Accounting for Disaster: Small Business Recovery in North Carolina
after Hurricanes Matthew and Florence

by

Alexander Meeks

B.A., Yale University (2014)

Submitted to the Department of Urban Studies and Planning
in Partial Fulfillment of the Requirements of the Degree of

Master in City Planning

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 2019

Signature of Author……

MIT School of Architecture and Planning
Department of Urban Studies and Planning
May 23, 2019

Certified by……

Karl Seidman
Senior Lecturer of Economic Development, Department of Urban Studies and Planning
Thesis Supervisor

Accepted by……...

Ceasar McDowell

Professor of the Practice
Co-Chair, MCP Committee, Department of Urban Studies and Planning

Accounting for Disaster: Small Business Recovery in North Carolina
after Hurricanes Matthew and Florence

by

Alexander Meeks

Submitted to the Department of Urban Studies and Planning
on May 23, 2019 in Partial Fulfillment of the Requirements of the Degree of
Master in City Planning

ABSTRACT

In an era of climate change, the rural, coastal plains of North Carolina might foretell the increased economic precariousness of coastal communities beset by stronger hurricanes and more frequent flooding. In 2016, Hurricane Matthew flooded much of North Carolina's southeastern region, inundating thousands of homes and businesses. Two years later, Hurricane Florence interrupted the state's recovery, precipitating even greater damage. Little academic work focuses on the state's recovery from the two storms, and none to date tracks the recovery of its small businesses. These businesses are important sources of employment and wages in the state's communities, yet compared to households and public facilities, they qualify for fewer sources of economic relief, and almost all of that relief consists of debt. These businesses also already bear the brunt of ongoing negative trends: increasing economic stratification between small and large firms nationwide as well as sustained rates of rural depopulation and divestment.

I focus on the supply and use of small business recovery capital in order to diagnose unmet need after the hurricanes and make recommendations to foster business recovery in North Carolina after these and future disasters. On the capital "supply side," I describe slow, sometimes arbitrary and occasionally risky federal disaster recovery programs geared toward small businesses. These contrast with the relatively sophisticated, efficient system of capital absorption below the state level, which pivots around a network of distributed, community-based small business development centers and lending intermediaries. On the capital "demand side," I theorize the vulnerability of small businesses and seek to understand their financial and operational decision-making through interviews. Small businesses, which are expected to recover on their own financial merits through insurance, debt financing, and savings, must also rely on factors well beyond their control: the availability of affordable and rapid debt capital, the quick resurgence of local spending after a disaster, and the public resolution of market failures through limited grant funding. Absent significant improvements in the penetration of insurance, disaster credit, and hazard mitigation, these businesses will continue to face rising fixed costs, diminished access to credit, tighter operating margins, and a higher probability of failure.

Thesis Supervisor: Karl Seidman

Title: Senior Lecturer of Economic Development and Planning

Table of Contents

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGMENTS

This thesis springs from the support of many mentors here at MIT and beyond.

Professor Karl Seidman is foremost among them. Karl's client-based practicum on "economic development planning" introduced me to the field of economic development; his course on "financing economic development," in which I was lucky enough to serve as a teaching assistant, sharpened my understanding of how corporate finance, financial institutions, municipal finance, and federal funding systems intersect to support economic development. And it is to Karl's great credit that a focus on equitable economic outcomes drove students' learning and efforts in both courses (and animates some of the main concerns of this thesis). Given Karl's expertise in economic development and his experience with disaster recovery (New Orleans after Hurricane Katrina)—as well as his gentle and trusting mentorship, sharp attention to detail, and otherworldly patience—I could not have had a better Thesis Supervisor. This spring, Karl retires from MIT DUSP: a loss to the university but perhaps a gain for the world as he continues to write and practice across the country.

Many thanks as well to **Professor Janelle Knox-Hayes, Ph.D.**, who not only served as a Thesis Reader but also served as a Research Advisor throughout my full term at MIT. I credit to Janelle's guidance and support much of my knowledge about the factors that determine risk perception, disaster insurance uptake, and hazard mitigation decision-making. And without the other projects of mine she has overseen, it is doubtful I would have developed the data wrangling chops to handle some of the larger federal datasets that give life to Chapter 3 of this thesis.

Thanks also to **Amanda Whittemore-Martin, AICP**, soon to be Ph.D. from UNC-Chapel Hill's Department of City and Regional Planning. Amanda played a pivotal role in the development of this thesis. In addition to making time for multiple conversations about disaster recovery and resilience in the context of North Carolina, she introduced me to the Southeast Disaster Recovery Partnership. The opportunity to present my (fledgling) research during the SDRP's 2019 Workshop redoubled into even better fortune, linking me to contacts and great ideas which significantly shaped the methodology of this thesis. This summer, she moves on to the North Carolina Office of Recovery and Resiliency, where she will continue to do incredible work.

I owe thanks to **Professor Jesse M. Keenan, Ph.D., J.D., LL.M.** Jesse's magisterial course "climate change resilience and adaptation" at the Harvard University Graduate School of Design dramatically enhanced my understanding of disaster resilience and climate change adaptation. The trade-offs between these two goals form the crux of my final conclusions and recommendations, which would have suffered without his kind and generous intellect.

And thanks to **Professor Amy Glasmeier, Ph.D.** at MIT DUSP. Amy guided me through rather tricky census and labor statistics definitions and oriented me on the rather niche subject of *rural* economic development just when I found myself in over my head.

I am grateful to the **Harold Horowitz (1951) Student Research Fund** at MIT's School of Architecture and Planning, which generously spotted the eight days I spent interviewing institutions and driving headlong across suburban and rural highways in North Carolina's coastal plains this January 2019.

And finally, an impossible task: how do I express the gratitude I hold for my family—my mother and father and brother but also aunts and uncles and cousins—who cheered me unceasingly through the darkest wintry stretches in Boston? Words fail. Thank you, always, for everything.

EXECUTIVE SUMMARY

Hurricane Matthew struck North Carolina in October 2016, dropping up to a foot and a half of rain across the state's southeastern coastal plains. Flooding overtopped rivers and inundated communities for days, damaging and disrupting and sometimes totally destroying houses, public facilities, and businesses. Within two years, Hurricane Florence interrupted the state's recovery from Matthew, landing at Wrightsville Beach, NC in September 2018 and inundating the southeastern-most coastal and inland communities of the state—some of them for the second time—with even greater amounts of rainfall.

After Matthew, the North Carolina Department of Commerce determined that up to 45% of businesses within disaster-affected counties had sustained some form of physical or economic impact from the storm, and that 30% of storm-affected businesses were struggling nine months after the initial impact (NC DOC LEAD, 2017a, 2017b). Although Florence struck too recently for comparable data to exist, flooding from Florence affected up to twice as many businesses as were affected by Matthew, according to data from the Small Business Administration (SBA, 2019c); some of these firms had passed under Matthew unscathed, while others found their already precarious financial condition further destabilized by yet another 500-year storm.

◆ ◆ ◆

Although this thesis constrains itself to the impacts of Hurricanes Matthew and Florence and the federal, state, and private programs that mobilized afterward to stimulate business and economic recovery in North Carolina, it repeatedly contextualizes these topics within a cluster of broader economic and environmental forces: global climate change, increasing economic stratification among businesses nationwide, and secular depopulation and divestment from rural areas. In addition to outlining my methodology and research questions, *Chapter 1* of this thesis—the Introduction—briefly describes each of these forces. Climate change promises more frequent and intense crises of the sort North Carolina has just weathered. Increasing economic stratification ratchets up financial pressure on the smallest and lowest-margin firms, which cannot compete with a rising class of monopolistic, multinational, high-margin corporations. And the drain of population, talent, and money from rural contexts—like much of NC's coastal plains region—threatens the long-term sustainability and viability of rural livelihoods and economies. Small businesses in vulnerable rural areas find themselves thrice-embattled by forces well beyond their control; therefore, policies that seek to remedy their short-term problems, such as the inventory restoration and basic disaster preparedness, must acknowledge and adapt to the weight of these larger trends.

This thesis also acknowledges North Carolina's unique strengths, which include a system of geographically dispersed business development centers, technical assistants, private economic development institutions, local government entities, and CDFI lending intermediaries that are highly capable at efficiently leveraging public and private capital for business development. In this sense, the state is a nationwide leader, in spite of the pressures mentioned above. Indeed, the state's robust capital absorption capacity informs the financial recommendations at the close of this thesis.

Chapter 2 of this thesis reviews work already written about disaster vulnerability, small business disaster recovery and decision-making, resilience and adaptation theory, and rural economic resilience. Although a healthy tradition of academic work has studied the recovery of businesses after major natural disasters—most notably after Hurricane Katrina in Louisiana and Mississippi—

little work has focused on the recovery of North Carolina's businesses after Hurricanes Matthew or Florence. Furthermore, little to no work has theorized or studied what is unique, or not unique, about rural disaster recovery and resilience versus those activities in an urban context. This thesis seeks to help fill both of these gaps in scholarship.

To understand and predict the vulnerability of individual businesses to natural hazards and disasters, it pays to break down vulnerability into the interaction between *exposure*, *sensitivity,* and *adaptive capacity* (Preston & Stafford-Smith, 2009). Chapter 2 parses a wealth of empirical literature on business disaster recovery variables using this framework. With regard to exposure, the review concludes that businesses with a smaller proportion of their assets as physical inventory and equipment (versus intangible assets like digital property or intellectual property) are less exposed to hazard impacts. The same, obviously, goes for businesses located farther from exposed areas, such as floodplains. With regard to sensitivity, businesses less reliant on critical infrastructure lifelines (e.g. electrical utilities, waterworks), businesses with greater geographic diversification (e.g. multiple locations, or customers across a wide geographic area), and businesses that provide more "essential" rather than nonessential services are less sensitive to hazard impacts. Finally, with regard to adaptive capacity, businesses that own their property rather than rent it, employ larger numbers of staff, and have greater levels of experience (owner experience and staff experience) tend to have more adaptive capacity to cope with and bounce back from an impact.

While the inherent characteristics and capabilities operationalized above can predict whether a business survives and to what extent it performs after a disaster, they fall short of a full "theory of vulnerability." These variables tend to confound one another, and they do not fully explain small business decision-making and recovery strategies. Access to and utilization of disaster relief and disaster insurance are useful data points here. A decent body of literature investigates the many reasons why households and businesses systematically underinsure against the risk of a disaster; explanations range from the challenge of understanding risk and optimizing insurance coverage accordingly (Kousky, 2019) to the inherent cognitive difficulty of appreciating and responding rationally to low-probability, high-magnitude losses (Kahneman & Tversky, 1979; Tversky & Kahneman, 1973). Unfortunately, relatively few authors probe how individual business owners manage the tradeoff between using disaster relief debt capital versus liquidating business or personal or family savings. In Chapter 4, interviews with individual small business owners make a small contribution to this gap.

A separate, more contemporary body of literature exists for "resilience," which is, glibly, the speed with which a system returns to an equilibrium or original state after a perturbation. After reviewing resilience theory and contrasting it with ideas of transformative adaptation, I assert that the speed and accessibility of emergency capital—grants, debt, and non-monetary technical assistance—after a disaster both reflect and foster an area's level of economic development and economic resilience. This "capital absorption capacity" often hinges on the number of, quality of, or partnerships between financial and community institutions. Expanding capital absorption capacity and boosting institutional capacity should be primary goals of rural economic development policy at the level of the state and local government, both to promote normal economic growth as well as rapid economic recovery after disasters. And ideally, policy should seek to go beyond status-quo-oriented resilience and tackle adaptation. Transformative adaptation policy might consider ways of overturning or reducing long-standing inequalities and injustices in the process of permanently mitigating hazard impacts through dramatic infrastructure, financial, and socioeconomic changes.

Chapter 3 shifts to a narrative of the hurricanes' short-term effects on small businesses and local economies. Data on this subject is sparse, scattered, and sometimes inaccessible to the public; therefore, jogging through various basic statistics and spatial analyses might benefit a reader still seeking quantitative data about the hurricanes' economic effects. Findings generally corroborate the size and sector-related patterns of vulnerability anticipated by Chapter 2: retailers, food and accommodations businesses, certain personal services providers, and arts and entertainment and recreation concerns cited greater post-disaster struggles and exhibited disproportionately greater demand for disaster relief, which I use as a proxy for vulnerability. Smaller firms also exhibited disproportionately greater demand for relief. These businesses tended to have more exposed assets, be more sensitive to the economic effects of disasters, and have less adaptive capacity.

Relatively few businesses seemed to close right after Matthew, at least according to available data and interviews. Those that did close tended to be already "on the brink" financially, operate under older owners nearing retirement, or operate informally without legal registration. While unemployment rates spiked dramatically in a number of counties after Matthew—especially Lenoir and Robeson—the effects on labor were short-lived, and most *formal* economic activity seems to have escaped unscathed. Unfortunately, the effects of Florence might curtail optimism about more recent conditions, and the effects of an economic shock like a disaster can take years to manifest in terms of business relocation and closure rates (Alesch, Holly, Mittler, & Nagy, 2001). Of Florence, the hurricane affected wealthy urban centers—e.g. Wilmington and Jacksonville, NC—in addition to the poorer, less populous areas flooded by Matthew; this difference resulted in twice greater demand for disaster relief among area businesses than the demand witnessed after Matthew.

Businesses that survived the flooding, lacked adequate disaster insurance, and sought economic relief to recover faced a few different options, which involved different federal, state, and local actors; these actors actually originated relief to firms with markedly different levels of speed and efficacy. SBA disaster loans formed the vast majority of all economic relief directed at businesses, which the SBA lends directly rather than through an intermediary. Unfortunately, the time it took businesses to apply for SBA loans and await underwriting increased the time during which they had to fall back on reserves, lines of credit, credit cards, personal loans, and other strategies to prolong their working capital and keep themselves afloat.

North Carolina separately authorized a $300.9 million state appropriation to fund disaster recovery after Matthew; $5 million of this money capitalized a loan pool reserved for small business lending (NC GA PED, 2019a). Three Community Development Financial Institutions (CDFI) distributed this money in the form of fast-paced bridge loans as well as longer-term recovery loans for small businesses. While CDFI bridge loans filled the troublesome time gap mentioned above for businesses awaiting SBA loan proceeds (or disaster insurance proceeds), the number of bridge loans made after Matthew and Florence pales in comparison to the volume of SBA loans after the hurricanes. Although the bridge loan program is valuable, its economic impact could have been greater given a larger loan pool and better advertisement to affected firms.

Finally, a separate program funded by the Department of Housing and Urban Development's (HUD) Community Development Block Grant-Disaster Recovery (CDBG-DR) allocation to North Carolina intended to issue forgivable loans to eligible small businesses. Unfortunately, the state's slow and roundly criticized handling of HUD CDBG-DR funding (NC GA PED, 2019a), in addition to poor program design that displaced overwhelming HUD requirements from public institutions onto

participating CDFI lenders and small business borrowers that were ill-equipped to handle them, means the CDBG-DR forgivable loan program has room for improvement.

After describing the federal, state and local business recovery frameworks activated by Hurricanes Matthew and Florence, *Chapter 4* pivots to the perspective of nine interviewed small business owners who were affected by Hurricane Matthew. Seven of them interacted with the SBA during their recovery process, and five actually took out SBA loans. Only one of the nine businesses had flood insurance prior to Matthew. While two business interviewed were thankful or had neutral feelings about their SBA disaster loans, other businesses either regretted taking out the loans, felt the SBA disaster debt service was unduly burdensome, or explained they had avoided SBA loans and other debt in order to duck long-term debt service and collateral obligations. However, those businesses that eschewed debt had to generate recovery proceeds from somewhere, oftentimes from internal reserves or personal/family savings. Tapping into savings poses financial risks as well, including reduced adaptive capacity in the event of another economic shock, reduced ability to secure debt later on for alternative reasons, and constraints on non-business goals and needs like family education, health, and retirement.

The thesis frames these financial decisions as lose-lose situations from the perspective of an uninsured business: taking on disaster debt burdens the business with higher fixed costs and collateralizes its assets without stimulating net new revenue that could help service its debt and restore its creditworthiness; but tapping capital reserves or personal/family savings reduces adaptive capacity, potentially liquidates assets that could be useful as collateral later on, and radically constrains a person's or family's private financial security. An uninsured business in either position suffers a greater level of precariousness, which is made even worse by persistent market failures: (1) temporary and sometimes permanent depopulation and depressed purchasing power after the floods, and (2) persistent pockets of devastation that exert negative externalities on nearby economic activity. Fixing these damages would require multi-stage acquisition, demolition, remediation and reconstruction projects that run so costly that even subsidized debt cannot make the projects pencil out.

In summary, the overwhelming pressure on small businesses originates from a variety of angles. The ongoing, global pressures described in Chapter 1 operate in tandem with more obvious, immediate stresses: increased indebtedness and asset collateralization, reduced customer traffic and depressed consumption of non-essential goods, and the negative spillover effects of persistent disaster damage (the utter destruction of downtown Fair Bluff, NC is a dramatic example of the latter). The immense challenge of doing business in a disaster-prone, economically vulnerable area raises doubts about whether the current cost of disaster debt is viable, and whether the paucity of grants for the smallest, most vulnerable rural businesses in the state is a sustainable policy decision.

Therefore, I conclude with recommendations to improve individual business recovery and general economic resilience in North Carolina. The recommendations target federal, state, and local spheres of disaster recovery and economic development policy and arrive in four broad categories:

1. Federal, state, and local actors should increase the penetration of disaster insurance among small businesses by ensuring the historical and projected accuracy of FEMA flood insurance maps, broadening the uptake of disaster insurance through advertising and technical assistance and enforcement, and ensuring the accessibility of flood insurance among the lowest-income, most vulnerable businesses.

2. Improve the accessibility and velocity of disaster relief capital by redesigning the CDBG-DR-funded small business forgivable loan program, legislating lower interest rates for all businesses regardless of creditworthiness in order to improve the accessibility and appropriateness of SBA disaster debt, increasing the quality of NC businesses' disaster loan applications by better advertising existing technical assistance to affected firms, accelerating SBA underwriting and loan origination periods by piloting novel SBA disaster loan guarantee programs, and rolling out a state-sponsored disaster loan guarantee program managed by the state's high-performing nonprofits and CDFIs.

3. Drive disaster resilience and climate change adaptation by precisely deploying CDBG-DR funding to resolve large-scale market failures in a way that maximizes public and private benefit, thoughtfully balancing status quo disaster recovery and resilience with longer-term and more transformative adaptation projects, formalizing small business relocation programs that still preserve the integrity of local communities, incentivizing businesses to use SBA disaster loans to adapt to future storms rather than merely recover from past events, and jumpstarting small business hazard mitigation using small starter grants paired with technical assistance.

4. Support future data collection and emergency response, recovery, and resilience planning within the state by empowering the state Department of Commerce to survey businesses affected by Hurricane Florence, delegating surveying authority to local economic development institutions to generate data across a wider context, supporting commitments to longitudinal research by public and private institutions, and ensuring the durability of the new North Carolina Office of Recovery and Resiliency.

Some of these recommendations are ambitious and controversial. To the greatest extent feasible, I attempt to balance the need for responsible lending with a normative belief, or assumption, that rural economic development, although riskier, is worth sustaining. It is worth sustaining even if doing so entails greater risk. I also attempt to balance shorter-term goals to recover and rebuild in place with longer-term concerns about adaptation to climate change. More farsighted measures encourage the careful, considered relocation of businesses out of vulnerable areas with the caveat that such "managed retreat" should take care to preserve the social, economic, and fiscal integrity of North Carolina's communities. Other measures involve adjusting the costs of doing business—in the form of insurance premiums, certain disaster loan interest rates—to reflect flood risk; but these measures will only work if policymakers pair them with a commitment to except or otherwise support lower-income and underserved communities and business owners rather than leave them to the rough vagaries of "market-managed" climate adaptation.

◆ ◆ ◆

The back-to-back impact of Hurricane Matthew and Hurricane Florence might in some sense be a fluke. In another sense, it is a warning about the sort of environmental conditions and destabilizing economic effects entailed by a changing climate. Contextualizing the state's economic recovery from these hurricanes within a greater process of grappling with global economic transition and climate change will serve North Carolina well as it continues on a path toward disaster recovery and economic resilience leadership.

CHAPTER 1—INTRODUCTION

1.1 Scope

The thesis outlines the recovery of small businesses, especially rural small businesses, in North Carolina after the impact of Hurricane Matthew and Hurricane Florence. Specifically, I describe the supply of economic relief—including recovery capital and technical assistance—to storm-affected small businesses in the state, and I analyze how access to and utilization of said economic relief varies across businesses by size and market sector. In addition, I diagnose a gap between the supply of economic relief and the need for relief among small businesses, resulting in potentially substantial unmet need for assistance after the back-to-back flooding. This unmet need exists for a variety of reasons including a lack of capital with accessible interest rates, a lack of attention and support provided to "faster" forms of capital (like bridge loans), and the inability of subsidized debt alone to correct widespread market failures associated with reductions in regional purchasing power and the costs of hazard mitigation and adaptation.

My research questions are as follows:

- **What form did economic disaster relief take in North Carolina?** What sorts of debt, grants, and technical assistance were made available to small businesses? What requirements did these forms of economic relief involve, and what were their advantages and disadvantages?
- **Who provides what types of economic relief, and how?** North Carolina contains a complicated web of centralized and decentralized economic development and disaster recovery actors on the level of the state, local government, non-profit sphere, and private lending arena. How did these actors leverage their unique strengths and capabilities (or fail to do so) in their contributions to business disaster recovery programs?
- **What is the demand for economic relief among storm-affected businesses?** Besides their level of flood damage, what made a business more or less likely to pursue economic relief? If they avoided publicly available programs, why? And what resources did they rely on instead? Is there sufficient supply of public economic relief to meet demand?
- **How do small businesses utilize the economic relief they receive?** Do they expend it on inventory, fixed capital, working capital, demolition, hazard mitigation?

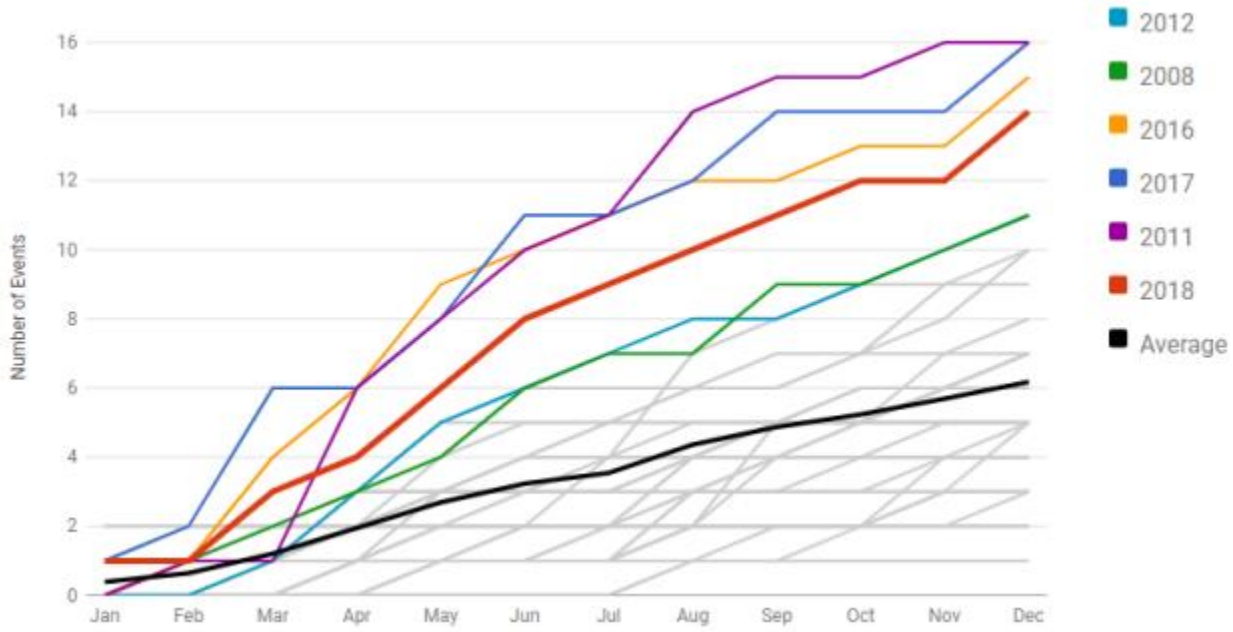
The scope of the analysis includes "small" businesses, but I do not take special pains to define what "small" means. Official definitions of "small" businesses differ substantially across different institutions active in business recovery; Small Business Administration (SBA) definitions vary depending on the market sector in question. I focus primarily on the smallest firms, especially "very small businesses" employing one (1) to 19 staff members. That said, multiple businesses I interviewed exceeded this threshold. In addition, my focus on small commercial firms leaves out agricultural farming and husbandry, landlords and lessors, and nonprofits. The agricultural sector operates within a separate sphere of disaster grants, debt, and technical assistance provided chiefly through the USDA and local agricultural extension offices. And real estate property lessors and nonprofits face substantially different business models, which also exceed the scope of this research.

1.2 Context

It is impossible to discuss small business disaster recovery in North Carolina without acknowledging a series of epochal shifts: small businesses continue to operate in the state under the crosshairs climate change, growing economic stratification, and rural depopulation and divestment.

An overwhelming scientific consensus on climate change foretells escalating environmental impacts on human society and natural ecosystems as a result of global warming (IPCC, 2014). Per the United States Climate Change Science Program, the US alone has experienced unprecedented increases in extreme precipitation events, more frequent and more intense hurricane activity, and worsening droughts and heat waves (Kunkel, 2015; Smith, 2019). A changing climate has exacerbated a spate of costly disasters over time (see **Figure 1**). In 2016, an unnamed rainstorm deluged Louisiana with three times as much rain as Hurricane Katrina and damaged 40,000 homes (Samenow, 2016). That same year, Hurricane Matthew swept across the Carolinas. In 2017, Puerto Rico and the Gulf Coast weathered Hurricanes Maria, Irma and Harvey, and 13 other disaster events struck elsewhere in the US—an unprecedented amount; in 2018, Hurricane Florence drenched North Carolina, destroying many homes and businesses for the second time in two years, and 13 other billion-dollar disasters impacted the US (Smith, 2019). Recent evidence suggests that although these hurricanes, severe storms, and winter storms would otherwise have occurred, they intensified as a result of rising ocean temperatures and atmospheric changes (Kunkel, 2015). The accelerating manifestation of climate change, particularly in the world's most vulnerable and poorest communities (IPCC, 2018), threatens the physical, economic and social integrity of communities large and small.

Figure 1: 1980-2018 US billion-dollar disaster event frequency (CPI-adjusted).



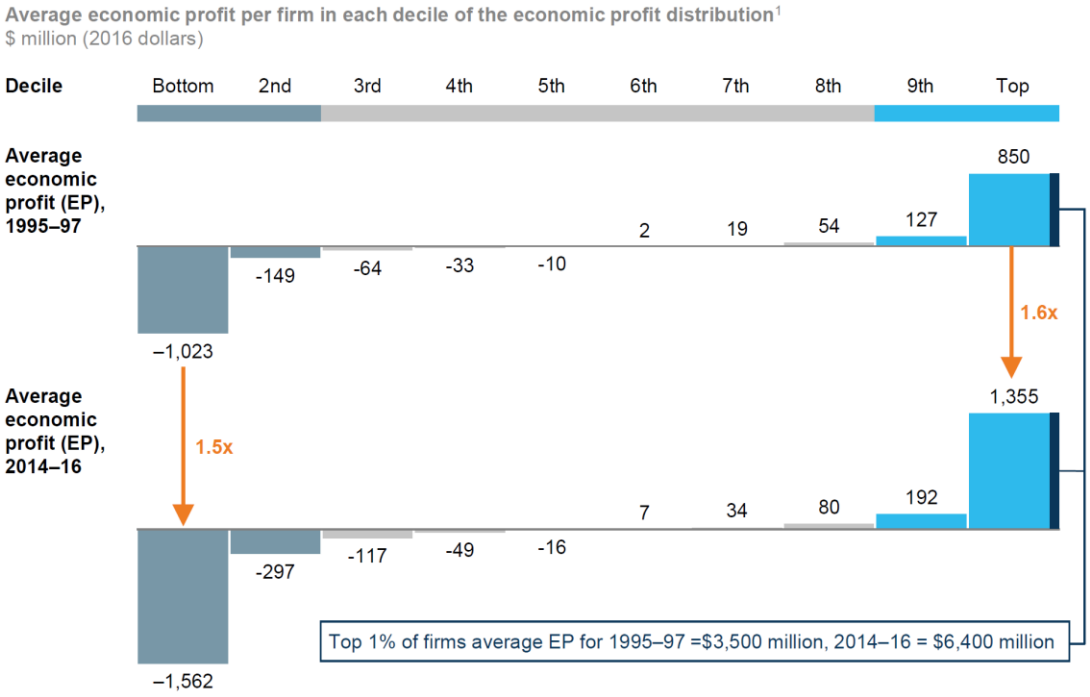
SOURCE: (Smith, 2019)

At the same time, growing economic stratification continues to manifest in a widening gap in household incomes and wealth (Piketty, 2017). A parallel stratification has recently developed among businesses. The performance of small and low-margin businesses is worsening relative to

that of an upper echelon of dominant and secure "superstar" firms. According to a 2018 McKinsey Global Institute Report:

> Over the past 20 years, the gap between superstar firms and median firms—and also between the bottom 10 percent of firms and median firms—has widened. Today's superstar firms have 1.6 times more economic profit on average than superstar firms 20 years ago. Today's bottom-decile firms have 1.5 times more economic loss on average than their counterparts 20 years ago, with one-fifth of them (a growing share) unable to generate enough pretax earnings to sustain interest payments on their debt. The growth of economic profit at the top end of the distribution is thus mirrored at the bottom end by growing and increasingly persistent economic losses, suggesting that in addition to firm-specific dynamics, a broader macroeconomic dynamic might be at work. (Manyika et al., 2018, p. 2)

Figure 2: Widening economic stratification (in terms of profit) between enterprises over time.



