligned}$$

Model 2:

$$\begin{aligned} \ln(\text{DomainDensity}_{it}) = & \\ \beta_0 + (\ln(\beta_1 \text{TotalCDBG}) * \text{Broadband})_{t,t-1,t-2} + \ln(\beta_2 \text{TotalCDBG}_{it}) & \\ + \ln(\beta_3 \text{Broadband}_{it}) + \gamma X_{it} + \alpha_i + \lambda_t + \varepsilon_{it} & \end{aligned}$$

Model 3:

$$\begin{aligned} \ln(\text{DomainDensity}_{it}) = & \\ \beta_0 + (\ln(\beta_1 \text{Activity}) * \text{Broadband})_{t,t-1,t-2} + \ln(\beta_2 \text{Broadband}_{it}) & \\ + \ln(\beta_3 \text{PublicServices}_{it}) + \ln(\beta_4 \text{Infrastructure}_{it}) + \ln(\beta_5 \text{BusinessServices}_{it}) & \\ + \gamma X_{it} + \alpha_i + \lambda_t + \varepsilon_{it} & \end{aligned}$$

Model 1 estimates the impact of total CDBG investment on domain name density in a ZIP code in the immediate, first, and second year after CDBG investment has occurred. $\ln(\text{DomainDensity})$ is the log of domain names per 100 residents in ZIP code i in year t and $\ln(\text{TotalCDBG})$ is the log of total CDBG expenditures per 100 residents in ZIP code i in year t , $t-1$, and $t-2$. γX_{it} represents ZIP code control variables, α_i represents fixed ZIP code effects, λ_t represents year fixed effects, and ε_{it} is the error term. Model 2 estimates the interactive effect of total CDBG investment and broadband subscriptions on domain name density, as well as the individual effects of CDBG and broadband. Model 3 estimates the interactive effect of specific CDBG activity types and broadband subscriptions on domain name density, controlling for the individual effects of CDBG, broadband, and other activity categories.

Summary Statistics

Median values are presented in Table 1 for the primary independent, dependent, and control variables in the entire sample of ZIP codes. The panel dataset includes 129,528 observations of CDBG investment and domain name hosts in 36,501 ZIP code areas. With 41,683 ZIP codes as of 2022, this represents nearly ninety percent of all U.S. ZIP code areas. For each year in the study period, an average of 4,264 ZIP codes receive CDBG investment, making up approximately 12 percent of the sample.

Table 1. ZIP Code Summary Statistics

Median Values	All ZIP codes	Treated	Not Treated
CDBG expenditures per 100 residents	\$0	\$924	\$0
Domains per 100 residents	1.98	3.93	1.75
Population	2,626	16,415	1,926
Income	\$67,467	\$67,266	\$67,498
Percent below poverty	7.5	9.7	7.2
Percent bachelors	14.4	17.3	14
Percent unemployed	2.8	3.6	2.6
Percent white alone	89	73	90.8
Percent broadband subscriptions	83.1	85.1	82.8
Percent employed in IT	1.1	1.6	1

Notes: CDBG expenditures and income are inflation-adjusted to 2023 dollars

Results

Empirical results are presented in Tables 2, 3, and 4. Addressing RQ1, Column 1 in Table 2 shows a negative but insignificant relationship between total CDBG expenditures and domain density in a ZIP code within the first three years of investment. Tables 3 and 4 address RQ2, examining the relationship between different types of CDBG spending and digital economic activity. Among broader categories in Table 3, a positive and significant relationship is observed for infrastructure spending within 1 year of investment at the 10% significance level. No significant relationship was found for overall public service spending, while business service spending showed a negative and significant relationship within three years of investment.

Table 2: CDBG Expenditures and Domain Density

Fixed-effects (within) regression Group variable: ZIP	Total CDBG per 100 residents	Total CDBG per 100 residents * % Population with Broadband
Domain name hosts per 100 residents	(1)	(2)
Year n	-0.000149	0.000084***
Year n - 1	-0.000095	0.000003
Year n - 2	-0.000138	0.000005
Controls		
% white alone	-0.000449**	-0.00044**
% bachelors	0.000877*	0.00088*
% unemployed	-0.005296***	-0.00528***
% below poverty	-0.001817***	-0.00178**
% IT employed	-0.001733*	-0.00174*
Median income	-0.000001***	-0.000001***
% broadband	0.000494**	0.00029*
Total CDBG per 100 residents	-	-0.00732
Year Fixed Effect		
2020	0.001967	0.002170
2021	0.004396**	0.004495**
2022	0.021363***	0.021514***
Observations	129,528	129,528
Sample Size	36,501	36,501

Notes: All regressions are weighted by average ZIP code population and standard errors are clustered at the unit level. * $p < 0.10$, ** $p < 0.05$, *** $p < .01$

Table 3: CDBG Expenditures and Domain Density by CDBG Category

Fixed-effects (within) regression Group variable: ZIP	Total CDBG per 100 residents	Total CDBG per 100 residents * % Population with Broadband
Domain name hosts per 100 residents	(1)	(2)
Total Infrastructure (Year n)	.00059*	.000103***
Year n -1	.00006	.000004
Year n -2	-.00011	.000003
Total Public Services (Year n)	-.0005717	.0000961**
Year n -1	-.0003376	-0.000000206
Year n -2	-.0005703	0.000000356
Total Business Services (Year n)	-.0010314*	-.0000288
Year n -1	.0000392	.0000007
Year n -2	.0006592	.0000112
Observations	129,528	129,528
Sample Size	36,501	36,501
Control Variables	Yes	Yes

Notes: All regressions are weighted by average ZIP code population and standard errors are clustered at the unit level. * $p < 0.10$, ** $p < 0.05$, *** $p < .01$

While overall CDBG spending shows no significant impact on domain name density, this may be due to the aggregated nature of the data obscuring activity-specific effects (Stokan and Overton 2020). Column 1 in Table 4 provides a more nuanced picture, with specific CDBG-funded projects, including commercial infrastructure improvements, residential improvements, security deposits, and direct financial assistance to businesses, demonstrating a positive association with digital economic activity in LMI communities.

Table 4: CDBG Expenditures and Domain Density by CDBG Activity

Activity		(1) CDBG Alone	(2) CDBG x Broadband
Infrastructure	Acquisitions		
	Asbestos		
	Brownfield Cleanup		
	Code Enforcement		
	Historic Commercial Improvements		
	Commercial Improvements	+	+
	Commercial Rehab.		
	Flood Facilities		
	Misc. Improvements		
	Neighborhood Facilities	-	
	Neighborhood Cleanup		
	Parking	-	-
	Parks and Recreation		
	Residential Improvements	+	+
	Sidewalks		
	Street Improvements		
	Tree Planting	-	-
	Utilities	-	-
	Water Improvements		
Public Services	Childcare		
	Crime Prevention		
	Disabled Services	-	-
	Downpayment Assistance		
	Employment Training		
	Fair Housing		
	Fire Stations		
	Food Banks		
	Health Services		+
	Homeless Facilities		
	Housing Counseling Services	-	-
	Lead Paint	-	-
	Legal Services		
	Mental Health Services		-
	Nonprofit Assistance	-	-
	Security Deposits	+	+
	Senior Services		
	Transportation Services		
	Subsistence Payments		
	Youth Services		+
	Other Public Services	+	+
Bus.	Business Financial Assistance	+	+
	Business Technical Assistance	-	
	Microbusiness Assistance	-	-

Notes: A positive (+) or negative (-) sign indicates a significant relationship between the activity and domain density in at least one of the three years in the study period. Empty cells indicate no significant relationship. The interaction term (CDBG x Broadband) reflects how broadband use modifies the impact of CDBG expenditure on domain density. * p < 0.10, ** p < 0.05, *** p < .01.

Addressing RQ3, Column 2 of Table 2 introduces an interaction term between CDBG funding and broadband subscriptions. This analysis shows a positive and significant effect on domain density in the initial year of CDBG investment. This effect is statistically significant at the 1% level, with a coefficient of 0.0000844. The practical interpretation of this effect is complicated, however, by the differing scales of the variables. CDBG spending is logged, reflecting percentage changes, while broadband subscriptions are not logged, reflecting absolute changes in the percentage of the population with broadband access. Simply put, the positive effect of CDBG spending on digital economic activity is conditional on broadband adoption levels in a ZIP code. Areas with higher broadband subscription rates experience a stronger boost in domain density from CDBG investments, while areas with lower broadband use may see more limited effects.

Similarly, when examining the interactive effects of different types of CDBG investments with broadband (Column 2 in Tables 3 and 4), the positive impact of infrastructure spending remains significant at the 1% level, and public services become significant at the 5% level. However, overall spending on business services is insignificant for all three years. In addition to the specific activities highlighted in Table 4, investments in health services and youth services also show a positive impact on boosting digital economic activity as broadband infrastructure adoption increases. Overall, these results demonstrate partial support for all hypotheses, particularly when looking at the specific CDBG activity within each spending category.

Robustness Checks

Additional tests were conducted to examine the robustness of the results in relation to spatial spillovers and different geographic contexts. Spatial spillovers refer to situations in which the dynamics of one economy influence the growth patterns of neighboring economies and are an increasingly important factor in explaining local economic development (Capello 2009). To account for potential spatial spillover effects between ZIP codes, standard errors were clustered at the city level (Abadie et al. 2022; Cameron and Miller 2015). The results remained largely consistent, showing no significant effect of overall CDBG investment on domain density, but a positive and significant effect of the interaction between CDBG expenditures and broadband subscriptions on domain density in year 1. Similarly, the results were stable when examining the impacts of infrastructure, business services, and public service CDBG investments on domain density. For full results, see Table 2A in the appendix.

To assess the stability of the results across different geographic contexts, the models were rerun separately for urban, suburban, and rural ZIP codes³. The results in Table 5 indicate that overall CDBG investment is insignificant across all geographic areas, consistent with the primary model that included all ZIP codes. The only exception is lag 1 in urban areas, where CDBG investment shows a marginally significant negative effect.

The interaction between CDBG investments and broadband adoption remains positive and significant in year 1, but only in urban ZIP codes. This suggests that CDBG

³ Kolko (2015) ZIP code classification into urban, suburban, and rural. <https://jedkolko.com/datasets/>.

investments and broadband have a stronger, more measurable impact in urban environments, likely due to better market conditions and agglomeration effects. However, when examining infrastructure investments, the interaction term between CDBG infrastructure spending and broadband is positive across all geographic types, indicating that this combination can have an impact regardless of urbanization.

Table 5: CDBG and Domain Density by ZIP Code Urban, Suburban, and Rural Status

Domain Density	CDBG Alone			CDBG x Broadband Subscriptions		
	Urban	Suburban	Rural	Urban	Suburban	Rural
	(1)	(2)	(3)	(4)	(5)	(6)
Total CDBG	-0.00083	0.00019	0.00015	0.00011**	0.00005	0.00001
L1	-0.00135*	0.00021	0.00074	-0.00001	0.00001	0.00001
L2	-0.00083	0.00008	0.00004	0.000003	0.00001	0.000002
Infrastructure	0.00139**	0.00035	0.00059	0.00012**	0.00011***	0.00002
L1	-0.00082	0.00019	0.00138*	-0.000005	0.000004	0.00002**
L2	-0.00066	0.00009	0.00022	-0.000003	0.000004	0.00001
Public Services	-0.00124*	-0.00021	0.00074	0.00009	0.00003	0.00007
L1	-0.00067	-0.00023	0.00013	-0.000003	0.00000003	0.0000007
L2	-0.00085	-0.00039	-0.00087	0.0000003	0.0000007	-0.00001
Business Services	-0.00173**	-0.00032	-0.00111	-0.00006	-0.00011	0.00005
L1	-0.00061	0.00097	-0.00046	-0.00001	0.00001	-0.00001
L2	-0.00002	0.00159*	-0.00002	0.00001	0.00002*	-0.000003
Observations	13,030	38,358	72,659	13,030	38,358	72,659
Sample Size	4,224	11,080	19,217	4,224	11,080	19,217
Control Variables	Yes					

Notes: All regressions are weighted by average ZIP code population and standard errors are clustered at the unit level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Additionally, while business services investments show no significant effect across all ZIP codes, they reveal a significant positive effect in suburban areas. These findings highlight that while urban areas exhibit the strongest overall response to CDBG and broadband investments, specific types of CDBG activities (such as infrastructure and business services) can have meaningful impacts on digital economic activity in suburban and rural areas as well.

Limitations and Directions for Future Research

While the regression results suggest that CDBG investments have a positive impact on digital economic activity under certain conditions, these findings should be interpreted with caution. First, while ZIP codes are better suited to capture neighborhood change than city- or county-level data, they are not entirely stable geographic units as their boundaries may change over time and they can be added or removed at the discretion of the U.S. Postal Service. However, given the relatively short study period between 2019 and 2022, I do not anticipate significant changes in ZIP code boundaries.

Second, while unit fixed effects account for *fixed* factors that may influence digital economic activity, factors that change over time must be explicitly controlled for. Given that the sample includes over 35,000 ZIP codes, data limitations preclude accounting for all non-CDBG policy interventions that may influence digital economic activity. Third, the use of domain data is not exhaustive of all digital economic activity. These data do not capture digital businesses that operate entirely on platforms, like Amazon or Etsy, for instance.

Last, the causal interpretations of two-way fixed effect models have been criticized in recent years, particularly when treatment effects are heterogeneous. (Goodman-Bacon 2021; de Chaisemartin and D’Haultfœuille 2020; Imai and Kim 2021). While new methods to overcome these limitations have been proposed (Baker et al. 2022; Callaway and Sant’Anna 2021), these solutions remain an active area of research and debate (Huntington-Klein 2022). Alternative estimators, such as the Callaway and Sant’Anna approach, generally assume that once a unit is treated, it remains treated (Wooldridge 2021; Wang, Hamad, and White 2024). This condition does not always align with the fluctuating nature of CDBG funding and the various types of CDBG projects. Additionally, most of these methods require a binary treatment indicator, which limits their applicability in studies like this one, where interaction terms, continuous treatment variables, and lagged effects are used. The use of a continuous treatment variable, as well as the analysis segmented by geography, may partially mitigate some concerns about heterogeneous treatment effects (Varadhan and Seeger 2013; Callaway, Goodman-Bacon, and Sant’Anna 2024), however. Nevertheless, the findings from this analysis should be considered as more exploratory, not confirmatory, of causal relationships.

Discussion and Conclusions

This study builds on a growing body of research examining how place-based investments, such as those funded by the Community Development Block Grant (CDBG) program, influence local economic development. Specifically, it examines how place-based investments boost digital economic activity in low-and-moderate income areas. In

summary, this study provides evidence that targeted CDBG activities, when combined with broadband adoption, positively impact digital economic activity by increasing domain density in a community. These findings are consistent with the digital entrepreneurial ecosystem theoretical framework that highlights the interactive role between digital, physical, and social factors in promoting digital economic activity.

The study's findings demonstrate that the type of place-based investment matters in fostering digital growth. Infrastructure investments, particularly commercial and residential improvements, show consistently positive effects on domain density, while other activities such as public services and business services exhibit more varied impacts. Within public services, security deposits, health services, and youth services show a positive impact on digital economic activity. As highlighted by Morris (2020), housing insecurity is a common non-business pressure among low-income entrepreneurs, one that frequently overlaps with gaps in digital connectivity (NAHRO 2024; Pew Charitable Trusts 2023). Efforts to improve both housing stability and broadband accessibility may be key in boosting digital entrepreneurship in LMI communities, as it provides a reliable foundation for the growth of these businesses that are often home-based and rely on a stable internet connection. Similarly, investments in health and youth services show a positive relationship with digital economic activity. By reducing healthcare costs, these investments may free up financial resources for low-income entrepreneurs to support and grow their businesses. Investments in youth services and facilities, often equipped with Wi-Fi, provide students with opportunities to build digital literacy, access tutoring, and

attend workshops, laying the foundation for their future participation in the digital economy as both consumers and entrepreneurs.

Though business service investments showed an inconsistent relationship with domain density overall, segmenting by geography suggests that business services may have a greater effect in suburban ZIP codes. Looking at specific types of business services, direct financial assistance showed a consistently positive relationship to domain density with and without the interaction of broadband adoption. With financial capital being a key resource for new and small businesses, this relationship was expected. The negative relationship between micro-business assistance and domain density, however, was unexpected, given that digital businesses are often micro in size (Mossberger, LaCombe, and Tolbert 2022). This relationship may stem from variations in how these programs are administered locally. Survey data indicate that many digital business owners, particularly those from low-income backgrounds, often underutilize public assistance programs designed to support their businesses (Venture Forward 2022). This reflects broader criticisms of inefficiencies in CDBG program delivery, with potential mismanagement of funds crowding out resources for those who most need them (Malanga 2017). Beyond microbusiness support, activities like tree planting, lead paint removal, and utilities showed negative relationships, likely reflecting their indirect or non-commercial nature.

Finally, it is important to consider the relatively short study period used in this analysis. Previous studies examining CDBG impacts over longer time horizons have found that significant impacts often take years to materialize (Galster et al. 2004; Pooley

2014). The absence of significant relationships in some areas is therefore not surprising. However, the fact that some significant impacts are already visible is notable. The use of domain data in this study, which captures the digital presence of both nascent and established firms, brings new insights about a sector of the economy previously underexplored in CDBG studies.

To conclude, this analysis reveals the potential for targeted place-based investments to catalyze digital economic activity in low- and moderate-income areas. Flexible programs like CDBG offer one pathway for supporting business technology use, but their impact depends on the nature of investments and the existing digital endowments of communities.

CHAPTER 3

ENVIRONMENTAL DRIVERS OF THE MAKER MOVEMENT: A CASE STUDY OF ARIZONA ETSY SELLERS

Introduction

The “maker movement,” characterized by small-scale, creative production, has emerged as a vital and dynamic segment of the modern economy. While domestic and small-scale production was commonplace in agrarian and pre-industrial societies, advances in technology and changes in consumption patterns have contributed to a resurgence of artisans and craft workers in recent years (Wolf-Powers et al. 2017; Dartnell and Kish 2021; Browder et al. 2019). With the potential to revive local manufacturing activity and spur economic development, the “maker movement” has captured the attention of both researchers and policymakers. This interest peaked in the mid-2010s, prompting local governments, non-profits, and institutes of higher education to invest in incubators and “makerspaces,” where individuals can take classes, share technical knowledge, and access capital-intensive equipment (Browder et al. 2019; Wolf-Powers et al. 2017; National League of Cities 2016).

While public interest in the maker movement surged in the 2010s, this sector was uniquely positioned to grow during the COVID-19 pandemic. Having an online presence (e.g., a shop on Etsy or a Shopify website) enabled maker-entrepreneurs to maintain business continuity amid social distancing restrictions. At the same time, consumer demand increased for artisanal and homemade goods, as well as supplies for do-it-

yourself projects (Dartnell and Kish 2021). The pandemic also revealed vulnerabilities in global supply chains (Newman 2020; Phillips et al. 2022), prompting shifts in consumer behavior, including 1) mindfulness of spending habits, particularly towards sustainability values (Arora et al. 2020), 2) preference for local producers (Cambefort 2020, Schmidt et al. 2020), and 3) a “homebody” economy in which consumers purchase goods for the home, from home (Granader 2021).

Despite renewed interest in this sector of the economy, academic research on the maker movement remains limited, with publications largely focusing on profiles of maker-entrepreneurs, or evaluations of makerspaces and coworking spaces (Lowe and Vinodrai 2020; Wolf-Powers et al. 2017; van Holm 2017; Vinodrai, Nader and Zavarella 2021). Less attention has been given to the broader environmental and systemic factors that support the growth of maker economies, an area particularly relevant for local policymakers seeking to foster maker-entrepreneurship in their communities.

Using geo-located data on Etsy shops across the state of Arizona, this study explores how regional conditions contribute to the development and performance of maker businesses. The findings suggest that environmental factors such as talent, infrastructure, quality of place, and entrepreneurial culture are positively associated with maker business development. Additionally, the overall quality of the entrepreneurial ecosystem, measured by a composite index, is a significant predictor of Etsy shop density. However, results suggest that shop performance is driven more by shop-level characteristics, such as the presence of external websites and follower counts, than by regional ecosystem quality.

This paper begins with an overview of the maker movement and entrepreneurial ecosystems and is followed by a discussion of the study's research design and findings. It concludes with implications for local economic development policy, offering recommendations for supporting local maker businesses.

Literature Review and Theoretical Framework

Maker Businesses

Maker businesses encompass a diverse range of industries and activities, combining traditional craftsmanship with modern technology to produce customized, small-batch goods. These enterprises often focus on handmade or artisan products, spanning home goods, apparel, jewelry, furniture, and craft supplies. Additionally, some maker businesses incorporate digital fabrication techniques, such as 3D printing and laser-cut designs.

Several technological advancements have made it easier for micro-manufacturers to experiment, refine, and commercialize their craft. Laser cutters and 3D printers, once confined to corporate research and development facilities, are now available at far lower costs (Wolf-Powers et al. 2017). Additionally, the internet has enabled creative entrepreneurs to learn new skills, connect with artisan communities, and market their products to customers on a local and global scale. Consumer preferences have also played a role in the growth of maker businesses. Contemporary consumers increasingly value sustainability, customization, and local production methods, often seeking products that reflect these values (Dartnell and Kish 2021, Heying 2010, Roy and Acott 2015). Growing preferences for neo-artisanal products, paired with technological accessibility,

have set the stage for the maker movement to flourish in the digital age and become a key component of local economic development strategies.

Entrepreneurial Ecosystems and the Maker Movement

Rooted in the conceptual lineage of industrial districts and regional clusters, entrepreneurial ecosystems broadly refer to the “interdependent actors and factors that enable and constrain entrepreneurship within a particular territory” (Stam and Van de Ven 2021). The entrepreneurial ecosystem (EE) perspective has gained prominence among scholars and policymakers and is especially of interest to local governments seeking to foster entrepreneurial activity in their communities. Consolidating much of the EE literature, Stam and Van de Ven (2021) developed an integrative model consisting of 10 elements essential to sustainable EEs. Their model includes structural factors such as institutions, culture, and networks as well as local resource endowments such as physical infrastructure, demand, intermediaries, talent, knowledge, leadership, and finance. From the EE perspective, it is the interplay and interdependence between these factors that produce productive and sustainable entrepreneurship in a territory. In this paper, I investigate *maker*-entrepreneurial ecosystems, asking what environmental factors enable makers to transform creative hobbies into commercial enterprises. Specifically, this study examines two essential questions:

1. How do environmental factors contribute to the development of local maker economies?
2. How do environmental factors influence the performance of individual maker businesses?

Motivated by similar questions, Browder, Aldrich, and Bradley (2019) were among the first to identify external enablers of the maker economy. In their conceptual model, four enabling forces, including digitization, economization, collaboration, and user-innovation, shape technological, social, and knowledge resources vital to maker-entrepreneurship. The authors argue that the commercialization of maker projects is dependent upon the coordination of these resources. In this framework, knowledge creation and sharing spaces are a central feature in which resources can be combined to execute, expand, and commercialize maker projects. While Browder, Aldrich, and Bradley's conceptual framework makes a valuable theoretical contribution to understanding the drivers of the maker economy, the elements of the framework have not yet been operationalized or empirically tested.

Scholarship on the attraction and development of “creative class” workers can also provide insight into enablers of the maker economy. Originally coined by economist Richard Florida, the creative class broadly refers to science and engineering, architecture and design, education, arts, music, and entertainment workers whose economic function is to create new ideas, new technology, and new creative content (You and Bie 2017). Several studies have found the quality of place, including urban and natural amenities, housing, education, and social atmosphere, to be a key driver of creative class agglomeration (Brown and Meczynski 2009, Clifton and Cooke 2009, Fritsch and Stützer 2008, Hansen 2007, Kloosterman 2013, Mansury et al. 2012). Drawing from literature on entrepreneurial ecosystems, the maker movement, and creative class theory, I identify seven elements of maker-entrepreneurial ecosystems (MEE), including institutional

support, knowledge, talent, infrastructure, quality of place, demand, and entrepreneurial culture.

MEE Elements

Institutional support

Formal and informal institutions, spanning government entities and non-profit organizations, play a key role in the development and success of businesses across industries (Malecki 2018; Lubacha-Sember and Godlewska 2018). In the MEE, institutional support refers to the degree to which artistic, cultural, and creative activities are socially and economically valued in a region. In this study, institutional support is assessed by the density of local arts agencies, museums, and historical sites at the county level. These indicators were chosen specifically to reflect the artisanal and creative nature of maker businesses.

Local Arts Agencies, supported by the Arizona Commission on the Arts, are government or non-profit entities that provide resources to promote the arts and encourage creative collaboration. Moreover, support for the arts, including museums and cultural sites, is closely linked to tourism, which can drive demand for maker businesses by attracting visitors who seek unique, locally made goods (OECD 2019).

Knowledge

Knowledge in the MEE context refers to investments in new knowledge, research, and development. Key indicators include the presence of makerspaces and institutes of higher education. Makerspaces are facilities that provide access to tools, resources, and

community support for creative projects, allowing makers to develop and commercialize their crafts (Browder et al. 2019). Similarly, higher education institutions contribute by offering technical education, research opportunities, and networks that support entrepreneurial growth. Makerspaces across the state were identified through internet search, Google Maps API, and various maker blogs and websites and institutes of higher education were gathered through the National Center for Education Statistics.

Talent

In the MEE framework, talent reflects the prevalence of creatively skilled and artisanally adept individuals within a region. This element is measured by the percentage of the population with a bachelor's degree and the percentage of the population employed in management, business, science, and arts occupations. High concentrations of educated and creatively skilled individuals are often associated with higher levels of innovative and entrepreneurial activities (Florida 2002; Wojan and McGranahan 2007). By focusing on indicators related to educational attainment and creative occupations, this measure captures the region's capacity to attract and produce skilled makers and customer bases who participate in the local maker economy.

Infrastructure

Infrastructure encompasses the quality of physical and technological foundations necessary for business operations. This element is measured by broadband subscriptions, average download speed, number of high-speed internet service providers (ISPs) per ZIP code, and the percentage of lane miles rated as "good" pavement condition.

Each indicator captures a critical aspect of infrastructure quality. Broadband subscriptions reflect the level of technology adoption in a region, while average download speed provides a measure of internet reliability and quality. The number of ISPs indicates the accessibility and affordability of internet services. Finally, the condition of lane miles serves as a proxy for transportation infrastructure. Reliable and accessible digital and physical infrastructure is critical for makers who rely on technology for online sales and marketing and on transportation networks for the distribution of goods (Atkinson et al., 2016; Wolf-Powers et al. 2017)

Quality of Place

Quality of Place captures the presence of factors that contribute to the region's economic, social, and natural livability. This element is measured by the Natural Amenities Index score, median income, and the Location Affordability Index. The Natural Amenities Index, developed by the USDA, quantifies the physical characteristics of a region, including climate, topography, and access to natural resources. The Department of Housing and Urban Development's Location Affordability Index measures the combined costs of housing and transportation relative to income, reflecting the economic accessibility of a region. Research on the creative class suggests that regions with strong urban and natural amenities are better positioned to attract skilled individuals, foster tourism, and support vibrant, creative communities (Brown and Meczynski 2009; Wojan and McGranahan 2007).

Demand

In the MEE, demand captures the market potential for artisanal goods through several key indicators, including the density of jewelry, luggage, and leather goods stores, farmers' markets, and employment in arts, entertainment, recreation, accommodation, and food services sectors. The presence of jewelry, luggage, and leather goods stores reflects consumer interest in handmade, small-batch products. Farmers' markets provide vital venues where local artisans, farmers, and food vendors connect directly with consumers, with their recent resurgence driven by the creative class's preference for local goods (DeMuynck 2019; Dartnell and Kish 2021). Finally, employment levels in arts, entertainment, recreation, accommodation, and food services sectors reflect a robust tourist economy, another key driver of demand for artisanal goods (Chadwick 2012). Together, these indicators suggest the presence of a receptive consumer base and the infrastructure to connect makers with broader markets.

Data for the density of jewelry, luggage, and leather goods stores and employment in tourism industries were gathered through the U.S. Census County Business Patterns dataset and the American Community Survey, respectively. County farmers' markets were identified through internet search, Google Maps API, and the USDA Food Directory website.

Entrepreneurial Culture

Entrepreneurial culture reflects the degree to which new business creation is valued and supported within a region. This element is measured by the number of business applications per 10,000 residents, capturing the local rate of entrepreneurial

activity. New business formation is a common measure of entrepreneurial culture as it can signal the presence of networks, mentorship opportunities, and support systems that contribute to regular business formation and growth (Stam and Van de Ven 2021, Credit, Mack, and Mayer 2018; Fritsch and Wyrwich 2014).

Research Design

To explore the relationship between environmental factors and maker economies, this study follows a case study design that examines the geographic distribution of Etsy sellers in the state of Arizona. Case studies allow for an in-depth investigation into social phenomena within its real-life context (Yin 2009). Yin argues that the case study approach is appropriate when 1) the research question seeks to answer “how,” “what,” “why,” and “who” questions, 2) the investigator has little control over events, and 3) the boundaries between the phenomenon of study and its context are not clear (2009).

Case studies can be used for exploratory, descriptive, and explanatory purposes. While descriptive and explanatory case studies are appropriate for affirming and testing theory, exploratory case studies are generally used to identify themes, develop theory, and generate hypotheses for future research. Given the emerging nature of this research topic and the use of cross-sectional data, an exploratory case study is an appropriate methodological approach. The aim of this study is not to predict, but to understand how environmental conditions support local maker economies and provide bases for future hypotheses.

Table 6: Maker Entrepreneurial Ecosystem Elements

Elements	Description	Empirical Indicators	Data sources
Institutional Support	The degree to which artistic, cultural, and creative activities are socially and economically valued in a region	# Local Arts Agencies per 10,000	Arizona Arts Agencies: Arizona Commission on the Arts (2017)
		# Museums, historical sites, and similar institutions per 10,000	County Business Patterns (2021) - NAICS Code 7121
Knowledge	Investments in fostering new knowledge, research, and development	# Makerspaces per 10,000	Google search, Google Maps API, “Maker” blogs
		# Institutions of higher education per 10,000	National Center for Education Statistics: College Navigator (2024)
Talent	Prevalence of creatively skilled and artisanally adept individuals	% Population with bachelor's degree	U.S. Census Bureau ACS 5-year Estimates (2022)
		% Population employed in management, business, science, and arts occupations	U.S. Census Bureau ACS 5-year Estimates (2022)
Infrastructure	Quality of physical and technological infrastructure in the region	% Households with broadband	U.S. Census Bureau ACS 5-year Estimates (2022)
		Average download speed	National neighborhood data archive (2020)
		Average # highspeed ISPs per ZIP	National neighborhood data archive (2020):
		% Lane miles rated "Good" pavement condition	Arizona Dept. of Transportation Pavement Condition Data (2023)
Quality of Place	The presence of factors that economically, socially, and naturally contribute to the region's quality of life	Natural amenities index score	USDA Natural Amenities Index (2024)
		Median income	U.S. Census Bureau ACS 5-year Estimates (2022)
		Location Affordability Index	U.S. Dept. of Housing and Urban Development (2021)
Demand	Potential market demand for handmade and artisan goods	# Jewelry, luggage, and leather goods stores per 10,000	County Business Patterns (2021): NAICS Code 4483
		# Farmers' markets per 10,000	Google search, Google Maps API, USDA Food Directory (2024)
		Tourism industry (% employed in arts, entertainment, recreation, accommodation and food services)	U.S. Census Bureau ACS 5-year Estimates (2022)
Entrepreneurial Culture	The degree to which new business creation is valued in a region	# Business applications per 10,000	U.S. Business Formation Statistics (2019)

Sample

With over 9 million active sellers and 96 million active buyers worldwide, Etsy is a leading peer-to-peer e-commerce platform for handcrafted and vintage items (Etsy 2025). Since its launch in 2005, Etsy has connected consumers with members of the “maker movement” who market their handmade and artisan goods on their platform. For many makers, e-commerce platforms such as Etsy provide an accessible way to commercialize their projects and reach markets locally and globally.

Nationally, Etsy sellers represent a diverse group of maker-entrepreneurs. According to the 2021 Etsy Seller Census, the majority of Etsy sellers are women, operate as sole proprietors, and work from their homes (Mozen 2022). Additionally, approximately one in four live in rural areas, and nearly half started their entrepreneurial journey on Etsy (Mozen 2022). While many Etsy sellers are artisan-focused, offering goods such as artwork, jewelry, and home decor, a growing number incorporate modern production techniques like laser printing and Cricut machines to create customized products.

While some maker-entrepreneurs utilize platforms such as Etsy as an online channel for their brick-and-mortar business, many maker-entrepreneurs operate entirely from platforms. These businesses are often too small or too new to be captured in traditional business statistics. Etsy’s Developer API (application programming interface) as well as web-scraping techniques make it possible to systematically collect shop-level data on large samples, or entire geographic populations, of Etsy sellers (Guyt, Datta, and Boegershausen 2024). Web-scraped data on Etsy sellers has been used in a handful of studies across a variety of disciplines, including marketing (Church and Oakley 2018),

socioeconomics (Jourdain 2019, Jourdan and Naulin 2024), and strategic management (Cutolo et al. 2020), but remain underutilized in the micro-manufacturing, entrepreneurship, and economic development literatures.

For this study, shop-level data is collected on all active Etsy shops in the state of Arizona as of January 2022. For the analysis, the number of Etsy shops are aggregated to the county level, forming a sample size of 15 counties. In the aggregate, these geo-located data on active Etsy shops provides a novel measure of maker-ecosystems across space.

Outcome Variables

The primary outcome variable in this study is Etsy shop density, which is measured as the number of Etsy shops per 10,000 county residents in the state of Arizona. These geo-located Etsy shop data were initially gathered by McCullough and McCullough (2022) and make up the population of maker-entrepreneurs analyzed in this study.

Following the Etsy API and web-scraping approach described by Ferreira, Jourdain, and Naulin (2018), McCullough and McCullough (2022) gathered quantitative and qualitative shop-level data for all Etsy sellers in Arizona who had active listings in January 2022. This data includes public information such as shop biography, creation date, location, social media accounts, external website, number of sales, and number of followers.

Because Etsy's API requires a unique shop name or shop ID to return shop information, web-scraping using the Python package, BeautifulSoup, was performed to gather shop names associated with product listings. This was accomplished by scraping

each page of listings under each product category, filtered by the location of the shop owner (Arizona). Once names were collected, an API request was initiated and requested shop information was returned for each shop. While most Etsy shops publicly display location information, this data is not provided by the Etsy API. Additional web-scraping of each shop's webpage was conducted to gather this information. This initial data collection process took place over a period of two weeks in January 2022, generating shop-level data for a total of 17,968 Arizona Etsy shops created between 2005 and 2022. Of these shops, 16,982 provided location information at the city level on their shop webpage⁴. For the 16,428 shops still active and operating in Arizona in 2023, shop-level information was gathered again in May 2023.

To form the primary dependent variable, I aggregate the number of Etsy shops to the county level based on their reported city location and normalize by population (per 10,000 residents). I also examine the impact of environmental factors on shop performance at the county and individual levels. At the county level, this is measured as the average percentage change in sales growth between 2022 and 2023, for all shops. At the individual level, the percentage change in sales growth for the individual shop is used. All sales growth data is log transformed to account for any outliers.

⁴ The remaining shops listed "Arizona, United States" as their location and are not included in the county level analysis

Analysis

Investigations into the spatial distribution of entrepreneurship have traditionally relied on multivariate regression models and other parametric methodological strategies. Ecosystem theorists, however, generally view entrepreneurial phenomena as an emergent property of interrelated relationships in a system, compromising assumptions of linearity and independence required for OLS. Considering this, Stam and Van de Ven (2021) opt for a two-stage, descriptive and systems-based analysis of entrepreneurial ecosystem elements. Likewise, this study follows a similar approach, beginning with a descriptive and correlational analysis of the relationships between environmental factors and Etsy shop density and performance. This is followed by the development of a maker-entrepreneurial ecosystem index that captures the quality of ecosystems at the county level. Consistent with the ecosystem theoretical perspective, this index approach allows for a more holistic understanding of how various environmental factors *collectively* impact the development and performance of local maker economies.