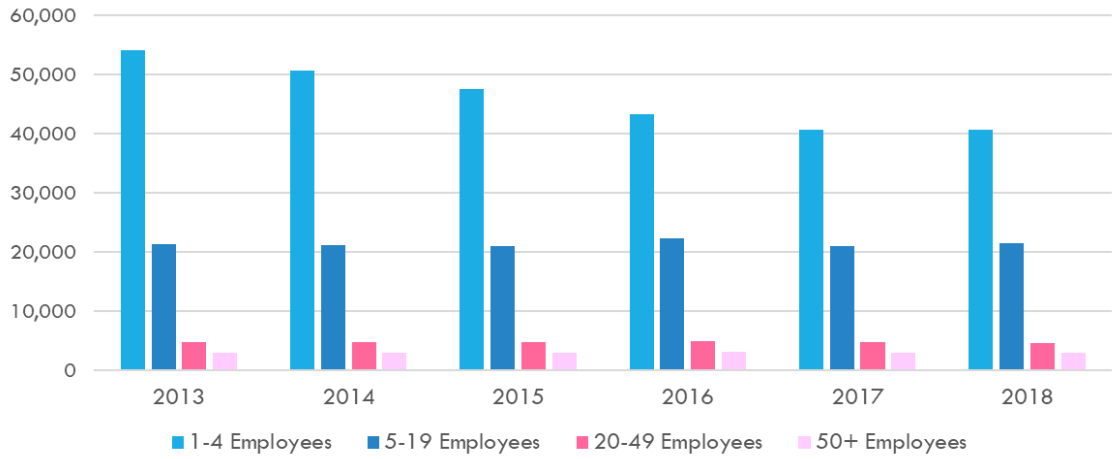
1 Considers corporations with average sales of $1 billion or more (adjusted for inflation) to calculate economic profit in each time period. Sample sizes are 2,450 firms in 1995–97 and 5,750 firms in 2014–16. Chris Bradley, Martin Hirt, and Sven Smit, *Strategy beyond the hockey stick: People, probabilities, and big moves to beat the odds*, Wiley, February 2018.

SOURCE: Manyika et al. (2018), Bradley et al. (2018)

The country's approach to a "winner-take-all" distribution of business profits parallels a secular decrease in the number of the smallest businesses in North Carolina. Analyzing changes to small business numbers by size class in North Carolina suggests that although other business size classes remain stable, the total number of businesses employing 1-4 people has decreased up to 7% per year between 2013 and 2018 (see **Figure 3**). Small to medium-sized businesses play an important role in local, regional and national economies. Their fates tightly interweave with those of their surrounding neighborhoods, making both vulnerable to disruption (Rose, 2004; Sauser, Baldwin,

Pourreza, Randall, & Nowicki, 2018; Schrank, Marshall, Hall-Phillips, Wiatt, & Jones, 2013). Since 1990, small and new businesses have created two out of every three *net new* jobs and have been responsible for about half of private sector employment (Sperling & Mills, 2012). These small businesses are especially important to the economic health of small communities, such as those with populations of 10,000 or fewer people (Yoshida & Deyle, 2005). Therefore, their potential decline is cause for grave concern.

Figure 3: Business establishments by size class in 8 randomly sampled NC counties 2013-2018.



Source: ReferenceUSA[1]

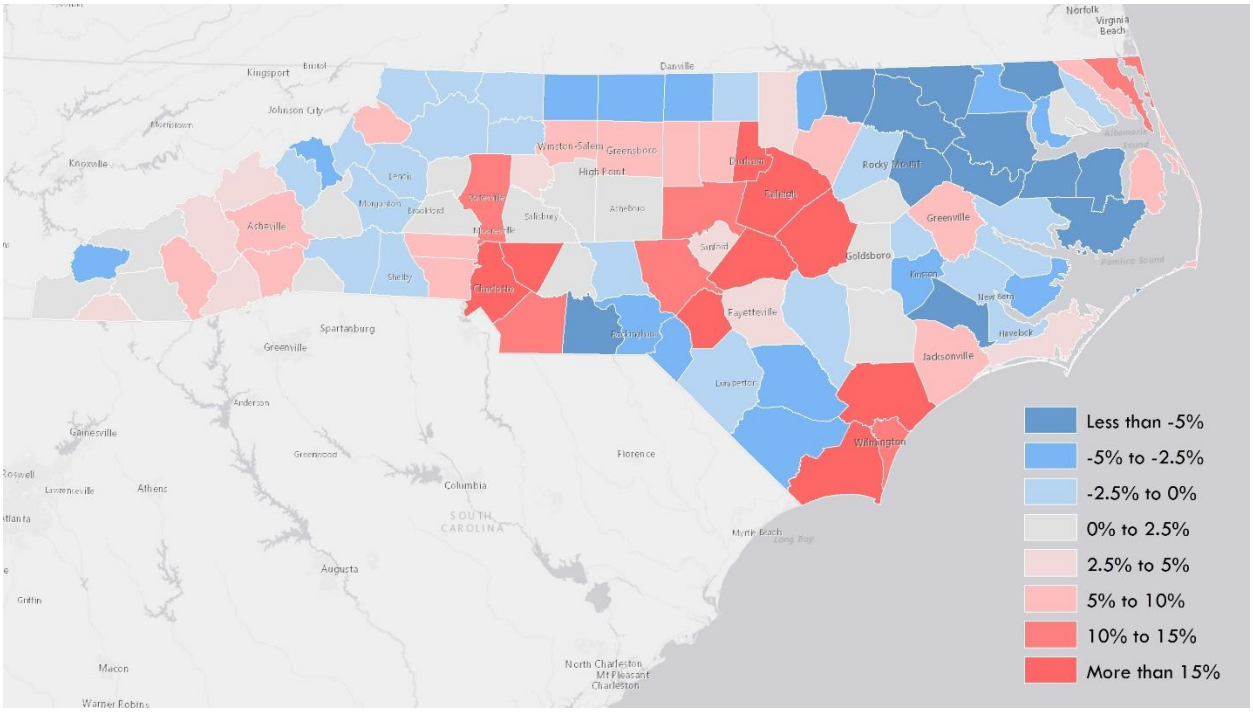
Net reductions to the number of small firms in rural areas also suggest that rates of entrepreneurship are falling, which bodes ill for rural economies. A sizable body empirically links entrepreneurship to economic growth in both urban and rural contexts (Z. Acs, Audretsch, Braunerhjelm, & Carlsson, 2006; Drabenstott, Novack, & Abraham, 2003; Henderson, 2006). Compared to the expansion of existing firms, the startup of new firms is disproportionately responsible for the creation of new jobs and products (Henderson, 2006; Lowrey, 2010; Sperling & Mills, 2012). Entrepreneurs also serve as efficient conduits of knowledge spillover, which drives economic growth in agglomeration economies (Z. Acs et al., 2006). After interviewing policymakers in England's Sheffield City region, Williams and Vorley (2014) determined that entrepreneurship promotes structural diversification and builds local adaptive capacity—in terms of knowledge, creativity, innovation.

Finally, rural areas across the United States and North Carolina face depopulation and divestment. Rural areas in the United States have experienced consistent secular depopulation since 2010, barring a small uptick in 2018 due to improving labor market conditions nationwide, and flight from rural counties in the northern Appalachians and the southeastern coastal plains has been especially severe (Cromartie & Vilorio, 2019). Since the Great Recession of 2008-2009, a gap in urban-rural employment recovery has persisted. There are many reasons for this: "Aging, outmigration, increased mortality, and reduced fertility all hinder employment growth by reducing the size of the potential labor force" in rural contexts (Cromartie, 2019).

[1] Alamance, Alleghany, Cleveland, Davidson, Greene, Macon, Mecklenburg, Rockingham Counties.

In North Carolina, the decline of traditionally rural industries, such as manufacturing and extractive industries (e.g. timber), has spurred outmigration to cities in and beyond the state (Stanford, 2017). 75% of the state's municipalities lost population or grew slower than the state overall since 2010 (Stanford, 2017). In **Figure 4**, counties that experienced depopulation over the last 7 years tend to be rural and tend to be concentrated in the far west of the state—The "Mountains" Region—and the eastern "Coastal Plain" region. The latter region suffered the brunt of Hurricane Floyd in 1999, Hurricane Matthew in 2016 and Hurricane Florence in 2018.

Figure 4: Rate of change in population in NC counties between 2010 and 2017 (ACS)



Although venture capital and entrepreneurial activity has spread beyond traditional havens of Silicon Valley and Boston into mid-sized cities like Charlotte, NC, rural areas are ceding rates of entrepreneurship and business creation to urban areas (Morelix, Hwang, & Tareque, 2017). The Kauffman Foundation's 2017 "State of Entrepreneurship Address" observed that rates of entrepreneurship have fallen in step with or even faster than rates of rural depopulation, with 20% of startups situated in rural counties in the 1980s and merely 12% in 2017 (Morelix et al., 2017).

In spite of these shifts, North Carolina manages an impressive economic development system that focuses on the rapid supply and absorption of public and private capital. North Carolina operates a robust and sophisticated system of business development that combines centralized management and policy with distributed sources of lending, technical assistance, and disaster recovery support that responsibly invests public dollars while maximizing the leverage of private capital. The state's distinguished participation in the 2010 State Small Business Credit Imitative (SSBCI), for example, demonstrates this point. Authorized in September 2010 by President Obama and funded by the Department of the Treasury, the SSBCI allocated $1.5 billion to 57 participating states and US territories, which states and territories could flexibly deploy in order to leverage private-sector investment in small businesses and manufacturers. As of March 2016, North Carolina

ranked among the top 10 fastest spending participants in terms of the percentage of SSBCI funds deployed (U.S. Department of Treasury, 2016). By the close of the program in 2017, North Carolina was second only to California in the amount of private financing leveraged—$707 million, or $15 private dollars leveraged for every single federal program dollar invested. 21% of dollars supported businesses and manufacturers in LMI census tracts and 39% were invested in rural counties (NC Rural Center, 2018).

The bottom line: Secular trends in inequality and rural divestment operate in tandem with random economic shocks—in the form of economic recessions but also man-made and natural disasters—to exert compounding challenges for small and medium-sized businesses. North Carolina's uniquely strong institutional and economic context make the state a particularly interesting locale in which to study the interaction between the supply of economic relief and a population of businesses endeavoring to continue operations in a rapidly changing context.

1.3 Methodology

The following research rests on a thorough review of recent and relevant literature, numerous secondary and primary datasets, and diverse interviews conducted in the spring of 2019, roughly half a year after the impact of Hurricane Florence and more than two-and-a-half years after the impact of Hurricane Matthew in 2016. I briefly review my methodology here, and I provide more detail about my data gathering and interviewing procedures in the *Appendix (A.2, A.3, A.4)*.

1.3.1 Data

To sketch a high-level, quantitative and spatial portrait of Hurricane Matthew and Hurricane Florence's effects on NC small businesses, I used a variety of secondary data sources: the U.S. Census American Community Survey (ACS) and County Business Patterns (CBP) datasets, the Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW) and Local Area Unemployment Statistics (LAUS), and some descriptive hurricane data from the National Hurricane Center (NHC) under the National Oceanic and Atmospheric Administration (NOAA).

I also used limited primary survey data kindly provided to me by key institutions: the North Carolina Department of Commerce's Labor and Economic Analysis Division provided me detailed summary statistics from a 2017 survey of Hurricane Matthew's effects on businesses nine months after the disaster (NC DOC LEAD, 2017b, 2017a), and the US Federal Reserve Bank provided me the North Carolina state "extract" of the 2017 Small Business Credit Survey module for disaster-affected firms (Battisto et al., 2017). Although they did not surface in my field research, individual towns, counties, chambers of commerce, and universities likely performed similar surveys of disaster-affected homeowners and businesses after the storms.

Finally, the most granular data on small business disaster debt, which can serve as an indicator of the geographic distribution and intensity of disaster effects on businesses as well as an indicator of the penetration and accessibility of the most dominant form of recovery capital for small businesses, came from the SBA in response to a FOIA request (SBA, 2019a, 2019c, 2019b).

1.3.2 Interviews

I conducted 16 interviews—the majority of them in person, some over the phone—with local institutions active in business-oriented disaster preparation and response. A full list of institutions, as well as my methodology for selecting and contacting them, is available in the *Appendix (A.2)*. I identified institutions directly involved in the supply of capital, emergency communications, or

technical assistance to disaster-affected businesses. These interviews served to confirm and elaborate on the flows of capital, communication, and assistance to business outlined in the state's disaster recovery plans; specify the geographic distribution and intensity of disaster impacts from both hurricanes; establish recovery patterns of firms by community, size, market sector (e.g. retail vs. manufacturing), and owner race/ethnicity; characterize patterns of business disaster preparedness and adaptation before and after the hurricanes; understand patterns of business disaster spending on repair and recovery post-disaster; and solicit attitudes about and ideas for small business resilience and general rural/small-town economic resilience in the future.

Table 1: Summary of small businesses interviewed

Business Description	Size	Locations	Disaster Experience	SBA Debt? (Matthew)	Flood Insurance?
"Mechanical Contractor" (811310: Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance)	12-15	1	Matthew & Florence	NO	NO
General Automotive Repair (811111)	1-4	1	Matthew & Florence	YES	After Matthew
"Vehicle Repair" (811490: Other Personal and Household Goods Repair and Maintenance)	3	1	Matthew & Florence	NO	NO
Office of Optometrists (621320)	25	2	Matthew	YES	After Matthew
"Specialty Trade Contractor" (238990: Building/Property Specialty Trade Services)	10-14	1	Matthew	YES	After Matthew
Sporting Goods Store (451110)	9	1	Matthew	NO	NO
Full-Service Restaurant (722511)	100-145	4	Matthew & Florence	YES	After Matthew
Art Dealer (453920)	1-4	1	Matthew	YES	After Matthew
Sporting Goods Store (451110)	62+	2	Matthew & Florence	NO*	YES

**Used SBA Debt to finance recovery from Hurricane Floyd, but not Matthew*

I conducted nine (9) interviews over the phone with small business owners, whom I have kept anonymous. I identify them using 6-digit NAICS descriptions (e.g. 441120 = "Used Car Dealer") and occasionally more specific descriptions if judged necessary for clarity. I do not specify businesses' county or city in the interests of their privacy. When I do specify a business's location, I do not provide its NAICS description. Businesses are summarized in **Table 1** below. These interviews with small businesses served to illustrate, within limits, small business financial and operational decision-making in the days and months after Hurricane Matthew or Hurricane Florence. Again, I elaborate on my methodology for selecting and contacting businesses in the *Appendix (A.4)*.

Findings from prior literature, secondary and primary data, and institutional and small business interviews paint a multifaceted picture of the state's response and recovery after the double-impact of Hurricanes Matthew and Florence. And they enable substantive recommendations about optimizing access to and use of capital and technical assistance and bolstering economic resilience in North Carolina's most flood-prone main streets, downtowns, and rural communities.

1.4 Organization

The following thesis consists of five chapters, including this introduction.

CHAPTER 2—LITERATURE REVIEW

Chapter 2 summarizes copious literature on business vulnerability and economic resilience. I review existing theories of vulnerability, in general and with respect to individual private firms, in order to develop a simple theory of small business vulnerability, which I then corroborate with scholars' extensive empirical findings regarding business survival and performance rates post-disaster.

While empirical scholarship duly tests the influence of various characteristics on survival and performance, relatively little work evaluates the actual decision-making and trade-offs faced by individual firms experiencing a hazard impact. I summarize what literature is available on the short-term financial and operational decision-making of disaster-affected firms, and then I use a framework of twinned balance sheets to model the short and long-term impacts of a disaster on a business's financial options. Separately, I borrow theories from cognitive science to explain the penetration of insurance products among at-risk firms.

Finally, I scale up to the size of local economies in order to review scholarship on resilience. I condense theories on general resilience and adaptation, as well as economic resilience specifically. I finish with an overview of rural entrepreneurship/economic development strategies, which might serve to optimize the economic resilience of rural contexts as well as the recovery of small businesses therein.

CHAPTER 3—IMPACT

Chapter 3 draws upon a diversity of state reports and secondary datasets to characterize the geographic, economic, and qualitative short-term impacts of Hurricane Matthew and Hurricane Florence using a variety of methods, many of which have never been utilized in the context of North Carolina after either of the two hurricanes studied. The evaluation of loan data provided by the Small Business Administration, as well as survey findings provided by the state's Department of Commerce, are particularly insightful and useful for painting a granular picture of economic impacts.

CHAPTER 4—FINANCING BUSINESS RECOVERY

Chapter 4 has two goals: (1) to characterize the landscape of disaster relief resources available to firms in North Carolina and (2) to evaluate how firms navigated this landscape in order to ensure their short-term survival and long-term performance. I start by mapping the landscape of institutions—government bodies, financial institutions, etc.—that are active in North Carolina's disaster recovery process on the local, state and federal level. I describe the characteristics and limitations of each institutions' involvement in funding, financing, or otherwise assisting recovery. Next, I draw upon interviews with institutions as well as various small business owners to describe how small business owners managed the trade-offs between different forms of economic relief. Finally, I conclude by gesturing at the degree to which the two hurricanes continue to manifest lasting economic effects; I ponder whether a system predominately composed of debt capital is the most appropriate way to finance recovery given lasting market failures that continue to suppress rates of recovery.

CHAPTER 5—CONCLUSION AND RECOMMENDATIONS

Chapter 5 concludes the thesis, making recommendations at both the local and federal level so that North Carolina, and perhaps similar states and communities, may better support its rural regions' most precarious set of businesses in the face of future disasters and the advent of climate change. Drawing on the distinction between resilience and transformative adaptation, I urge disaster recovery actors to consider the policies and programs that both increase the short-term accessibility of recovery capital but also internalize the long-term costs and benefits of commercial activity in areas whose vulnerability to climate change impacts will only continue to escalate.

CHAPTER 2—LITERATURE REVIEW

2.1 Introduction

To organize the empirical findings of previous research as well as new findings presented in this thesis, I build a simple theoretical framework for assessing the vulnerability of businesses to natural hazards. This framework accommodates and explains the empirical findings that follow, which cover business vulnerability, recovery and post-disaster performance in the United States over the last 20 years or so. Next I summarize research on the demand for and utilization of insurance products and disaster capital by businesses, noting that the latter (business disaster capital) suffers from a relatively narrow body of research. Finally, I briefly address the definition of "economic resilience" as related to rural contexts and tie it back to methods of improving rural economic development and rural capital absorption after a disaster. This definition discusses the trade-off between reconstruction in place and more radical forms of adaptation, including managed retreat.

A note on terminology: The Bureau of Labor Statistics (BLS) defines an "establishment" as a single physical location where business is conducted or where services or operations are performed. A "firm" is a business organization that consists of one *or more* establishments under common ownership or control with a single Employer Identification Number (EIN) per the IRS. The vast majority of firms are single-establishment firms. An "enterprise" is a business organization that consists of one or more establishments, or one or more firms, that operate across multiple economic sectors and has one or more EINs (Sadeghi, Talan, & Clayton, 2016).[2] When I use the term "business," I refer indiscriminately to single-establishment and multi-establishment firms unless otherwise indicated; since my thesis concerns small businesses, the businesses I study are overwhelmingly single-establishment firms with single EINs.

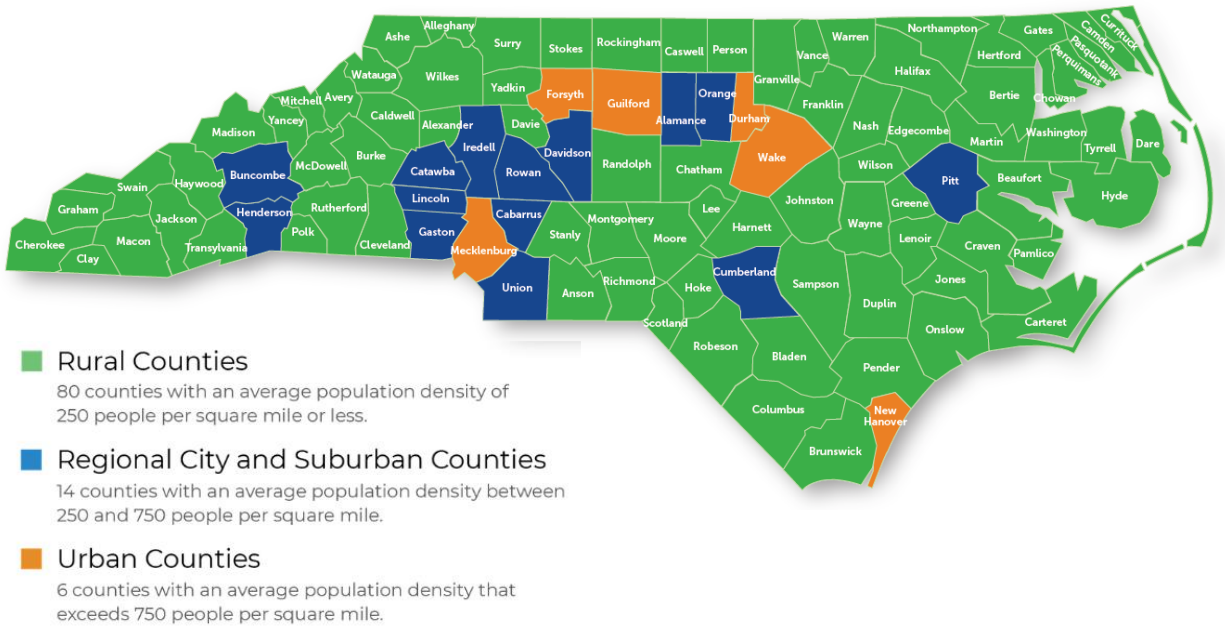
A note on geography: It is important to clarify "*What is rural?*" As of 2013, the federal government acknowledged 15 different definitions, which precisely parsed land on the basis of population density but sometimes on the basis of "character" ("The federal definition of 'rural'—times 15," 2013). The North Carolina Rural Center, as of 2015, classified counties with population densities below 250 people per square mile as rural and acknowledged "in-between" counties as suburban, (**Figure 5**). When analyzing rural versus urban counties, I use the official distinctions employed by the US Office of Management and Budget (OMB) and the USDA's Economic Research Service (ERS), which are based on labor markets (Cromartie & Parker, 2018) (**Figure 6**).[3] On the next two pages, a series of maps illustrate various conceptions of what areas in North Carolina qualify as rural. Ultimately, a precise definition of rurality is not as vital as a general grasp of the distribution of population, income, wealth, and business development across counties and regions; crude, county-level designations of rural, suburban and urban will always leave out socioeconomic nuance and granularity.

---

[2] The US Census makes slightly different distinctions between firms and enterprises, depending on the dataset. Statistics of U.S. Businesses (SUSB) makes a distinction (see https://www.census.gov/programs-surveys/susb/about/glossary.html (US Census Bureau, 2018)). Business Dynamics Statistics (BDS) conflate the two (Haltiwanger, Jarmin, & Miranda, 2009). I rely on BLS definitions when possible.

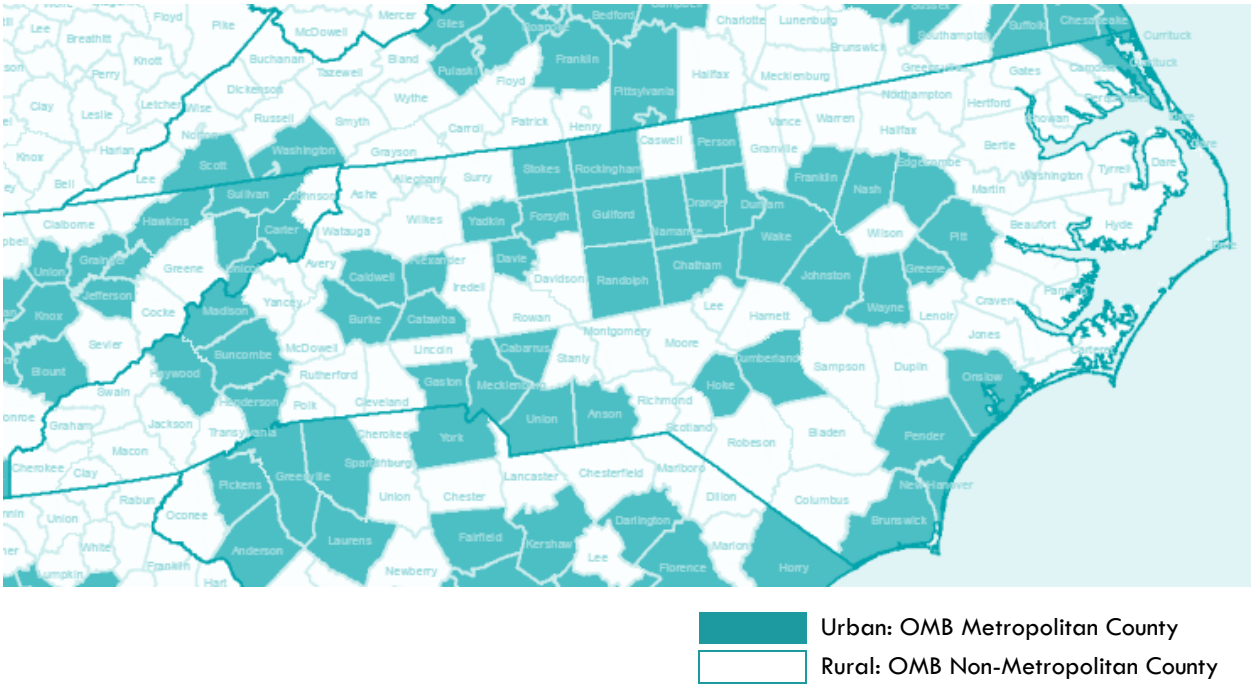
[3] The US Census employs an alternative system of rural classification. Metro counties are (a) counties that contain one or more "densely populated" urban areas with at least 50,000 residents or (b) "outlying counties" where either 25% of residents commute to the central metro county or 25% of jobs employ residents of the central metro county. Rural or "non-metro" counties comprise the balance of counties: micropolitan counties containing urban clusters of 10,000-49,999 residents and other non-core counties that are even less dense.

Figure 5: Rural, suburban, urban counties of NC, as determined by the NC Rural Center.



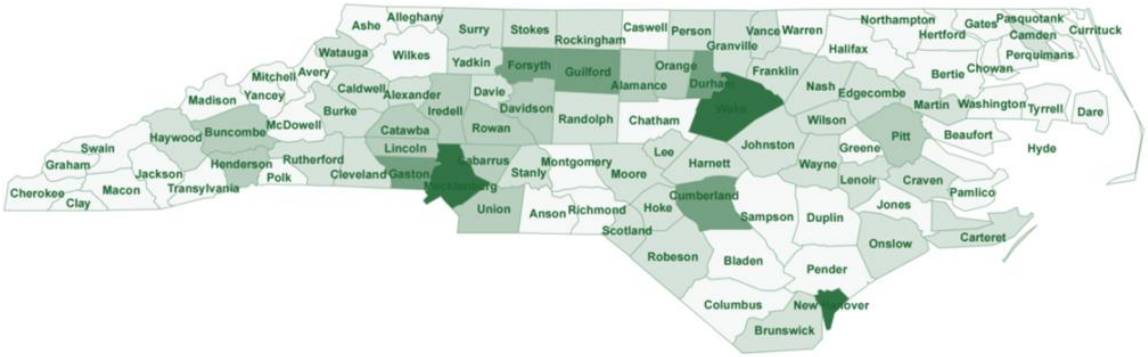
SOURCE: (NC Rural Center, 2015)

Figure 6: Understanding rural vs. urban areas in NC on the basis of OMB definitions



SOURCE: (ERS, 2000).