Stage 1: Descriptive and Correlational Analysis

The first stage presents basic descriptive statistics of Etsy shop density and performance across the 15 Arizona counties as well as the correlations among the environmental ecosystem elements and Etsy shop outcomes. For the correlation analysis and index development, each of the 17 regional variables in Table 6 were standardized using min-max scaling, resulting in values ranging from 0 to 1 across the 15 counties. For each ecosystem element, composite measures were created by averaging each element's respective indicators (see Table 2B in the appendix). For the Quality of Place element, the inverse of the affordability index score was used to calculate the composite measure.

Stage 2: Index Construction and Systems Analysis

In the second stage, an index score was developed based on the seven ecosystem elements, allowing for comparison between counties. Following Stam and Van de Ven's approach, an additive index was constructed by summing the composite values for each MEE element (Institutional Support + Knowledge + Talent + Infrastructure + Quality of Place + Demand + Entrepreneurial Culture), providing a cumulative measure of ecosystem quality at the county level. To capture the interactive effects of the ecosystem elements, I constructed a multiplicative index (Institutional Support * Knowledge * Talent * Infrastructure * Quality of Place * Demand * Entrepreneurial Culture). A constant of 1 was added to each element to account for zeros in the data. These indexes were then tested using regression models to explore their influence on Etsy shop density and sales growth at both the county and individual shop levels. The formal models are described below.

Model 1: Etsy Shop Density

$$\begin{aligned} \text{EtsyShopDensity} = \\ \beta_0 + \beta_1 \text{MakerEcosystemIndex} + \beta_2 \text{CountyUnemployment} + \varepsilon \end{aligned}$$

Model 2: County-Level Sales Growth

$$\begin{aligned} \text{Ln}(\text{SalesGrowth}) = \\ \beta_0 + \beta_1 \text{MakerEcosystemIndex} + \beta_2 \text{CountyUnemployment} + \beta_3 \text{AverageAge} \\ + \beta_4 \text{AverageFollowers} + \beta_5 \text{PercWebsite} + \varepsilon \end{aligned}$$

Model 3: Shop-Level Sales Growth

$$\begin{aligned} \text{Ln}(\text{SalesGrowth}) = \\ \beta_0 + \beta_1 \text{MakerEcosystemIndex} + \beta_2 \text{CountyUnemployment} + \beta_3 \text{Age} \\ + \beta_4 \text{Followers} + \beta_5 \text{Website} + \varepsilon \end{aligned}$$

Model 1 regresses MEE index scores on Etsy shop density, controlling for county unemployment rates. Unemployment was included to reflect potential external economic

conditions, especially those related to the COVID-19 recession. Other socioeconomic factors were not controlled for individually, as many of them were already captured within the MEE index itself. Model 2 regresses MEE index scores on average shop sales growth, aggregated to the county level, controlling for county unemployment and county shop characteristics, such as average shop age, percentage of shops with external websites, and average shop followers.

Model 3 extends the analysis to the individual shop level. Model 3 is an OLS regression examining the impact of county-level MEE index scores on sales growth, controlling for shop age, number of followers, presence of an external website, and county unemployment. To account for within-county correlation, all models cluster standard errors at the county level.

Results

Summary Statistics

Descriptive statistics are presented in Table 7 for each environmental variable across the 15 Arizona counties. Additional descriptive statistics can be found in Tables 1B and 2B in the appendix, including a correlation table between the environmental variables as well as the composite measures for each MEE element across the Arizona counties.

Table 7. Summary Statistics

County Variables (n = 15)	Mean	Std. Dev.	Min	Med	Max
Number of Etsy Shops	1,132.1	2,945.2	6	181	11,512
Adult Population	371,921	864,719.8	6,894	99,006	3,406,731
Etsy Shops per 10,000 Population	19.8	9.6	8.7	15.5	39.6
Arts Agencies	2	3.5	0	2	14
Museums & Historical Sites	7.1	9.4	0	4	33
Makerspaces	2.4	5.5	0	0	21
Institutes of Higher Education	8.2	20.4	0	2	79
% Bachelor's Degrees	21.2	8.5	8.1	18.9	36.3
% Management, Business, Science, and Arts Occupations	32.2	4.8	26.5	31.8	41.2
Average Download Speed	69.9	42.1	21.5	64.4	174.1
Average # Highspeed ISPs per ZIP	1.1	.9	.1	1.0	3.1
% Broadband Subscriptions	60.4	12.4	29.4	63.9	77.8
% Pavement in Good Condition	25.1	7.79	13.3	26.8	38.1
Natural Amenities Score	4.9	1.4	1.9	4.9	7.5
Median Income	59,725.5	11,372.6	37,483	58,421	80,675
Location Affordability Index	62.5	5.8	53.7	61.6	75.3
Jewelry, Luggage, & Leather Stores	23.4	57.4	0	23.4	225
Farmers' Markets	6.9	10.1	0	5	40
% Arts, Ent., Rec., Accom. & Food Services Occupations	11.1	3.7	5.4	10.4	19.3
Business Applications	5,102.6	14,350.1	63	774	56,380

Correlation Analysis

The results of this study provide important insights into the environmental factors influencing the density and performance of maker businesses in Arizona. Column 1 of

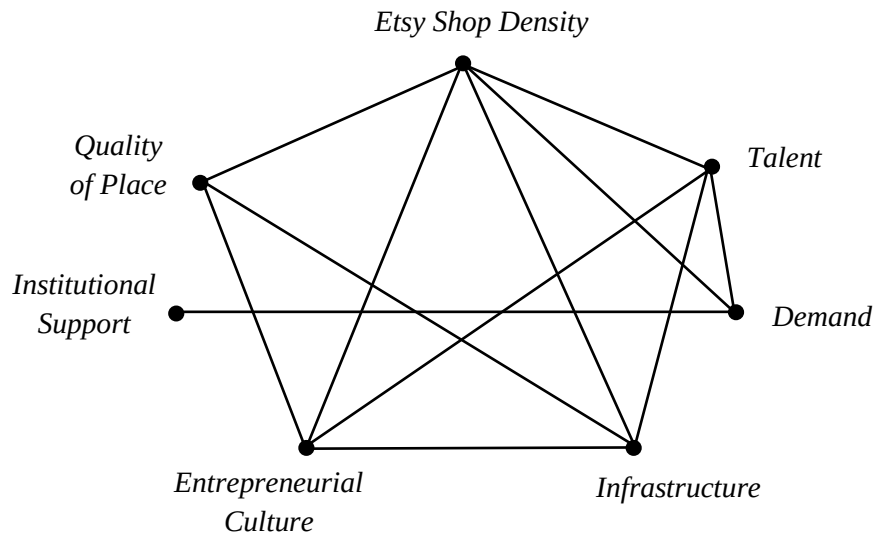
Table 8 reveals that several ecosystem elements, including Talent, Infrastructure, Quality of Place, and Entrepreneurial Culture, are positively and significantly correlated with Etsy shop density. These elements do not function in isolation but interact to create a supportive environment for the maker economy, as illustrated by the interconnectedness shown in Figure 1. While certain elements of the maker-entrepreneurial ecosystem had positive relationships with shop density, their impact on shop performance is less clear. As seen in Column 2 of Table 8, only demand showed a positive and significant correlation with sales growth. Though statistically insignificant, the presence of creative talent was moderately correlated with performance as well. Nonetheless, a receptive local market may be a key factor in the growth potential of maker businesses.

Table 8: Maker-Entrepreneurial Ecosystem Elements & Etsy Shop Density and Performance Correlations

	Etsy Shop Density	Sales Growth
MEE Elements	(1)	(2)
Institutional Support	0.20	0.12
Knowledge	-0.09	0.22
Talent	0.85***	0.44
Infrastructure	0.56**	0.10
Quality of Place	0.47*	-0.27
Demand	0.43	0.65***
Entrepreneurial Culture	0.66**	-0.001

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 1. MEE Elements Interdependence Web



Notes: Elements with moderate to high positive correlations ($>.4$)

Index Analysis

In the second stage of the analysis, a Maker-Entrepreneurial Ecosystem (MEE) Index was developed to assess the collective and interactive effects of ecosystem elements on the development and performance of maker businesses. As shown in Table 9, counties such as Maricopa, Coconino, Pima, and Yavapai score the highest on the MEE index, while Santa Cruz, Yuma, Apache, and Greenlee counties score the lowest. As seen in Tables 10 and 11, a correlational and regression analysis confirmed the significance of ecosystem quality in supporting Etsy shop density at the county level, with significant and positive relationships for both the additive and multiplicative index.

Table 9: Maker Ecosystem Index Scores & Etsy Shop Density

County	Etsy Shops Per 10,000	Additive Index	Multiplicative Index
Yavapai	33.43	3.32	14.54
Maricopa	25.98	4.32	23.62
Pima	24.95	3.44	14.97
Coconino	24.6	4.24	26.12
Cochise	18.25	3.19	13.08
Mohave	16.29	2.13	6.18
Pinal	14.19	2.75	9.31
La Paz	12.59	2.04	5.74
Gila	11.79	3.18	13.27
Navajo	11.48	2.04	5.87
Graham	10.14	2.73	8.55
Santa Cruz	9.2	2.91	10.41
Yuma	8.86	2.28	6.79
Apache	7.27	1.04	2.53
Greenlee	6.33	1.61	3.68

Table 10: MEE Index Scores &
Etsy Shop Density and Performance Correlations

County Level	Additive Index	Multiplicative Index
Etsy Shop Density	0.76***	0.78***
Sales Growth	0.32	0.38

Notes: Sales growth is the average percentage growth in sales between 2022-2023 per county (logged). * $p < 0.10$, ** $p < 0.05$, *** $p < 0$.

Table 11: MEE Index and Etsy Shop Density Regressions

OLS Regression	Additive Index	Multiplicative Index
Shop Density	(1)	(2)
Index Score	8.09***	1.09***
County Unemployment	-2.29	-2.39
Observations	15	

However, addressing performance, the index scores were not positively associated with sales growth at the county or individual level (Tables 12 and 13). At the county level, no significant relationship was observed. At the individual level, a negative and significant relationship was found between the MEE index and sales growth. This finding suggests that while ecosystem quality may support the development of maker businesses, it does not necessarily translate into immediate sales growth. It is important to interpret this result cautiously, as sales growth was measured over a single year during a period influenced by external factors such as the COVID-19 recession. Further, the shop-level analysis reveals that factors such as having an external website and the number of followers may be a greater driver of performance.

Table 12: MEE Index and County Etsy Shop Performance

OLS Regression	Sales Growth	
	Additive Index	Multiplicative Index
County Level	(1)	(2)
Index Score	.15	.046
County Unemployment	.45	.44
Average Shop Followers	-.001	-.001
% Shops with a Website	12.69	11.24
Average Shop Age	.16	-.001
Observations	15	15

Notes: Sales growth is the mean % growth in sales between 2022-2023 per county (logged). Standard errors are clustered at the county level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 13: MEE Index and Individual Etsy Shop Performance

OLS Regression	Sales Growth	
	Additive Index	Multiplicative Index
Individual Level	(1)	(2)
Index Score	-.043**	-.005**
County Unemployment	-.023	-.021
Number of Followers	.00004***	.00004***
Has Website	.428***	.428***
Shop Age	-.079***	-.079***
Observations	16,460	

Notes: Sales growth is the % growth in sales between 2022-2023 (logged).

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the county level.

Robustness Checks

Given the cross-sectional nature of this study, isolating factors such as time and other variables that may influence outcomes presents certain challenges. While controls were included to partially account for factors that may influence shop density and performance (e.g., age, followers, etc.), additional analyses were conducted to ensure the stability of the results. To better isolate any effects related to time, particularly in the COVID-19 context, I ran the regressions segmented by “all shops” and “new shops,” with new shops defined as those created between 2020 and 2022.

Consistent with the primary analyses, the index scores showed no significant relationship with shop density and performance when segmented by creation date at the county level. At the individual level, the negative relationship between the index scores and shop sales growth was consistent between both groups. Additionally, the effects of unemployment, followers, website presence, and age remained the same for both groups

in the shop-level analysis. This stability across groups suggests that MEE quality has a consistent influence on shop outcomes regardless of post-pandemic trends. Results can be found in Tables 3B, 4B, and 5B in the appendix.

Limitations

It is important to discuss a few limitations of the findings presented above. First, the use of Etsy shop density as a measure of the maker economy may not fully capture the breadth of the maker movement in a region. For instance, these data do not capture segments of the maker economy that operate solely through other channels, such as local craft fairs and farmers' markets, direct sales, or alternative online platforms.

Second, the cross-sectional nature of the sample data precludes causal analysis between environmental factors and Etsy shop density. While the incorporation of longitudinal data on performance metrics, such as percentage sales growth, helps mitigate this issue to some extent, these data are limited to one year. A longer study period would provide a more comprehensive understanding of how environmental factors influence shop performance over time. Thirdly, the focus on Arizona counties reduces external validity as findings may not fully translate to different geographic contexts. Nevertheless, the purpose of this research is exploratory, with the intention to provide a theoretical foundation for future causal studies.

Last, while the majority of the environmental variables draw on publicly available government data, content analysis methods are used to gather data for variables such as the presence of farmers markets and makerspaces. Information on these factors are derived from internet sources, such Google Maps, local and state government websites,

and industry-related blogs and directories. As such, these data may not fully capture the presence of these variables in regions.

Discussion and Conclusions

This study examines the environmental factors that shape the development and performance of local maker economies. The analysis reveals that talent, infrastructure, quality of place, and entrepreneurial culture are positively associated with Etsy shop density and are central to the development of maker businesses. Surprisingly, knowledge and institutional support were not correlated with shop density, potentially due to aggregation effects at the county level. Nevertheless, these ecosystem elements are interdependently linked and work together to create supportive environments for the development of maker businesses. Evidence of this systemic effect is seen in the positive relationship between the Maker Entrepreneurial Ecosystem index and Etsy shop density.

The influence of environmental factors on shop performance, measured through sales growth, is less straightforward. While demand for artisan goods positively correlates with sales growth, other ecosystem elements showed no significant relationship. The MEE index, while positively associated with shop density, exhibited no relationship with performance at the county level and a negative relationship at the individual level. However, it is important to note that these performance findings are based on one year of data, limiting the ability to capture long-term trends. Additionally, the shop-level analysis highlights the importance of individual characteristics, such as having an external website, the number of followers, and shop age, all of which significantly influence sales growth. These relationships reveal the importance of both

macro-level regional ecosystems and micro-level shop-specific strategies in driving success.

Contextual information on Arizona's counties adds further nuance to these findings. Yavapai county, home to the picturesque, arts-driven community of Sedona (Arizona Commerce Authority 2022) ranks highest in the total number of Etsy shops per 10,000 residents. Additionally, both Yavapai and Coconino counties are among the top five for MEE scores, despite their more rural geographic locations. Interestingly, Coconino County, home to the Grand Canyon, parts of Sedona, and the ski town of Flagstaff, outperforms the metropolitan Maricopa and Pima counties in the multiplicative index. While it is expected that these urban counties would have greater business density, these findings suggest that for maker businesses, factors such as tourism, cultural resources, and natural amenities may offset traditional barriers to business development, such as lower population density and limited transportation networks.

Further, Navajo County, where nearly 70 percent of the land comprises Indian reservations, including parts of Navajo Nation, the Hopi Tribe, and the White Mountain Apache Tribe, offers additional insights into the relationship between traditional craftsmanship and digital entrepreneurship (Navajo County 2024). Native communities have a long history of arts and craftsmanship, with creative production deeply embedded in cultural traditions and economic livelihoods (First Peoples Fund 2013). Despite this rich tradition, many forms of maker-entrepreneurship in Native American communities, such as quilt-making, beadwork, and quillwork, are often pursued informally and underrepresented in standard economic measures of employment and business ownership (Navajo Nation Division of Economic Development 2024; First Peoples Fund 2013).

Digital platforms like Etsy provide Native artisans with opportunities to expand their markets and refine their craft, yet Navajo County ranks lower in Etsy shop density and overall MEE index scores compared to other Arizona counties. While the county performs at or above average in MEE factors such as demand and institutional support, it scores among the lowest in infrastructure, particularly broadband quality and adoption, as well as other key components like quality of place and entrepreneurial culture. Rugged terrain in this region of the state has historically made broadband deployment challenging, furthering digital access issues and limiting participation in digital marketplaces (Wilhelm 2011; Howard and Morris 2022). Although craftwork remains a strong cultural and economic asset in these communities, this analysis highlights some of the key barriers that limit Indigenous maker-entrepreneurs from fully engaging in the digital economy.

To conclude, this case study highlights how environmental factors work together to enable or constrain maker economies and provides support for ecosystem-oriented policies. The findings suggest that tailored, holistic measures that account for regional strengths and challenges are essential for translating creative maker projects into commercial businesses. Moreover, in regions with favorable ecosystems, individual-level assistance for marketing and digital presence, combined with investment in artisan markets and tourism events can expand market reach and ensure sustainable growth for maker businesses. Digitalization has created new opportunities for economic growth and participation, with the maker movement serving as a key example. This study provides a framework for how local and regional governments can support maker economies, strengthen local manufacturing, and promote inclusive growth in their communities.

CHAPTER 4

RESOURCE-CONSTRAINED ENTREPRENEURSHIP IN THE DIGITAL ECONOMY

Introduction

Widespread digitalization has transformed how goods and services are produced, distributed, and consumed (Pournaras and Lazakidou 2008), not only providing new tools to "main street" businesses but also spurring the creation of entirely digital start-ups that leverage the internet to reach markets on local and global scales. This digital transformation of the economy accelerated during the COVID-19 pandemic as businesses relied on digital tools to maintain economic exchange amid stay-at-home orders and physical distancing (Kenney and Zysman 2020; Costa and Castro 2021). As entrepreneurs responded to the shock of the pandemic, digital technologies such as cashless payment systems, websites, and peer-to-peer platforms provided means to adapt business models and processes, and at the same time, created new business opportunities (Kuckertz and Brändle 2021). While brick-and-mortar businesses closed their storefronts in record numbers, the United States experienced a historic increase in new entrepreneurial activity, particularly among digital businesses (Djankov and Zhang 2021; Haltiwanger 2021).

While mostly small and micro in size, emerging research suggests that these digital businesses play an important role in the prosperity and resilience of local economies (Mossberger, Tolbert, and LaCombe 2021), and in times of volatility (Li et al., 2016; Vadana et al., 2019). As such, understanding the characteristics, needs, and potential of digital entrepreneurs is increasingly important for entrepreneurship

researchers and policymakers. However, these dimensions vary among digital entrepreneurs and one-size-fits all policies may fail to effectively target resources and support.

Despite the opportunities presented by digitalization, not all entrepreneurs are equally positioned to benefit from these changes. Resource-constrained entrepreneurs, particularly those from low-income backgrounds, face significant barriers to business growth and success (Morris 2020). Moreover, low-income individuals and smaller, informal businesses were among the hardest hit by the pandemic, highlighting the need for targeted support (Parker, Minkin, and Bennet 2020; World Bank 2022; Fairlie 2020). As the nation recovers, critical questions emerge about who resource-constrained entrepreneurs are, how they navigate the digital economy, and what specific support they need to thrive. Understanding these dynamics is vital for shaping policies that promote inclusive economic recovery and growth.

Drawing on a pooled survey sample of nearly 10,000 digital entrepreneurs, I examine how socioeconomic characteristics, business practices, and needs vary based on income status. The findings reveal notable similarities and differences between low- and higher-income entrepreneurs. While low- and higher-income entrepreneurs share similar motivations and early-stage challenges, low-income entrepreneurs are more likely to operate primarily online, leverage digital platforms for essential business functions, and experience challenges relating to profitability, marketing, and capital acquisition.

This paper begins with an overview of resource-constrained entrepreneurship in the digital economy, followed by a discussion of the research design and results. It

concludes with key findings and their implications for local economic development policy.

Literature Review and Theoretical Framework

Resource Constrained Entrepreneurship

Ongoing digitalization of the economy and increased technology use have drastically reduced barriers to entry for nascent entrepreneurs, while expanding capacities, capabilities, and opportunities for established firms (Belitski et al. 2021; Nambisan et al. 2019). A growing body of research on “digital entrepreneurship” seeks to understand this transformative role of technology on entrepreneurial phenomena (Sahut et al 2021; Sussan and Acs 2017; Song 2019). While interest in digital entrepreneurship is expanding, a critical gap remains in understanding its impact on resource-constrained entrepreneurs, particularly those who face significant financial and knowledge limitations.

Resource mobilization is one of the primary challenges for entrepreneurs seeking to establish and grow their businesses. This challenge is especially pronounced for startups and microbusinesses, given the inherent liabilities of newness and smallness (Baker and Nelson 2005; Stinchcombe 1965; Yang and Aldrich 2017). Limited access to financial, social, and human capital restricts not only survival but also shapes strategic decision-making, as entrepreneurs must work within the bounds of what is available (Senyard et al. 2014; Villanueva, Van de Ven, and Sapienza 2012).

For low-income business owners, particularly those in poverty contexts, resource constraints can be extreme, encompassing not only financial limitations but also gaps in

education, support networks, and quality infrastructure (Morris 2020). Described as the “liability of poorness” by Morris (2020), these entrepreneurs often face additional non-business pressures, including childcare, housing, and healthcare challenges.

Although resource limitations are traditionally viewed as barriers to growth, research suggests they can also drive creativity and adaptation, potentially leading to new forms of innovation (Chen and Shen 2023). Under resource constraints, entrepreneurs often rely on their ability to creatively mobilize and repurpose available resources, a process known as bricolage (Baker and Nelson 2005). In the digital age, accessible technology may serve as a tool for resource-constrained entrepreneurs, enabling them to engage in bricolage and unlock new opportunities even with limited means. This intersection of digitalization and resource-constrained entrepreneurship raises important theoretical questions: How do low-income entrepreneurs navigate their unique resource constraints in a digital context? How does digitalization challenge extant assumptions about poverty entrepreneurship? And how can targeted support better meet the needs of digital entrepreneurs?

To explore these dynamics, this study examines the socioeconomic characteristics, business practices, and resource needs of low-income digital entrepreneurs. Using survey data from nearly 10,000 digital entrepreneurs across the United States, this study is guided by the following research question:

RQ1: How do the business practices, motivations, and resource needs of low-income digital entrepreneurs differ from those of higher-income entrepreneurs?

Defining and Measuring Digital Entrepreneurship

As a new and evolving area of study, what constitutes a digital entrepreneur is debated (Giones and Brem 2017). For the purpose of this paper, I use Sussan and Acs (2017) definition of a digital entrepreneur as “any agent that is engaged in any sort of venture be it commercial, social, government, or corporate that uses digital technologies.” According to Sussan and Acs (2017), digital entrepreneurs include both “Schumpeterian entrepreneurs” (Schumpeter 1911) who create digital companies and innovative products as well as “Kirznerian entrepreneurs” (Kirzner 1973) who leverage digital technologies to support their operations.

In the United States, governments have traditionally relied on employment in the information technology sector (Jackson et al 2018; Moretti 2012) or e-commerce sales (Highfill and Surfield 2022) as measures of digital economic activity. These statistics, however, fail to capture digital entrepreneurs outside of the technology sector and commercial applications of digital tools beyond e-commerce transactions, such as online advertising and communication for brick-and-mortar businesses (Mossberger, LaCombe, and Tolbert 2022; Abraham et al. 2018). Given limitations in public data, researchers are increasingly turning to private sector data to measure digital economic activity (Tam and Van Halderen 2020; Adobe 2022; Raj et al. 2021). Among these include data on domain name hosts used for websites, security certificates (SSL), and email (Mossberger, LaCombe, and Tolbert 2022; Kolko 1999; Moss and Townsend 1997). Domain names serve as the underlying address book of the internet (ICANN 2012) and provide a platform for digital entrepreneurs to conduct a wide range of business activities including

e-commerce, online marketing, email, and data analytics (Mossberger, LaCombe, and Tolbert 2022).

Deidentified data on domain name hosts have been made publicly available by the world's largest domain registrar, GoDaddy, and has been used by academic researchers and policymakers to measure digital economic activity (Mossberger et al. 2023; Hartman and Parilla 2022; Bengali and Yu 2021). These data include over 20 million domain name hosts and represent over half of all domain names in the United States. Nation-wide randomized surveys of GoDaddy customers indicate that nearly 80 percent of domain name sites are used for commercial purposes (Venture Forward 2022). Beyond reasons for domain use, these surveys give insight into the characteristics of the digital entrepreneurs who utilize domain name hosts and provide the primary data used in this study.

Identifying resource-constrained digital entrepreneurs

While resource constraints can span various forms of capital, including knowledge and social networks, this study focuses specifically on financial constraints determined by the income level of the entrepreneur. Surveys indicate that most digital ventures are small or micro-sized and are often funded primarily through the owner's personal finances (Venture Forward 2022). For the purposes of this study, resource-constrained entrepreneurs are identified as those with low-income status, capturing those who face significant financial limitations. Low-income status is assigned to digital business owners whose household income falls below 150% of the 2024 federal poverty

threshold, adjusted by household size, a common threshold to qualify for many state and federal public assistance programs (Kolesnikova and Liu 2012; Dinan 2009).

Research Design

Data

This study utilizes data from four repeated cross-sectional surveys developed by domain registrar and web hosting company, GoDaddy, and researchers at Arizona State University and the University of Iowa. These surveys were administered between August 2022 and February 2024 to a nationwide random sample of digital entrepreneurs with active domain name hosts registered for websites, SSL certificates, or email hosting through GoDaddy⁵. These surveys generated responses from 14,077 GoDaddy customers, with each survey receiving an average of 3,519 responses. For the purposes of this analysis, only respondents who indicated a commercial purpose for their website and identified as the business owner were included. After these criteria were applied, the final sample consisted of approximately 9,139 digital entrepreneurs. These surveys gather a wide range of information from domain-name host owners including website purpose, business operations and growth, challenges and expectations, awareness and use of assistance programs, and demographics.

⁵ Survey administered by marketing firm Advanis

Summary of Models

To examine the characteristics, practices, and needs of resource-constrained digital entrepreneurs, this study employs a descriptive, segmented analysis of pooled survey data. I first present response frequencies for the overall sample as well as the income segmented groups. Statistical differences between groups are assessed using logistic and multinomial logistic regression models, depending on the type of question. Logistic regressions are applied for binary responses (e.g., yes/no) and "select all that apply" questions, where each response option is treated as a separate binary outcome (Model 1). For multiple-choice questions with a single categorical response, multinomial logistic regression was used (Model 2). In multinomial regressions, statistical significance is determined relative to a reference category (one of the response options). Fixed effects for survey waves are included in both models to control for external factors that may have influenced responses in specific survey years. The formal models are described below.

Model 1:

$$\log\left(\frac{P(Y_i=1)}{1-P(Y_i=1)}\right) = \beta_0 + \beta_1 LowIncome_i + a_{SurveyWave_i} + \varepsilon$$

Model 2:

$$\log\left(\frac{P(Y_i=j)}{P(Y_i=r)}\right) = \beta_{0j} + \beta_{1j} LowIncome_i + a_{jSurveyWave_i} + \varepsilon \text{ for } j \neq r$$

In Model 1, $(P(Y_i = 1))$ is the probability of a positive response (e.g., "yes" or "selected"). β_1 represents the coefficient for low-income status, and a_i represents the fixed effects for the survey wave. In Model 2, $(P(Y_i = j))$ is the probability of choosing category j , while $(P(Y_i = r))$ is the probability of choosing the reference category. β_{1j} is

the coefficient for low-income status for category j and a_j represents the fixed effect for the survey wave.

Summary Statistics

Descriptive information for each survey wave is presented in Table 14, including the date the survey was administered, the overall sample size, and the sample size when segmented by income.

Table 14: Summary Statistics				
Survey	Date	Sample Size	Low-Income	Med-High Income
1	August 2022	1,910	323	1,587
2	February 2023	2,404	323	2,081
3	August 2023	2,436	315	2,121
4	February 2024	2,389	240	2,149
Total		9,139	1,201 (13.14%)	7,938 (86.88%)

Results

Survey responses are organized into four main categories: Demographics, Business Operations, Practices, and Technology Use, Motivations and Ambitions, and Needs and Challenges. For full results, including the statistical significance of group differences, see Table 1C in the appendix.

Demographics

Presented in Table 15, the demographic characteristics of low-income digital entrepreneurs differed notably from those of higher-income entrepreneurs. Low-income business owners were more likely to be female and non-white compared to higher-

income entrepreneurs. In terms of educational attainment, low-income entrepreneurs had lower levels of formal education, with fewer holding graduate degrees and a greater proportion having only a high school education or less. Housing status also differed, with low-income entrepreneurs less likely to own a home and more likely to live with friends or family without a rent obligation.

Table 15: Demographics

		Med-High Income	Low Income	All
Gender	Male	45.9%	35.3%	44.5%
	Female	49.9%	60.5%	51.3%
	Other	1.0%	1.6%	1.1%
Race / Ethnicity	White	69.7%	56.3%	67.9%
	Black or African American	13.4%	22.3%	14.6%
	Asian or Pacific Islander	4.0%	3.3%	3.9%
	American Indian or Alaska Native	0.8%	0.9%	0.8%
	Other or Multiple	6.3%	11.6%	7.0%
Education	Less than HS	0.6%	1.5%	0.7%
	HS or GED	6.6%	13.1%	7.4%
	Technical / Vocational School	5.3%	8.9%	5.8%
	Some college	21.4%	33.9%	23.0%
	4-year degree	35.4%	28.1%	34.5%
	Graduate degree	29.9%	13.9%	27.9%

Notes: “prefer not to answer” response selections not shown

Business Operations, Practices, and Technology Use

Significant differences emerged in the business operations of low- and higher-income digital entrepreneurs. While the majority of digital entrepreneurs in the sample operated their businesses independently, low-income entrepreneurs were more likely to have no employees. Business registration status also differed, with low-income entrepreneurs more likely to be in the process of formal business registration, while

higher-income entrepreneurs were more likely to have corporate status. In terms of revenue, low-income business owners generally reported lower earnings than their higher-income counterparts.

Table 16: Where Business is Conducted

	Med-High Income	Low Income	All
On my website	59.2%	65.1%	59.9%
On social media	39.2%	50.6%	40.7%
In a physical location	51.6%	41.9%	50.3%

Notes: Select all that apply

Table 17: Website Use

	Med-High Income	Low Income	All
Sales orders	24.1%	37.8%	25.7%
Bookings	18.2%	24.3%	18.9%
Communication	30.8%	30.5%	30.8%
Marketing and credibility	69.4%	59.5%	68.2%
Operations	6.0%	5.2%	5.9%

Notes: Select all that apply.

The surveys also revealed differences in technology use between low-income and higher-income digital entrepreneurs. When asked where business is conducted (Table 16), low-income entrepreneurs were more likely to operate primarily through their website or social media platforms, while higher-income entrepreneurs were more likely to operate from a physical location. Additionally, as reported in Table 17, low-income

entrepreneurs more frequently used their websites for sales orders and bookings, whereas higher-income entrepreneurs used their websites for marketing and credibility purposes. Advanced technology adoption, such as AI, cloud computing, and robotics, remained low among both groups, though it was slightly lower for low-income business owners.

Motivations & Ambitions

The surveys revealed variation in the motivations and long-term ambitions of entrepreneurs when segmented by income level. Low-income business owners reported being more motivated by personal dreams, while medium-and-high-income entrepreneurs were more likely to be motivated by a desire for independence (“more success on my own”). Interestingly, both groups reported similar motivations when starting their businesses in response to an idea for a new product or service or after being laid off or furloughed. This may challenge extant literature on opportunity- and necessity-motivated entrepreneurship which generally associates opportunity identification with higher-income business owners, and economic necessity motives with lower-income entrepreneurs (Martínez-Rodríguez et al. 2020; Dencker et al. 2021). A larger proportion of low-income entrepreneurs were unemployed when they started their businesses, however. While this may indicate some necessity-driven motives, it does not appear to be the sole factor behind their decision to pursue digital entrepreneurship. Regarding ambitions for growth, low-income entrepreneurs were more likely to aim for expansion into mid-sized or corporate businesses, whereas higher-income entrepreneurs were more inclined to keep their businesses small (Table 18).

Table 18: Long Term Ambitions

	Med-High Income	Low Income	All
Solo entrepreneur, stay small	36.5%	29.9%	35.6%
Small business w/ some employees and/or physical location	31.4%	34.6%	31.8%
Mid-size business	14.7%	15.5%	14.8%
Corporate business	5.3%	7.9%	5.6%
“Unicorn,” billion-dollar valuation	2.6%	4.8%	2.9%

Notes: Select all that apply

Needs & Challenges

Low-income digital entrepreneurs reported facing significant financial stress, often operating with limited on-hand cash for business operations. Access to capital was a common challenge, with many low-income entrepreneurs finding it “very difficult” to obtain funding compared to higher-income entrepreneurs. In general, however, the digital entrepreneurs in the sample indicated low capital needs to start their businesses, requiring less than \$5,000 to start their businesses. This was particularly true for low-income entrepreneurs who reported needing less than \$1,000 to cover start-up costs. As highlighted in Table 19, low-income entrepreneurs also reported more difficulty in getting their businesses online and cited online marketing as a major challenge, though this issue was common across income levels.

Table 19: Top Startup Challenge

Med-High Income	Marketing online (18%)
	Access to financial capital (11%)
	Marketing with traditional media (9%)
Low Income	Marketing online (18%)
	Access to financial capital (15%)
	Getting business online (9%)

Notes: Top three responses for the #1 challenge when starting business

Table 20: Aware of Public Resources for Business

	Med-High Income	Low Income	All
Yes	31.5%	22.2%	30.2%
No	58.5%	68.9%	59.9%

Overall, awareness of public resources for business support was low among digital entrepreneurs (Table 20). However, despite their heightened need for support, awareness of public resources and assistance programs was significantly lower among low-income entrepreneurs. This finding suggests a crucial gap in outreach or accessibility of public support services for resource-constrained entrepreneurs.

Limitations and Directions for Future Research

Several limitations of these results should be noted. First, the study's focus on GoDaddy customers with active domain name hosts may limit the generalizability of the findings. This sample may not fully capture the breadth of digital entrepreneurs, such as

business owners who use alternative hosting services or operate entirely on platforms (e.g., Airbnb, Etsy, Instagram).

Second, only 13% of the sample consists of low-income business owners, making them a relatively small subgroup in the analysis. Combining medium- and high-income entrepreneurs into a single comparison group introduces noise and may obscure meaningful differences among these income levels. However, the focus of this study is on highly resource-constrained entrepreneurs. Future research could further explore differences across a broader range of income levels to better capture the spectrum of resource constraints. Third, not all survey questions were asked across all four waves, resulting in some variation in the sample size. Despite this inconsistency, these questions were included in the analysis because they can provide valuable insights. However, the findings related to these questions should be interpreted with caution, as the reduced sample size may impact generalizability. The included survey waves for each question are noted in the full results.

Finally, the reliance on repeated cross-sectional surveys provides only snapshots and does not capture how motivations, business practices, and outcomes evolve over time. As a result, these findings are descriptive rather than causal. Without experimental or longitudinal data, causal claims cannot be made regarding the precise effects of income level on digital entrepreneurial practices and outcomes.

Future research could address these limitations by incorporating longitudinal and panel methods, expanding the sample to include a broader range of digital entrepreneurs across multiple platforms, and using methodologies designed to identify causal

relationships. Nevertheless, these descriptive findings provide a valuable foundation for future studies in the field.