Figure 7: Understanding rural vs. urban in NC on the basis of population density

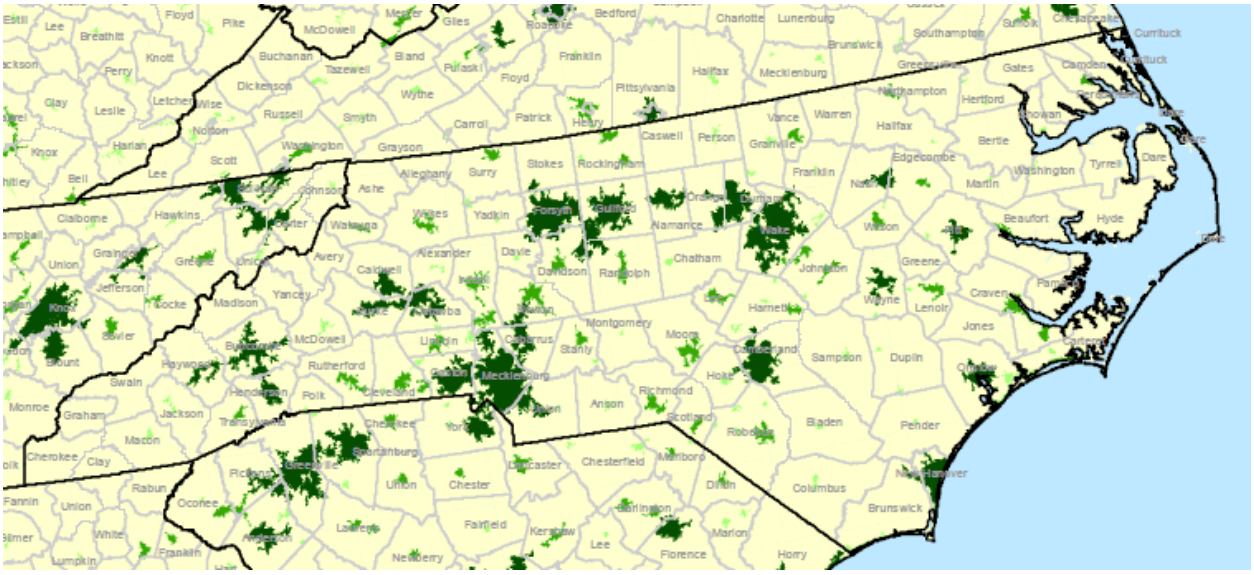


People per Square Mile:

<= 100 | 101-250 | 251-500 | 501-1000 | > 1000

SOURCE: (Rash, 2017)

Figure 8: Understanding rural vs. urban NC on the basis of population by census urban areas.



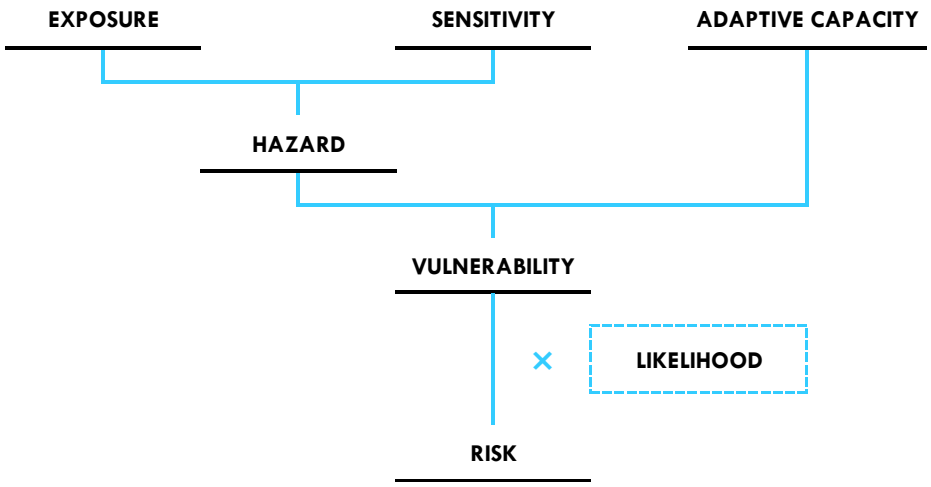
Rural areas (Pop <= 2,500) | Urban areas (Pop 2,500-9,999 | Urban Areas (Pop 10K-49,999 | Urban Areas (Pop 50,000+)

SOURCE: (ERS, 2000).

2.2 Theories of Business Vulnerability

Vulnerability is commonly conceived as a function of *exposure*, *sensitivity*, and *adaptive capacity*; *Exposure* is an element or system's (physical) interaction with an adverse impact. *Sensitivity* is the immediate effect of that adverse impact on the element or system. Exposure and sensitivity define the quality of an adverse impact, whereas *adaptive capacity* refers to the object or system's ability to weather, manage, cope with, or adapt to the impact (Preston & Stafford-Smith, 2009, p. 11; Smit & Wandel, 2006, p. 286). For example, a mobile home is highly exposed and highly sensitive to the wind, flooding and storm surge impacts of a hurricane. A houseboat is highly exposed yet relatively insensitive to those impacts. And a mobile home with flood and wind insurance plans has greater adaptive capacity than an uninsured mobile home.

Figure 9: The components of vulnerability and risk



Adapted from Preston & Stafford-Smith (2009).

A few authors have reflected on past disaster events to develop theories, or at least categories, of business vulnerability. However, they bootstrap their categories using a combination of empirical data and reasoning that do not rely on any core theories of vulnerability or adaptation. Therefore, as I summarize these frameworks below, I purposefully parse the authors' work using concepts of *exposure*, *sensitivity*, and *adaptive capacity*.

Tierney (2007) explores how and why businesses are vulnerable to disasters, starting with place-based exposure to hazards and moving on to market, community, and individual business-based forms of vulnerability. Tierney also observes that preexisting trends at the level of the individual business, and macro-level market trends, can either exacerbate or mitigate a business's vulnerability. Following an ostensibly similar pattern, Zhang et al. (2009) use a model of business operations that maps the flow of resources and products between a business, its suppliers, and its customers in order to develop and operationalize four types of vulnerability: capital vulnerability, labor vulnerability, supplier vulnerability, and customer vulnerability. Boyd (2014) outlines three overarching variables that determine business resumption post-disaster: the business's internal ability to recoup lost assets post-disaster, the extent of damage on resources the business depends on such as customers, suppliers and employees, and the business's (inherent/adaptive) ability to adapt to the new post-disaster environment. Below and in **Figure 10**, I break down the categories

posited by Tierney (2007) and Zhang et al. (2009) since they offer the most comprehensive catalogues of business vulnerability.

Figure 10: Parsing frameworks of business vulnerability

	Exposure	Sensitivity	Adaptive Capacity	
Tierney (2007)				*Definitions*
Vulnerability of Place	×		×	Physical exposure to impact; property tenure
Business Vulnerability			×	Business size and owner characteristics
Market Vulnerability		×		Market diversification and demand sensitivity
Community/Infrastructure Vulnerability	×	×	×	Community efforts toward mitigation, regulation; pace and quality of community disaster
Zhang, Lindell, & Prater (2009)				*Definitions*
Capital Vulnerability	×		×	Asset exposure, property tenure, size/capacity
Labour Vulnerability			×	Labor flexibility and adaptability
Supplier Vulnerability	×		×	Supply chain exposure, sensitivity, diversification
Customer Vulnerability		×		Market diversification and demand sensitivity

In summary, business vulnerability comprises *exposure* and *sensitivity* to a hazard as well as *adaptive capacity*:

- A business's *hazard exposure* is a function of its location, the proportion and locations of its tangible vs. non-tangible assets, and the respective exposure of its major suppliers and supply chain elements.

- A business's *hazard sensitivity* is a function of its degree of reliance on critical infrastructure (or lifelines), the geographic and sectoral diversification of the markets it serves, the fluctuation of supplier availability and input delivery, and the positive or negative fluctuation of its sales to post-disaster fluctuations in demand.

- A business's *adaptive capacity* is a function of its property tenure (ownership vs. rentership across its fixed assets), its size (in terms of number of employees), the flexibility and adaptability of its labor force and labor operations, and access to diverse and alternative suppliers. Based on other empirical data (summarized below), I add that *adaptive capacity* is also related to the size of a business's profit margins, its access to capital, its level of insurance, as well as the experience, knowledge and skills of its owner (in terms of years established, number and quality of past business ventures, level of education, experience with prior hazards or adversity).[4]

And finally, while Tierney (2007) is astute to note community vulnerability as a determinant to business recovery and post-disaster performance, but the exposure, sensitivity and overall adaptive capacity of an entire community or environment is beyond the control of any one business (and beyond the scope of this thesis). Nonetheless, I briefly touch on community-scale vulnerability, and resilience, at the conclusion of the chapter.

[4] I exclude minority/woman ownership from "adaptive capacity" for now, since this owner characteristic correlates closely with other confounding characteristics like business size and business sector.

2.3 Challenges of Empirical Disaster Recovery Research

The bulk of empirical scholarship on post-disaster business recovery has focused on the "vulnerability" of businesses to a specific natural hazard event, be it the 1989 Loma Prieta earthquake in Northern California, the 1994 Northridge Earthquake in Los Angeles, the 9/11 terrorist attacks in New York, Hurricane Katrina in 2005, or one of numerous other incidents in the United States and worldwide. A smaller number of studies have modeled the potential vulnerability of businesses to theoretical events (Martinelli, Cimellaro, Terzic, & Mahin, 2014; Nigg, 1995; Pant, Barker, & Zobel, 2014; Rose & Liao, 2005; Sauser et al., 2018). Because my thesis concerns disaster recovery in North Carolina, my literature is biased toward US-specific cases and theories. But this bias extends across the field; Felbermayr and Gröschl (2014) note that worldwide scholarship on economic vulnerability and recovery to disasters is biased significantly toward developed countries with higher GDPs.

9/11 and Hurricane Katrina in 2005 are especially significant moments in the history of US disaster recovery. Given the economic and social magnitude of Katrina's effects in 2005 and the years afterward, New Orleans and other affected counties in Louisiana and Mississippi have served as particularly attractive laboratories for researchers interesting in learning about business closure, recovery, resilience, or adaptation through the use of secondary data, surveys, interviews and modeling. Seidman and Seigel (2008), writing about 9/11 and with a nod to Hurricane Katrina, observe that both events precipitated significant academic and policy attention to emergency response and disaster recovery just as they revealed significant federal weaknesses in emergency response. Gotham (2008) observes that these disasters galvanized major reconsiderations of disaster recovery and reconstruction in policy and academic circles, serving as "watershed moments" in the way the United States thought and went about disaster recovery.

Unfortunately, post-disaster research methods, including the analysis of census data and the act of surveying/interviewing, suffer from unique challenges that require special consideration. Bourque et al. (2003) and Schrank et al. (2013) detail some of these challenges, including the relatively short duration of observable phenomena post-disaster, the difficulty generalizing findings to other disaster contexts, the higher monetary cost of disaster-related field research, and the substantially reduced identifiability and accessibility of disaster-affected business owners/managers. Furthermore, disaster research is necessarily time-constrained and *post hoc*; researchers cannot "plan" such research and they cannot easily replicate their findings (Killian, 2003).

Much post-disaster business recovery research consists of the statistical analysis of survey results bedeviled with problems. The failure to identify and survey *failed/non-operating* leads to overwhelming survivorship bias (Schrank et al., 2013). The need to override random sampling techniques in order to achieve a representative and externally valid set of businesses requires extra work and careful justification. And the qualitative, unscientific recall by surveyed parties about the level of damage their businesses sustained, or the performance of their businesses relative to a pre-disaster baseline years in the past, introduces recall error and bias.

In addition, the impact or stimulus of a disaster can be difficult to isolate from other secular and one-time forces at work in any given context (Killian, 2003), such as rapid economic growth in a particular sector, or an independent economic downturn (e.g. the 2008-08 recession's impact in New Orleans a few years after Hurricane Katrina). Indeed, various meta-analyses of post-disaster surveys have concluded that macroeconomic and secular economic trends (beyond and independent

of the disaster) play a large role in explaining businesses' post-disaster recovery, depending on the sector (Webb, Tierney, & Dahlhamer, 2000, 2002).

Finally, research must take care to define its temporal scope. In general, survival in the immediate aftermath of a disaster doesn't guarantee long-term survival and continued operation; exogenous disaster-related shocks can damage a business with time delays that can exceed well over a year in duration (Chang & Rose, 2012). Alesch et al. (2001) determined that most businesses do not fail immediately after a disaster, but in the second, third or fourth years after the initial event. Delays associated with dynamic socioeconomic systems require researchers to consider both short-run and long-run status, and to differentiate between survival (does the business still exist?) versus performance (is the business generating profit?). Unfortunately, determining a clear "recovery period" and establishing what a return to "baseline" actually entails can be methodologically impossible (Killian, 2003; Marshall & Schrank, 2014). In fact, a community may never truly return to its previous structure or identity after a disaster, for better or for worse.

Despite these limitations and concerns, the emergence of relatively uniform findings across a growing body of literature on post-disaster business recovery does suggest that existing research certainly remains valid and useful, despite the challenges noted above.

2.4 Dimensions of Business Vulnerability after Disasters

Variables combine and interact to determine the vulnerability of a business to closure or reduced performance after a disaster, including the number of staff, property tenure, level of pre-disaster hazard mitigation, reliance on external critical infrastructure (power, transportation), market sector, owner(s) ethnic and gender identity, years of experience, access to and utilization of federal assistance, and level of insurance. Obviously, these variables exhibit complicated multi-collinearities: for instance, ethnic minority-owned firms are more likely to employ fewer staff and more likely to participate in retail-related market sectors (Lowrey, 2010; Marshall, Niehm, Sydnor, & Schrank, 2015). Therefore, it is somewhat artificial to explore these variables individually.

Larger businesses are more likely to survive natural disasters and are more likely to invest in meaningful pre-disaster planning, but the advantage of size dwindles over the course of longer-term recovery. According to various syntheses of the literature, the size of a business in terms of its number of employees is almost always associated with greater chances of survival after a disaster (Boyd, 2014; Chang & Rose, 2012; Tierney, 2007). Chronicling small business recovery after Loma Prieta in San Francisco, CA, Kroll et al. (1990, p. 49) write, "our concerns are with small and moderately-sized business," arguing that larger businesses have greater cash reserves, more latitude to temporarily relocate operations to other facilities, a higher likelihood of operating in newer buildings, greater leverage in negotiations with suppliers, labor and customers, and greater capacity to administrate formal emergency response procedures. These claims align with the theoretical framework of vulnerability defined above: larger firms might have more *adaptive capacity* to handle the effects and aftermath of a disaster, and they might be less *sensitive* to disasters as a function of geographic diversification.

Narrating the recovery of Santa Cruz, CA and Watsonville, CA after the 1989 Loma Prieta earthquake, Eadie (1998, p. 291) notes that larger corporate owners had a greater ability to withstand the economic hit and rebuild than small local businesses. Interviewing owners and managers of 107 businesses affected by the 2001 Nisqually Earthquake in Seattle, WA, S.E. Chang and Falit-Baiamonte (2002) determine that a "vulnerability factor"—composed of size, sector and

property tenure—explains a business's financial losses post-disaster more successfully than actual physical damage or pre-disaster preparedness behavior. Surveying about 1,400 LA businesses 26 months after Hurricane Katrina, Lam et al. (2012) determined that floodwater height at the business's location and the business's size were the two most significant predictors of reopening after the hurricane. Marshall et al. (2015, p. 346) surveyed 4,000 "small" businesses (employing 200 or fewer staff) in 10 storm-affected counties in Mississippi after Hurricane Katrina and discovered that, among other things, a greater number of employees increased the likelihood of operating post-storm. Runyan (2006) conducts five semi-structured interviews with businesses in gulf-coast LA/MS towns post-Katrina, concluding that small businesses suffer worse post-disaster losses and performance due to a relative lack of pre-disaster preparation, sensitivity to cash flow interruption, lack of access to capital, difficulties negotiating the Small Business Administration (SBA) loan process, and infrastructure problems. Tierney (1995), with the Disaster Research Center (DRC), conducted post-disaster surveys in Des Moines after the 1993 Midwest Floods and in Los Angeles after the1994 Northridge Earthquake; she determined that small businesses were less likely to have insurance and more likely to struggle or fail post-disaster. And in a meta-analysis of five large-scale DRC mail surveys of approximately 5,000 private sector firms across Memphis/Shelby County, TN; Des Moines, IA; Los Angeles, CA; Santa Cruz County, CA; South Dade County, FL, Webb et al. (2000) find that larger businesses were usually, but not always, more likely to fully return to their pre-disaster baseline level of operation after a disaster.[5] In short, larger businesses post-disaster had greater adaptive capacity and, in some cases, could afford to desensitize themselves from natural disasters.

In the long run, the positive influence of business size dwindles and becomes inconsistent. Although business size correlated positively with survival in affected Mississippi counties right after Hurricane Katrina, it correlated with higher closure rates by 2013, suggesting that a short-run interruption of cash flow as well as other longer-term disaster-related stresses (e.g. additional debt for repairs) may turn a large body of staff into a cost burden that the business cannot sustainably maintain in the long run (Sydnor, Niehm, Lee, Marshall, & Schrank, 2017). Considering post-disaster "performance" rather than survival in New Orleans, six to eight months after Hurricane Katrina, Corey and Deitch (2011) found that business size was not associated with performance post-disaster. Likewise, (Lam et al., 2012) realize that business size was only an advantage to businesses for a window of six to nine months after Hurricane Katrina.

With regard to pre-disaster mitigation planning and investment, businesses across the board perform poorly, but larger businesses are more likely to plan in advance of a disaster (Corey & Deitch, 2011; Dahlhamer & D'Souza, 1995; Yoshida & Deyle, 2005). Drabek (1994, 1995) makes the same conclusion with businesses in the tourist industry. Experience with prior disasters does not necessarily increase a business's likelihood of investing in preparedness or mitigation (Flynn, 2007).

Sole proprietorships may be an exception to the rule that greater size implies less vulnerability. Drawing on weekly and then seasonal drive-by observations of businesses among three major New Orleans business corridors post-Katrina, LeSage et al. (2011) found that sole proprietorship was a significant predictor of reopening for at least three to six months after the hurricane. And home-based businesses, which are probably more likely to be sole proprietorships, are also more likely

[5] (Uniquely, in a more specific study, Webb et al. (2002) discovered no significant relationship between the number of employees and survival of a business in Santa Cruz County, CA eight years after the Loma Prieta earthquake or in South Dade County, FL six years after Hurricane Andrew.)

to survive and maintain revenue post-disaster (Headd, 2003; Hiramatsu & Marshall, 2018; Marshall et al., 2015). NB: the higher performance of home-based businesses might at least partially relate to property tenure, explored immediately below.

Owning property is associated with greater levels of pre-disaster preparation, but it's unclear how it correlates with superior performance post-disaster. In theory, leasing fixed assets such as real estate and equipment confers a variety of benefits on a business owner, including financial and operational flexibility, freedom from the costs and obligations of ownership, and relative affordability compared to debt payments for the same purchased asset; however, the lessor must also manage the risk of foreclosure upon default, and she also loses out on any appreciation in the assets' value (in the case of real estate markets) as well as tax benefits, such as depreciation (Seidman, 2005, pp. 119–120). According to theories of vulnerability, an additional disadvantage of leasing fixed assets is the inability—or difficulty—of reducing the exposure or sensitivity of leased assets to a hazard; since the business doesn't own the assets it seeks to protect, it can't alter or otherwise directly defend those assets. Indeed, capital improvements are largely the purview of the property owner or landlord, and even securing a "leasehold improvement loan" to improve leased assets can be difficult if a business does not have sufficient alternative collateral (Seidman, 2005, p. 117). Therefore it is not surprising that businesses that own their property, rather than rent it, are more likely to invest in mitigation measures and disaster planning (Dahlhamer & D'Souza, 1995; Webb et al., 2000).

Research suggests that property ownership also improves disaster outcomes, controlling for pre-disaster mitigation. Summarizing findings from a survey of 5,000 businesses across Memphis/Shelby County, TN; Des Moines, IA; Los Angeles, CA; Santa Cruz County, CA; South Dade County, FL, Webb et al. (2000) property-owning businesses tended to outpace property-leasing businesses in post-disaster recovery. Businesses who rented property in Downtown Seattle after the Nisqually Earthquake were more likely to struggle (Chang & Falit-Baiamonte, 2002), but it's important to note that these businesses were mostly retailers, which are in and of themselves more vulnerable to economic and natural disaster shocks (see sector review below).

As mentioned above, home-based businesses are uniquely well-positioned to withstand natural hazards. Evaluating the benefit of federal SBA disaster loans on businesses in affected Mississippi counties 10 years after Hurricane Katrina, Hiramatsu and Marshall (2018) determine that home-based recipients tended to fare better financially than non-home-based businesses, but they also note that home-based businesses tend not to be eligible for SBA disaster loans in general. Marshall et al. (2015) find that home-based businesses were more likely to survive in Mississippi after Hurricane Katrina. Analyzing the US Census Bureau's Business Information Tracking Series (BITS) and Characteristics of Business Owners (CBO) datasets, Headd (2003) notes home-based businesses have higher rates of survival (in general, irrespective of disasters) than comparable businesses in commercial zones due to having lower startup costs, and he also supposes that home-based business owners may be more likely to persist in the face of adversity due to the importance of the business as a passion project. It is possible that basis in the home correlates with lower startup and operating costs and saves the owner from having to balance the repair of her business against the repair of her home, since they are collocated.

Pre-disaster mitigation has not been associated with increased survival or performance post-disaster. Although size and property ownership increases a business's likelihood of investing in

mitigation and pre-disaster preparation, it does not appear that mitigation materially reduces losses or improves the probability of survival post-disaster (at least when controlling for business size and tenure). To survey businesses about preparedness and mitigation efforts in Des Moines/Polk Counties, IA and Memphis/Shelby Counties, TN before a theoretical disaster, Dahlhamer and D'Souza (1995, p. 15) list a number of example actions:

1. Attend meetings/take written information
2. Talk with employees
3. Brace shelves, equipment
4. Purchase earthquake/flood insurance
5. Purchase business interruption insurance
6. Store food or water
7. Store office supplies
8. Store fuel or batteries
9. Learn first aid
10. Obtain first aid kit or extra medical supplies
11. Develop an emergency plan
12. Develop a recovery plan
13. Have engineer assess building
14. Conduct drills or exercises
15. Attend preparedness/response training
16. Make arrangements for alternative location
17. Obtain an emergency generator

With the exception of action (3) and perhaps (13), these actions under a theoretical framework of business vulnerability would serve to improve a business's and its staff's *adaptive capacity*, their ability to respond to a disaster within the first hours, days, and weeks of it occurring.[6] With the exception of (4,5,14,16, and 17), the actions are relatively affordable.

Studies of past disasters have found no advantage to this kind of preparation planning (Corey & Deitch, 2011; Tierney, 2007; Webb et al., 2000, 2002). However, these findings do not indicate pre-disaster mitigation is pointless. It is possible that uniformly low levels of disaster preparation and mitigation across business sectors mean that business are not preparing or investing *enough* for their preparations to be meaningful (Webb et al., 2002). Indeed, Dahlhamer and D'Souza (1995) don't even ask about more dramatic actions like dry flood-proofing or elevation, likely because these dramatic adjustments exceed the budgets of most local business owners.

Businesses in retail and certain service sectors are more vulnerable to disaster impacts, while professional services businesses and construction firms fare relatively well. According to the 2017 SBCS, US firms affected by disasters were more likely to participate in sectors such as leisure, hospitality, and retail and much less likely to participate in sectors such as professional services, real estate, finance and insurance (see **Figure 11**) (Battisto et al., 2017).[7] This recent pattern agrees with overwhelming scholarship about the disproportionate vulnerability of certain sectors: certain sectors—especially the financial and insurance and real estate (FIRE) businesses—are more likely to have more geographically diversified customer bases and are more likely to engage in hazard mitigation; in addition, certain businesses provide more "essential" services than other more "discretionary" businesses, which could scale to the level of entire sectors.

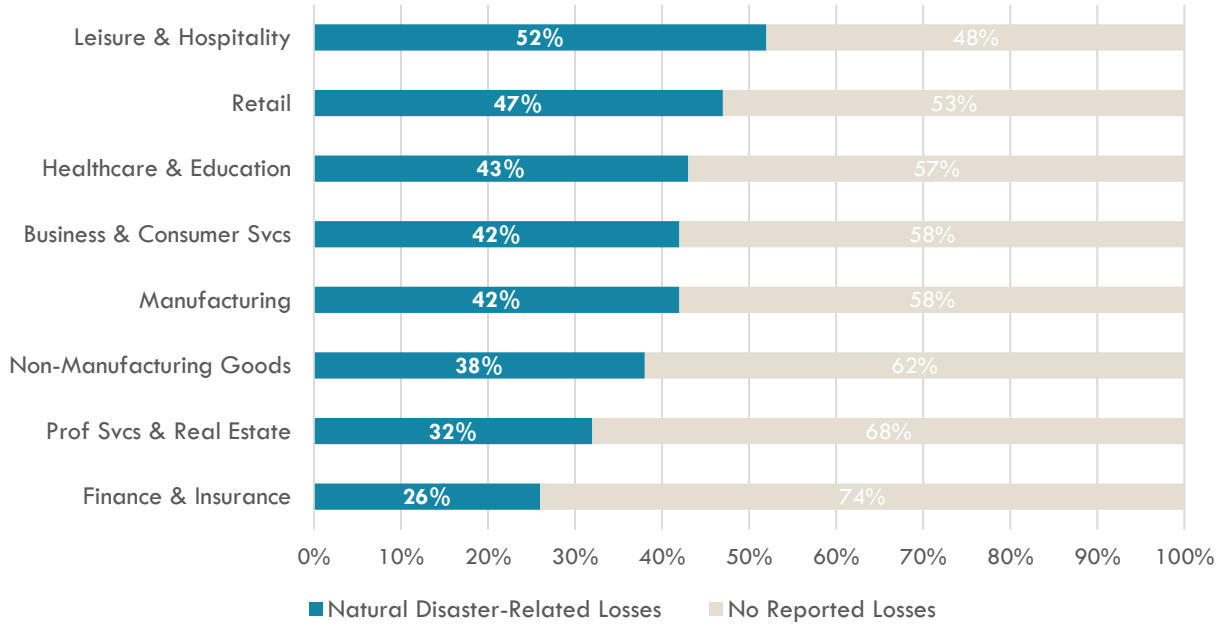
Across multiple contexts, FIRE businesses are generally more likely to survive and perform well post-disaster than retail and service-sector firms (Tierney, 1995; Webb et al., 2000, 2002). In addition,

[6] Insurance could be said to reduce a business's *sensitivity* to disaster impacts, but insurance is an ongoing investment that facilitates a business's financial return from disaster, not its ability to withstand a disaster at the moment it occurs. It is more appropriate to bucket insurance as a form of adaptive capacity.

[7] Chapter 2 draws upon the Federal Reserve Bank's SBCS 2017 data reflecting nationwide survey responses. While these survey responses are useful for validating past empirical scholarship and theory, the vast majority of responses are from firms affected by Hurricane Irma (73%) and Hurricane Harvey (26%), while only 5% reflect firms affected by Hurricane Matthew. In Chapter 3 and 4, I use the SBCS's North Carolina extract to make limited claims about firms' financial condition specifically in relation to the effects of Matthew.

Webb et al. (2002) point out that FIRE and other professional services firms are more likely to rely on regional, national, and international markets compared to retail and service-sector firms, which rely on less diversified local markets that are more exposed to the local impacts of the natural hazard. With regard to mitigation, Dahlhamer and D'Souza (1995) observe that FIRE firms are significantly more likely to engage in disaster preparedness actions that other businesses.

Figure 11: Share of US firms reporting disaster losses by Q4 2017, aggregated by sector



Source: SBCS 2017, p.1

Garber et al. (2006) draw upon BLS Current Employment Statistics (CES) and Quarterly Census of Employment and Wages (QCEW) data to study Hurricane Katrina's labor impacts sector-by-sector in affected areas of Louisiana and Mississippi. Their study area lost 216,000 jobs in September 2005 as a result of Hurricane Katrina, with leisure, hospitality, education, health, trade, transportation, utilities, general merchandise retail suffering the highest rates of job loss. By May 2006, construction jobs had made short-term gains and the trade, transportation and utilities "super-sector" experienced the largest share of employment growth since the hurricane, followed by general professional/business services; leisure/hospital employment remained depressed but stable (or continued to decline in Mississippi). Analyzing operating performance (revenue compared to pre-disaster baseline) specifically in New Orleans after Katrina, Corey and Deitch (2011) find that construction, transportation and retail firms had the highest post-disaster performance, while education, arts/entertainment/recreation and information-sector businesses had the lowest. The high performance of construction firms is not surprising, given the general swell in post-disaster construction pipelines and recovery contracting followed by an eventual sector-specific crash or return to normal (Chang & Rose, 2012; Zhang et al., 2009). The high performance of retail firms seems surprising; perhaps those retail firms that do survive and reopen soon after a disaster benefit from increased customer traffic displaced away from those firms that do not survive or face extended closure.

Minority and woman-owned businesses fare worse after disasters, mostly due to the exacerbation of entrenched societal inequalities and prejudices. Marshall et al. (2015, p. 335) theorize that a natural disaster might exacerbate structural economic and social inequalities that make women-owned and minority-owned businesses less likely to reopen or perform as well as they did pre-disaster; indeed, they find that woman, minority and veteran-owned businesses were more likely to fail after Hurricane Katrina. Synthesizing previous literature, Forthergill (1996) suggests that women's role as caregivers, their relative lack of mobility, and their inferior access to capital increases their disaster vulnerability relative to male business owners. And women-owned SBA loan recipients made less revenue post-disaster than male-owned SBA recipients (Hiramatsu & Marshall, 2018). As for minorities, Black, Hispanic and Asian-owned establishments had higher closure rates than White-owned establishments between 2002 and 2006 according to US Census Survey of Business Owners (SBO) and BITS datasets; and minority-owned firms tended to be smaller than white-owned firms (Lowrey, 2010). The overrepresentation of minority-owned businesses among small businesses and in the service and retail sectors likely exacerbates this subpopulation's vulnerability during times of disaster (Marshall et al., 2015).