Discussion and Conclusions

To conclude, this survey analysis suggests that digital technologies provide low-income entrepreneurs with a relatively low-cost pathway to business ownership, allowing them to pursue personal ambitions while expanding economic opportunities for themselves and their communities. By reducing the need for physical infrastructure, digital platforms enable these entrepreneurs to operate primarily online, use social media to reach customers, and leverage technology to grow their businesses. The survey findings suggest that digitalization may help level the playing field in certain respects, as both income groups reported similar motivations and early-stage challenges. Despite financial constraints, low-income entrepreneurs show resourcefulness and adaptability, utilizing online platforms and digital tools in ways that could be seen as a form of “digital bricolage” to overcome traditional barriers (Santos and Neumeyer 2023). Notably, they report operating primarily online or through social media more frequently than their higher-income counterparts, using these platforms for essential business functions, such as sales and bookings. This contrasts with higher-income entrepreneurs, who often focus on using digital platforms for brand credibility. This difference, however, could be attributed to differences in industry and other factors not captured in these surveys.

Nonetheless, key barriers remain. Low-income entrepreneurs reported lower profitability, initial challenges getting their business online, and difficulties marketing to customers. Although many entrepreneurs in the sample required minimal startup capital,

low-income respondents experienced greater difficulty in securing funds, likely hindering their ability to invest in growth, marketing, and advanced technologies. Even so, this analysis suggests that low-income digital entrepreneurs are highly motivated to expand, even in the face of these challenges.

These findings carry important implications for policymakers aiming to foster inclusive economic growth. The low awareness of public assistance programs among low-income digital entrepreneurs reveals a critical gap in outreach. Targeted campaigns to improve the visibility and accessibility of resources are essential, particularly for underrepresented groups who are more likely to face resource constraints, including entrepreneurs from minority racial and ethnic backgrounds, women, and student business owners. Local governments could also introduce programs that provide microloans, digital skills-building, and support for marketing, enabling resource-constrained entrepreneurs to overcome financial and operational barriers. Such policies would not only bolster individual business success but also strengthen the resilience and diversity of local economies.

CHAPTER 5

CONCLUSION

Digital transformation of the economy rapidly accelerated during the COVID-19 pandemic, marking a turning point in technology use for entrepreneurship. Amid physical distancing restrictions, businesses were forced to adapt, adopting digital technologies such as e-commerce platforms and contactless payments for transactions and websites and social media for communications (Mishrif and Khan 2023; Raj, Sundararajan, and You 2021). These trends have created new pathways for economic growth and participation, expanding the capabilities of existing businesses and empowering new ventures and industries to emerge. At the same time, these shifts have highlighted stark “digital divides” across geographies and socioeconomic groups, raising questions about how to design policies that support more inclusive economic growth.

This dissertation sheds light on these questions by exploring the conditions that shape digital entrepreneurial activities, focusing on the role of local environments, policy interventions, and the individual characteristics of business owners. Collectively, the essays present a systemic view of digital entrepreneurship, emphasizing how both environmental and individual-level factors contribute to its development and outcomes.

Key Findings

Structural and Environmental Influences on Digital Entrepreneurship

Digital entrepreneurs do not exist in isolation but are embedded within broader social, economic, and technological contexts that influence access to resources, networks, and opportunities (Sussan and Acs 2017; Yáñez-Valdés and Guerrero 2024). Chapters 2

and 3 speak to the importance of place, demonstrating how geographically targeted interventions and regional characteristics enable digital economic activity in specific communities and industries. The analysis in Chapter 2 found that place-based public improvements, spanning infrastructure, business services, and social services, increased digital economic activity when combined with broadband adoption. This insight is reflected in Chapter 3, where regional factors such as creative talent, physical and digital infrastructure, quality of place, and entrepreneurial culture interact to support the development of digitally-enabled creative businesses. These findings suggest that local contexts matter deeply in shaping digital entrepreneurial opportunities and are consistent with digital ecosystem frameworks that highlight the interdependence of such factors.

The Role of Individual Entrepreneurs and Targeted Support

While the external environment provides a foundation for digital entrepreneurial activity, the role of the individual entrepreneur remains central. Understanding the socioeconomic characteristics, resources, and skills of business owners is essential for designing effective policy interventions. In Chapter 3, individual firm factors, such as having a website and online following, were associated with greater sales growth. This relationship highlights the importance of a firm's "digital footprint," and the digital literacy needed to reach greater markets.

Additionally, the analysis of low-income digital entrepreneurs in Chapter 4 reveals how resource constraints affect a diverse range of business owners, including ethnic and racial minorities, women, and students. Entrepreneurs in resource-constrained contexts are more likely to experience lower profitability, financial stress, and difficulties

accessing capital. These challenges are compounded by limited awareness of and engagement with public resources designed to support them. Effectively targeted support is critical to addressing these barriers. Chapter 2, for example, found that in low-income areas, direct financial assistance to business owners had a measurable impact on digital entrepreneurial activities.

Implications for Scholarship, Policy and Practice

This dissertation advances systems-based understandings of digital entrepreneurship by exploring the macro and micro factors associated with the development, processes, and outcomes of digital entrepreneurial activity. The findings highlight that systemic conditions, particularly physical and digital infrastructure as well as quality-of-life factors, are critical for enabling digital business activity. However, sustaining and scaling these businesses likely requires more individualized support, including access to capital, marketing tools, and ongoing capacity-building. Policymakers and community institutions might consider offering microgrants and low-interest capital for early-stage businesses, technical assistance for digital marketing and e-commerce development, and mechanisms to increase awareness and uptake of public support programs. Together, these strategies can help communities not only generate new digital ventures but sustain them moving forward.

Research Agenda

While this dissertation provides new insights into the dynamics of digital entrepreneurship, its findings are constrained by short study periods, data limitations, and challenges in establishing causal relationships. Looking ahead, longitudinal studies with

extended time horizons are needed to assess the long-term outcomes of digital entrepreneurship as well as the economic and social returns of public investments. To deepen these insights, future research should prioritize tracking individual firms across time, spanning various geographies, industries, and stages of growth.

Moreover, methodological constraints, particularly the short study period in Chapter 2, cross-sectional analysis in Chapter 3, and descriptive analysis in Chapter 4, limit the ability to establish causal claims. However, these exploratory findings provide a foundation for future causal studies. The data sources used in this work, including commercial domain-name data and web-scraped firm-level data, capture emerging economic activity often overlooked or delayed in conventional public datasets. As researchers seek alternatives due to data collection limitations and budget constraints (Tam and Van Halderen 2020), sources such as “big data” from websites and social media, administrative data from open government portals, and commercial data from private firms, offer new opportunities for studying economic trends in real-time. Expanding the use of these emerging data sources, combined with more advanced econometric methods would allow future research to more precisely assess long-term impacts, evaluate policy effectiveness, and generate deeper insights into the evolving digital economy.

Closing Remarks

Rapid digitalization of the economy has been characterized by winner-take-all dynamics, with economic gains concentrated in “superstar” cities and established tech hubs, while under-connected communities face persistent digital divides and economic

stagnation. The COVID-19 pandemic exposed these disparities, spurring unprecedented investments to bridge digital gaps, including initiatives such as the Affordable Connectivity Program and Digital Equity Act. As the nation recovers, local governments play an important role in ensuring that advances in technology and access serve as a driver of economic opportunity, rather than reinforcing existing inequalities.

The promise of digital entrepreneurship for economic development is not solely about replicating "Silicon Valleys" but about equipping “everyday” entrepreneurs with the tools to leverage technology in ways that generate both prosperity and opportunity. Rather than one-size-fits-all approaches, this work emphasizes tailored, holistic strategies aligned with the unique needs of local communities. In doing so, this dissertation offers a roadmap for policymakers and practitioners seeking to build inclusive, resilient economies in an increasingly digital world.

REFERENCES

- Abadie, Alberto, Susan Athey, Guido W. Imbens, and Jeffrey M. Wooldridge. “When Should You Adjust Standard Errors for Clustering?” *The Quarterly Journal of Economics* 138, no. 1 (December 15, 2022): 1–35. <https://doi.org/10.1093/qje/qjac038>.
- Abraham, Katharine G., John C. Haltiwanger, Kristin Sandusky, and James R. Spletzer. “Measuring the Gig Economy: Current Knowledge and Open Issues.” National Bureau of Economic Research, September 3, 2018. <https://doi.org/10.3386/w24950>.
- Acs, Zoltan J., Erik Stam, David B. Audretsch, and Allan O’Connor. “The Lineages of the Entrepreneurial Ecosystem Approach.” *Small Business Economics* 49, no. 1 (June 2017): 1–10. <https://doi.org/10.1007/s11187-017-9864-8>.
- Adobe. “Digital Economy Index,” 2022. <https://business.adobe.com/resources/digital-economy-index.html>.
- Aldrich, Howard E. ““The Democratization of Entrepreneurship? Hackers, Makerspaces, and Crowdfunding.”” *Proc. AMIA Annu. Fall Symp.* 2014, no. 1 (January 1, 2014). <https://doi.org/10.5465/ambpp.2014.10622symposium>.
- . “Using an Ecological Perspective to Study Organizational Founding Rates.” *Entrepreneurship Theory and Practice* 14, no. 3 (April 1, 1990): 7–24. <https://doi.org/10.1177/104225879001400303>.
- Anderson, Louise, Hannah Burke, and Jacob Gottlieb. “Getting Connected: How Economic Developers Are Expanding Broadband Access.” International Economic Development Council, 2021. <https://www.iedconline.org/edrp-reports/archive/getting-connected-how-economic-developers-are-expanding-broadband-access/>.
- Angrist, Joshua D., and Jörn-Steffen Pischke. *Mostly Harmless Econometrics: An Empiricist’s Companion*. Princeton, New Jersey: Princeton University Press, 2009. <https://play.google.com/store/books/details?id=YSAzEAAAQBAJ>.
- Anthony, Jerry. “Housing Affordability and Economic Growth.” *Housing Policy Debate* 33, no. 5 (May 16, 2022): 1–19. <https://doi.org/10.1080/10511482.2022.2065328>.
- Arizona Commerce Authority. “Community Profile for Sedona,” 2022. <https://www.azcommerce.com/a/profiles/ViewProfile/110/Sedona/>.

- Arizona Commission on the Arts. “Local Arts Agencies,” 2017.
<https://azarts.gov/resources/local-arts-agencies/>.
- Arizona Department of Transportation. “Pavement Condition Data Portal,” 2023.
<https://experience.arcgis.com/experience/abb6a0ed15a545898cf8f6be55fde413/page/Dashboards/>.
- Atkinson, R., D. Castro, Stephen Ezell, Alan McQuinn, and J. New. “A Policymaker’s Guide to Digital Infrastructure.” Information Technology and Innovation Foundation, May 16, 2016. <https://www2.itif.org/2016-policymakers-guide-digital-infrastructure.pdf>.
- Baker, Andrew C., David F. Larcker, and Charles C. Y. Wang. “How Much Should We Trust Staggered Difference-in-Differences Estimates?” *Journal of Financial Economics* 144, no. 2 (May 1, 2022): 370–95.
<https://doi.org/10.1016/j.jfineco.2022.01.004>.
- Baker, Ted, and Reed E. Nelson. “Creating Something from Nothing: Resource Construction through Entrepreneurial Bricolage.” *Administrative Science Quarterly* 50, no. 3 (September 1, 2005): 329–66.
<https://doi.org/10.2189/asqu.2005.50.3.329>.
- Belitski, Maksim, Christina Guenther, Alexander S. Kritikos, and Roy Thurik. “Economic Effects of the COVID-19 Pandemic on Entrepreneurship and Small Businesses.” *Small Business Economics*, September 12, 2021.
<https://doi.org/10.1007/s11187-021-00544-y>.
- Bengali, Leila, and William Yu. “An Index for Online Microbusinesses.” GoDaddy and UCLA Anderson Forecast, 2021. https://www.godaddy.com/ventureforward/wp-content/uploads/2021/09/GoDaddyUCLA_MicrobusinessIndex_July2021.pdf.
- Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan. “How Much Should We Trust Differences-in-Differences Estimates?” *The Quarterly Journal of Economics* 119, no. 1 (2004): 249–75.
<https://doi.org/10.1162/003355304772839588>.
- Browder, Russell E., Howard E. Aldrich, and Steven W. Bradley. “The Emergence of the Maker Movement: Implications for Entrepreneurship Research.” *Journal of Business Venturing* 34, no. 3 (May 1, 2019): 459–76.
<https://doi.org/10.1016/j.jbusvent.2019.01.005>.

- Browder, Russell E., Joel West, Marc B. Gruber, Jeffery McMullen, Russell E. Browder, Letizia Mortara, Ludmila Striukova, and Joel West. "Makerspaces and Entrepreneurship: Colocation and Collaboration in the Digital Era." *Proceedings: A Conference of the American Medical Informatics Association / ... AMIA Annual Fall Symposium. AMIA Fall Symposium* 2019, no. 1 (August 1, 2019): 11093. <https://doi.org/10.5465/AMBPP.2019.11093symposium>.
- Burbidge, John B., Lonnie Magee, and A. Leslie Robb. "Alternative Transformations to Handle Extreme Values of the Dependent Variable." *Journal of the American Statistical Association* 83, no. 401 (1988): 123–27. <https://doi.org/10.2307/2288929>.
- Callaway, Brantly, Andrew Goodman-Bacon, and Pedro H. Sant'Anna. "Difference-in-Differences with a Continuous Treatment." Cambridge, MA: National Bureau of Economic Research, February 5, 2024. <https://doi.org/10.3386/w32117>.
- Callaway, Brantly, and Pedro H. C. Sant'Anna. "Difference-in-Differences with Multiple Time Periods." *Journal of Econometrics* 225, no. 2 (December 1, 2021): 200–230. <https://doi.org/10.1016/j.jeconom.2020.12.001>.
- Cambefort, Marine. "How the COVID-19 Pandemic Is Challenging Consumption." *Markets, Globalization & Development Review* 5, no. 1 (2020). <https://doi.org/10.23860/MGDR-2020-05-01-02>.
- Cameron, A. Colin, and Douglas L. Miller. "A Practitioner's Guide to Cluster-Robust Inference." *The Journal of Human Resources* 50, no. 2 (2015): 317–72. <https://muse-jhu-edu.ezproxy1.lib.asu.edu/article/581178>.
- Capello, Roberta. "Spatial Spillovers and Regional Growth: A Cognitive Approach." *European Planning Studies* 17, no. 5 (May 1, 2009): 639–58. <https://doi.org/10.1080/09654310902778045>.
- Chadwick, Reina. "Exploring the Relationship between the Arts & Tourism." Knight Foundation. Accessed February 7, 2025. <https://knightfoundation.org/articles/exploring-the-relationship-between-the-arts-tourism/>.
- Chaisemartin, Clément de, and Xavier D'Haultfœuille. "Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects." *The American Economic Review* 110, no. 9 (September 2020): 2964–96. <https://doi.org/10.1257/aer.20181169>.

- Chen, Shuxing, and Tao Shen. "Resource Constraints and Firm Innovation: When Less Is More?" *China Population Resources and Environment* 21, no. 3 (September 1, 2023): 172–80. <https://doi.org/10.1016/j.cjpre.2023.09.006>.
- Church, E. Mitchell, and Richelle L. Oakley. "Etsy and the Long-Tail: How Microenterprises Use Hyper-Differentiation in Online Handicraft Marketplaces." *Electronic Commerce Research* 18, no. 4 (December 1, 2018): 883–98. <https://doi.org/10.1007/s10660-018-9300-4>.
- Clifton, Nick, and P. Cooke. "Creative Knowledge Workers and Location in Europe and North America: A Comparative Review." *Creative Industries Journal* 2 (January 1, 2009): 73–89. <https://doi.org/10.1386/cij.2.1.73/1>.
- Costa, Joana, and Rafael Castro. "SMEs Must Go Online—E-Commerce as an Escape Hatch for Resilience and Survivability." *Journal of Theoretical and Applied Electronic Commerce Research* 16, no. 7 (November 5, 2021): 3043–62. <https://doi.org/10.3390/jtaer16070166>.
- Credit, Kevin, Elizabeth A. Mack, and Heike Mayer. "State of the Field: Data and Metrics for Geographic Analyses of Entrepreneurial Ecosystems." *Geography Compass* 12, no. 9 (September 1, 2018): e12380. <https://doi.org/10.1111/gec3.12380>.
- Cunningham, Scott. *Causal Inference: The Mixtape*. New Haven, CT: Yale University Press, 2021. <https://play.google.com/store/books/details?id=PSEMEAAAQBAJ>.
- Cutolo, Donato, Simone Ferriani, and Gino Cattani. "Tell Me Your Story and I Will Tell Your Sales: A Topic Model Analysis of Narrative Style and Firm Performance on Etsy." In *Aesthetics and Style in Strategy*, edited by Cattani Gino, Ferriani Simone, Godart Frédéric, and V. Sgourev Stoyan, 42:119–38. Advances in Strategic Management. Emerald Publishing Limited, 2020. <https://doi.org/10.1108/S0742-332220200000042005>.
- Dartnell, Lewis R., and Kaitlin Kish. "Do Responses to the COVID-19 Pandemic Anticipate a Long-Lasting Shift towards Peer-to-Peer Production or Degrowth?" *Sustainable Production and Consumption* 27 (July 2021): 2165–77. <https://doi.org/10.1016/j.spc.2021.05.018>.
- Demuyneck, E. "The Reproduction of Neoliberal Urbanism via an Idealised Cultural Amenity: The Farmers' Market." *Journal of Urban Ethnography* 9, no. 2 (2019). https://doi.org/10.1111/j.1467-8330.2011.00970_2.x/full#b28.

- Dencker, John C., Sophie Bacq, Marc Gruber, and Melvin Haas. "Reconceptualizing Necessity Entrepreneurship: A Contextualized Framework of Entrepreneurial Processes under the Condition of Basic Needs." *Academy of Management Review* 46, no. 1 (January 14, 2021): 60–79. <https://doi.org/10.5465/amr.2017.0471>.
- Department of Housing and Urban Development. "CDBG National Objectives," 2007. https://www.hud.gov/sites/documents/DOC_16472.PDF.
- . "Community Development Block Grant Grantee Areas," July 31, 2023. <https://hudgis-hud.opendata.arcgis.com/datasets/02646919444d4fddbc477987ef0ec1e1>.
- Deursen, Alexander van, Ellen Helsper, Rebecca Eynon, and Jan van Dijk. "The Compoundness and Sequentiality of Digital Inequality." *International Journal of Communication Systems* 11, no. 0 (January 27, 2017): 22. <https://ijoc.org/index.php/ijoc/article/view/5739>.
- Dinan, Kinsey Alden. "Budgeting for Basic Needs: A Struggle for Working Families," 2009. <https://www.nccp.org/publication/budgeting-for-basic-needs-a-struggle-for-working-families/>.
- Djankov, Simeon, and Eva Zhang. "Startups Boom in the United States during COVID-19." Peterson Institute for International Economics, February 17, 2021. <https://www.piie.com/blogs/realtime-economic-issues-watch/startups-boom-united-states-during-covid-19>.
- "Establishing a Creative Economy: Art as an Economic Engine in Native Communities." First Peoples Fund, 2013. https://www.giarts.org/sites/default/files/Establishing-a-Creative-Economy_Art-Economic-Engine-Native-Communities.pdf.
- Etsy, Inc. "Key Figures." Etsy Investor Relations, 2025. <https://investors.etsy.com/overview/key-figures/default.aspx>.
- Fairlie, Robert. "The Impact of COVID-19 on Small Business Owners: Evidence from the First 3 Months after Widespread Social-Distancing Restrictions." *Journal of Economics & Management Strategy*, August 27, 2020. <https://doi.org/10.1111/jems.12400>.
- Ferreira, Bruno Chaves, Anne Jourdain, and Sidonie Naulin. "Les plateformes numériques révolutionnent-elles le travail ?" *Reseaux - Ciepsum* n° 212, no. 6 (2018): 85–119. <https://www.cairn.info/revue-reseaux-2018-6-page-85.htm>.

- Florida, Richard. *The Rise of the Creative Class*. New York: Basic Books, 2002.
<https://creativeclass.com/rfcgdb/articles/14%20The%20Rise%20of%20the%20Creative%20Class.pdf>.
- Fritsch, Michael, and Michael Stuetzer. “The Geography of Creative People in Germany.” *International Journal of Foresight and Innovation Policy* 5, no. 1–3 (January 1, 2009): 7–23. <https://doi.org/10.1504/IJFIP.2009.022096>.
- Fritsch, Michael, and Michael Wyrwich. “The Long Persistence of Regional Levels of Entrepreneurship: Germany, 1925–2005.” *Regional Studies* 48, no. 6 (June 3, 2014): 955–73. <https://doi.org/10.1080/00343404.2013.816414>.
- Galster, George, Christopher Walker, Christopher Hayes, Patrick Boxall, and Jennifer Johnson. “Measuring the Impact of Community Development Block Grant Spending on Urban Neighborhoods.” *Housing Policy Debate* 15, no. 4 (January 1, 2004): 903–34. <https://doi.org/10.1080/10511482.2004.9521526>.
- Giones, Ferran, and Alexander Brem. “Digital Technology Entrepreneurship: A Definition and Research Agenda.” *Technology Innovation Management Review* 7, no. 5 (May 27, 2017). <https://papers.ssrn.com/abstract=2984542>.
- Goodman, Josh, and Mark Robyn. “Lessons for Governments From Amazon’s Headquarters Search.” The Pew Charitable Trusts, April 25, 2019. <https://pew.org/2vkLRUb>.
- Goodman-Bacon, Andrew. “Difference-in-Differences with Variation in Treatment Timing.” *Journal of Econometrics* 225, no. 2 (December 1, 2021): 254–77. <https://doi.org/10.1016/j.jeconom.2021.03.014>.
- Granader, Robert. “The Rise Of The Homebody: Leveraging Key Pandemic Trends To Drive Your Business.” *Forbes Magazine*, September 23, 2021. <https://www.forbes.com/sites/forbesbusinesscouncil/2021/09/23/the-rise-of-the-homebody-leveraging-key-pandemic-trends-to-drive-your-business/>.
- Guyt, Jonne Y., Hannes Datta, and Johannes Boegershausen. “Unlocking the Potential of Web Data for Retailing Research.” *Journal of Retailing*, March 2024. <https://doi.org/10.1016/j.jretai.2024.02.002>.
- Haltiwanger, John C. “Entrepreneurship During the COVID-19 Pandemic: Evidence from the Business Formation Statistics.” National Bureau of Economic Research, 2021. https://www.nber.org/system/files/working_papers/w28912/w28912.pdf.

- Hansen, Høgni Kalsø. *Technology, Talent and Tolerance: The Geography of the Creative Class in Sweden*. Lunds Universitet, 2007.
<https://play.google.com/store/books/details?id=cInBMgAACAAJ>.
- Hartman, Jeremy, and Joseph Parilla. “Microbusinesses Flourished during the Pandemic. Now We Must Tap into Their Full Potential.” Brookings Institution, 2022.
<https://www.brookings.edu/blog/the-avenue/2022/01/04/microbusinesses-flourished-during-the-pandemic-now-we-must-tap-into-their-full-potential/>
- Helsper, Ellen. “The Digital Disconnect : The Social Causes and Consequences of Digital Inequalities,” 2021, 1–232.
<http://www.torrossa.com/gs/resourceProxy?an=5019480&publisher=FZ7200>.
- Heying, Charles H. *Brew to Bikes: Portland’s Artisan Economy*. Portland: Ooligan Press, 2010. https://pdxscholar.library.pdx.edu/usp_fac/52/.
- Highfill, Tina, and Christopher Surfield. “New and Revised Statistics of the U.S. Digital Economy, 2005–2021.” U.S. Department of Commerce: Bureau of Economic Analysis, 2022. <https://www.bea.gov/system/files/2022-11/new-and-revised-statistics-of-the-us-digital-economy-2005-2021.pdf>.
- Holm, Eric Joseph van. “Makerspaces and Local Economic Development.” *Economic Development Quarterly* 31, no. 2 (May 1, 2017): 164–73.
<https://doi.org/10.1177/0891242417690604>.
- Howard, Brian, and Traci Morris. “Tribal Technology Assessment: The State of Internet Service on Tribal Lands,” July 27, 2019. <https://doi.org/10.2139/ssrn.3427547>.
- Hui, Julie, Kentaro Toyama, Joyojeet Pal, and Tawanna Dillahunt. “Making a Living My Way: Necessity-Driven Entrepreneurship in Resource-Constrained Communities.” *Proc. ACM Hum.-Comput. Interact.* 71, 2, no. CSCW (November 1, 2018): 1–24. <https://doi.org/10.1145/3274340>.
- Huntington-Klein, Nick. *The Effect: An Introduction to Research Design and Causality*. Chapman and Hall, 2022.
<https://www.taylorfrancis.com/books/mono/10.1201/9781003226055/effect-nick-huntington-klein>.
- Imai, Kosuke, and In Song Kim. “On the Use of Two-Way Fixed Effects Regression Models for Causal Inference with Panel Data.” *Political Analysis: An Annual Publication of the Methodology Section of the American Political Science Association* 29, no. 3 (July 2021): 405–15. <https://doi.org/10.1017/pan.2020.33>.

- Internet Corporation for Assigned Names and Numbers. “Welcome to ICANN,” 2012. <https://www.icann.org/resources/pages/welcome-2012-02-25-en>.
- J. Jackson, J. Lee, M. Lin, M. Ratnatunga. “Best-Performing Cities 2018: Where America’s Jobs Are Created.” Milken Institute, 2018. <https://milkeninstitute.org/report/best-performing-cities-2018-where-americas-jobs-are-created>.
- Jourdain, Anne. “From Commodification to Free Labor: The Gendered Effects of the Etsy Platform on Work and Family.” In *31st Annual Meeting of the Society for the Advancement of Socio-Economics (SASE)*, 2019. <https://hal.archives-ouvertes.fr/hal-02383338/>.
- Jourdain, Anne, and Sidonie Naulin. “Cooking and Crafting in a Digital Economy: The Effects of Online Commodification on Leisure Activities.” *Cultural Sociology*, December 25, 2024. <https://doi.org/10.1177/17499755241305843>.
- Keith Wardrip, Laura Williams, and Suzanne Hague. “The Role of Affordable Housing in Creating Jobs and Stimulating Local Economic Development: A Review of the Literature.” The Center for Housing Policy, 2011. <https://www.opportunityhome.org/wp-content/uploads/2018/02/Housing-and-Economic-Development-Report-2011.pdf>.
- Kenney, Martin, and John Zysman. “COVID-19 and the Increasing Centrality and Power of Platforms in China, the US, and Beyond.” *Management and Organization Review* 16, no. 4 (October 2020): 747–52. <https://doi.org/10.1017/mor.2020.48>.
- Kevin Barefoot, Dave Curtis, William A. Jolliff, Jessica R. Nicholson, and Robert Omohundro. “Measuring the Digital Economy.” *Journal of the U.S. Bureau of Economic Analysis* 99, no. 5 (2019). <https://apps.bea.gov/scb/issues/2019/05-may/pdf/0519-digital-economy.pdf>.
- Kirzner, Israel M. *Competition and Entrepreneurship*. University of Chicago Press, 1973. <https://play.google.com/store/books/details?id=jLc3CgAAQBAJ>.
- Kloosterman, Robert C. “Cultural Amenities: Large and Small, Mainstream and Niche—A Conceptual Framework for Cultural Planning in an Age of Austerity.” *European Planning Studies* 22, no. 12 (December 2, 2014): 2510–25. <https://doi.org/10.1080/09654313.2013.790594>.

- Kolesnikova, Natalia, and Yang Liu. "Understanding Poverty Measures and the Call to Update Them." Federal Reserve Bank of St. Louis, 2012.
https://www.stlouisfed.org/-/media/project/frbstl/stlouisfed/Files/PDFs/publications/pub_assets/pdf/re/2012/c/poverty.pdf.
- Kolko, Jed. "The Death of Cities? The Death of Distance? Evidence from the Geography of Commercial Internet Usage," 1999. <http://dx.doi.org/>.
- Kuckertz, Andreas, and Leif Brändle. "Creative Reconstruction: A Structured Literature Review of the Early Empirical Research on the COVID-19 Crisis and Entrepreneurship." *Management Review Quarterly*, May 10, 2021.
<https://doi.org/10.1007/s11301-021-00221-0>.
- Lai, John, and Nicole O. Widmar. "Revisiting the Digital Divide in the COVID-19 Era." *Applied Economic Perspectives and Policy* 43, no. 1 (March 2021): 458–64.
<https://doi.org/10.1002/aepp.13104>.
- Lazakidou, Athina, and Evangelos Pournaras. "Trust and Innovativeness in Virtual Organisations." *International Journal of Business Innovation and Research* 2, no. 3 (2008): 262. <https://doi.org/10.1504/ijbir.2008.017521>.
- Lee, Neil. "Inclusive Growth in Cities: A Sympathetic Critique." *Regional Studies* 53, no. 3 (March 4, 2019): 424–34. <https://doi.org/10.1080/00343404.2018.1476753>.
- Li, Mao, Iris Gomez-Lopez, Anam Khan, Philippa Clarke, and Megan Chenoweth. "National Neighborhood Data Archive (NaNDA): Broadband Internet Availability and Speed by ZIP Code Tabulation Area, United States, 2014-2020." ICPSR - Interuniversity Consortium for Political and Social Research, 2022.
<https://doi.org/10.3886/E128841V3>.
- Li, Weizi, Kecheng Liu, Maksim Belitski, Abby Ghobadian, and Nicholas O'Regan. "E-Leadership through Strategic Alignment: An Empirical Study of Small- and Medium-Sized Enterprises in the Digital Age." *Journal of Information Technology Impact* 31, no. 2 (June 1, 2016): 185–206.
<https://doi.org/10.1057/jit.2016.10>.
- Lowe, Nichola, and Tara Vinodrai. "The Maker-Manufacturing Nexus as a Place-Connecting Strategy: Implications for Regions Left Behind." *Economic Geography* 96, no. 4 (August 7, 2020): 315–35.
<https://doi.org/10.1080/00130095.2020.1812381>.

- Lubacha-Sember, Judyta, and M. Godlewska. "The Role of Local Formal and Informal Institutions in Microfirms' Development: Evidence from Poland." *Economics & Sociology* 11, no. 3 (July 1, 2018): 43–58. <https://doi.org/10.14254/2071-789X.2018/11-3/3>.
- Malanga, Steven. "Let's Kill the CDBG." *City Journal*, October 11, 2017. <https://www.city-journal.org/article/lets-kill-the-cdbg/>.
- Malecki, Edward J. "Entrepreneurs, Networks, and Economic Development: A Review of Recent Research." In *Reflections and Extensions on Key Papers of the First Twenty-Five Years of Advances*, edited by Jerome Katz and Andrew Corbett, 71–116. *Advances in Entrepreneurship, Firm Emergence, and Growth*. Emerald Publishing Limited, 2018. <https://doi.org/10.1108/s1074-754020180000020010>.
- Mansury, Yuri S., Nij Tontisirin, and Sutee Anantsuksomsri. "The Impact of the Built Environment on the Location Choices of the Creative Class: Evidence from Thailand." *Regional Science Policy & Practice* 4, no. 3 (August 2012): 183–205. <https://doi.org/10.1111/j.1757-7802.2012.01068.x>.
- Martínez-Rodríguez, Isabel, Fernando E. Callejas-Albiñana, and Ana Isabel Callejas-Albiñana. "Economic and Socio-Cultural Drivers of Necessity and Opportunity Entrepreneurship Depending on the Business Cycle Phase." *Journal of Business Economics and Management* 21, no. 2 (February 27, 2020): 373–94. <https://doi.org/10.3846/jbem.2020.11848>.
- McCullough, Meredith. "Place-Based Policy and Neighborhood Business Density: Impacts of the Community Development Block Grant Program." *Urban Affairs Review*, 2024.
- McCullough, Meredith, and David McCullough. "Digital Entrepreneurship During the COVID-19 Pandemic: An Exploratory Study of Etsy Seller Motivations," 2022.
- McGranahan, David. "Natural Amenities Scale." USDA Economic Research Service, 2024. <https://www.ers.usda.gov/topics/rural-economy-population/natural-amenities>.
- Mishrif, Ashraf, and Asharul Khan. "Technology Adoption as Survival Strategy for Small and Medium Enterprises during COVID-19." *Journal of Innovation and Entrepreneurship* 12, no. 1 (August 30, 2023): 1–23. <https://doi.org/10.1186/s13731-023-00317-9>.
- Moretti, Enrico. *The New Geography of Jobs*. New York, NY: Houghton Mifflin Harcourt, 2012. https://play.google.com/store/books/details?id=br0S54w0u_sC.

- Morris, Michael H. “The Liability of Poorness: Why the Playing Field Is Not Level for Poverty Entrepreneurs.” *Poverty & Public Policy* 12, no. 3 (September 2020): 304–15. <https://doi.org/10.1002/pop4.283>.
- Moss, Mitchell L., and Anthony Townsend. “Tracking the Net: Using Domain Names to Measure the Growth of the Internet in U.S. Cities.” *Journal of Urban Technology* 4, no. 3 (December 1, 1997): 47–60. <https://doi.org/10.1080/10630739708724566>.
- Mossberger, Karen, Scott LaCombe, and Caroline J. Tolbert. “A New Measure of Digital Economic Activity and Its Impact on Local Opportunity.” *Telecommunications Policy* 46, no. 1 (February 2022): 102231. <https://doi.org/10.1016/j.telpol.2021.102231>.
- Mossberger, Karen, Nicholas F. Martini, Meredith McCullough, and Caroline J. Tolbert. “Digital Economic Activity and Resilience for Metros and Small Businesses during Covid-19.” *Small Business Economics* 60, no. 4 (April 1, 2023): 1699–1717. <https://doi.org/10.1007/s11187-022-00674-x>.
- Mossberger, Karen, Caroline J. Tolbert, and Scott J. LaCombe. *Choosing the Future: Technology and Opportunity in Communities*. New York, NY: Oxford University Press, 2021.
- Mossberger, Karen, Meredith McCullough, Angel Molina, and Yushim Kim. “Policy Brief: Digital Entrepreneurship in Communities of Color.” ASU Center on Technology, Data and Society, 2021. <https://techdatasociety.asu.edu/content/policy-brief-digital-entrepreneurship-communities-color>.
- Mozen, Chelsea. “Etsy Helps Drive the Year of the Great Renewal for Creative Entrepreneurs.” Etsy News, April 5, 2022. <https://www.etsy.com/news/etsy-helps-drive-the-year-of-the-great-renewal-for-creative-entrepreneurs>.
- Nambisan, Satish. “Digital Entrepreneurship: Toward a Digital Technology Perspective of Entrepreneurship.” *Entrepreneurship Theory and Practice* 41, no. 6 (November 1, 2017): 1029–55. <https://doi.org/10.1111/etap.12254>.
- Nambisan, Satish, Mike Wright, and Maryann Feldman. “The Digital Transformation of Innovation and Entrepreneurship: Progress, Challenges and Key Themes.” *Research Policy* 48, no. 8 (October 1, 2019): 103773. <https://doi.org/10.1016/j.respol.2019.03.018>.
- National Center for Education Statistics. “College Navigator,” 2024. <https://nces.ed.gov/collegenavigator/>.