Recent research suggests that women may be disproportionately vulnerable to disasters but also uniquely "resilient"—more likely to bounce back.[8] Drawing from the National Family Business Panel dataset, Danes et al. (2009) determine that women-owned businesses are less likely than male-owned businesses to receive federal disaster aid, but when they do receive it, women-owned businesses are more resilient (in this case, Danes et al. define resilience as an indicator based on seven subjective survey questions). Using the same dataset, Haynes et al. (2011) determined women-owned businesses were less likely to survive a disaster but that if they did survive, they were more likely to increase their revenue after the disaster. Sydnor et al. (2017, p. 1652) provide counterevidence, finding that storm-affected women-owned businesses were more likely to close eight years after Hurricane Katrina than their male-owned counterparts.

Experience, however defined, has inconsistent effects on businesses' post-disaster performance and survival rates. In theory, greater experience would increase a business's adaptive capacity to deal with natural hazards, but there are many ways of defining "experience," and some experience (e.g. prior adversity) might be more damaging than it is developmental or instructive.

In the context of Louisiana and Mississippi after Hurricane Katrina, older firms were more likely to survive in the short and long term (Marshall et al., 2015; Sydnor et al., 2017). But one survey determined business age a disadvantage in Midwestern and western disaster contexts (Webb et al., 2002). With regard to experience with prior adversity, Webb (2002) finds that experience with prior disasters had no positive effect on survival or performance. But Marshall et al. (2015) finds prior disaster experience, as well as prior experience with cash flow issues, had a positive effect on survival in Katrina-affected Mississippi. Prior disaster experience has inconsistent-to-positive effects on rates of mitigation and preparation (Dahlhamer & D'Souza, 1995; Webb et al., 2000). Finally, more educated owners are more likely to survive and return to baseline levels of performance across the board (Hiramatsu & Marshall, 2018; Marshall et al., 2015; Sydnor et al., 2017). There is little conclusive empirical data about the relationship between a business owner's own age and the business's fortune post-disaster. Alesch et al. (2001) suggest that if an aging owner has shored up her retirement nest egg in a disaster-affected business, she might prefer to

[8] This is a glib definition; a much more intensive definition of resilience is available in 2.6: Rural Resilience…

sink time and resources into restoring the business to a pre-disaster baseline in order to "rescue" her only chances at retirement; other aged owners with independent retirement resources, however, might cut their losses and walk away from a storm-destroyed venture entirely.

The receipt of federal assistance can be helpful or hurtful, depending on the financial health and capacity of the business. Webb et al. (2000) find little to no compelling relationship between the receipt federal disaster assistance (e.g. National Flood Insurance Program payouts or SBA disaster loans) and survival/performance post-disaster. Tierney (1995) reproduces this finding and comments that most small businesses do not seek federal assistance after a disaster either due to a lack of sufficient damage or due to the reliance on personal finances rather than outside resources to recoup business losses. Federal disaster assistance to businesses, which chiefly arrives in the form of insurance payouts and SBA debt, might exert a neutral or even negative effect on business recipients for one or more reasons: the length of time between the disaster event and the government aid is too long, the use of debt to fund repairs that do not in and of themselves produce net new increases in revenue places another long-term stress on the business, and neither loans nor insurance payouts can quickly enough resolve the short-run lapse in income that can make or break a business in the first weeks and months after a disaster (Tierney, 2007). Indeed, in the context of the 1994 Northridge Earthquake in Los Angeles, Dahlhamer and Tierney (1996) find the use of SBA disaster loans had a negative impact on recovery.

More recent scholarship points to positive conclusions about the influence of federal debt. In a nationwide analysis, Davlasheridze and Geylani (2017) determine SBA loans improved individual business survival rates and general economic recovery rates in urban and metropolitan areas but only exerted neutral effects in rural areas. Hiramatsu and Marshall (2018) conduct a long-term study of SBA loan outcomes in Mississippi for 10 years after Hurricane Katrina, determining that SBA loans had a positive impact on revenue both objectively (according to financial statements) and subjectively (according to owners' subjective recall). Notably, male owners and owners with college degrees fared much better with their SBA loans compared to female owners and owners of small retail businesses. The researchers acknowledge that disaster debt exerts both a release and a stress on cash flow-strapped business, and they make an appeal for post-disaster grants (rather than debt) reserved for smaller and more vulnerable businesses.

Natural disaster insurance potentially increases adaptive capacity after a disaster, but only if businesses are *comprehensively* insured ahead of time. Businesses seeking to hedge against losses during and after a disaster have access to a suite of insurance products for a myriad of damages: property damage, revenue loss, labor expenses, etc. However, certain insurance products only cover certain *sources* of damage: for example, wind damage insurance is widely available from private purveyors while, in the United States, flood insurance is provided almost exclusively by the federal government in the form of FEMA's National Flood Insurance Program (NFIP). For disaster insurance coverage to be a useful or "worthwhile" investment in retrospect, it must cover all of a business's damages in question, which requires the business to patch together a number of different products. But since it can be difficult or impossible for an individual business to assess its level of risk, given the diversity of risks it could suffer, and since maintaining a variety of insurance investments can mount a business's fixed costs without a guaranteed upside, accomplishing the requisite patchwork of products is a challenge for many small businesses. Indeed, the US Federal Reserve Bank's 2017 Small Business Credit Survey determined that among disaster-affected zip

codes that year, surveyed "Firms' insurance holdings appear[ed] to be mismatched to the sources of their damages, leaving uncovered losses" (Battisto et al., 2017, p. v).

Perhaps because of the complexity of disaster insurance coverage and the tendency to under-insure, scholarship about the influence of insurance on disaster recovery is inconclusive. Collier et al. (2016) reviewed business recovery in the months following Hurricane Sandy in New York City and determined that even insured businesses experienced losses due to incomplete coverage (e.g. a business that owned flood insurance but lacked business interruption insurance), and that the possession of insurance did not predict improved survival rates several months post-disaster. Collier et al. also noted that younger and smaller firms were less likely to have insurance. Documenting small business recovery rates in New Zealand after the 2011 Christchurch Earthquake, Poontirakul et al. (2017) find that business interruption insurance had a positive but statistically insignificant impact on short-term recovery yet a positive, significant effect on productivity and profitability two to three years after the storm. In conclusion, the association between insurance uptake and other attributes such as business size make it difficult to abstract conclusions about the utility of insurance, but generally, insurance would improve recovery rates only if a business has sufficient coverage against the right forms of damage and loss: a tall order for smaller firms.

The disruption of critical power and water infrastructure and utilities—referred to as "lifelines"—can cause permanent closure in the short term and operating issues later on. Across a variety of contexts, disrupted electricity, water, gas after the disaster are associated with higher rates of permanent closure as well as lower performance post-disaster, especially when lifelines remain inoperable for long periods of time (Chang & Rose, 2012; Nigg, 1995; Sydnor et al., 2017; Tierney, 1995; Webb et al., 2000). Only Webb et al. (2002) find that the disruption of lifelines was not associated with business failure or long-term performance, in the case of disasters in Santa Cruz County, CA and South Dade County, FL.

Aside: on the macroeconomic level, macroeconomic impacts of natural disasters are negative, but temporary. In general, powerful natural disasters result in short-term damage to the regional (and sometimes national) macroeconomy, but any negative impact disappears in the long run (no longer than 10 years) as GDP and other measures of macroeconomic wellbeing and productivity ultimately course-correct to the mean (English, 2015; Felbermayr & Gröschl, 2014; Klomp, 2016; Klomp & Valckx, 2014; Lazzaroni & van Bergeijk, 2014). Notably, meta-analyses of macroeconomic impact analyses reveal a historical bias towards publishing negative impacts—that is, the conclusion that disasters suppress GDP—but also suggest that positive impacts are appearing more frequently in the literature (Klomp & Valckx, 2014; Lazzaroni & van Bergeijk, 2014; Loayza, Olaberría, Rigolini, & Christiaensen, 2012). Perhaps communities are improving their ability to recover after major natural disasters over time.

Figure 12: Summary of empirical findings

Variables Influencing the Post-Disaster Recovery and Performance of Businesses

*NOTE: "Influence on Survival/Performance" refers to whether a Variable being **TRUE** or **GREATER** makes a business more likely to survive and return to baseline post-disaster.*

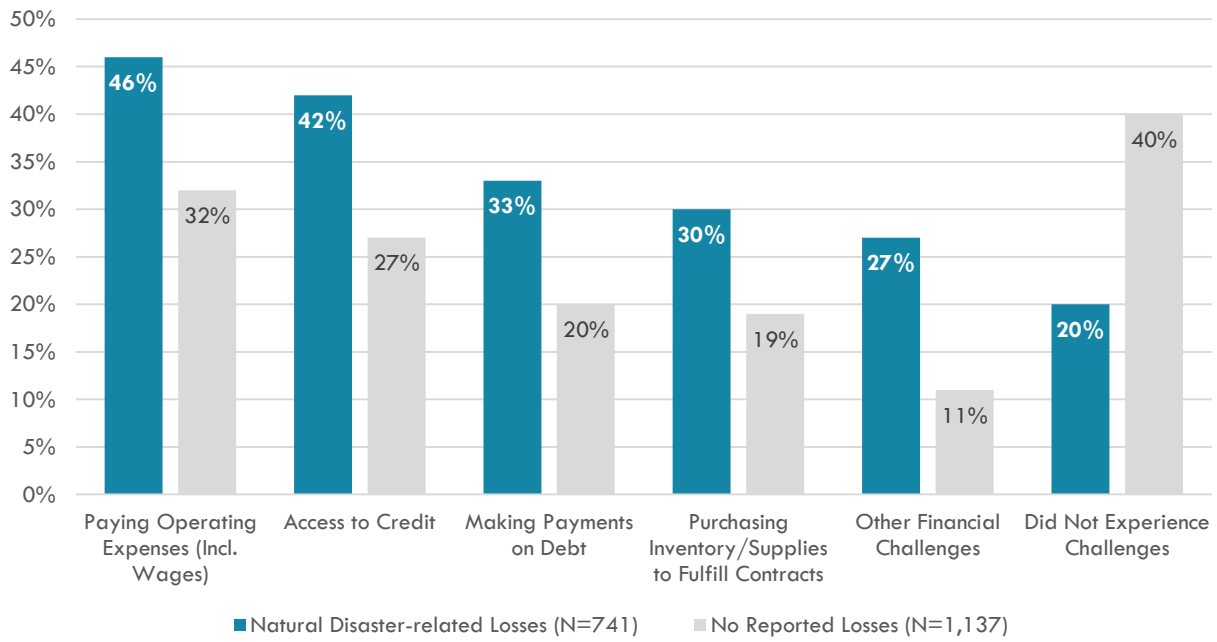
Variable	Description	Influence on Survival/Performance	Relevant Citation(s)
Larger Size	In terms of number of employees	+	(Boyd, 2014; Chang & Rose, 2012; Eadie, 1998; Kroll, 1990; Lam et al., 2012; Marshall et al., 2015; Runyan, 2006; S.E. Chang and Falit-Baiamonte, 2002; Tierney, 1995, 2007; Webb et al.,
Wholesale/Retail Sector		–	(Corey and Deitch, 2011; Garber et al., 2006; Tierney, 1995)
Service Sector		–	(Corey and Deitch, 2011; Tierney, 1995; Hiramatsu & Marshall, 2018)
Financial, Insurance, Real Estate (FIRE) Sectors		+	(Dahlhamer & D'Souza, 1995; Tierney, 1995; Webb et al., 2000, 2002)
Construction, Transportation, Utilities Sectors		+	(Chang & Rose, 2012; Corey and Deitch, 2011; Garber et al., 2006)
Property Ownership		*Unclear*	(Dahlhamer & D'Souza, 1995; Webb Gary R. et al., 2000)
Home-Based Business		+	(Headd, 2003; Hiramatsu & Marshall, 2018; Marshall et al., 2015)
Disruption of Life Lines	Disruption of critical power, water infrastructure, utilities	–	(Chang & Rose, 2012; Nigg, 1995; Sydnor et al., 2017; Tierney, 1995; Webb Gary R. et al., 2000; Webb et al. 2002)
Inventory/Crops Loss		–	(Sydnor et al., 2017; Tierney, 1995)
Longer Closure	Longer closure/service interruption immediately post-disaster	–	(Webb et al., 2000)
Minority Ownership	Non-white ownership	–	(Haynes et al., 2011; Hiramatsu & Marshall, 2018; Marshall et al., 2015; Webb et al., 2002)
Woman Ownership		–	(Danes et al., 2009; Forthergill, 1996; Haynes et al., 2011; Hiramatsu & Marshall, 2018; Marshall et al., 2015; Webb et al., 2002)
Pre-Disaster Revenues		*Unclear*	(Webb et al., 2002)
Years in Business		*Variable Effect*	(Marshall et al., 2015; Sydnor et al., 2017; Webb et al., 2002)
Disaster Experience	Survival of prior disasters	*Unclear*	(Marshall et al., 2015; Webb et al., 2002)
Adversity Experience	Prior financial hardship	*Insufficient Data*	(Marshall et al., 2015)
Owner Education		+	(Hiramatsu & Marshall, 2018; Marshall et al., 2015; Sydnor et al., 2017)
Owner Age		*Insufficient Data*	
Hazard Mitigation	Investment in disaster planning or hazard mitigation	No Effect	(Corey & Deitch, 2011; Tierney, 2007; Webb et al., 2002; Webb et al., 2000)
Federal Assistance	SBA loans	*Variable Effect*	(Davlasheridze and Geylani, 2017; Dahlhamer and Tierney, 1996; Hiramatsu & Marshall, 2018; Tierney, 1995; Tierney, 2007; Webb et al., 2000)
Disaster Insurance	NFIP, Business Continuity, etc.	+	(Collier et al., 2016; Poontirakul et al., 2017)

2.5 Small Business Decision-Making after a Disaster

> *Often, small businesses survive natural hazard events and, even with damage to structures and inventory, are back in business quickly and are as profitable after the event as before. Often they are not. But the firms rarely close forever in the few days following the earthquake, flood, hurricane, or tornado. Small business owners often hang on, trying to get the business generating a living again, pouring their savings in, and hoping for the best. At last, they run out of energy, assets, and hope, and the company dies, not with a bang, but a whimper. (Alesch et al., 2001, p. 92)*

Disaster-affected firms face steeper operating and financial pressures after suffering a natural disaster. The 2017 SBCS found that disaster-affected firms were almost 50% more likely to struggle to pay operating expenses such as wages and utility bills, about 50% more likely to struggle with credit availability, and over 50% more likely to struggle to service their debt (see **Figure 13**). Meanwhile, firms that escaped disaster were twice as likely to respond that they did not experience any financial challenges in 2017 (Battisto et al., 2017, p. 7). Given these heightened pressures, how do firms navigate recovery and return to baseline? How do they balance funding and financing options—including government disaster relief, private debt, capital reserves, personal savings? How do they manage the stress of additional disaster-related debt, if they take out loans, and to what extent do they experience less flexibility after tapping into their reserves or savings?

Figure 13: Financial challenges among disaster-affected US firms, Q4 2016 – Q4 2017



Adapted from SBCS 2017, p.7

While an abundance of empirical and theoretical work identifies independent variables that successfully predict small business failure or "recovery" over a period of time, a small amount of research explains the financial, operational decisions made by small businesses during a disaster

and in its aftermath. For instance: it is clear that a firm with a larger staff and greater market share might have more options on the table for recovery, but few scholars investigate or demonstrate the nature and costs and outcomes of those decisions for individual firms. The relative ease of surveys (which gather simpler information associated with discrete variables, rather than complex decisions), and the many challenges associated with post-disaster ground research (see above), partly explain the paucity of decision-making data. The few sources that do study business decision-making after disasters unsurprisingly tend to rely on qualitative interviews with business owners. Alesch et al. (2001) and Zolin and Kropp (2007) are examples of this type of work.

Alesch et al.'s 2001 volume provides a seminal analysis of the decision-making of disaster-affected business owners who must weigh insurance, equity, and debt financing options as well as a number of possible resolutions: reopening, relocation, or closure. The authors repeatedly interviewed 40 small business owners—including some non-profit organizations—across a variety of post-disaster contexts in order to abstract lessons about small business decision-making after disasters. Lessons learned included the importance of insurance coverage, the costs of liquidating equity, the difficulty of obtaining affordable debt, and unique circumstances of older, almost retired business owners.

The authors concluded that insurance—whether for fire, earthquakes, wind, business interruption, flooding, etc.—protected owner equity (capital) and preserved an array of longer-term options for an affected owner. Such options could include reopening, relocating, changing the business model, opening a new business, selling the business or simply retiring. Unfortunately, pre-disaster insurance coverage was inconsistent among businesses. With regard to flood insurance: "Far fewer than half the flood victims we interviewed were covered, to any extent, by flood insurance. Of those respondents in the [100]-year flood plain, significantly more had coverage; none of those we interviewed in the 500-year flood plain were insured" (Alesch et al., 2001, p. 62).

Uninsured or underinsured business owners faced significant downside consequences involving the liquidation of equity (personal savings, capital reserves) or the acquisition of significant debt to return to baseline. With or without insurance, businesses also dealt with sometimes long-term cash flow issues, due to the dislocation of and reducing spending among longtime customers, which required a variety of extraordinary strategies. Owners used personal credit cards "to buy inventory, make repairs, and make payroll," depended on lines of credit when available, negotiated with able customers to receive early payments on accounts receivable, negotiated putting off or financing accounts payable with suppliers and landlords (p. 48). The authors note that many businesses were either ineligible for SBA loans due to a level of creditworthiness that was either too high or too low for SBA underwriting standards (see *Section 4.2.1* for SBA underwriting standards). Other businesses decided against pursuing SBA debt due to the SBA's collateral requirements. Alesch et al. recognized an absence of grant money for business recovery, noting that what little grant money exists often carries imposing requirements.

According to Alesch et al., many owners were, or felt themselves to be, locked into their struggling businesses due to a combination of a "sunk cost" fallacy and the belief that reopening and returning to baseline was the only way they could recover lost assets and, say, retire "on time." In fact, the authors recognize owners close to retirement as a special case: sufficiently aged owners tended to walk away from their business if they preserved enough equity for retirement; however, if the business represented most or all of their "retirement nest egg," many felt forced to invest significant time, money, and debt into rehabilitating the business before they could sell and recover its value.

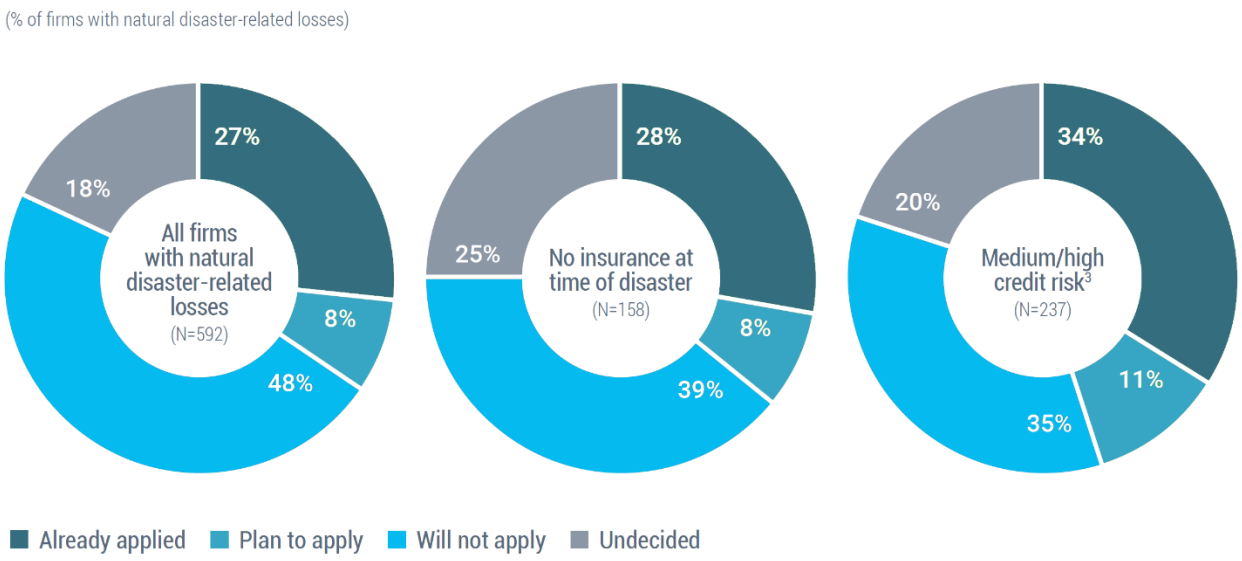
This behavior suggests that some owners tried to recovery only when it might not have been financially justified or wise.

The authors noted that interviewed businesses generally tended to exhibit path dependency post-disaster, hewing to old business models and locations when a more radical change or relocation (when feasible) would have made better business sense given permanently changed, post-disaster market conditions. Many business owners assumed "things will get back to normal" and even proceeded to incur significant debt and other liabilities in expectation of a return to status quo that would never occur. Finally, Alesch et al. (2001) also comment at length at the sometimes ruinous and destabilizing trauma—PTSD, essentially—that dogs some business owners for years after their "survival" of a disaster. The management of personal, household, family and economic trauma all at once weighs on a business owner's bandwidth and emotional, intellectual capacity to reopen in ways that are hard to predict and difficult to grapple second-hand.

Zolin and Kropp (2007) operate a similar research program in New Orleans after Hurricane Katrina but with a much smaller sample: a mid-sized information and professional services firm, a very large educational institution, and a very large information technology service provider. They theorize a chronology of business response stages: personal situation awareness, business situational awareness, finding employees, reconstructing management, reconstructing strategy, and returning to business in a transformed environment. (These stages might compress for a much smaller business with only, say, 10 employees and a flatter management structure.) All three relatively large, organizations exhibited adaptive capacity by temporarily or permanently relocating workers or operations. They did this very rapidly and sometimes absurdly (the mid-sized firm engaged in what reads like police bribery in order to access its flooded property and rescue a collection of company computers (Zolin & Kropp, 2007, p. 188)). Unfortunately, the authors do not detail individual organizations' decisions about financing, or whether and to what extent the organizations were insured. And the author's selection of relatively large and apparently well capitalized firms precludes conclusions about the difficult decisions faced by much smaller firms.

Finally, the 2017 SBCS provides some insight into the financial decision-making of firms on the basis of their levels of insurance and creditworthiness. While 40% of firms in disaster-affected areas reported disaster-related losses, only about a quarter (27%) of disaster-affected firms sought disaster relief in the form of debt or grants, suggesting that the balance of firms either sustained relatively minor losses or ignored or failed to qualify for available recovery debt due to the cost or collateral requirements. The survey found some difference in the short-term financial decision-making of firms with and without insurance (see **Figure 14**): firms without insurance at the time of the disaster were more likely to seek relief (note the difference between the sample sizes). Based on Alesch et al.'s (2001) findings, it might be surprising that the difference between insured and uninsured firms is not larger. The discrepancy suggests that firms' insurance proceeds seldom covered the entirety of damage sustained, meaning that firms were underinsured. Finally, firms that posed higher credit risk to (on the basis of credit scores prior to the disaster) were more likely to seek disaster relief (Battisto et al., 2017, p. 6).

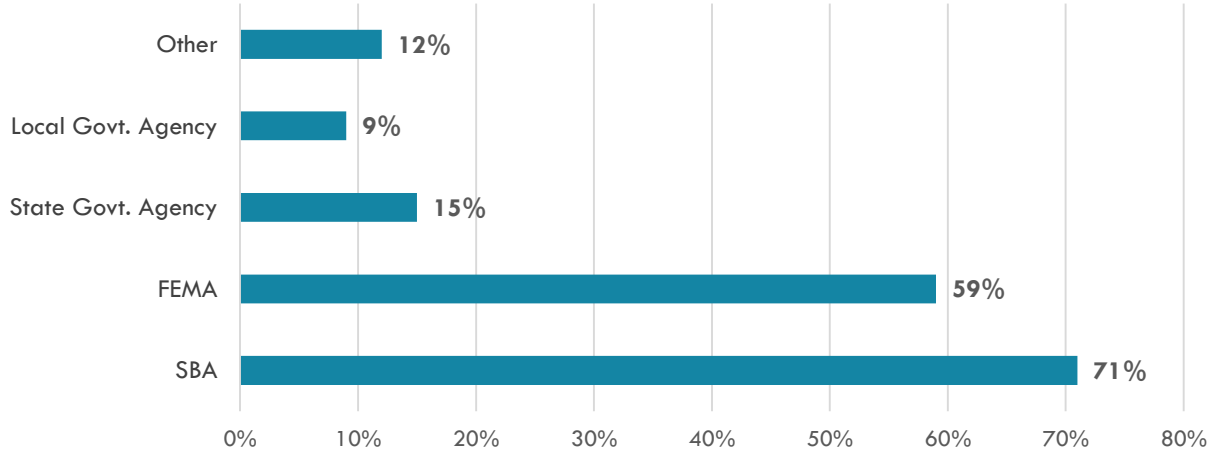
Figure 14: Demand for disaster relief among disaster-affected firms nationwide in 2017



Adapted from SBCS 2017, p.6

Surveyed firms were overwhelmingly likely to seek disaster relief assistance from the SBA and FEMA (see **Figure 15**). The nature of firms' FEMA applications is unclear. While FEMA does provide grants to households, FEMA would only refer small businesses to the SBA for disaster loans. An exception to this rule might be home-based businesses, which could potentially qualify for both SBA and/or FEMA financing depending on how they applied and how they represented their business.

Figure 15: Sources of disaster relief among 204 US firms that applied for relief in 2017.

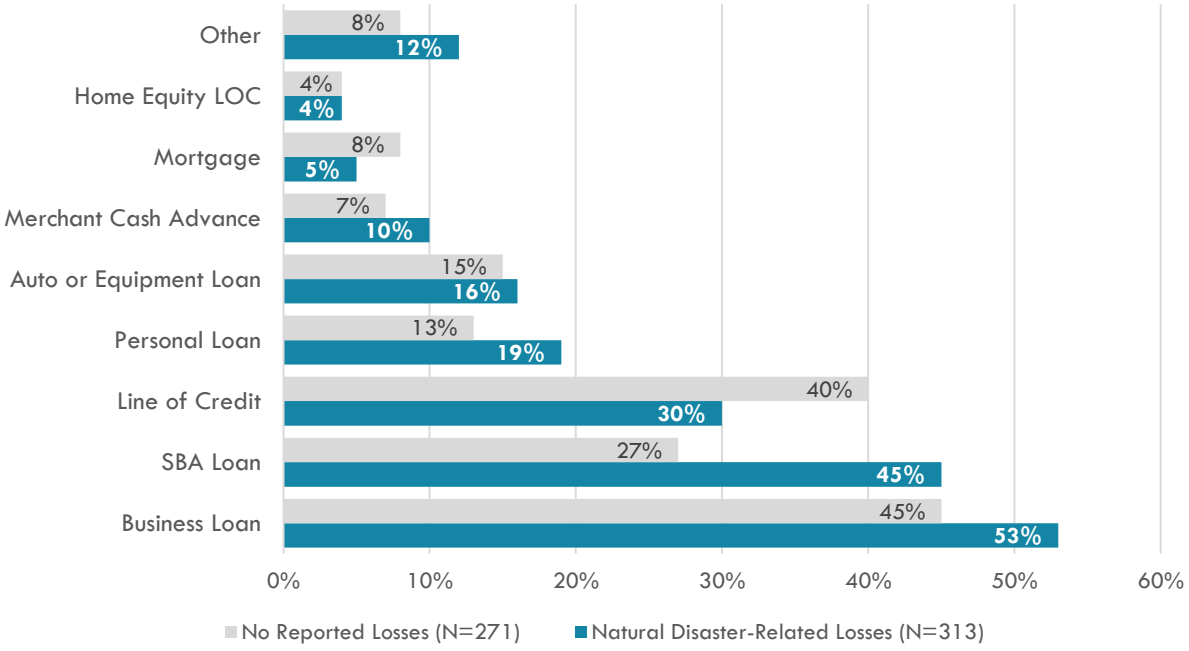


Adapted from SBCS 2017, p.6

Finally, SBCS results suggest business owners were strategic in the ways they prioritized funding sources. Among disaster-affected and unaffected firms, the perceived likelihood of approval was the most common reason for pursuing a financing activity, followed by the speed of the financing decision and then the cost of the financing (e.g. the interest rate). Of those that applied for financing,

48% (the plurality) of firms pursued three or more sources of financing, including cash advances and personal loans, which suggests many firms cobbled together multiple sources of financing in order to recover (Battisto et al., 2017, p. 11). Among both affected and unaffected firms, sources of financing mostly comprised formal private and SBA loans, followed by lines of credit from a business owner's lender; other more creative forms of financing, often based off an owner's personal network or equity, were used but less commonly (see **Figure 16**) (Battisto et al., 2017, p. 10).

Figure 16: US application rates for various loan and line of credit (LOC) products in 2017



Adapted from SBCS 2017, p.11

Modeling the effects of small business decision-making can be helpful in conceiving of business options after a disaster as well as the secondary effects of those options. While a rigorous econometric analysis or system dynamics exercise is beyond the scope of this thesis,[9] this subsection does include a simple theorization of business financial stresses and options using the framework of twinned balance sheets. A balance sheet is a single snapshot in time of a business's assets and liabilities; two balance sheets from separate times can capture shifts in its current assets, current liabilities, and long-term capital structure. Below, Table 2 represents a week to a month after the disaster. Table 3 represents several months to a year thereafter for an *insured* business, while Table 4 represents the same time for an *uninsured* business.[10]

[9] See Alesch et al. (1993) for an series of post-earthquake business financial models. See Sauser et al. (2018) for a system dynamics model of balancing and reinforcing feedback loops that, while leaving out internal business decision-making, catalog the interactions between neighborhood recovery and the recovery of small-to-medium sized businesses therein.

[10] Categories are potential categories on a balance sheet; not every business has assets and liabilities in all of the categories below, and some more complex businesses may have more categories and subcategories. Thanks to Karl Seidman (2005) for a number of "mock" sheets associated with assignments for his textbook "Economic Development Finance" taught in his 2018 MIT course "11.137/437: Financing Economic Development."

Table 2: Short-term mock balance sheet for a disaster-affected small business

	Disaster Effect[11]	Explanation
Assets		
Current Assets		
Cash	▼	A business uses liquid cash reserves to pay for repair, resupply, and ongoing fixed costs (labor, utilities, etc.)
Accounts Receivable	▼	AR delayed due to disaster-impacted customers, or reduced if customers never reopen post-disaster.
Inventory	▼	Inventory destroyed by flooding
Prepaid Expenses		
Other current assets		
Total Current Assets		
Fixed Assets		
Land		
Real Estate Property	■	Property damaged by flooding, but finances may not register loss of value until point of sale.
Equipment	▼	Equipment damaged by flooding.
Leasehold Improvements (if renter)	■	Property improvements damaged by flooding, but finances may not register loss of value until point of sale.
Less accumulated depreciation		
Other Assets		
Total Fixed Assets		
Total Assets		*Equals total liabilities and equity*
Liabilities and Equity		
Current Liabilities		
Accounts Payable	■	Indeterminate Effect. Business may continue to pay AP or negotiate with suppliers/property owners to suspend AP.
Accrued Expenses	■	Indeterminate Effect. See AP.
Accrued Income Taxes	▼	Revenue decreases, income taxes decrease. Business continues to pay down accrued income taxes.
Current portion of Long-Term Debt		
Insurance Expenses		*An insurance policy can eventually mitigate losses among current and fixed assets, above.*
Total current liabilities		
Long-term liabilities		
Long-term Debt		
Capital, Nonbusiness Personal Savings, Shareholder Equity, *etc.*	▼	A business liquidates capital/equity; could include the personal/family savings of a business owner.
Total long-term liabilities		
Total Liabilities and Shareholders' Equity		*Equals total assets*

[11] **LEGEND: ▼ DECREASE | ▲INCREASE | ■ INDETERMINATE EFFECT**

Table 3: Long-term mock balance sheet for a disaster-affected small business with insurance

This balance sheet assumes a well-insured business has to take out little to no debt to recover.

	Disaster Effect	Explanation
Assets		
Current Assets		
Cash	■	Cash reserves might remain low or increase due to insurance proceeds.
Accounts Receivable	■	Indeterminate effect. AR may or may not remain delayed/ suppressed based on the vulnerability of customers.
Inventory	▲	Insurance proceeds restore (insured) inventory
Prepaid Expenses		
Other current assets		
Total Current Assets		
Fixed Assets		
Land	■	Over a very long term, land value may depreciate due to recurrent flooding, insurance market signals, etc.
Real Estate Property	■	Insurance proceeds restore insured property.
Equipment	▲	Insurance proceeds restore insured equipment.
Leasehold Improvements (if renter)	■	Insurance proceeds restore insured property.
Less accumulated depreciation		
Other Assets		
Total Fixed Assets		
Total Assets		*Equals total liabilities and equity*
Liabilities and Equity		
Current Liabilities		
Accounts Payable	▲	AP may have increased if business delayed paying AP.
Accrued Expenses	▲	Expenses may have accrued if business delayed paying.
Accrued Income Taxes		
Current portion of Long-Term Debt		
Insurance Expenses		*An insurance policy can eventually mitigate losses among current and fixed assets, above.*
Total current liabilities		
Long-term liabilities		
Long-term Debt		
Personal/Family Savings, Shareholder Equity, *as applicable*	▲	Owner may "reimburse" equity, if the owner used any to fund emergency repair/working capital needs.
Total long-term liabilities		
Total Liabilities and Shareholders' Equity		*Equals total assets*

Table 4: Long-term mock balance sheet for a disaster-affected uninsured small business

This balance sheet assumes the business takes out a loan to recover. The balance sheet cannot express the impact of the bank or SBA collateralizing a large portion of fixed/current assets.

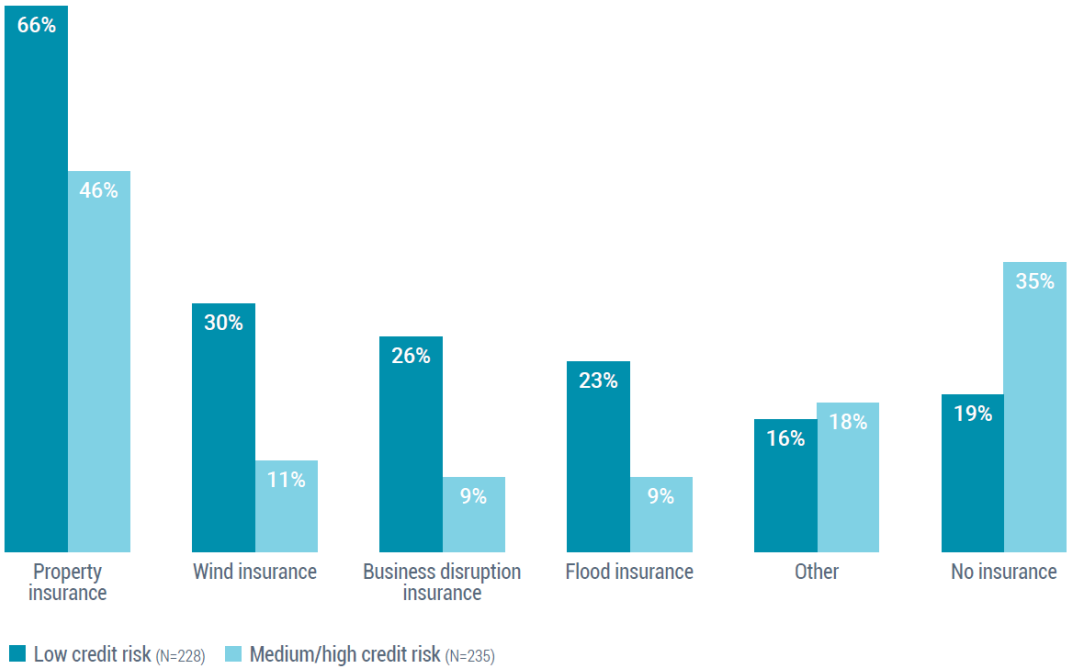
	Disaster Effect	Explanation
Assets		
Current Assets		
Cash	▼	Cash reserves might fall further in order to service debt.
Accounts Receivable	■	Indeterminate effect. AR may or may not remain delayed/ suppressed based on the vulnerability of customers.
Inventory	▲	Loan proceeds restore inventory
Prepaid Expenses		
Other current assets		
Total Current Assets		
Fixed Assets		
Land	■	Over a very long term, land value may depreciate due to recurrent flooding, insurance market signals, etc.
Real Estate Property	■	Insurance proceeds restore insured property.
Equipment	▲	Insurance proceeds restore insured equipment.
Leasehold Improvements (if renter)	■	Insurance proceeds restore insured property.
Less accumulated depreciation		
Other Assets		
Total Fixed Assets		
Total Assets		*Equals total liabilities and equity*
Liabilities and Equity		
Current Liabilities		
Accounts Payable	▲	AP may have increased if business delayed paying AP.
Accrued Expenses	▲	Expenses may have accrued if business delayed paying.
Accrued Income Taxes		
Current portion of Long-Term Debt	▲	A business takes out long-term debt to fund repair/ resupply, or short-term bridge loan for working capital.
Insurance Expenses		*An insurance policy can eventually mitigate losses among current and fixed assets, above.*
Total current liabilities		
Long-term liabilities		
Long-term Debt	▲	A business takes out long-term debt to pay for repair/resupply.
Personal/Family Savings, Shareholder Equity, *as applicable*		
Total long-term liabilities		
Total Liabilities and Shareholders' Equity		*Equals total assets*

The exercise above reinforces the role of insurance in the preservation of an owner's options. Sufficient insurance proceeds will offset some or all of the owner's immediate spending to restore damaged assets and return to baseline. At this point, the owner has the freedom to reopen or sell the business without having lost too much equity. Without insurance, the owner may liquidate equity—here, in the case of small and family-owned businesses, I include non-business accounts like personal savings, retirement savings, family savings as types of equity. Although the transfer of equity across the business's balance sheet restores short-term functioning, it limits the business owner's latitude to deal with future disturbances, make additional investments, or meet personal obligations (e.g. retirement, education, etc.). Independent of equity, the owner may take out disaster debt (private, SBA, etc.), which increases the owner's short and long-term liabilities for the foreseeable future. Even though upfront debt proceeds can restore some or all current and fixed assets that were destroyed, subsequent month and years will subject the business to decreased operating margins due to debt service (interest and principal). In summary, the loss of equity or the use of debt—or both—places the underinsured business in a precarious state of operation within a market context already destabilized by potentially long-lasting consumer dislocation and depopulation, concomitantly depressed rates of consumer spending, and other heightened costs (e.g. mitigation, emergency inventory storage, etc.).

Unfortunately, the complexity of making correct insurance investments and the influence of powerful cognitive biases militates against the penetration of insurance among vulnerable actors. As argued above, businesses tend to systematically under-insure their revenue and assets due to the complexity and expense involved in patching together the correct suite of insurance products given the business's unique risk profile. The US Federal Reserve Bank's 2017 SBCS determined that among disaster-affected zip codes that year, surveyed "Firms' insurance holdings appear[ed] to be mismatched to the sources of their damages, leaving uncovered losses" among disaster-affected firms (Battisto et al., 2017, p. v) (see also **Figure 17**). Kousky (2019, p. 10) notes that individuals tend to under-insure either due to ignorance about their risk, confusion about the complexity of what different insurance products cover or exclude, or strategic behavior that balances market insurance with mitigation and self-insurance.

Beyond the inherent difficulty of estimating correct insurance coverage, powerful cognitive biases prevent households and businesses from recognizing their level of risk and investing accordingly. The "Availability Bias," theorized by Tversky and Kahneman (1973), leads individuals to discount the probability of low-visibility or distant events and overestimate the probability of events that are salient or easy to recall. In the context of disasters, the availability bias leads households and business owners to underestimate the probability of a flood risk if they have not recently experienced a flood, which in turn motivates under-investment in flood preparation or insurance (Atreya, Ferreira, & Kriesel, 2013; Bin & Landry, 2012; Bin & Polasky, 2004; Kousky, 2010).

Figure 17: Levels of insurance among US firms in Q4 2017, aggregated by credit risk.[12]

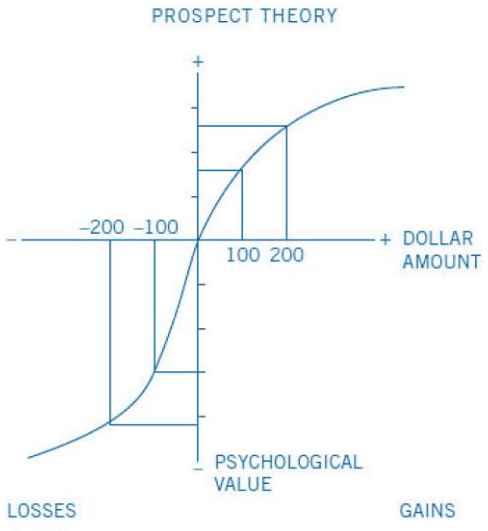


SOURCE: SBCS 2017, p.5

Kahneman and Tversky's (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992) Prospect Theory (PT) further explains why individuals underprepare for low-probability, high-cost events (see **Figure 18**). According to PT, individuals establish their preferences for risk from a certain starting point, or "reference point," that colors how they interpret a gain or loss. From the position of this reference point, individuals exhibit "diminishing sensitivity" to higher and higher magnitudes of gain or loss. For example, from a reference point of zero losses, the difference between $1,000 and $2,000 in damage *might seem notionally bigger* (the latter doubles the former) than the difference between $100,000 and $120,000 in damage (despite the fact the lattermost difference is *twenty times* the former). The reduced ability to appreciate differences between high-magnitude losses and gains leads individuals to have a higher tolerance for extreme-cost risks, like the total destruction posed by a hurricane, compared to moderate-cost events. It follows that the difficulty of appreciating the "objective" value of low-probability, high-cost catastrophes leads individuals to systematically discount the value of disaster insurance and therefore ignore it. Even when individuals do invest in insurance, the gravity of their reference point guides them toward insurance policies for low quantities of damage (say, product warranties)—even if these policies are actuarially overpriced given the likelihood of loss—and away from insurance policies against unlikelier yet much greater losses, even when these policies are well-subsidized as in the NFIP (Eckles & Wise, 2011; Schmidt, 2016).

[12] From the SBCS: "Self-reported business credit score or personal credit score, depending on which is used to obtain financing for their business. If the firm uses both, the highest risk rating is used. 'Low credit risk' is an 80-100 business credit score or 720+ personal credit score. 'Medium credit risk' is a 50–79 business credit score or a 620–719 personal credit score. 'High credit risk' is a 1–49 business credit score or a <620 personal credit score." (Battisto et al., 2017, p. 5).

Figure 18: Prospect theory explains decreasing notional value of increasing magnitudes of loss



SOURCE: (Kahneman, 2013)

In conclusion, insurance appears to be an advantage to a vulnerable business owner: at the cost of upfront premiums, insurance limits the owner's need to fall back on debt or business/personal savings in the event of a disaster. However, the difficulty and expense of patching together adequate coverage for a business owner's unique risk profile as well as the effort involved in overcoming entrenched cognitive biases that dissuade from preparing for low-probability but high-cost events make it easy for a business to underinsure. These reasons likely explain the low penetration of disaster insurance nationwide among both households and small businesses. Therefore, for insurance markets to work effectively, a sort of mandate must serve to require business owners to purchase adequate policies. And given the relative inaccessibility of insurance for small and lower-income businesses (Collier et al., 2016; Kousky, 2019), greater subsidies must be available for the most vulnerable firms.

2.6 Rural Resilience and Adaptation

> *"Regional economic resilience [is] the capacity of a regional or local economy to withstand or recover from market, competitive and environmental shocks to its developmental growth path, if necessary by undergoing adaptive changes to its economic structures and its social and institutional arrangements, so as to maintain or restore its previous developmental path, or transit to a new sustainable path characterized by a fuller and more productive use of its physical, human and environmental resources." (Martin & Sunley, 2015, p. 13)*

The remainder of the literature review steps back from individual businesses and their owners to consider disaster-affected economies at large, trading writings on vulnerability in favor of more recent theories of resilience and adaptation. As emphasized in Chapter 1, rural areas face a disproportionate challenge navigating the economic impacts of natural disasters and climate change, partly due to their generally inferior and deteriorating rates of economic development. In this way they are less *economically resilient*. Economic resilience, whose definition is available in the epigraph above and in an elaborated form further below, hinges on a variety of socioeconomic

and geographic factors. However, I venture that a region's "disaster capital absorption capacity"—the speed and scope with which a post-disaster region absorbs and mobilizes large amounts of disaster capital including debt, grants, and perhaps non-monetary technical assistance—is crucial to any measure of economic resilience.

2.6.1 Defining Resilience and Adaptation

Ecologists adapted the concept of **resilience** from mechanical science in the 1970s, when it was used most prominently, though not first (as is often claimed), by C.S. Holling in 1973 (Alexander, 2013). Holling (1973, p. 14) defined *resilience* as "a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables." This he contrasted with *stability*, "which represents the ability of a system to return to an equilibrium state after a temporary disturbance; the more rapidly it returns and the less it fluctuates, the more stable it would be." Interestingly, Holling observes that highly unstable systems often have the highest degrees of resilience, due to the robustness and diversification of their elements (from an evolutionary, Darwinian perspective). Different perspectives propose a resilient system has either a single equilibrium (a moment of "steady state") or can shuttle between multiple equilibria (Gunderson, 2000; Pendall, Foster, & Cowell, 2010).

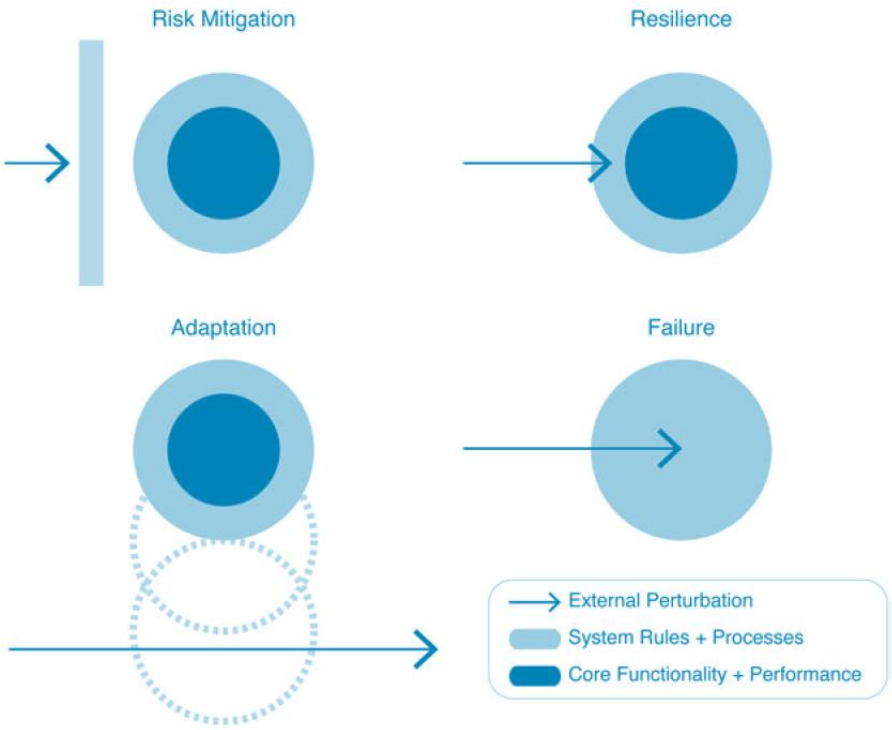
Alexander (2013) charts the adoption of "resilience" by psychology and later—by economists and geographers—into the realm of social science, around the turn of the century. Today, "resilience" is a popular concept that operates across a number of unrelated fields almost in the manner of a "metaphor" (Olsson, Jerneck, Thoren, Persson, & O'Byrne, 2015; Pendall et al., 2010; Pickett, Cadenasso, & Grove, 2004). Brand and Jax (2007) characterize resilience as a "boundary object," a concept with relatively low intension (internal content or meaning) yet high extension across a number of fields, and ponder whether it has gone the way of "sustainability"—a buzzword, perhaps, that can accommodate, or conceal, a multitude of agendas. Resilience has become challenging to write about; in the words of Alexander (2013, p. 2713): "The amount of literature on resilience is now so copious that it is becoming increasingly difficult to summarise." The explosion in usage has invited a variety of meta-reviews that attempt to rescue some intension out of this profusion of scholarship (Davidson et al., 2016; Meerow, Newell, & Stults, 2016; Moser, Meerow, Arnott, & Jack-Scott, 2019).

- Meerow et al. (2016) define "urban resilience" as "the ability of an urban system—and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales—to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity" (2016, p. 45)

- Davidson et al. (2016) acknowledges several "schools" of resilience thinking, including ecological, social-ecological, urban, disaster, and community resilience. He theorizes "resilience" according to three typologies. Type 1, basic resilience, concerns reducing disturbance and maintaining system status quo. Type 2, adaptive resilience, concerns adapting to change but maintaining the system's inherent structure or identity. Type 3, transformative resilience, relates to a complete transition from the status quo, and perhaps an adjustment or revision to the whole system.

A cursory reading reveals these definitions all blend notions of resilience with notions of "transformation." If resilience measures the ability to return to a previous or new equilibrium such that the original integrity of the system is preserved, transformation and "transformative resilience" violate the basic structures of the system by changing it permanently and thoroughly enough to permanently protect it from a hazard. Transformation is thus a form of **adaptation**, a manifestation or implementation of adaptive capacity that obviates the need for risk mitigation or resilience later on (Smit & Wandel, 2006), rather than a process of resilience that preserves that status quo (Keenan, 2016). A helpful model from Keenan (2018) in **Figure 19** illustrates the conceptual differences between *risk mitigation*, *resilience* and *adaptation* in a system.

Figure 19: Conceptual differences between risk mitigation, resilience, adaptation



SOURCE: (Keenan, 2018, p. 6)

Recognition that resilience seeks the status quo leads us to the United Nations Office for Disaster Risk Reduction's current definition of resilience:

> "The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management." (UNISDR, 2017, p. 24)

The UNISDR's definition still includes notions of adaptation and transformation, but it grounds the purpose of resilience as the maintenance of basic structures and functions of a system, and it defines the means of resilience as risk management within the system.

In contrast, adaptation acknowledges dramatic climate change and accepts that infrastructural, economic and social transformations are necessary in order to continue the integrity of socioeconomic systems. The Intergovernmental Panel on Climate Change's (IPCC) Assessment Report 5 defines adaptation as follows:

> "The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects." (Noble et al., 2014, p. 838)

Resilience favors a physical, social, and economic status quo that may preserve undesirable, systemic inequities and vulnerabilities. Although most scholarship regards resilience as categorically positive (Davidson et al., 2016; Moser et al., 2019), some critiques its neoliberal bent. The positive appeal of resilience elides the fact that preserving the status quo may preserve systematic inequalities among differently affected populations; resilience for what, *whom*, when, where and why must be carefully considered (Meerow et al., 2016). Gillard (2016) argues that resilience fails to account for complex social processes such as power relations, agency and inequality and instead merely focuses on material assets, economic incentives, and optimizing individual behavior. This "neoliberal" focus on individual accountability and material conditions clouds notions of collective responsibility among accountable bodies and institutions—such as government bodies—and ignores socioeconomic, structural conditions that render some individuals more marginal and more vulnerable than others. Writing about the application of resilience theory to *rural* areas, Scott (2013) critiques resilience as bundled alongside neoliberal ideas of self-reliance, sink-or-swim economics and austerity politics, which not only disproportionately challenge rural contexts but also erase the structural economic disadvantages of those selfsame areas. In Chapter 5, I attempt to respond to these critiques by introducing normative, transformative policy recommendations about the availability of grants and the cost of disaster capital for vulnerable, rural firms. These recommendations seek to preserve some accountability within rural contexts and among rural firms but also re-centers responsibility to abler, government actors.

2.6.2 Back to Business: Economic Resilience & Capital Absorption Capacity

Economic resilience is the speed with which an economy absorbs or bounces back from an impact in a manner that maintains its dominant state variables—such as sector diversity, productivity, employment levels, etc.—notwithstanding the fates of individual stakeholders and elements. In a seminal theorization of economic resilience, Martin and Sunley (2015) are more exhaustive:

> "Regional economic resilience [is] the capacity of a regional or local economy to withstand or recover from market, competitive and environmental shocks to its developmental growth path, if necessary by undergoing adaptive changes to its economic structures and its social and institutional arrangements, so as to maintain or restore its

> previous developmental path, or transit to a new sustainable path characterized by a fuller and more productive use of its physical, human and environmental resources." (Martin & Sunley, 2015, p. 13)

Scholarship has established many factors that contribute to economic resilience, including levels of entrepreneurship (Williams & Vorley, 2014), income equality and economic sectoral diversity (EDA, 2016), or a compilation of census indicators (Cutter, Ash, & Emrich, 2016; Cutter, Burton, & Emrich, 2010). A contribution of this thesis is that *the rapid supply and absorption of post-disaster capital* is also relevant. It is both an indicator of and a driver of regional economic resilience, given the importance of business continuity and cash availability to the structures, arrangements and pathways described by Martin and Sunley (2015). That is, economic resilience hinges not only on the stability of consumption patterns and the continuity of businesses but also on the rapid and equitable availability of capital that can support said consumption and business continuity.

Although Living Cities focuses on leveraging the power of philanthropy and financial institutions in *urban* areas (Hacke, Wood, Grace, & Urquilla, 2013), I borrow its idea of "capital absorption capacity" to measure the ability and fairness with which any place—urban or rural—can handle the vast influx of often intractable, rule-bound capital—debt, grants, technical assistance—that often drops down on a community after a disaster. The capital absorption capacity of a place is not so much about the "supply" of capital but about "the ability of communities to make effective use of different forms of capital to provide needed goods and services to underserved communities" (Hacke et al., 2013, p. 3). In the same way Living Cities centers this capacity around the presence, dynamism, cooperation, and missions of financial stakeholders, a place's capacity to absorb *disaster* capital can hinge around a concentration of traditional banking institutions, mission-driven financial institutions and intermediaries such as Community Development Financial Institutions (CDFIs), community groups, public agencies, chambers of commerce, trade organizations, and other stakeholders. The development of these stakeholders is part and parcel of a community's overall path of economic development, which should be viewed as a mainstream method of shoring up a community's general disaster preparedness and resilience.

2.6.3 Rural Economic Development Problems and Strategy

On top of the secular negative socioeconomic trends explored in Chapter 1, rural counties face a variety of structural disadvantages in their attempts at economic development. Rural areas' economic development liabilities include inadequate access to capital, limited local demand, limited skilled labor, a lack of specialized support services (e.g. healthcare, marketing, printing, etc.), poor access to extra-regional markets, low access to technological support, lack of general and electrical infrastructure, lack of information, geographic and social isolation from other business owners, and negative attitudes about rural life and rural career advancement opportunities (Z. J. Acs & Malecki, 2003; Fuller-Love, Midmore, Thomas, & Henley, 2006; MacKenzie, 1992). Rural areas suffer from weak enabling environments: "Weak governance, allied to sociocultural barriers and the lack of previous entrepreneurial role models, is one of the most important institutional barriers that hinder rural entrepreneurship," write Pato and Teixeira (2016, p. 10). North and Smallbone (2006) single out youth, immigrants and "animators" as potential sources of entrepreneurship; unfortunately, rural areas generally have fewer of such people. Rural counties tend to contain smaller businesses than urban counties, and smaller businesses have lower access to capital due to their higher risk in the eyes of most private financial institutions. Between 2000 and 2015, businesses in rural counties received smaller Community Reinvestment Act (CRA) loan amounts per capita than urban counties,

and CRA loans spurred more business growth in urban counties (Rupasingha & Wang, 2017).[13] And in general, insufficient attention focuses on rural economic development in the United States. Pato and Teixeira (2016) reflect that the majority of scholarship and research on rural entrepreneurship takes place in Europe, suggesting that the US is not paying attention to it. Acs and Malecki (2003) contend that compared to Europe, the US has little to no federal policy for rural small-to-medium-sized businesses. And state-level policy is inconsistent.

That said, rural areas face a number of unique tangible and intangible assets that bolster economic development strategies. Advantages include the popular appeal of a rural lifestyle to some Americans, rural outdoor amenities, dispersed but highly mobile human resources, lower costs, and the possibility for technology (such as teleconferencing) to reduce or obviate the costs of additional infrastructure (MacKenzie, 1992).

Rural areas are more likely to have greater social capital, which redounds positively to their general adaptive capacity in the face of adversity. Social capital is mediated in part by bonding on the basis of homophily: shared religion, class, perspective, traditions, appearance (Aldrich & Meyer, 2015). As evidence of rural communities' considerable social capital and tendency toward adaptive cooperation, the North Carolina Rural Center reported that rural residents of NC donate disproportionately to their means, and that even economically distressed rural communities provide significant giving compared to urban counties in the state. The same report also notes large amounts of untapped wealth in the state's most rural counties and sets expectations for an unprecedentedly large "transfer of wealth" given the state's aging population (McGregor, Gray, & Matthews, 2009).

Finally, resilience scholarship demonstrates that while rural areas are on the whole less resilient than urban/suburban areas (Cutter et al., 2010; Kapucu, Hawkins, & Rivera, 2013), rural areas have superior "community resilience" (Cutter et al., 2016), as a function of their social capital. A good definition of "community resilience" is Aldrich's (2012): "the collective ability of a neighborhood or geographically defined area to deal with stressors and efficiently resume the rhythms of daily life through cooperation following shocks." Communities with greater levels of community capital or social capital, such as rural communities, harness said capital to support "community resilience" and recover faster from natural disasters—all other things being equal (Aldrich & Meyer, 2015).