- National League of Cities. “How Cities Can Grow The Maker Movement,” 2016.
<https://www.nlc.org/wp-content/uploads/2016/12/Maker-Movement-Report-final.pdf>.
- Navajo County. “About Navajo County,” 2025.
<https://www.navajocountyaz.gov/213/About-Navajo-County>.
- Navajo Nation Division of Economic Development. “Navajo Nation Comprehensive Economic Development Strategy,” 2024. https://navajoeconomy.org/wp-content/uploads/2024/10/2024-2029-Navajo-Nation-Comprehensive-Economic-Development-Strategy.FINAL_.pdf.
- Neumark, David, and Helen Simpson. “Place-Based Policies.” In *Handbook of Regional and Urban Economics*, edited by Gilles Duranton, J. Vernon Henderson, and William C. Strange, 5:1197–1287. Amsterdam, Netherlands: Elsevier, 2015.
<https://doi.org/10.1016/B978-0-444-59531-7.00018-1>.
- Newman AO, Peter. “COVID, Cities, and Climate: Historical Precedents and Potential Transitions for the New Economy.” *Urban Science* 4, no. 3 (July 13, 2020): 32.
<https://doi.org/10.3390/urbansci4030032>.
- Nidhi Arora, Tamara Charm, Anne Grimmelt, Mianne Ortega, Kelsey Robinson, Christina Sexauer, Yvonne Staack, Scott Whitehead, Naomi Yamakawa. “A Global View of How Consumer Behavior Is Changing amid COVID-19.” McKinsey & Company, 2020.
<https://www.mckinsey.de/~media/McKinsey/Business%20Functions/Marketing%20and%20Sales/Our%20Insights/A%20global%20view%20of%20how%20consumer%20behavior%20is%20changing%20amid%20COVID%2019/20200707/covid-19-global-consumer-sentiment-20200707.pdf>.
- Nijkamp, Peter. “Entrepreneurship in a Modern Network Economy.” *Regional Studies* 37, no. 4 (June 1, 2003): 395–405.
<https://doi.org/10.1080/0034340032000074424>.
- Organisation for Economic Co-operation and Development. “The Missing Entrepreneurs 2019: Policies for Inclusive Entrepreneurship,” 2019.
<https://doi.org/10.1787/3ed84801-en>.
- Overton, Michael, and Eric Stokan. “Rethinking Development and Redistribution Policy: Testing the Local Expenditure Assumption Using the Community Development Block Grant Program.” *Journal of Urban Affairs*, 2023, 1–21.
<https://doi.org/10.1080/07352166.2023.2171880>.

- Parker, Kim, Rachel Minkin, and Jesse Bennett. "Economic Fallout From COVID-19 Continues To Hit Lower-Income Americans the Hardest." Pew Research Center, September 24, 2020. <https://www.pewresearch.org/social-trends/2020/09/24/economic-fallout-from-covid-19-continues-to-hit-lower-income-americans-the-hardest/>.
- Penghui, Xu, Zhao Xicang, and Li Haili. "Direct and Indirect Effects of Health Expenditure on Economic Growth in China." *La Revue de Sante de La Mediterranee Orientale [Eastern Mediterranean Health Journal]* 28, no. 3 (March 29, 2022): 204–12. <https://doi.org/10.26719/emhj.22.007>.
- Pew Charitable Trusts. "How to Close the Digital Divide in Affordable Rental Communities," May 26, 2023. <https://pew.org/429aoIM>.
- Pew Research Center. "Internet/Broadband Fact Sheet," April 7, 2021. <https://www.pewresearch.org/internet/fact-sheet/internet-broadband/?menuItem=2ab2b0be-6364-4d3a-8db7-ae134dbc05cd>.
- Phillips, Wendy, Jens K. Roehrich, Dharm Kapletia, and Elizabeth Alexander. "Global Value Chain Reconfiguration and COVID-19: Investigating the Case for More Resilient Redistributed Models of Production." *California Management Review* 64, no. 2 (February 1, 2022): 71–96. <https://doi.org/10.1177/00081256211068545>.
- Pooley, Karen Beck. "Using Community Development Block Grant Dollars to Revitalize Neighborhoods: The Impact of Program Spending in Philadelphia." *Housing Policy Debate* 24, no. 1 (January 2, 2014): 172–91. <https://doi.org/10.1080/10511482.2013.851100>.
- Raj, Manav, Arun Sundararajan, and Calum You. "COVID-19 and Digital Resilience: Evidence from Uber Eats." NYU Stern School of Business, 2021. <https://doi.org/10.2139/ssrn.3625638>.
- Ranieri, R., and Raquel Almeida Ramos. "Inclusive Growth: Building up a Concept," March 1, 2013. <https://www.econstor.eu/bitstream/10419/71821/1/736729240.pdf>.
- Rosenfeld, Raymond A., Laura A. Reese, Vicki Georgeau, and Scott Wamsley. "Community Development Block Grant Spending Revisited: Patterns of Benefit and Program Institutionalization." *Publius* 25, no. 4 (January 1, 1995): 55–72. <https://doi.org/10.1093/oxfordjournals.pubjof.a038225>.
- Roy, Kelley, and Peggy Acott. *Portland Made: The Makers of Portland's Manufacturing Renaissance*. Portland Made Press, 2015.

- Sahut, Jean-Michel, Luca Iandoli, and Frederic Teulon. "The Age of Digital Entrepreneurship." *Small Business Economics* 56, no. 3 (February 2021): 1159–69.
<http://search.ebscohost.com/login.aspx?direct=true&db=eoh&AN=1893836&site=ehost-live&scope=site>.
- Santos, Susana C., and Xaver Neumeyer. "The Technologization of Entrepreneurial Processes: A Poverty Perspective." *IEEE Transactions on Engineering Management* 70, no. 3 (2023).
https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9881967&casa_token=KWy5-IF0558AAAAA:OuL35P4FzKMPV_VVoDkIYoRkMH9gMH6fJ2TswSg2ABNQIR812AyWCbQ_orccmeFIXES0lKQ&tag=1.
- Schmidt, Claudia, Stephan Goetz, Sarah Rucker, and Zheng Tian. "Google Searches Reveal Changing Consumer Food Sourcing in the COVID-19 Pandemic." *Journal of Agriculture, Food Systems, and Community Development* 9, no. 3 (May 21, 2020): 9–16. <https://doi.org/10.5304/jafscd.2020.093.032>.
- Schumpeter, Joseph. *The Theory of Economic Development*. Harvard University Press, 1911.
- Senyard, Julianne, Ted Baker, Paul Steffens, and Per Davidsson. "Bricolage as a Path to Innovativeness for Resource-constrained New Firms: Bricolage as a Path to Innovativeness." *The Journal of Product Innovation Management* 31, no. 2 (March 1, 2014): 211–30. <https://doi.org/10.1111/jpim.12091>.
- Shambaugh, Jay C., and Ryan Nunn. *Place-Based Policies for Shared Economic Growth*. Hamilton Project, Brookings, 2018. https://www.brookings.edu/wp-content/uploads/2018/09/THP_PBP_fullbook_web_1003.pdf.
- Song, Abraham K. "The Digital Entrepreneurial Ecosystem—a Critique and Reconfiguration." *Small Business Economics* 53, no. 3 (October 1, 2019): 569–90. <https://doi.org/10.1007/s11187-019-00232-y>.
- Spigel, Ben. "The Relational Organization of Entrepreneurial Ecosystems." *Entrepreneurship Theory and Practice* 41, no. 1 (January 1, 2017): 49–72. <https://doi.org/10.1111/etap.12167>.
- Stam, Erik. "Entrepreneurial Ecosystems and Regional Policy: A Sympathetic Critique." *European Planning Studies* 23, no. 9 (September 2, 2015): 1759–69. <https://doi.org/10.1080/09654313.2015.1061484>.

- Stam, Erik, and Andrew van de Ven. “Entrepreneurial Ecosystem Elements.” *Small Business Economics* 56, no. 2 (February 1, 2021): 809–32.
<https://doi.org/10.1007/s11187-019-00270-6>.
- Stinchcombe, Arthur L. “Social Structure and Organizations.” In *Handbook of Organizations (RLE: Organizations)*, 1st Edition., 142–93. Routledge, 1965.
<https://doi.org/10.4324/9780203629130-5>.
- Stokan, Eric, and Michael Overton. “NTA Paper: 45 Years and Counting: What Is the Fiscal and Economic Legacy of the CDBG Program.” *UMBC Faculty Collection*, 2020.
<https://nta.confex.com/nta/2020/mediafile/ExtendedAbstract/Paper4035/NTA%20Paper%20Final%20Stokan%20and%20Overton.pdf>.
- Strategic Policy Forum. “Digital Transformation of European Industry and Enterprises.” European Commission, 2015.
- Sussan, Fiona, and Zoltan J. Acs. “The Digital Entrepreneurial Ecosystem.” *Small Business Economics* 49, no. 1 (2017): 55–73.
<http://www.jstor.org/stable/44697212>.
- Tam, Siu-Ming, and Gemma Van Halderen. “The Five V’s, Seven Virtues and Ten Rules of Big Data Engagement for Official Statistics.” *Statistical Journal of the IAOS* 36, no. 2 (June 9, 2020): 423–33. <https://doi.org/10.3233/sji-190595>.
- The National Association of Housing and Redevelopment Officials (NAHRO). “No Home Left Offline: Closing the Digital Divide For Public Housing Residents,” October 10, 2024. <https://www.nahro.org/news/no-home-left-offline-closing-the-digital-divide-for-public-housing-residents/>.
- The Organization for Economic Co-operation and Development. “Culture and Local Development: Maximising the Impact,” September 4, 2019.
https://www.oecd.org/en/publications/culture-and-local-development-maximising-the-impact_9a855be5-en.html.
- US Census Bureau. “American Community Survey 2021 5-Year Estimates,” 2021.
<https://www.census.gov/data/developers/data-sets/acs-5year/2021.html>.
- . “Business Formation Statistics,” 2019.
<https://www.census.gov/econ/bfs/index.html>.
- U.S. Census Bureau. “County Business Patterns,” 2021.
<https://www.census.gov/data/datasets/2021/econ/cbp/2021-cbp.html>.

- U.S. Department of Agriculture. “Local Food Directories,” 2024.
<https://www.usdalocalfoodportal.com/>.
- Vadana, Ioan-Iustin, Lasse Torkkeli, Olli Kuivalainen, and Sami Saarenketo. “Digitalization of Companies in International Entrepreneurship and Marketing.” *International Marketing Review* 37, no. 3 (January 1, 2019): 471–92.
<https://doi.org/10.1108/IMR-04-2018-0129>.
- Varadhan, Ravi, and John D. Seeger. “Estimation and Reporting of Heterogeneity of Treatment Effects.” In *Developing a Protocol for Observational Comparative Effectiveness Research: A User’s Guide*. Agency for Healthcare Research and Quality (US), 2013. <https://www.ncbi.nlm.nih.gov/books/NBK126188/>.
- Venture Forward. “2022 National Survey Results.” GoDaddy, June 2, 2022.
<https://www.godaddy.com/ventureforward/2022-national-survey-results/>.
- Villanueva, Jaume, Andrew H. Van de Ven, and Harry J. Sapienza. “Resource Mobilization in Entrepreneurial Firms.” *Journal of Business Venturing* 27, no. 1 (January 1, 2012): 19–30. <https://doi.org/10.1016/j.jbusvent.2010.09.001>.
- Vinodrai, Tara, Brenton Nader, and Christian Zavarella. “Manufacturing Space for Inclusive Innovation? A Study of Makerspaces in Southern Ontario.” *Local Economy* 36, no. 3 (May 2021): 205–23.
<https://doi.org/10.1177/02690942211013532>.
- Walker, Chris, Chris Hayes, George Galster, Patrick Boxall, and Jennifer Johnson. “The Impact of CDBG Spending on Urban Neighborhoods.” The Urban Institute, 2002.
<https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=e3084adb069b06412d71d2ae7f54d2a090d6632d>.
- Wang, Guangyi, Rita Hamad, and Justin S. White. “Advances in Difference-in-Differences Methods for Policy Evaluation Research.” *Epidemiology (Cambridge, Mass.)* 35, no. 5 (September 1, 2024): 628–37.
<https://doi.org/10.1097/EDE.0000000000001755>.
- Wilhelm, Anthony. “Closing the Digital Divide: Focus on Native American Communities.” National Telecommunications and Information Administration, 2011. <https://www.ntia.gov/blog/2011/closing-digital-divide-focus-native-american-communities>.
- Williams, Luyanda Dube. “Concepts of Digital Economy and Industry 4.0 in Intelligent and Information Systems.” *International Journal of Intelligent Networks* 2 (January 1, 2021): 122–29. <https://doi.org/10.1016/j.ijin.2021.09.002>.

- Wing, Coady, Kosali Simon, and Ricardo A. Bello-Gomez. "Designing Difference in Difference Studies: Best Practices for Public Health Policy Research." *Annual Review of Public Health* 39 (April 1, 2018): 453–69. <https://doi.org/10.1146/annurev-publhealth-040617-013507>.
- Wojan, Tim, and David McGranahan. "The Creative Class: A Key to Rural Growth." USDA Economic Research Service, 2011. <https://www.ers.usda.gov/amber-waves/2007/april/the-creative-class-a-key-to-rural-growth>.
- Wolf-Powers, Laura, Marc Doussard, Greg Schrock, Charles Heying, Max Eisenburger, and Stephen Marotta. "The Maker Movement and Urban Economic Development." *Journal of the American Planning Association. American Planning Association* 83, no. 4 (October 2, 2017): 365–76. <https://doi.org/10.1080/01944363.2017.1360787>.
- Wooldridge, Jeffrey M. "Two-Way Fixed Effects, the Two-Way Mundlak Regression, and Difference-in-Differences Estimators." *SSRN Electronic Journal*, August 17, 2021. <https://doi.org/10.2139/ssrn.3906345>.
- World Bank Group. "The Economic Impacts of the COVID-19 Crisis." In *World Development Report 2022*. World Bank Group, 2022. <https://www.worldbank.org/en/publication/wdr2022/brief/chapter-1-introduction-the-economic-impacts-of-the-covid-19-crisis>.
- Yáñez-Valdés, Claudia, and Maribel Guerrero. "Determinants and Impacts of Digital Entrepreneurship: A Pre- and Post-COVID-19 Perspective." *Technovation* 132 (April 1, 2024): 102983. <https://doi.org/10.1016/j.technovation.2024.102983>.
- Yang, Tiantian, and Howard E. Aldrich. "'The Liability of Newness' Revisited: Theoretical Restatement and Empirical Testing in Emergent Organizations." *Social Science Research* 63 (March 2017): 36–53. <https://doi.org/10.1016/j.ssresearch.2016.09.006>.
- Yin, Robert K. *Case Study Research: Design and Methods*. SAGE, 2009. <https://play.google.com/store/books/details?id=FzawIAdilHkC>.
- You, Heyuan, and Chenmeng Bie. "Creative Class Agglomeration across Time and Space in Knowledge City: Determinants and Their Relative Importance." *Habitat International* 60 (February 1, 2017): 91–100. <https://doi.org/10.1016/j.habitatint.2016.12.010>.
- Zuo, George W. "Getting beneath the Hood of Effective Place-Based Policies: Evidence from the Community Development Block Grant." University of Maryland College Park, 2020. http://econweb.umd.edu/~zuo/files/ZuoGeorge_JMP.pdf.

APPENDIX A

SUPPLEMENTARY MATERIALS: PLACE-BASED POLICY AND DIGITAL ECONOMIC ACTIVITY: IMPACTS OF THE COMMUNITIY DEVELOPMENT BLOCK GRANT

Table 1A: CDBG Categories and Activities

Infrastructural Improvements	Public Services	Business Services
Parks, Recreational Facilities	Food Banks	ED Direct: Financial Assistance to For-Profit Businesses
Street Improvements	Health Services	ED Direct: Technical Assistance
Sidewalks	Homeless Facilities (not operating costs)	Micro-Enterprise Assistance
Non-Residential Historic Preservation	Mental Health Services	
Parking Facilities	CDBG Non-Profit Organization Capacity Building	
Flood and Drainage Facilities	Subsistence Payments	
Tree Planting	Transportation Services	
Water/Sewer Improvements	Homebuyer Downpayment Assistance-Excluding Housing Counseling, under 24 CFR 5.100	
Clean-up of Contaminated Sites/Brownfields	Employment Training	
Commercial/Industrial Infrastructure Development	Fair Housing Activities	
Asbestos Removal	Crime Awareness/Prevention	
Code Enforcement	Security Deposits	
Neighborhood Facilities	Legal Services	
Neighborhood Cleanups	Screening for Lead-Based Paint/Lead Hazards Poisoning	
Privately Owned Utilities	Other Public Services Not Listed in 05A-05Y, 03T	
Misc. Public Improvements	Fire Stations/Equipment	
Residential Improvements	Senior Facilities & Services	
Acquisition, Clearance, and Disposition	Youth Facilities & Services	
Rehabilitation: Publicly or Privately Owned Commercial/Industrial	Child Care Facilities & Services	
	Housing Counseling Services	
	Facilities & Services for the Disabled/Handicapped	
	Assistance to Institutions of Higher Education	
	Other Public Services	

Table 2A: CDBG Expenditures and Domain Density by CDBG Category

Fixed-effects (within) regression Group variable: ZIP code	Total CDBG per 100 residents	Total CDBG per 100 residents * % Population with Broadband
<i>Domain name hosts per 100 residents</i>	(1)	(2)
Total CDBG Spending (<i>Year n</i>)	-0.000149	.0000844***
<i>Year n -1</i>	-0.000095	0.000003
<i>Year n -2</i>	-0.000138	0.000005
Total Infrastructure (<i>Year n</i>)	.0005936*	.0001029***
<i>Year n -1</i>	0.000059	0.000004
<i>Year n -2</i>	-0.000111	0.000003
Total Public Services (<i>Year n</i>)	-0.000572	.0000961**
<i>Year n -1</i>	-0.000338	-0.0000002
<i>Year n -2</i>	-0.000570	0.000000
Total Business Services (<i>Year n</i>)	-.0010314*	-0.000029
<i>Year n -1</i>	0.000039	0.000001
<i>Year n -2</i>	0.000659	0.000011
Observations	129,528	129,528
Sample Size	36,501	36,501
Control Variables	Yes	Yes

Notes: All regressions are weighted by average ZIP code population and standard errors are clustered at the city level. * $p < 0.10$, ** $p < 0.05$, *** $p < .01$.