Scholarship on rural economic development highlight the unique assets of rural areas and focuses on ways rural strategies seek to address the areas' institutional, financial, and policy weaknesses. Tools include top-down guidance, capacity-building and knowledge generation, higher-risk lending, interregional and inter-jurisdictional partnerships, and land use policy. Pender et al. (2012) provide an overarching summary of rural asset-based economic development frameworks and wealth-building strategies, which they position within the economic, institutional, policy context of rural areas. MacKenzie (1992) also focuses on fostering rural entrepreneurship as part of an integrated approach to overall economic development.

Reviewing case studies around the US, Miller (2014) summarizes three successful approaches: bottom-up, county-level planning mandated by the state; redefinition of planning, zoning, and building codes to reflect and support diversified, non-agricultural land use; and a combination of

[13] The one exception is that smaller loan amounts (< $100K) had the largest effect on small business growth in rural counties, suggesting that smaller loans (and even microfinance) could exert greater leverage in rural counties (Rupasingha & Wang, 2017).

bottom-up and top-down economic development guided by the state and implemented by a county government or regional actor. Miller's case study on Colorado's statewide economic development strategy "Colorado Blueprint" documents the lattermost strategy: Colorado delegated local public engagement, visioning, and planning obligations to the state's counties and held them to a tight schedule before rolling the county-level plans into regional plans and ultimately into one comprehensive state plan. (This process echoes North Carolina's process of preparing its 50 county-level resilient redevelopment plans as well as four regional resilient redevelopment plans after Hurricane Matthew, which I briefly touch upon in the final chapter as well as the *Appendix*.)

Evaluating the Kellogg Foundation's Entrepreneurial Development Systems (EDS) and the Appalachian Regional Commission's entrepreneurial development efforts, Goetz et al. (2010, p. 26) concluded that effective strategies leveraged local knowledge and expertise, recognized and supported local champions and leaders—or "Animators" (North & Smallbone, 2006)—created local and regional partnerships, fixated on new entrepreneurship development metrics beyond job creation (such as business profitability or numbers of youth contemplating entrepreneurship), increased popular understanding and appreciation of entrepreneurship (especially among youth), endorsed a statewide approach rather than a focused approach only on rural counties, and integrated entrepreneurship education into institutional spaces like colleges.

Drabenstott et al. (2003) at the Federal Reserve Bank at Kansas City call for entrepreneurship-oriented education and training, opportunities for business networking, expanded access to capital, greater focus on supporting business networks and clusters rather than individual firms, a prioritization of young firms with growth potential, and promoting entrepreneurship rates among targeted minority, women and youth populations. With regard to expanding access to capital, the authors mention Revolving Loan Funds (RLFs) as a means of expanding rural access to capital, cite the EDA's Public Works program as a means of improving business-adjacent infrastructure and real estate, and suggest new programs such as the SBA's New Markets Venture Capital Program and USDA's Rural Business Investment Program as potential solutions to the lack of venture capital in rural contexts.

In general, effective rural economic development tends to emphasize creating an enabling environment for entrepreneurship, linking disparate institutions around common development missions as a way of overriding the low administrative capacity of any one rural office, and expanding access to smaller amounts of credit using above-average subsidies to empower rural projects that involve greater levels of risk. In addition, effective rural economic development planning balances bottom-up self-determination with top-down guidance and policy tools. Inter-jurisdictional partnerships and credit access are key to driving economic development and business creation. Although all of these aspects of economic development are crucial to economic resilience, this thesis—in its focus on the immediate recovery of businesses after a disaster—focuses chiefly on credit accessibility and capital absorption capacity.

2.7 Conclusion

The exact supply of disaster relief capital and technical assistance to small businesses in North Carolina, as well as the proof of any specific supply gaps in the state, is best left to the empirical chapters that follow. However, existing literature readily suggests theories on the demand for and utilization of economic relief by disaster-affected businesses.

A theory of business vulnerability explains small business recovery likelihoods on the basis of exposure, sensitivity and adaptive capacity, which respectively explain why certain characteristics and conditions either foster or jeopardize business recovery. The proposed model of vulnerability explains why retail sector businesses, for instance, empirically fare worse post-disaster. Retail businesses are highly exposed as a function of "*asset exposure*": they have a high proportion of assets comprised by physical inventory, which might be destroyed by hazard impacts. They are also highly *sensitive* to impacts because they rely overwhelmingly on local customers (unless they also ship to geographically diverse areas that are untouched by a hazard), and those customers' demand for retail goods may sink post-disaster for all but the most essential goods. Retailers may have lower *adaptive capacity* if they are small, or if they must conduct all operations (sales, storage) onsite rather than remotely, or if they have lower profit margins (very probable in the case of retail). There are exceptions. In North Carolina, big box stores and Dollar Generals, for instance, withstood the Hurricanes and sometimes even performed abnormally well right after the disaster. These large, multi-establishment firms were insensitive to the impacts of the hurricanes, since the storms affected just a few of their stores. Furthermore, their enormous size and the diversity of their suppliers enabled greater adaptive capacity, and their essential goods—food, dry goods, etc.—enjoyed a spike in demand after homeowners ran out of personal supplies and could not use other local retail alternatives, which were likely still closed after the storm. Therefore, business variables—size, sector, market share and geography, etc.—exert counteracting influences on a business's success post-disaster in ways that can be somewhat explained by a theory of vulnerability.

Theoretical models of vulnerability bolstered by empirical evidence can extend to post-disaster small business financial decision-making, which is currently under-theorized. Businesses that are less exposed and less sensitive and that boast greater adaptive capacity in the event of a disaster are, for instance, more likely to possess relevant and sufficient insurance and less likely to require reliance on debt products, which can further stress a business operating on the margin. Likewise, highly exposed, sensitive businesses with reduced adaptive capacity—e.g. small retailers, small food and accommodations establishments, providers of discretionary services, etc.—should be less likely to have proper insurance, more likely to incur post-disaster debt, and more likely to close—if not immediately, then in the years after the disaster. Therefore, should any gap in the supply of economic relief exist, it mostly likely exists for these types of exposed, sensitive, low-capacity firms.

Finally, the speed and accessibility of emergency capital—grants, debt, and perhaps non-monetary technical assistance—after a disaster both reflect and foster an area's level of economic development and economic resilience. This "capital absorption capacity" often hinges on the number of, quality of, or partnerships between financial and community institutions. Places with truly high capacity for capital absorption will distribute such capital (1) quickly, before some businesses must close their doors permanently or for extended periods of time, (2) fairly, recognizing that business owners who are most vulnerable—either as a function of asset exposure, market sensitivity, size, normal operating margins, or whatever variable—often need the greatest, fastest, and most flexible infusions of cash assistance after the waters recede, yet (3) responsibly, acknowledging that some businesses, even if they have inferior access to credit, are simply too weak or too risky to shoulder debt.

Subsequent chapters discuss the immediate impact of both Hurricane Matthew and Hurricane Florence on small businesses and regional economic performance in North Carolina, the multi-level supply of economic relief to small and large firms after the disaster, and the short and long term

operational and financial decisions and attitudes of sampled firms. The detailed description of impacts and responses in North Carolina serves as one of the first pieces of business-oriented disaster recovery scholarship that is specific to that region. Findings serve to corroborate or challenges theories discussed above and ultimately inform specific recommendations to the state of North Carolina in the final chapter.

CHAPTER 3—IMPACT

3.1 Introduction

Chapter 3 draws upon a variety of datasets, and some interviews, to outline the initial impacts of Hurricanes Matthew and Florence on businesses. The chapter begins by providing various, new explanations and visualizations of the extent of economic damage after each storm. Means of measuring and representing business damage include measuring the potential number of businesses exposed to each storm, interpreting data from various primary survey sources, mapping longitudinal changes in unemployment by county over time, mapping and analyzing the spread of Small Business Administration (SBA) disaster debt after each storm, and speculating about business closure rates and reasons based on qualitative interviews. Among these methods, the visualization of unemployment changes per county and the visualization of SBA disaster debt per county and per sector are particularly innovative and revealing.

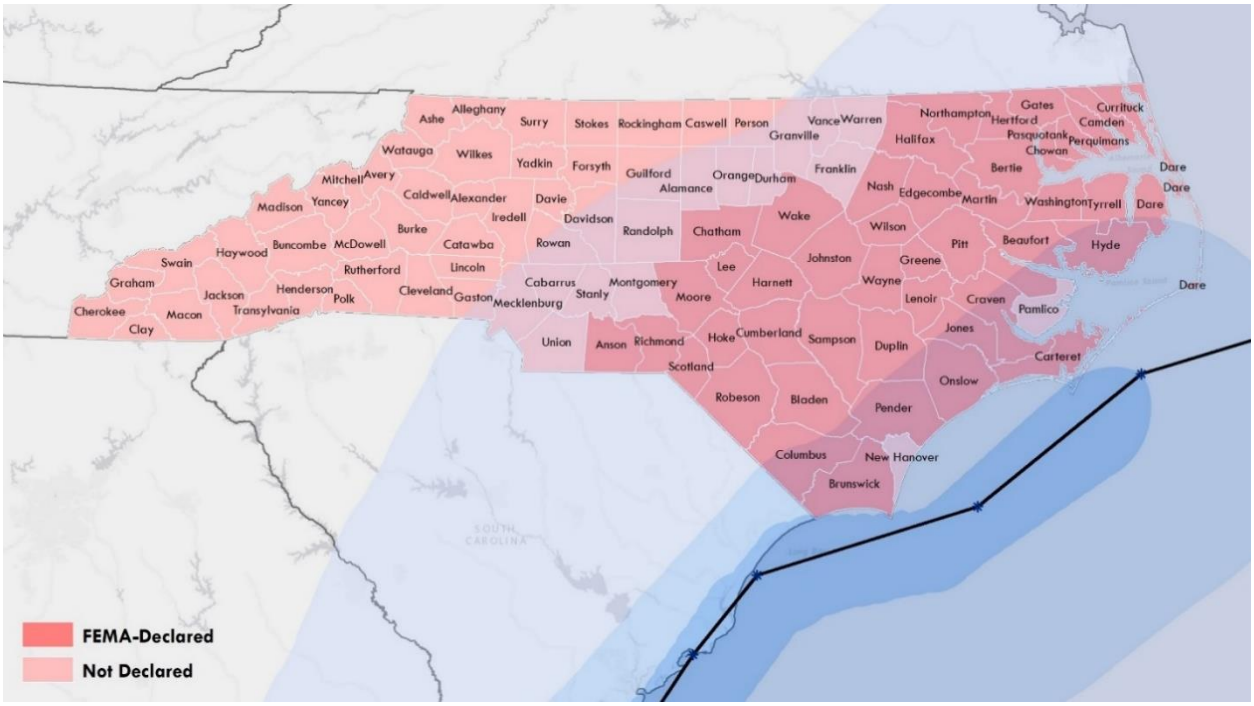
Analysis confirms that business damages generally concentrated around towns adjacent to major rivers in the state. Survey data and SBA loan denial rates confirm that substantial unmet need for capital still exists among NC businesses affected by the hurricanes. A comparison of debt patterns in the aftermaths of Matthew and Florence reveals that Florence disproportionately struck coastal areas, which tended to be wealthier than inland rural areas, a discrepancy that had meaningful implications for how Community Development Financial Institutions (CDFIs) and other post-disaster active institutions directed their outreach after each event. Finally, analysis of survey data, debt, and speculated closures consistently confirm that businesses theorized to have greater asset exposure, less adaptive capacity, and greater sensitivity to flooding hazards fared worse after the disaster. These more vulnerable firms were more likely to take on debt and in some cases took on disproportionately greater amounts of debt than that assumed by otherwise comparable firms.

A comprehensive review of various federal, state and private aid systems is available at the top of Chapter 4 (*Section 4.2*), but I include a précis at the head of this chapter in order to contextualize the data to come. After a presidentially declared disaster, the Federal Emergency Management Agency (FEMA) is typically first to declare individual counties as eligible for federal disaster assistance. To determine business aid, the SBA typically follows FEMA's declarations, but it makes distinctions based on counties' level of disaster exposure. The SBA mainly authorizes two types of loans after a disaster: physical injury disaster loans, which finance damage to physical inventory and fixed assets including equipment and real estate, and economic injury disaster loans (EIDLs), which finance a business's loss of revenue needed to support working capital. The SBA authorizes both physical and economic injury loans for counties it deems most directly affected by the disaster, and it authorizes only EIDLs for "contiguous" counties that might have been indirectly affected. Beyond SBA financing, HUD occasionally allocates states or communities large amounts of federal recovery money in the form of Community Development Block Grant—Disaster Recovery (CDBG-DR) funding. CDBG-DR funding typically arrives after particularly devastating disasters and flows at the behest of congressional approval; in this way, it is more *ad hoc* than FEMA/SBA procedures, but there are also fewer limitations on its use by state and local sub-recipients.

3.2 Landfall Narrative and Disaster Declarations

3.2.1 Hurricane Matthew

Figure 20: FEMA disaster-declared counties in North Carolina after Hurricane Matthew (2016)



Sources: FEMA (2016), NOAA NHC (2016)

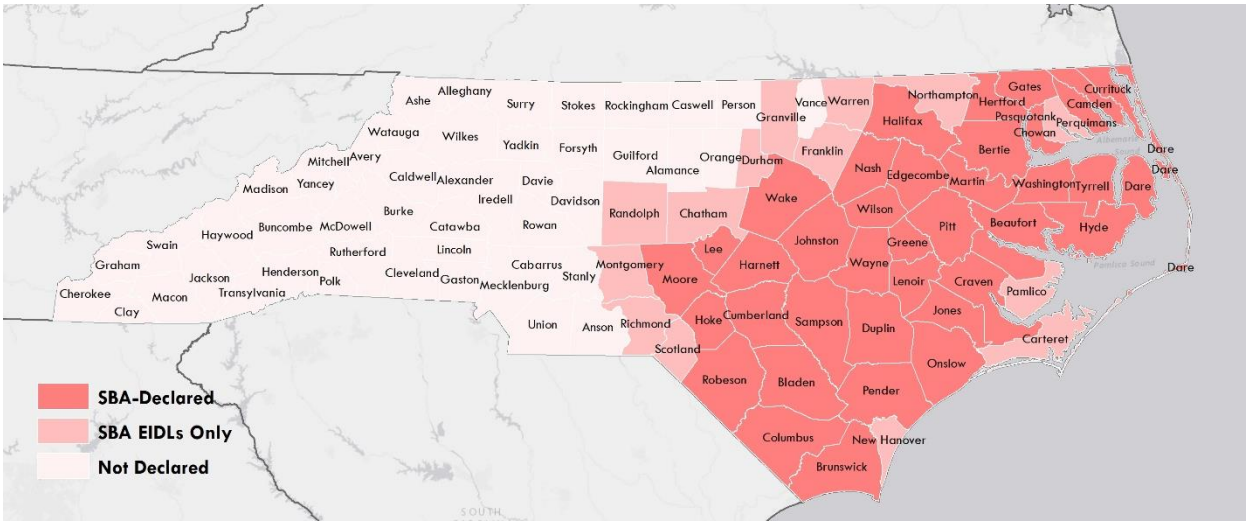
Hurricane Matthew made landfall in South Carolina as a category 1 storm and moved northward along the coast of North Carolina, producing torrential rainfall over eastern NC over the weekend of October 8th, 2016. Gauges in NC's southeastern coastal plains recorded as much as a foot and half of rain, sometimes more, over 2-3 days. Approximately 19" of rainfall was recorded near Evergreen in Columbus County, 17" of rainfall near Hope Mills (south of Fayetteville) in Cumberland County. Storm surges swept into coastal counties—chiefly Dare County and Carteret County—with 2' to 4' of water. In North Carolina, the storm killed at least 25 people, caused at least $1.5 billion in property damage to 100,000 buildings, and cut off power for 900,000 people. Matthew's rains flooded rivers throughout NC's coastal plains, overfilling the Cape Fear, Cashie, Black, Lumber, Tar, Neuse, and other rivers and creeks (Stewart, 2017). A presidential disaster declaration declared 45 counties eligible for FEMA assistance (See **Figure 20**).[14]

The state estimated over 300,000 businesses sustained physical or economic impacts, "including many small 'mom and pop' businesses located in small rural communities" (NC DOC, 2019). The Small Business Administration (SBA), which makes separate disaster designations, ultimately

[14] **FEMA Matthew-declared counties:** Anson, Beaufort, Bertie, Bladen, Brunswick, Camden, Carteret, Chatham, Chowan, Columbus, Craven, Cumberland, Currituck, Dare, Duplin, Edgecombe, Gates, Greene, Halifax, Harnett, Hertford, Hoke, Hyde, Johnston, Jones, Lee, Lenoir, Martin, Moore, Nash, Northampton, Onslow, Pasquotank, Pender, Perquimans, Pitt, Richmond, Robeson, Sampson, Scotland, Tyrrell, Wake, Washington, Wayne, and Wilson Counties.

designated 55 Hurricane Matthew disaster counties in NC: 34 counties were eligible for both physical injury and economic injury loans, while 21 counties were eligible only for economic injury loans (**Figure 21**) (SBA, 2016a).[15]

Figure 21: SBA disaster declarations in North Carolina after Hurricane Matthew (2016)



SOURCE: (SBA, 2016a)

North Carolina's CDBG-DR Action Plan, first published in April 2017, acknowledged Cumberland, Edgecombe, Robeson, and Wayne Counties as "most impacted" and named 17 additional counties as "Tier 2" (NC DOC, 2019).[16] 80% of funds are dedicated to Tier 1 most-impacted counties (NC REDD DOC, 2019b).

Matthew's impacts were widely regarded as a "surprise" by among forecasters and the greater population (Bidgood, Blinder, & Katz, 2017). And the greatest rainfall and wind effects disproportionately impacted some of North Carolina's poorest counties (CDC, 2018), which are concentrated in the coastal plains in the eastern region of the state. Among the hardest hit were Robeson County, with the 3rd highest poverty rate in the state according to American Community Survey (ACS) 2013-2017 series data, and Columbus County, with the 13th highest. (See **Figure 22** and **Figure 23** for NC counties by median income and percentage of families in poverty.)

[15] **SBA Matthew-declared counties eligible for all loans:** Beaufort, Bertie, Bladen, Brunswick, Camden, Chowan, Columbus, Craven, Cumberland, Currituck, Dare, Duplin, Edgecombe, Gates, Greene, Halifax, Harnett, Hertford, Hoke, Hyde, Johnston, Jones, Lee, Lenoir, Martin, Moore, Nash, Onslow, Pasquotank, Pender, Pitt, Robeson, Sampson, Tyrrell, Wake, Washington, Wayne and Wilson Counties.
SBA Matthew-declared contiguous counties eligible for economic injury loans only: Carteret, Chatham, Durham, Franklin, Granville, Montgomery, New Hanover, Northampton, Pamlico, Perquimans, Randolph, Richmond, Scotland and Warren Counties.
In South Carolina, Dillon, Horry and Marlboro Counties were eligible for economic injury loans, as were Chesapeake City, Southampton, Suffolk City, Virginia Beach in **Virginia**.

[16] **Matthew CDBG-DR Tier I counties**: Cumberland, Edgecombe, Robeson, Wayne. **Matthew CDBG-DR Tier II counties**: Beaufort, Bertie, Bladen, Carteret, Columbus, Craven, Duplin, Greene, Hyde, Jones, Lenoir, Martin, Nash, Pamlico, Pitt, Tyrrell, Wilson.

Figure 22: North Carolina median income by county (ACS, 2013-2017)

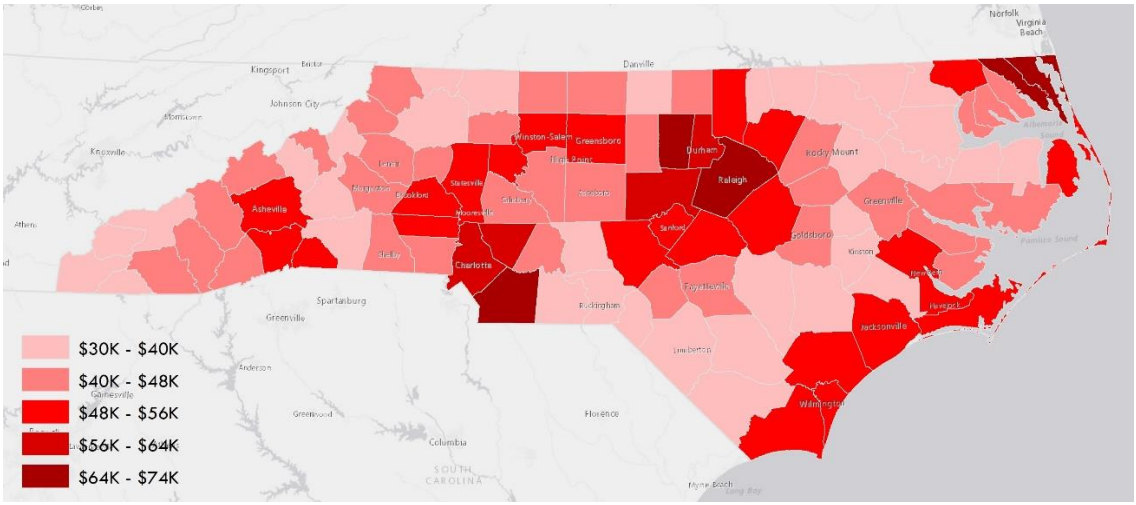
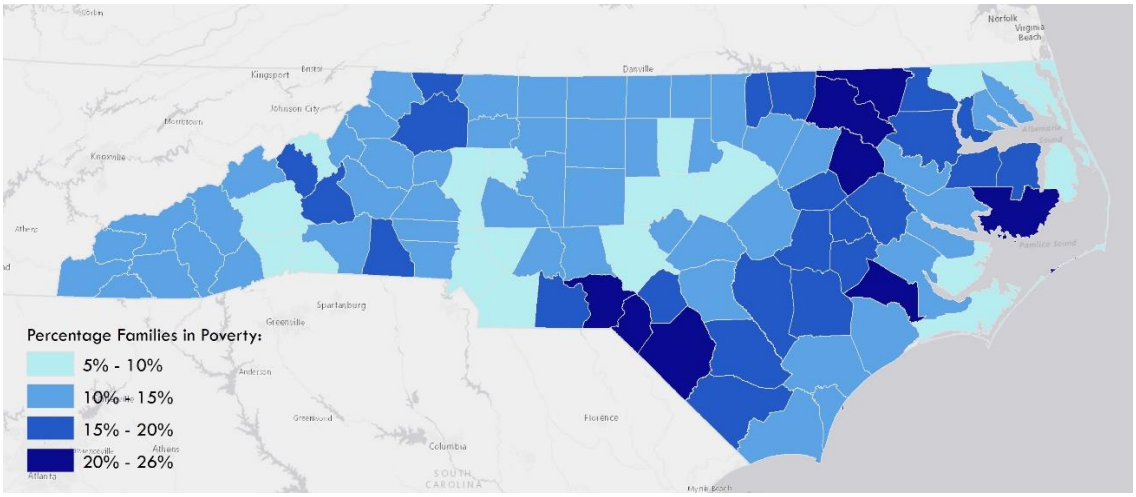
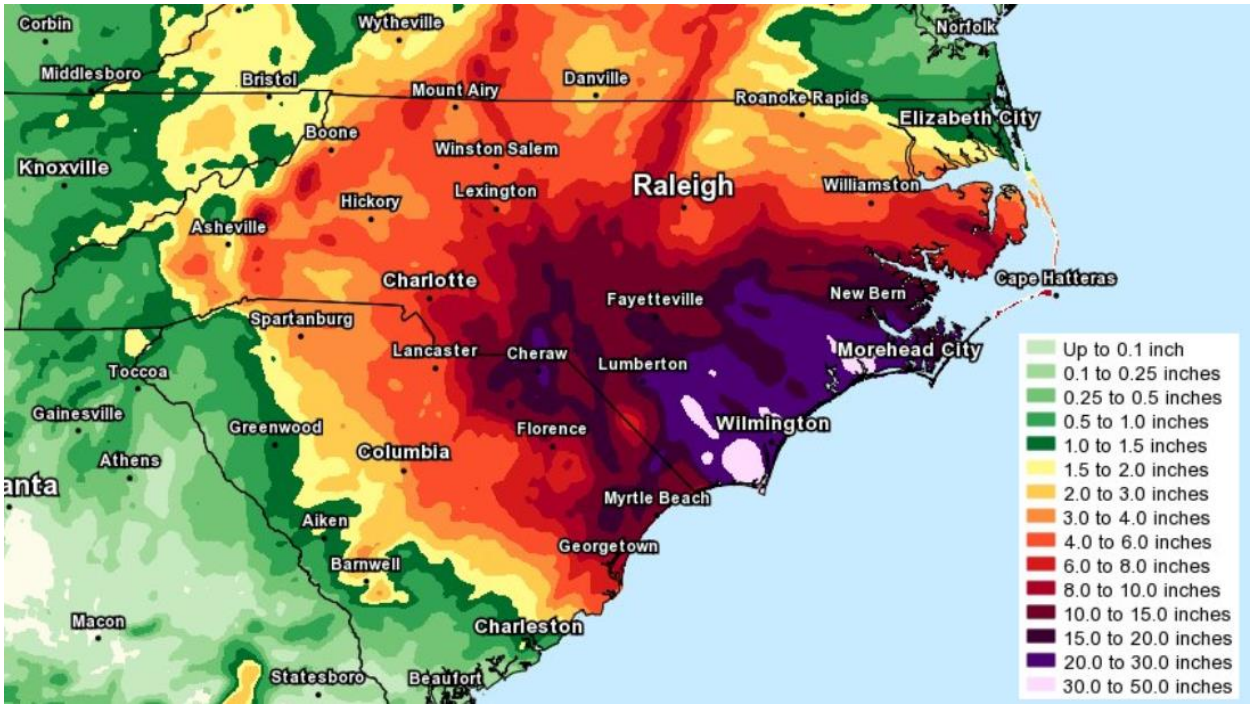


Figure 23: North Carolina percentage of families in poverty by county (ACS, 2013-2017)



3.2.2 Hurricane Florence

Figure 24: Rainfall estimates from Hurricane Florence, produced by NWS Eastern Region HQ.



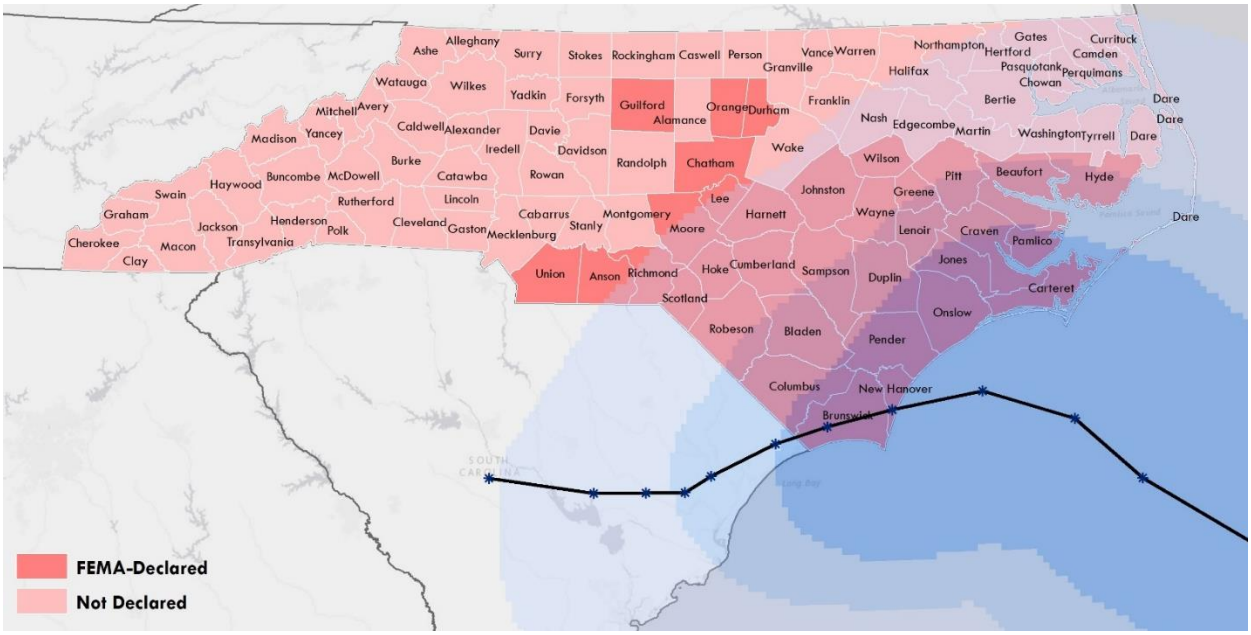
SOURCE: National Weather Service (NWS) Eastern Region Headquarters (NOAA, 2019)

Less than two years after Hurricane Matthew, Hurricane Florence made landfall as a category 1 storm on Wrightsville Beach, NC near Wilmington on Friday, September 14th, 2018, shellacking most of the state's coastline with worse storm surges than Matthew's and dumping record-breaking rainfall across the southeast coastal plains region (see **Figure 24**). Record-level flooding also occurred along the Cape Fear, Northeast Cape Fear, Lumberton, and Waccamaw Rivers, among others (NOAA, 2019). Rather unusually, Florence stalled in southeastern-most area of the country over the weekend, deluging Brunswick, New Hanover and Pender counties while giving the rest of the state a longer time to prepare for the storm. Rainfall as high as 36" was recorded in Bladen County, as well as 30-34 inches reported in Onslow County (Davis, 2018). North Carolina reported 42 fatalities and over 5,000 rescues (NOAA, 2019). Many areas flooded by Matthew—Whiteville, Fair Bluff, Lumberton—again sustained heavy damage and flooding.

In a report released less than a month after the storm, North Carolina's Office of the Governor that Hurricane Florence caused over $3.1 billion in housing damage and over $2.3 billion in agricultural damage. Governor Cooper's office estimated that 3,800 businesses sustained water damage, amounting to $754 million in lost or damaged fixed assets (real estate and equipment) and implying an economic loss of nearly $3.9 billion (NC Office of the Governor, 2018).

A presidential disaster declaration rendered 34 counties eligible for FEMA assistance (**Figure 25**),[17] and the SBA ultimately declared 52 counties eligible for Florence disaster loans: 38 eligible for both loans, 14 eligible only for economic injury loans (**Figure 26**) (SBA, 2018a).[18]

Figure 25: FEMA disaster-declared counties in North Carolina after Hurricane Florence (2018)



SOURCES: FEMA (2018), NOAA NHC (2018)

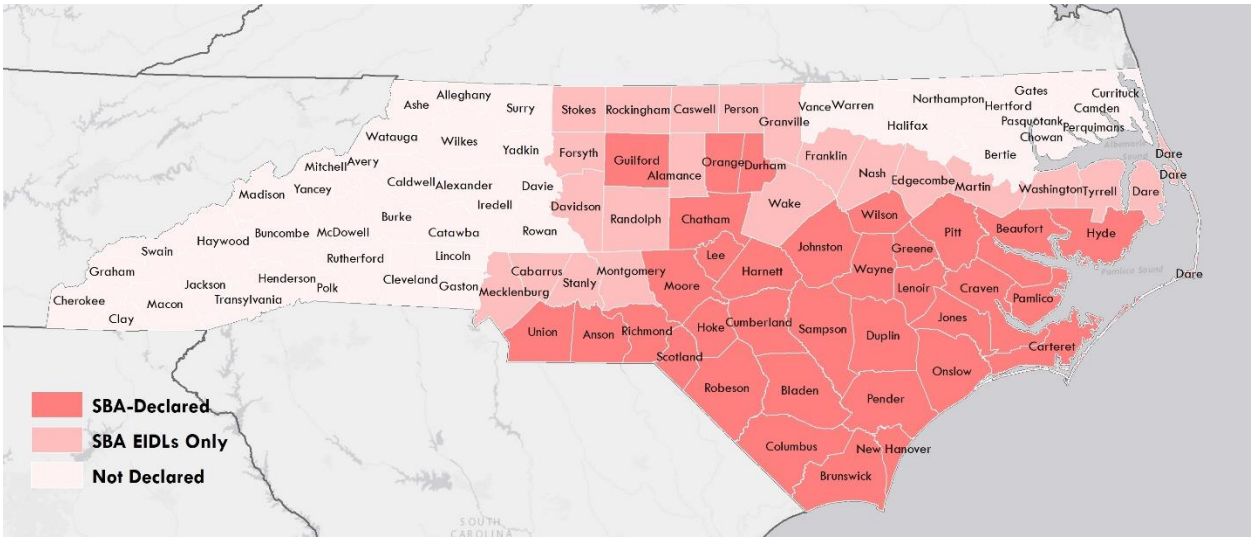
Activity regarding Florence-related HUD CDBG-DR dollars remains unclear as of time of writing. The third substantial amendment to NC's CDBG-DR Action Plan for Matthew recovery, published January 2019, did acknowledge selective funding cap increases in light of additional damages from Hurricane Florence (NC DOC, 2019, p. 50). However, North Carolina has not issued a separate Action Plan for CDBG-DR monies from Florence, and HUD has not yet delivered the $1.68 billion in CDBG-DR funding authorized October 2018 by Congress for states affected by Florence. The delayed issuance may be related to the 35-day 2018-2019 government shutdown, per a January 2019 letter to President Trump from governor Roy Cooper (Cooper, 2019).

---

[17] **FEMA Florence-declared counties:** Anson, Beaufort, Bladen, Brunswick, Carteret, Chatham, Columbus, Craven, Cumberland, Duplin, Durham, Greene, Guilford, Harnett, Hoke, Hyde, Johnston, Jones, Lee, Lenoir, Moore, New Hanover, Onslow, Orange, Pamlico, Pender, Pitt, Richmond, Robeson, Sampson, Scotland, Union, Wayne, and Wilson counties.

[18] **SBA disaster-declared counties in NC:** Anson, Beaufort, Bladen, Brunswick, Carteret, Chatham, Columbus, Craven, Cumberland, Duplin, Durham, Greene, Guilford, Harnett, Hoke, Hyde, Johnston, Jones, Lee, Lenoir, Moore, New Hanover, Onslow, Orange, Pamlico, Pender, Pitt, Richmond, Robeson, Sampson, Scotland, Union, Wayne, and Wilson Counties.
SBA disaster-declared "contiguous" counties eligible for economic injury loans: Alamance, Cabarrus, Caswell, Dare, Davidson, Edgecombe, Forsyth, Franklin, Granville, Martin, Mecklenburg, Montgomery, Nash, Person, Randolph, Rockingham, Stanly, Stokes, Tyrrell, Wake, and Washington Counties.
In South Carolina, Chesterfield, Darlington, Dillon, Florence, Georgetown, Horry, Marion, Marlboro Counties were eligible for both loan types, while Berkeley, Charleston, Chesterfield, Clarendon, Dillon, Horry, Kershaw, Lancaster, Lee, Marlboro, Sumter, Williamsburg Counties were eligible only for economic injury loans.

Figure 26: SBA disaster declarations in North Carolina after Hurricane Florence (2018)



SOURCE: (SBA, 2018a)

Unlike Matthew, the brunt of the Florence hit both low *and* high-income counties, which ultimately had implications in terms of the geography, number and nature of businesses that ultimately applied for loans from the SBA and state's various CDFIs. And unlike Matthew, Florence was relatively well forecasted (Davis, 2018), and its weekend stall gave most North Carolinians outside the worst-affected counties slightly more time to prepare.

3.3 Business Existing Conditions

Secondary data and survey datasets allow high-level, order-of-magnitude assessments of the number of businesses impacted by the hurricanes in North Carolina, but with limitations.

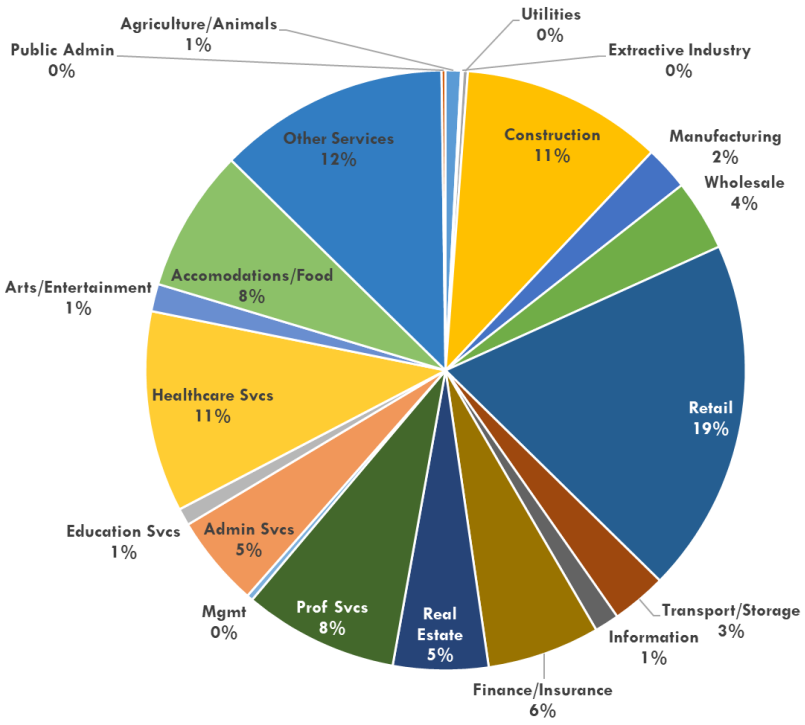
Using the U.S. Census's County Business Patterns (CBP) dataset for 2016 allows a high-level sketch of "existing conditions" as of the April before Hurricane Matthew. 75,814 establishments (including self-employed/incorporated freelancers as well as firms with more than one establishment) existed within the 38 counties that were eligible for both physical and economic injury loans from the SBA. 64,428 of these establishments, or 85% of the total, employed fewer than 20 people.[19] A survey by the NC Department of Commerce Labor and Economic Analysis Division (DOC LEAD) used a sample with the same proportion of small businesses (NC DOC LEAD, 2017a).

Among those potentially affected businesses that employ 1-19 people—henceforth "Very Small Businesses" or VSBs—the representation among high-level market sectors (defined by 2-digit NAICS codes) is essentially the same as that of all business classes across all of North Carolina (**Figure 27**). According to the literature, at least three sectors—retail; accommodations and food; arts, entertainment, and recreation—are uniquely vulnerable to disasters due to their lower *adaptive capacity*, greater asset *exposure*, and heightened *sensitivity* to post-disaster economic stresses.

[19] Wake County (home to Raleigh, the second-largest municipality in NC) alone contains over 56,600 establishments. Excluding Wake County, the numbers for the remaining counties remain similar. Out of 94,978 establishments potentially affected, 81,446 (86%) employed 1-19 people.

Factoring in agriculture as well, at least 28% of establishments within the disaster area (~18,000 establishments) are at highest risk for interruption or closure in the months and years post-disaster.

Figure 27: Market sector representation among NC VSBs in 38 physical/economic injury-eligible SBA Counties, Hurricane Matthew



SOURCE: U.S. Census County Business Patterns (2016)

Hurricane Florence struck too recently for comparable data to exist. CBP data for 2017, 2018 and 2019 remain unavailable. However, the Carolina Small Business Development Fund estimates that 48,851 employer firms (excluding self-employment) operated within the 27 counties most affected by Hurricane Florence.[20] 41,839 of these firms (86%) employed fewer than 20 people, and 95% employed fewer than 50 (McCall, 2018). The Fund's numbers for Florence largely echo the projections above for Matthew.

According to the North Carolina state extract of the Federal Reserve Bank's 2017 Small Business Credit Survey (SBCS)—provided by the FRB for this project—establishments in disaster-affected areas tended to be younger than establishments outside the disaster area, but they were otherwise similar in terms of variation in revenue size, owner race/ethnicity, and owner gender. Notably, 50% of surveyed establishments in a disaster area represented medium-to-high credit risk (on the basis of business or individual credit scores), whereas only 34% of non-disaster-area establishments represented such a high level of risk. And while only 28% of non-disaster-area establishments applied for financing in 2016, 41% of disaster area establishments did (FRB, 2019). That is,

[20] The Fund does not specify how it determined the 27 counties most affected by Florence, but its approach appears to be more conservative than the one utilized here for businesses after Hurricane Matthew, which selected FEMA disaster-declared counties excluding SBA "contiguous" counties only eligible for EIDLs.

establishments in disaster-declared areas were generally less creditworthy to begin with, yet simultaneously experienced greater demand for debt likely due to the effects of the disasters.

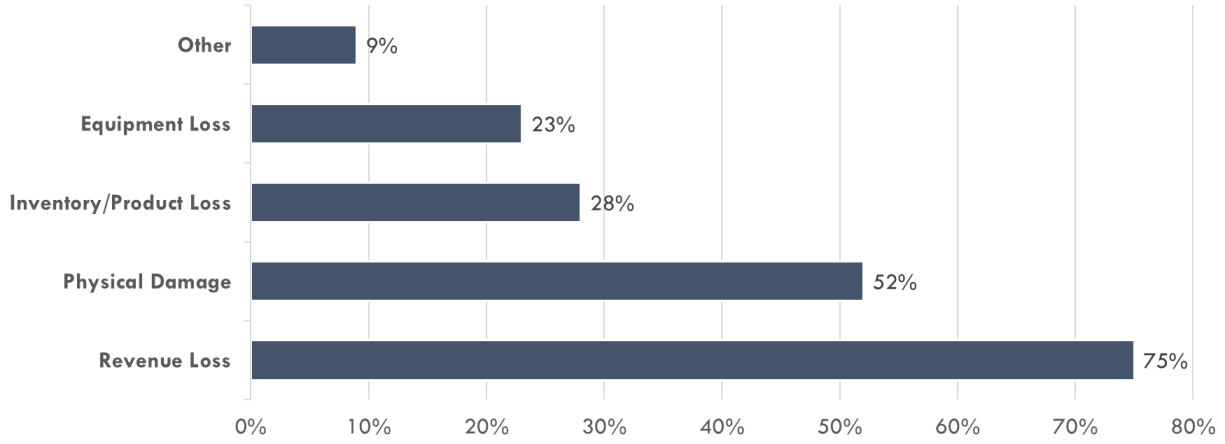
3.4 Business Damage Assessment

Of those businesses potentially exposed to Matthew, a fraction of them sustained damages. The SBCS 2017 NC extract finds that 16% of NC small business respondents located in a FEMA-designated disaster area sustained natural disaster-related losses in 2016 (this includes all of the FEMA disaster declarations in NC in 2016) (FRB, 2019). According to the NC Department of Commerce Labor and Economic Analysis Division's 2017 Business Impact Survey—detailed results of which were provided by DOC LEAD for this project—45% of businesses surveyed "business damages or financial losses due to storm and aftermath" (NC DOC LEAD, 2017a). The SBCS extract had a sample size of 417 and focused on a larger swath of the state, whereas the DOC LEAD survey had a sample size of 835 and sampled the 28 most-affected counties (those counties where SBA applications amounted to 1% of total establishments). DOC LEAD's more extreme findings make sense, given its tighter geographic focus on the most affected areas.

Table 5: Reported damages from Hurricane Matthew (N=261)

Loss Type	% of Respondents	Median Loss	Mean Loss
Revenue	75%	$10,000	$45,000
Real Estate	52%	$6,000	$84,000
Inventory	28%	$5,000	$61,000
Equipment/Machinery	23%	$5,000	$31,000
Other Damages/Losses	9%	$10,000	$214,000
	Weighted averages:	*$14,070*	*$120,900*

Figure 28: Prevalence of losses among all surveyed storm-affected businesses.



Adapted from NC DOC LEAD survey results (NC DOC LEAD, 2017b).

DOC LEAD found business damages tracked the original path of Hurricane Matthew, with Cumberland, Dare, Hyde, Lenoir, and Robeson counties sustaining the most business damage. The majority of damaged businesses cited revenue losses as well as physical damage, while fewer cited loss of inventory or loss of equipment (See **Table 5** and **Figure 28**) (NC DOC LEAD, 2017a).

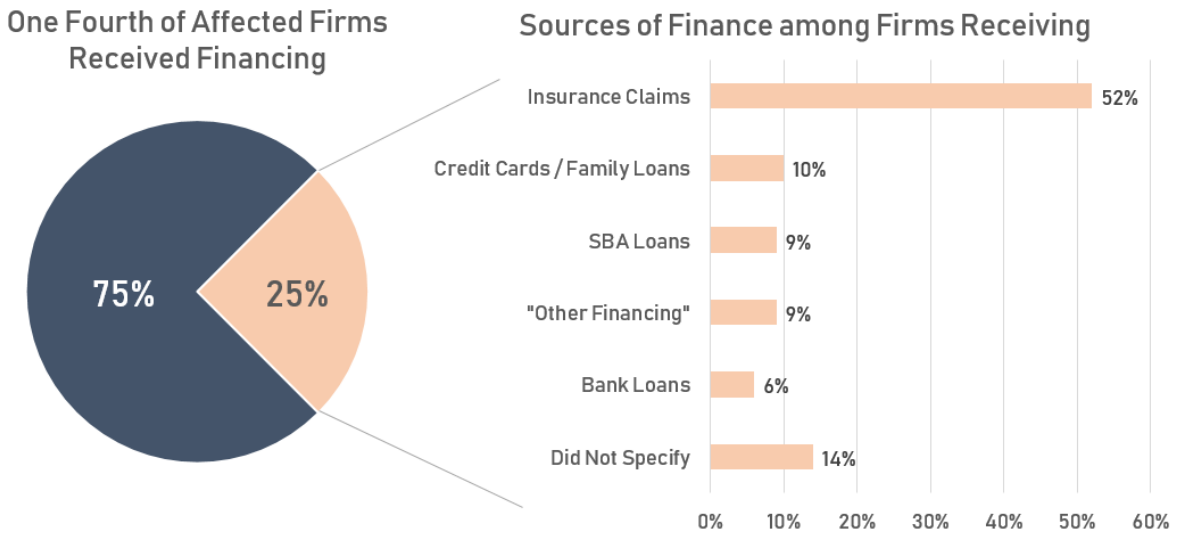
To be more specific than the county level, the greatest flooding—and by extension the worst damage and disruption—occurred close along the branching rivers and streams threading the state's coastal plains. Unsurprisingly, businesses situated closer to rivers and creeks suffered greater *exposure* to flooding after Hurricanes Matthew and Florence, and they were more vulnerable as a function of this exposure. Indeed, many affected businesses interviewed could actually name the river, creek or ditch that ran nearby or even directly adjacent to their establishment property.

By May 2017, only 25% of Matthew-damaged businesses (91 out of 365) reported receipt of financial assistance, and that fraction of businesses drew upon a variety of sources:

Table 6: Reported sources of financial assistance after Hurricane Matthew (N~91)

	% of Respondents	Median Proceeds	Mean Proceeds
Insurance Claims	52%	$12,000	$150,000
Credit Cards / Family Loans	10%	$10,000	$9,000
SBA Loans	9%	$31,000	$78,000
"Other Financing"	9%	$25,000	$68,000
Bank Loans	6%	$20,000	$24,000

Figure 29: Reported sources of financial assistance after Hurricane Matthew (N~91)

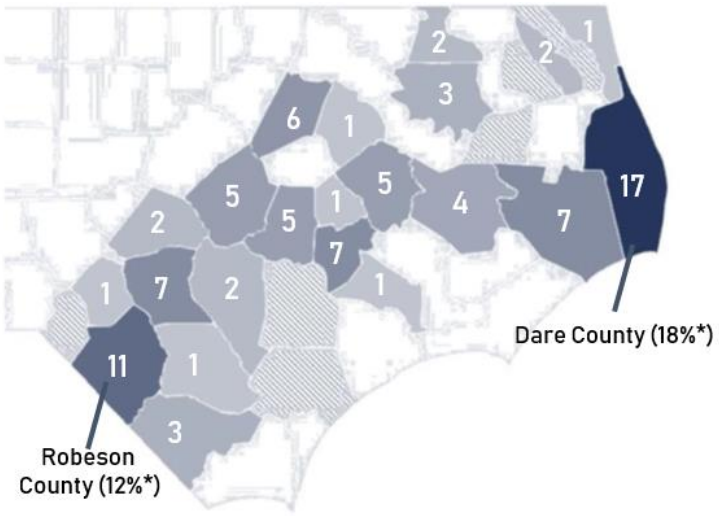


Adapted from NC DOC LEAD survey results (NC DOC LEAD, 2017b).

Insurance claims—presumably a combination of NFIP claims and commercial business interruption claims—constituted the majority of business financial assistance. Fortunately, for the statistically average insured business with weighted average losses of $150,000, average insurance proceeds (~$150,000) might have been sufficient to cover all losses. In other cases, insurance payouts might have been *in*sufficient to cover losses, in which case businesses still had to resort to capital reserves or debt to fully return to baseline. And presumably, among the 75% of businesses that did not claim financial assistance after the disaster, there was some subset that sustained enough damage to have to liquidate capital reserves or personal savings to finance recovery.

According to NC DOC LEAD's survey, 30% of damaged establishments (94 businesses) reported ongoing business challenges nine months after Hurricane Matthew, most often citing the repair of physical damage, reestablishment of business with customers, and access to financing as chief operating challenges. Notably, these still-struggling businesses were more likely to have received assistance (40% of them received some form of financial assistance), with an impressive 83% of them receiving insurance claims. The primacy of insurance payouts, and the geographic distribution of these still struggling establishments (**Figure 30**), unsurprisingly suggest that businesses located in hardest-hit areas were most likely to be struggling nine months later. Finally, retail trade, accommodation and food, health care and social assistance, and agriculture sectors were overrepresented (at 57%) among the 94 establishments that were still struggling nine months post-Matthew (NC DOC LEAD, 2017a). These market sectors correspond to those sectors highlighted in prior literature as most vulnerable to natural hazards due to their higher sensitivity and lower adaptive capacity.

Figure 30: Geographic distribution of businesses "still struggling" 9 months after Matthew.



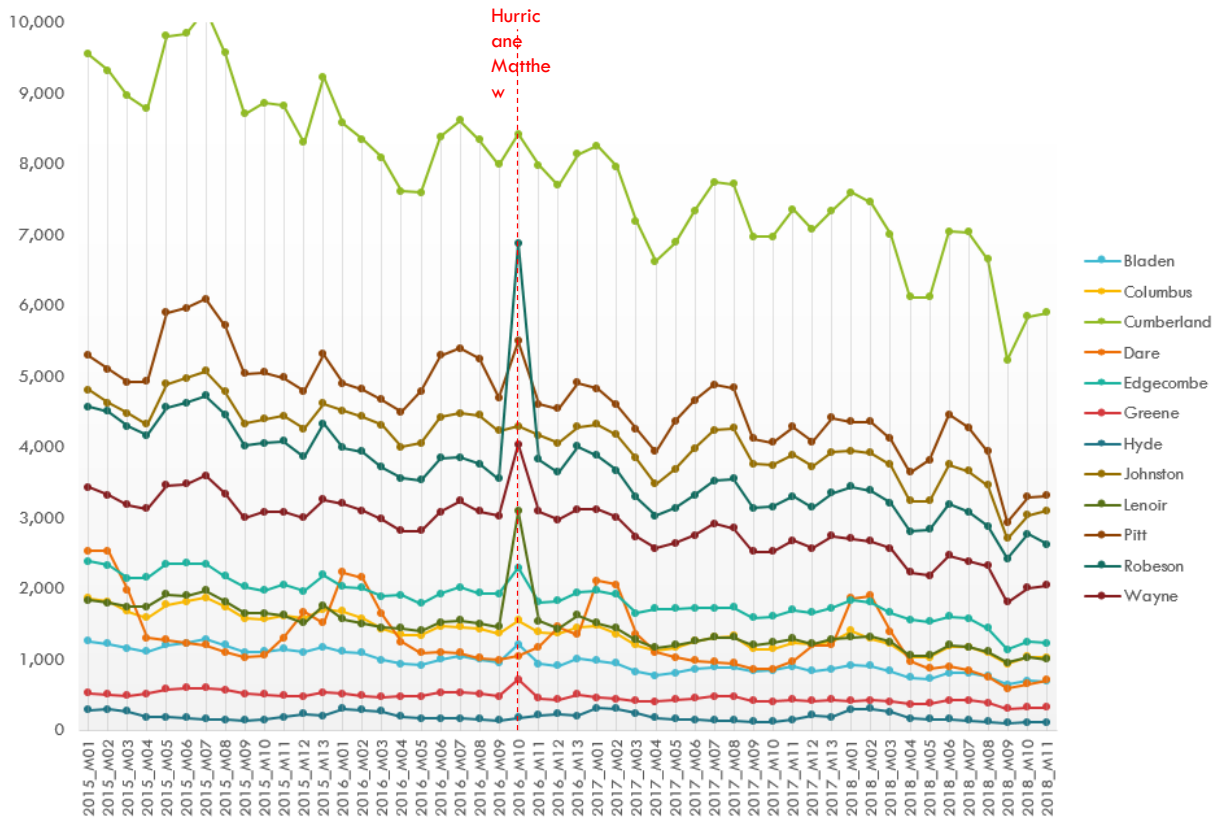
Adapted from NC DOC LEAD survey results (NC DOC LEAD, 2017b).

3.5 Business Labor Impact

A lack of accessible, granular, periodic data on establishments before and after the storm prevents a rigorous longitudinal analysis on the storms' impact on businesses over time. However, monthly and quarterly data from the Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) and Local Area Unemployment Statistics (LAUS) data series enable variables such as period-to-period employment and wages to serve as crude indicators of business disruption.[21]

[21]The analysis of post-disaster unemployment patterns was inspired by the DC DOC LEAD, which tweeted a simplified unemployment chart post-Matthew for Robeson and Lenoir Counties (NC DOC LEAD, 2018). I also discussed the approach with Jeff DeBellis, the LEAD's Director of Economic and Policy Analysis.

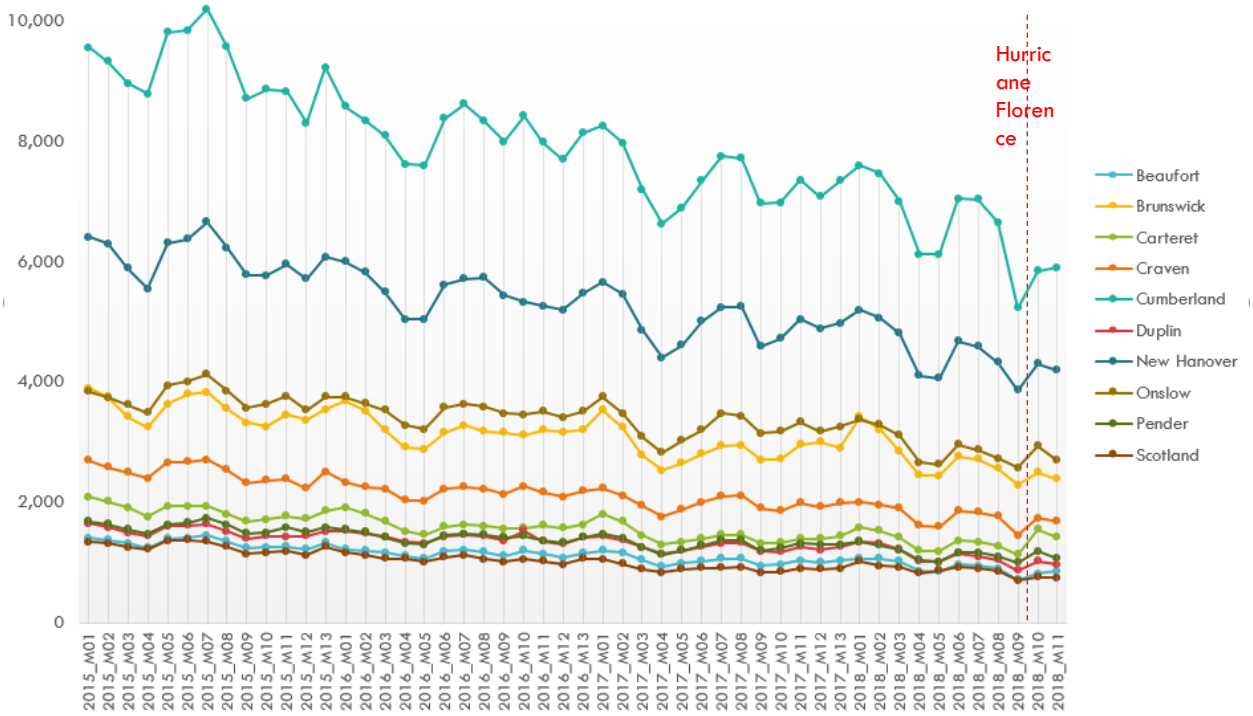
Figure 31: Monthly unemployed figures 2015-2018 among 10 counties most disaster-indebted by Matthew



SOURCE: BLS Local Area Unemployment Statistics (LAUS) (2015-2018)
NOTE: LAUS data not seasonally adjusted

Hurricane Matthew spiked unemployment numbers, for only one month, in several counties. The number of unemployed residents of Robeson County and Lenoir County both doubled (94% and 111% increases, respectively), while unemployment increased 50% in Greene County and 34% in Wayne County. Unemployment may have also slightly spiked in Pitt, Edgecombe, and Bladen counties, although these counties' data are noisier (See **Figure 31**). In general, however, Matthew did not exert noticeable, long-lasting effects that are visible in secondary data. QCEW quarterly wages would be hypothesized to increase after a disaster, since lower-wage jobs disproportionately concentrated in the most vulnerable sectors are temporarily or permanently snuffed out (Garber et al., 2006). In theory, establishment counts could also be expected to stagnate or decrease. But neither quarterly wages nor quarterly establishment counts exhibited exceptional patterns around or after the impacts of Hurricane Matthew. Overall, unemployment generally decreased, across sampled counties, as a result of continued economic growth nationwide.