APPENDIX B

SUPPLEMENTARY MATERIALS: ENVIRONMENTAL DRIVERS OF THE MAKER

MOVEMENT: A CASE STUDY OF ARIZONA ETSY SELLERS

Table 1B: Maker Ecosystem Variable Correlations

Variables	Shop Density	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) Art Agencies	0.02	-																
(2) Museums & Historical Sites	0.31	0.50	-															
(3) Makerspaces	-0.01	0.14	-0.22	-														
(4) Institutes of Higher Education	-0.15	0.06	-0.21	0.55	-													
(5) Bachelor's Degrees	0.87	0.19	0.49	0.06	-0.15	-												
(6) Creative Occupations	0.77	-0.06	0.20	0.06	-0.19	0.86	-											
(7) Download Speed	0.36	-0.23	-0.28	0.22	-0.17	0.36	0.30	-										
(8) High Speed Providers	0.46	-0.23	-0.09	0.07	-0.31	0.49	0.47	0.84	-									

107	(9) Broadband	0.66	0.03	0.25	0.03	-0.36	0.60	0.44	0.69	0.75	-								
	(10) Good Pavement	0.21	-0.46	-0.10	-0.42	-0.05	0.20	0.22	0.07	0.01	0.06	-							
	(11) Natural Amenities Score	0.08	0.63	0.20	0.25	0.13	0.05	-0.11	-0.05	-0.08	0.20	-0.58	-						
	(12) Income	0.46	-0.14	-0.04	0.24	-0.31	0.42	0.42	0.68	0.76	0.77	-0.06	0.10	-					
	(13) Affordability Index (inv.)	0.54	-0.09	0.12	0.21	-0.34	0.53	0.45	0.68	0.77	0.89	-0.05	0.16	0.96	-				
	(14) Jewelry, Luggage, & Leather Stores	0.48	0.13	0.65	-0.12	-0.30	0.67	0.51	-0.14	-0.03	0.08	0.18	-0.08	-0.03	0.09	-			
	(15) Farmers’ Markets	0.04	0.72	0.15	0.39	0.17	0.11	0.08	-0.18	-0.37	-0.18	-0.39	0.40	-0.26	-0.28	0.07	-		
	(16) Tourism Occupations	0.22	-0.05	-0.12	0.14	0.46	0.13	0.17	-0.29	-0.39	-0.05	0.40	0.07	-0.16	-0.11	0.00	0.04	-	
(17) Business Applications	0.64	0.00	0.09	0.06	-0.10	0.57	0.44	0.70	0.76	0.76	0.02	0.19	0.77	0.77	0.07	-0.30	-0.09	-	

Table 2B: MEE Element Composite Scores by County

County	Institutional Support	Knowledge	Talent	Infrastructure	Quality of Place	Demand	Entp. Culture
Maricopa	0.07	0.25	0.96	0.94	0.84	0.25	1.00
Greenlee	0.00	0.00	0.05	0.33	0.74	0.05	0.43
Coconino	0.60	0.43	0.97	0.39	0.69	0.73	0.43
Cochise	0.62	0.14	0.66	0.40	0.69	0.37	0.33
Pinal	0.15	0.15	0.47	0.73	0.65	0.17	0.43
Graham	0.00	0.99	0.16	0.34	0.61	0.21	0.41
Gila	0.50	0.65	0.37	0.22	0.61	0.52	0.30
Yavapai	0.44	0.14	0.62	0.50	0.61	0.45	0.56
Pima	0.14	0.29	0.90	0.68	0.61	0.31	0.53
Mohave	0.15	0.12	0.20	0.40	0.53	0.33	0.40
Santa Cruz	0.91	0.20	0.23	0.30	0.51	0.25	0.51
Yuma	0.16	0.23	0.18	0.63	0.49	0.30	0.27
La Paz	0.00	0.50	0.24	0.34	0.30	0.33	0.32
Navajo	0.31	0.18	0.45	0.33	0.20	0.34	0.23
Apache	0.00	0.14	0.28	0.15	0.09	0.37	0.00

*Each composite score represents the average of the normalized indicator variables associated with that ecosystem element. These values for each element are added or multiplied to form the additive and multiplicative indexes, respectively.

Table 3B: MEE Index and Etsy Shop Density Regressions by Creation Date

OLS Regression		Number of observations: 15 Standard errors adjusted for 15 clusters in county		
	All Shops		New Shops	
Shop Density	Additive Index	Multiplicative Index	Additive Index	Mult. Index
Index	8.09***	1.09***	3.99***	.562** *
County Unemployment	-2.29	-2.39	-.578	-.624

Notes: New Shops are those established between the years 2020 and 2022.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4B: MEE Index and County Etsy Shop Performance by Creation Date

OLS Regression	Number of observations: 15 Standard errors adjusted for 15 clusters in county			
	All Shop Density		New Shop Density	
Sales Growth (County Level)	Additive Index (1)	Multiplicative Index (2)	Additive Index (3)	Multiplicative Index (4)
Index Score	.15	.046	.12	.041
County Unemployment	.45	.44	.57	.598
Average Shop Followers	-.001	-.001	.013	.007
% Shops with a Website	12.69	11.24	10.25	11.16

Notes: New Shops are those established between the years 2020 and 2022. Sales growth is the mean % growth in sales between 2022-2023 per county (logged).
* p < 0.10, ** p < 0.05, *** p < 0.01.

Table 5B: MEE Index and Individual Etsy Shop Performance by Creation Date

OLS Regression	Number of observations: 16,428 (all shops), 7,517 (new shops) Standard errors adjusted for 15 clusters in county			
	All Shops		New Shops	
Sales Growth (Shop Level)	Additive Index (1)	Multiplicative Index (2)	Additive Index (3)	Multiplicative Index (4)
Index Score	-.043**	-.005**	-.056*	-.007**
County Unemployment	-.023	-.021	.0031	.006
Number of Followers	.00004***	.00004***	.0005**	.0005**
Has Website	.428***	.428***	.653***	.653***
Shop Age	-.079***	-.079***	-.442***	-.442***

Notes: New Shops are those established between the years 2020 and 2022. Sales growth is the mean % growth in sales between 2022-2023 (logged). * p < 0.10, ** p < 0.05, *** p < 0.01.

APPENDIX C

SUPPLEMENTARY MATERIALS: RESOURCE CONSTRAINED

ENTREPRENEURSHIP IN THE DIGITAL ECONOMY

Full Survey Results

Table 1C.1: Demographics

Question	Responses	Med-High Income	Low Income	Total Sample	Survey Wave
Gender	Male	45.88	35.30	44.49	All
	Female	49.90	60.53	51.30	
Race / Ethnicity	White	69.66	56.29	67.91	All
	Black / African American	13.44	22.31	14.61	
	Asian / Pacific Islander	4.07	3.25	3.96	
	Other / Multiple	0.82	0.92	0.83	
Hispanic Origin	Yes	8.91	15.82	9.82	All
	No	87.20	81.10	86.40	
Education	Less than HS	0.59	1.50	0.71	All
	HS or GED	6.55	13.07	7.41	
	Technical / Vocational School	5.34	8.91	5.81	
	Some college (incl. assoc. degree)	21.35	33.89	23.00	
	4-year degree	35.44	28.06	34.47	
	Graduate degree	29.96	13.91	27.85	
Age	Under 20	0.03	0.46	0.09	1,2
	20-29	2.70	6.35	3.25	
	30-39	20.42	28.79	21.67	
	40-49	25.33	26.16	25.45	
	50-59	23.85	17.34	22.88	
	60-69	17.31	10.84	16.34	
	70+	6.43	3.72	6.03	
Living Situation	Owns home (w/out mortgage)	19.22	15.24	18.70	All
	In a home (w/ a mortgage)	52.07	28.73	49.00	
	Renting	23.32	43.13	25.92	
	With friends/family no rent expectation	2.87	11.82	4.05	

Table 1C.2: Business Operations, Practices, and Technology Use

Question	Responses	Med-High Income	Low Income	Total Sample	Logit	Survey Waves
# Employees (Select 1)	1 (just me)	57.46	69.44	59.03	(ref. category)	All
	2-4	31.33	25.23	30.53	-	
	5-9	6.17	3.25	5.79	-	
	10-19	2.81	1.25	2.60	-	
	20-49	1.17	0.17	1.04	-	
	50-99	0.37	0.17	0.34		
	100 or more	0.44	0.17	0.40		
Business Registration (Select all that apply)	LLC	45.39	44.74	45.29		1,2
	Sole Proprietorship	21.32	21.21	21.30		
	Corporation	13.90	6.19	12.75	-	
	Nonprofit	0.76	0.15	0.67		
	“Doing Business As” Name	16.55	17.80	16.74		
	EIN	48.53	47.99	48.45		
	Not registered, but in process	5.48	9.60	6.10	+	
	Not registered, do not intend to	3.95	4.49	4.03		
Where business is conducted (Select all that apply)	None are true	2.34	3.10	2.46		All
	On my website	59.15	65.08	59.96	+	
	On social media	39.17	50.55	40.73	+	
Where customers reside (Select all that apply)	In a physical location	51.61	41.96	50.29	-	1,2,3
	Neighborhood	19.26	20.50	19.44		
	City	35.48	36.63	35.64		
	State	39.49	36.00	38.99	-	
	United States	54.34	56.61	54.67		
Business generates a source of income (Select 1)	International	19.81	20.71	19.94		All
	Main source	27.82	30.06	28.11	(ref. category)	
	Suppl. Source	40.54	38.30	40.25	-	
Number of businesses started	No income	25.72	24.65	25.58		1,3,4
	1 (just this one)	48.62	54.29	49.37	(ref. category)	
	2	24.48	20.43	23.94	-	

(Select 1)	3	13.60	12.42	13.44		
	4	4.64	4.63	4.64		
	5 or more	7.00	6.88	6.98		
Average monthly revenue for this business (Select 1)	N/A no income generated	31.65	31.64	31.64	(ref. category)	All
	\$500 or less	13.83	26.64	15.52	+	
	\$501 to \$2,500	14.25	20.90	15.12	+	
	\$2,501 to \$5,000	10.82	8.91	10.57	-	
	\$5,001 to \$10,000	10.75	5.50	10.06	-	
	\$10,001 to \$15,000	5.59	2.25	5.15	-	
	\$15,001 to \$25,000	2.00	0.75	1.84	-	
	\$25,001 to \$50,000	2.38	0.50	2.13	-	
	Over \$50,000	1.31	0.00	1.14		
Hours spent on business per week (Select 1)	0	1.07	1.83	1.17	(ref. category)	All
	1-10	22.52	25.73	22.95		
	11-20	17.46	19.23	17.69		
	21-30	14.61	13.41	14.45	-	
	31-40	14.03	12.41	13.82	-	
	41-50	14.66	9.58	13.99	-	
	51 or more	14.26	16.07	14.50		
What do you use website for the most (Select all that apply)	Sales orders	24.09	37.79	25.73	+	2,3,4
	Bookings	18.18	24.30	18.92	+	
	Communication	30.78	30.47	30.75		
	Marketing and credibility	69.37	59.53	68.19	-	
	Operations	6.03	5.23	5.93		
Does your business use any of the following tech (Select all that apply)	Machine learning	5.33	3.48	5.14		4
	Cloud computing	14.31	8.26	13.71	-	
	Artificial Intelligence	21.08	20.00	20.97		
	IOT	5.76	2.61	5.45	-	
	Blockchain	1.10	3.04	1.30	+	
	3D printing	3.60	3.04	3.55		
	Virtual reality	1.73	0.87	1.64		
	Robotics	1.39	1.30	1.38		
	None of the above	66.30	73.04	66.97	+	
How can technology help your business? (Select all that apply)	Market insights	51.11	50.00	51.00		4
	Strategies for marketing or operations	47.73	52.75	48.25	+	
	Writing content	45.82	39.91	45.21		
	Creating or editing multimedia content	56.40	62.39	57.01	+	

	Summarizing info or text	26.53	25.69	26.45		
	Writing computer code	13.58	14.22	13.65		
	Business operations	36.52	38.07	36.68		
	Other	1.53	1.38	1.52		

Table 1C.3: Motivations and Ambitions

Question	Responses	Med-High Income	Low Income	Total Sample	Logit	Survey Waves
Top 1 reason for starting business	Dream	8.15	11.29	8.53	+	2,3,4
	Be my own boss	18.78	16.65	18.52		
	Career change	4.93	5.13	4.95		
	Idea for new product or service	7.31	7.07	7.28		
	Support a cause or hobby	12.59	14.94	12.87	+	
	Extra money	8.83	9.81	8.95		
	Lost prior job	3.89	3.99	3.90		
	Needed flexibility	10.20	9.58	10.13		
	Contribute to community	5.29	6.27	5.41		
	Retired	2.76	1.71	2.64	-	
	For fun	2.87	2.85	2.87		
	More success on my own	11.63	8.55	11.25	-	
Employed when started business (Select 1)	Yes, left prior job to start business	30.54	28.14	30.22	(ref. category)	All
	Yes, started business while working elsewhere	48.90	44.21	48.29		
	No, laid off or furloughed	5.14	6.41	5.31	+	
	No, student	3.28	4.66	3.46	+	
	No, other reasons (disability, parenting, retirement, etc.)	9.60	14.99	10.31	+	
Current employment situation (Select 1)	Fully employed by business	43.22	37.14	42.42	(ref. category)	All
	Employed full time outside of business	26.68	17.82	25.52	-	
	Employed part time outside of business	10.05	16.07	10.84	+	
	Stay-at-home parent, a student, or unable to find	4.56	11.49	5.47	+	

	work due to a disability					
	I am retired	8.98	6.74	8.69		
	Unemployed	4.02	8.16	4.56	+	
If supplemental, hopes business becomes primary income (Select 1)	N/A	59.46	61.70	59.75		All
	Yes	26.44	31.06	27.05	+	
	No	8.24	3.75	7.65	(ref. category)	
Ambitions long term (Select all that apply)	Solo-entrepreneur, stay small	36.50	29.89	35.63	(ref. category)	All
	Small business w/ some employees and/or physical location	31.37	34.64	31.80	+	
	Mid-size business	14.69	15.49	14.79	+	
	Corporate business	5.29	7.91	5.64	+	
	“Unicorn,” billion-dollar valuation	2.56	4.83	2.86	+	

Table 1C.4: Needs and Challenges

Question	Responses	Med-High Income	Low Income	Total Sample	Logit	Survey Waves
Currently, on-hand cash will cover (Select 1)	No cash available	11.19	26.43	13.19	+	All
	Less than a month of business operations	24.31	37.27	26.01	+	
	1-3 months	22.34	15.59	21.45	+	
	More than 3 months	29.64	10.96	27.18	(ref. category)	
Total capital needed to start business (Select 1)	None	11.64	10.66	11.51	(ref. category)	All
	Less than \$500	14.11	19.40	14.80	+	
	\$500 - \$1,000	13.04	17.07	13.57	+	
	\$1,000 - \$5,000	21.13	21.65	21.19		
	\$5,000 - \$10,000	12.26	11.24	12.12		
	\$10,000 - \$25,000	8.36	7.58	8.26		
	\$25,000 - \$50,000	5.54	4.66	5.43		
	\$50,000+	9.05	4.66	8.47	-	
How easy or hard was it for you to access the capital you needed to start your business? (Select 1)	N/A (no capital needed)	11.64	10.66	11.51	(ref. category)	All
	1 – Very Easy	19.90	11.41	18.79	-	
	2	6.22	3.66	5.89	-	
	3	6.95	3.75	6.53	-	
	4 – Moderate	29.08	28.81	29.04		
	5	6.19	6.91	6.28		
	6	5.45	8.49	5.85	+	
	7 – Very Difficult	10.96	23.65	12.63	+	
Top thing you'd use capital for if easier to access (Select 1)	N/A – Access to capital not a top challenge	78.13	65.00	76.81	(ref. category)	3,4
	Marketing online	5.49	10.00	5.94	+	
	Marketing using traditional media	1.58	5.00	1.93	+	
	Hiring employees	2.84	2.50	2.80		
	Developing new products	2.56	2.08	2.51		
	Office/Retail space	1.21	1.67	1.26		
	Creating my website	0.56	0.42	0.54		
	Obtaining licenses/permits	0.74	1.25	0.80		
	Hiring a consultant	0.74	1.25	0.80		
	Equipment	2.93	5.42	3.18	+	
	Inventory	2.23	4.17	2.43	+	

Top 2 stressors related to business (Select 2)	Financial	33.82	50.63	35.75	+	3,4
	Work life balance	23.98	19.82	23.50	-	
	Customers	8.92	6.49	8.64	-	
	Employees	5.53	2.52	5.18	-	
	Vendors / Partnerships	5.62	3.60	5.39	-	
	Technology / Equipment	7.24	5.59	7.05		
Top 1 challenge when starting business (Select 1)	Access to financial capital	10.91	14.66	11.37	+	2,3,4
	Affordable space	3.67	3.19	3.61		
	Marketing online	18.04	17.61	17.99		
	Marketing with traditional media	8.87	8.98	8.88		
	Healthcare/Benefits	4.57	3.43	4.43		
	Finding employees	4.49	2.48	4.24	-	
	Getting business online	6.84	9.10	7.12	+	
	Getting social media accounts set up	3.00	3.19	3.02		
	Business planning and management	6.74	6.26	6.68		
	Rising costs (wages, materials, etc.)	3.40	3.78	3.45		
	Technology management	3.17	2.48	3.08		
	Networking with other businesses	3.84	3.78	3.83		
	Licensing/Permits	4.82	5.20	4.87		
	Supply chain delays	1.23	0.95	1.20		
	Time management	2.98	1.89	2.85		
	Taxes	5.49	5.20	5.45		
	Knowing what to do	5.22	3.66	5.03		
	Pandemic related shutdowns	2.73	4.14	2.91	+	
Aware of public resources (Select 1)	Yes	31.49	22.16	30.16	(ref. category)	1,2,3
	No	58.49	68.99	59.99	+	