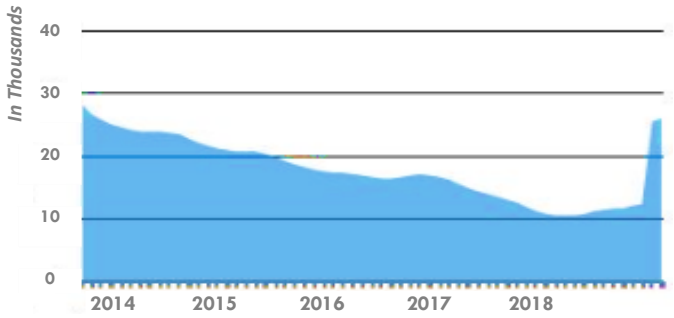
Figure 32: Monthly unemployed figures 2015-2018 among 10 counties most disaster-indebted by Florence



SOURCE: BLS Local Area Unemployment Statistics (LAUS) (2015-2018)
NOTE: LAUS data not seasonally adjusted

Although Florence was a stronger, more damaging storm, economic impacts remain provisional and uncertain. LAUS data does not exhibit a spike in unemployment in the 10 counties most indebted by Hurricane Florence after Florence struck (See **Figure 32**), nor does it show anything extraordinary in those counties that were initially worst-affected by Matthew (revisit **Figure 31**). However, NC DOC reported a steep statewide increase in initial unemployment insurance claims at the very end of 2018 (see **Figure 33**), "which appears to be due, at least in part, to the Hurricane [Florence]" (LEAD, 2018). The disconnect between BLS data and Department of Labor (DOL) data could be due to the recentness of the storm.

Figure 33: NC statewide initial unemployment insurance claims (NC DOC LEAD, 2018)



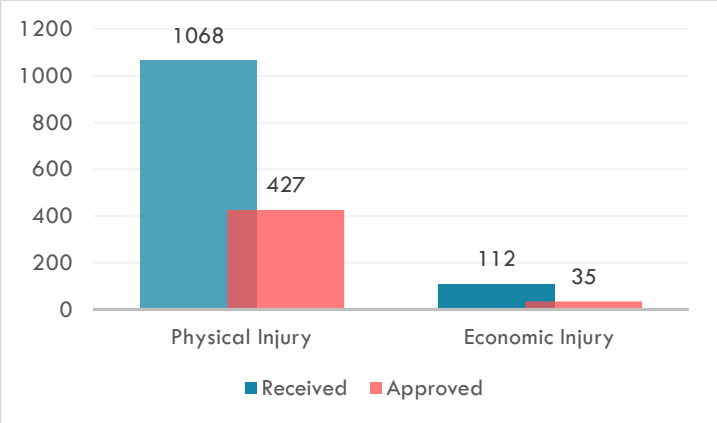
3.6 Debt Analysis

The following information originates from the SBA's response to a Freedom of Information Act Request and is current as of February 26, 2019 (SBA, 2019a, 2019b, 2019c). While SBA loan data for Hurricane Matthew is set in stone, EIDL loan amounts for Hurricane Florence are liable to have increased since time of writing, as Florence EIDL loans are available until July 2019.

3.6.1 Hurricane Matthew

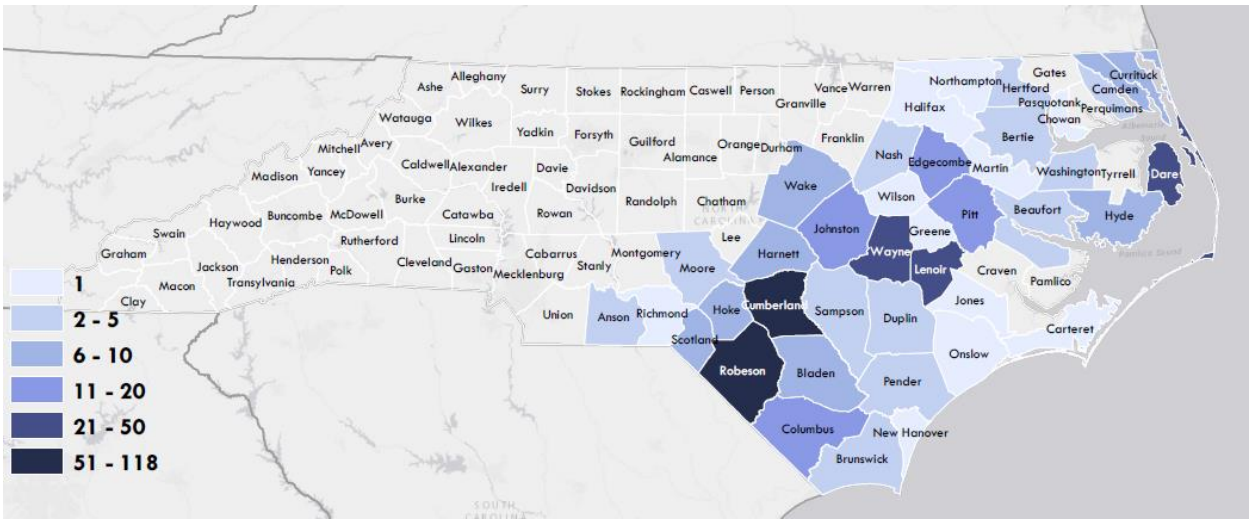
The Small Business Administration (SBA) ultimately designated 55 Hurricane Matthew disaster counties in NC: 34 counties were eligible for both physical injury and economic injury loans, while 21 counties were eligible only for economic injury loans (SBA, 2016a). In total, the SBA received 1,180 Matthew disaster loan applications—1,068 for physical injury and 112 for economic injury—and approved 462—427 physical, 35 economic—for an overall approval rate of 39% (See **Figure 34**).

Figure 34: SBA loan applications received, approved statewide (Matthew, 2016-2017)



The distribution of loans—in terms of number of loans and total dollar amounts originated—largely tracks the path of worst flooding, with Cumberland, Robeson, Wayne, Dare, Johnston, Lenoir, Edgecombe, Columbus, Greene, Hyde, and Pitt counties ranking top 12 with respect to number of loans originated (See **Figure 35**).

Figure 35: SBA Matthew disaster debt penetration: number of SBA disaster loans per county



SOURCE: (SBA, 2019a, 2019b)

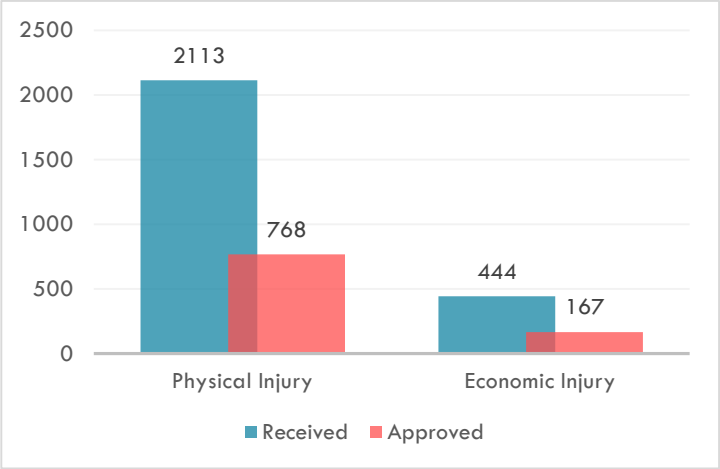
The SBA originated $31,245,200 in disaster loans for Matthew; the average physical injury loan was $73,000, and the average economic injury loan was $31,000. (The SBA did not disclose sufficient information to compute medians amounts for EIDL and physical loans.) Comparing these

averages to the mean physical asset/inventory losses in NC DOC LEAD's 2017 impact survey, it is clear the average loan was much lower than the average real estate loss ($84K), not even counting average inventory, equipment, machinery losses. Economic injury loans also tended to be less than reported average revenue losses ($45K). These numbers suggest, and subsequent interviews with small businesses confirm, that businesses used loans to patch up a portion of a "portfolio" of losses. Many businesses, especially uninsured ones, had to use multiple sources of capital at once in order to recover.

3.6.2 Hurricane Florence

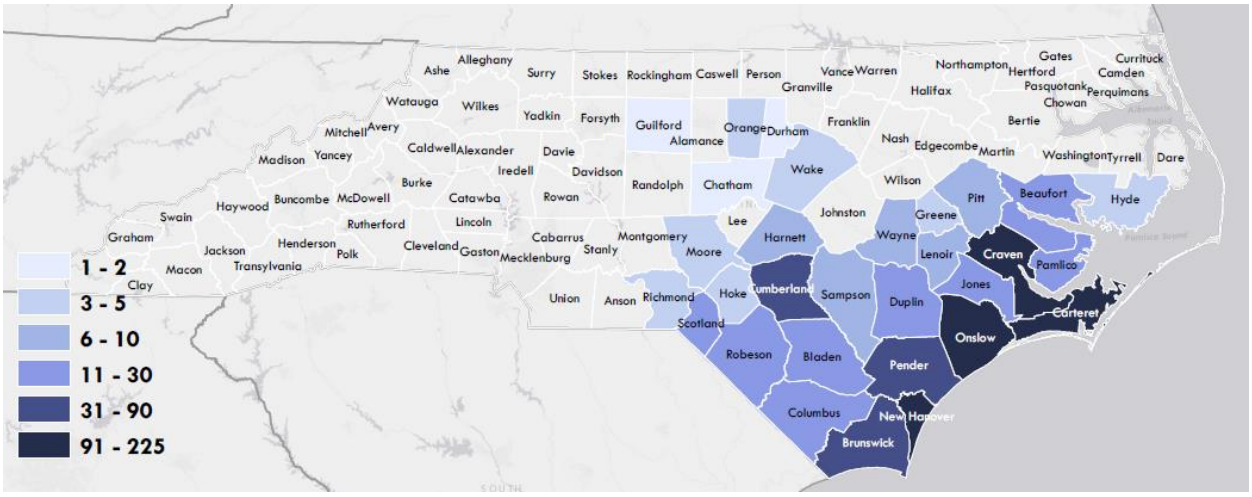
The SBA ultimately declared 52 counties eligible for Florence disaster loans: 38 eligible for both loans, 14 eligible only for economic injury loans (SBA, 2018a). In total, the SBA received 2,557 loan applications—2,113 physical injury, 444 economic injury—and approved 935—768 physical, 167 economic—for an overall approval rate of 37% (see **Figure 36**).

Figure 36: SBA loan applications received, approved statewide (Florence, 2018-2019)



The distribution of the number of loans originated per county reveals the distinct path of Hurricane Florence, which hovered over the southeaster-most corner of the state before continuing west (see **Figure 37**). The fact that larger, wealthier coastal population centers were affected—e.g. Wilmington in New Hanover County, Jacksonville in Onslow—at least partly explains the larger number of SBA disaster loans processed for Florence.

Figure 37: SBA Florence disaster debt penetration: number of SBA disaster loans per county.



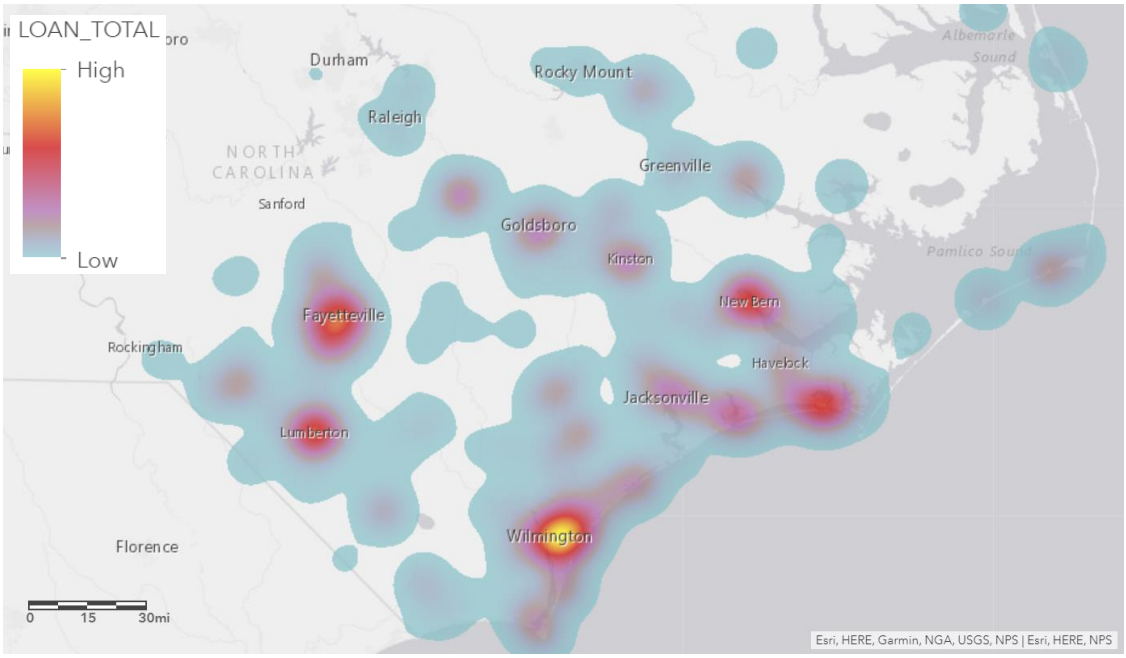
SOURCE: (SBA, 2019c)

The SBA originated, as of February 2019, $62,496,200 in loans, nearly twice the amount originated for Matthew two years before. The average physical injury loan was $70,000. The average economic injury loan was $54,000. In comparison to Matthew, the increased average economic injury attests to the fact that affected businesses tended to have higher sales and revenues due to their location in major, coastal population centers.

Barry Ryan, Vice President at the North Carolina Rural Center, confirmed that Florence-affected areas benefited from stronger economic prospects prior to the storm, which explains their greater (and faster) pursuit of recovery loan products compared to Matthew-affected communities. The pace of Hurricane Florence, which stalled over urbanized areas in southeastern-most North Carolina, before advancing to rest of the coastal plains, also manifested in the timing of loan applications from different kinds of business owners. The Rural Center observed an initial surge of applications from fairly affluent, primarily white and male business owners. As a result, the Center proactively reached out to non-white and woman-owned businesses to advertise the availability of their disaster recovery products, who did respond, but after a longer period of time.

Apart from the greater density and wealth of the counties that bore the brunt of Florence's rainfall and flooding, other factors likely drove greater numbers of businesses to apply for SBA loans. By fall 2018, businesses were probably more educated about disaster aid processes and thus more likely to attempt applying (although, given the negligible increase to SBA's loan approval rates after Florence, businesses were hardly more successful). It is also possible that twice-affected businesses were more likely to apply for loans the second time around, having exhausted business reserves or personal resources after Matthew. Unfortunately, because my interviews focused on businesses affected by Hurricane Matthew irrespective of their experiences during Florence, I cannot test this hypothesis.

Figure 38: Heat map of SBA disaster loans (by dollar amount) for Matthew and Florence

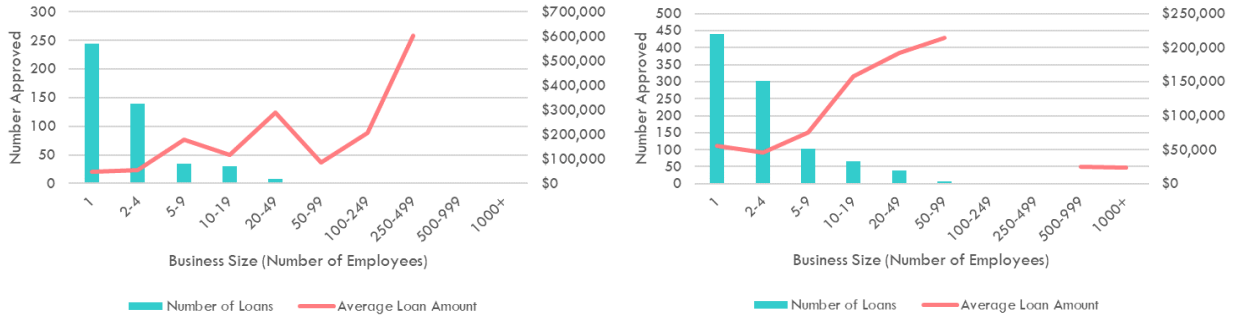


SOURCE: SBA FOIA 2019

3.6.3 Size Analysis

Analyzing debt by business size classes confirms that firms with fewer staff were more likely to apply for SBA disaster loans after both Hurricane Matthew and Hurricane Florence. However, larger firms tended to receive larger loans.[22]

Figure 39: Hurricanes Matthew, Florence SBA loan frequency and average loan size, aggregated by business size class



SOURCE: SBA FOIA 2019

In this sense, the SBA fulfilled its mandate to serve small business owners rather than large ones. Knowing that smaller businesses compose the overwhelming majority of total businesses in the disaster-affected areas of North Carolina (as discussed above), this conclusion seems uninteresting. However, very small businesses—especially "solopreneurs"—were *disproportionately* likely to receive SBA loans after the storms. Although firms employing 1-4 staff compose just over half of all businesses in the disaster affected area, they received nearly 80% of all SBA loans (see **Table 7**).

Table 7: SBA Matthew, Florence loan penetration by business size class versus number of businesses per size class

Size Class	SBA Loan %	Comp. All Business	Difference
1-4	79.3%	52.7%	**26.6%**
5-9	9.8%	18.9%	-9.2%
10-19	6.8%	13.0%	-6.2%
20-49	3.3%	9.6%	-6.3%
50-99	0.6%	3.3%	-2.8%
100-249	0.1%	1.7%	-1.6%
250-499	0.1%	0.4%	-0.4%
500-999	0.1%	0.2%	-0.1%
1000+	0.1%	0.2%	-0.1%

SOURCE: SBA FOIA 2019, US CBP (2016)

Therefore, SBA disaster loans appeared to be a disproportionately common source of post-disaster financing for microbusinesses and sole proprietorships in North Carolina after the storms. It is unclear

[22] All employee numbers are adjusted to include the owner as an employee. Therefore, a firm with one employee is a sole proprietorship or "solopreneur."

whether this is a result of SBA underwriting and approval preferences or the disproportionate vulnerability and financing needs of the smallest businesses. It is probably a combination of the two.

3.6.4 Sector Analysis

Analyzing debt by sector after the hurricanes provides mixed messages about business exposure and decision-making that requires careful interpretation. To start off, it is necessary to subset the data to scope. Real Estate and Rental and Leasing businesses (NAICS code 53) received nearly a majority of SBA approved loans—48% after Hurricane Matthew and 45% after Hurricane Florence (see **APPENDIX: Table 14**). The vast majority of these "establishments" (90%) are lessors of commercial and residential buildings, and thus lie outside the scope of this thesis. Therefore, subsequent analysis ignores NAICS-53 classified firms. After omitting lessors and landlords, the representation of sectors in the SBA's loan portfolio appears to validate previous theoretical and empirical findings about post-disaster business vulnerability (See **Table 8**).

Table 8: Hurricane Matthew, Florence SBA loans per sector versus number of firms per sector

Excluding 53: "Real Estate and Rental and Leasing"

NAICS	Sector Description	SBA Loans Originated	% SBA Loans	Biz. per Sector*	% Area Biz.	Difference
11	Agriculture, Forestry, Fishing, Hunting	35	4.65%	424	0.46%	4.19%
21	Extractive Industry	0	0.00%	77	0.08%	-0.08%
22	Utilities	0	0.00%	263	0.29%	-0.29%
23	Construction	43	5.71%	9,504	10.37%	-4.66%
31-33	Manufacturing	31	4.12%	2,990	3.26%	0.85%
42	Wholesale Trade	19	2.52%	4,119	4.50%	-1.97%
44, 45	Retail Specialized Goods, General, Misc.	137	18.19%	15,190	16.58%	1.61%
48, 49	Transportation, Mail, Warehousing, Storage	36	4.78%	2,316	2.53%	2.25%
51	Information	8	1.06%	1,595	1.74%	-0.68%
52	Finance and Insurance	10	1.33%	5,408	5.90%	-4.58%
53	Real Estate and Rental and Leasing					
54	Professional, Scientific, and Technical Svcs.	64	8.50%	11,074	12.09%	-3.59%
55	Management of Companies, Enterprises	0	0.00%	624	0.68%	-0.68%
56	Admin, Support, Waste Mgmt., Remediation	31	4.12%	5,320	5.81%	-1.69%
61	Educational Services	8	1.06%	1,265	1.38%	-0.32%
62	Health Care and Social Assistance	54	7.17%	10,710	11.69%	-4.52%
71	Arts, Entertainment, and Recreation	30	3.98%	1,520	1.66%	2.32%
72	Accommodation and Food Services	74	9.83%	9,188	10.03%	-0.20%
81	Other Services	173	22.97%	9,822	10.72%	12.25%
99	Public Administration	0	0.00%	198	0.22%	-0.22%
		753		91,607		

** Only counting businesses in counties declared for either Hurricane Matthew or Hurricane Florence by SBA*
***For a version of this table that includes 53—Real Estate and rental and Leasing—see Appendix*
SOURCES: SBA (2019) (FOIA), U.S. Census Bureau County Business Patterns (2016)

Comparing the market-sectoral composition of the SBA's Matthew/Florence loan portfolio to the general composition of North Carolina's disaster-declared counties reveals some sectors were over-represented in the SBA's loan portfolio. Compared to their percentage composition of businesses in general, agricultural businesses, retailers, transportation and storage businesses, arts and recreation and entertainment businesses, and "other services" firms were disproportionately likely to apply for

SBA disaster debt. Meanwhile, construction, finance and insurance, professional services, and healthcare establishments were disproportionately less likely to do so. Assuming that businesses more likely to apply for subsidized SBA disaster loans were disproportionately vulnerable to storm impacts, these findings generally confirm findings in prior literature. Finance and insurance and professional services firms likely were less *sensitive* and had more *adaptive capacity* to handle the storms' impacts without resorting to or qualifying for subsidized debt. It is possible that construction firms (especially residential construction) were more likely to enjoy a post-disaster upswing in demand after the disasters, hence their lower-than-expected demand for SBA debt. And healthcare/social services firms might have benefited from the relatively essential nature of their services post-disaster, compared to the less essential services of specialized retail, arts and recreation and entertainment, and other consumer services firms.

Important caveats: there are multi-collinear relationships present in the sector data above that limit its usefulness in assessing disproportionate disaster vulnerability and recovery. For example, specialized goods retailers, general retailers, and miscellaneous retailers might tend to be smaller than wholesale trade businesses; thus, they could be more vulnerable and in greater need of debt chiefly as a result of their smaller average size and less so, or not at all, as a result of any inherent sectoral disadvantage. The unexpected neutrality of accommodations and food services businesses—these businesses received loans at a rate proportionate to their composition of total businesses in North Carolina—reveals further limitations: the inability to differentiate between winners and losers within any given sector. Although restaurants and motels with large "asset exposure" might have been disproportionately likely to suffer catastrophic damage after flooding, those that did survive likely enjoyed boosts in patronage post-disaster. Tina Parker at the Town of Tarboro observed that after Hurricane Matthew, residents of Princeville and other nearby communities were displaced for long periods of time into nearby hotels and motels, oftentimes paid for or reimbursed by FEMA. She estimated that displaced persons exceeded available, undamaged accommodations in Lenoir County, forcing residents and families to spend extended periods many miles into adjacent counties, where they would also spend money on still-operating restaurants and food stores as opposed to the flooded establishments closer to their homes. Fortunately—apart from the neutrality of the food and accommodations sector—the relationships discussed above generally correspond to empirical literature, findings from secondary datasets, and statements from interviews, which suggests the results reflect real business disruption discrepancies after the storm.

When reviewing average loan amounts per sector (See **Table 9**, on the next full page), businesses with greater asset *exposure* were more likely to apply for larger loans post-disaster. Manufacturing firms; wholesale trade and specialized goods retailers; accommodation and food services firms; and arts, entertainment and recreation firms (the latter only after Florence) tended to receive larger loans than other types of firms. These firms usually have a greater proportion of their assets in the form of supplies and inventory. Manufacturing, wholesale trade, retail, accommodation, restaurants, and grocery business models depend on the management and rapid sale of inventory produced and purchased to customers. These firms are most exposed to the liquidation of supplies or inventory by a natural disaster, hence their larger average loans post-disaster. Expensive fixed assets such as specialized equipment might also explain why manufacturing firms and arts, entertainment, and recreation firms tended to require larger disaster loans.

Table 9: Hurricane SBA disaster loan summaries by sector

Hurricane Matthew SBA Loan Summary (NC-00081)

NAICS	NAICS Category Description	Total Loans	%	Dollars Approved	%	Average Loan
11	Agriculture, Forestry, Fishing and Hunting	18	3.90%	$792,400	2.45%	$ 44,022
23	Construction	12	2.60%	$955,000	2.95%	$ 79,583
31	Food & Textile Manufacturing	0	0.00%	$0	0.00%	$ -
32	Nonmetalic and Chemical Manufacturing	0	0.00%	$0	0.00%	$ -
33	Metallic, Electronic, Misc. Manufacturing	5	1.08%	$1,773,800	5.49%	$ 354,760
42	Wholesale Trade	8	1.73%	$1,069,400	3.31%	$ 133,675
44	Retail Specialized Goods	28	6.06%	$2,242,200	6.94%	$ 80,079
45	Retail General & Misc. Merchandise	7	1.52%	$814,900	2.52%	$ 116,414
48	Transportation	9	1.95%	$211,700	0.65%	$ 23,522
49	Mail, Warehousing and Storage	0	0.00%	$0	0.00%	$ -
51	Information	4	0.87%	$801,300	2.48%	$ 200,325
52	Finance and Insurance	2	0.43%	$57,700	0.18%	$ 28,850
53	Real Estate and Rental and Leasing	221	47.84%	$11,490,900	35.55%	$ 51,995
54	Professional, Scientific, Technical Svcs.	14	3.03%	$503,800	1.56%	$ 35,986
56	Admin, Support, Waste Mgmt, Remed.	8	1.73%	$658,800	2.04%	$ 82,350
61	Educational Services	1	0.22%	$15,000	0.05%	$ 15,000
62	Health Care and Social Assistance	16	3.46%	$1,365,800	4.23%	$ 85,363
71	Arts, Entertainment, and Recreation	8	1.73%	$365,700	1.13%	$ 45,713
72	Accommodation and Food Services	25	5.41%	$3,494,300	10.81%	$ 139,772
81	Other Services (except Public Admin)	76	16.45%	$5,712,700	17.67%	$ 75,167
		462		$32,325,400		

Hurricane Florence SBA Loan Summary (NC-00099, NC-00100)

NAICS	NAICS Category Description	Total Loans	%	Dollars Approved	%	Average Loan
11	Agriculture, Forestry, Fishing and Hunting	17	1.82%	$450,200	0.72%	$ 26,482
23	Construction	31	3.32%	$1,820,500	2.91%	$ 58,726
31	Food & Textile Manufacturing	6	0.64%	$393,800	0.63%	$ 65,633
32	Nonmetalic and Chemical Manufacturing	7	0.75%	$972,100	1.56%	$ 138,871
33	Metallic, Electronic, Misc. Manufacturing	13	1.39%	$1,598,100	2.56%	$ 122,931
42	Wholesale Trade	11	1.18%	$1,350,900	2.16%	$ 122,809
44	Retail Specialized Goods	55	5.88%	$5,434,700	8.70%	$ 98,813
45	Retail General & Misc. Merchandise	47	5.03%	$2,404,600	3.85%	$ 51,162
48	Transportation	26	2.78%	$1,819,800	2.91%	$ 69,992
49	Mail, Warehousing and Storage	1	0.11%	$43,900	0.07%	$ 43,900
51	Information	4	0.43%	$110,300	0.18%	$ 27,575
52	Finance and Insurance	8	0.86%	$672,800	1.08%	$ 84,100
53	Real Estate and Rental and Leasing	423	45.24%	$20,435,800	32.70%	$ 48,312
54	Professional, Scientific, Technical Svcs.	50	5.35%	$2,817,500	4.51%	$ 56,350
56	Admin, Support, Waste Mgmt, Remed.	23	2.46%	$2,328,700	3.73%	$ 101,248
61	Educational Services	7	0.75%	$291,500	0.47%	$ 41,643
62	Health Care and Social Assistance	38	4.06%	$1,945,200	3.11%	$ 51,189
71	Arts, Entertainment, and Recreation	22	2.35%	$3,233,400	5.17%	$ 146,973
72	Accommodation and Food Services	49	5.24%	$5,975,800	9.56%	$ 121,955
81	Other Services (except Public Admin)	97	10.37%	$8,396,600	13.44%	$ 86,563
		935		$62,496,200		

Unfortunately, firms with a large proportion of their assets as inventory (especially flood-exposed inventory) might also have disproportionately worse access to market-rate financing after a disaster. During a loan underwriting process, a lender may analyze the business's liquidity: the business's ability to quickly convert its assets to cash in order to handle short-term liabilities (e.g., a monthly debt service payment). A business's "current ratio" is one indication of liquidity, calculated by assessing how many current assets (excluding land, buildings and equipment) the business has per its liabilities. The "quick ratio" is a more conservative assessment, which discounts inventory and prepaid expenses in order to calculate the immediate, liquid cash and accounts receivable the business has available. These ratios assess how much liquidity the business has to meet unexpected demands (such as those posed by a natural disaster) as well as increased costs of doing business (such as the debt service for the loan in question).

$$Current\ Ratio = \frac{current\ assets}{current\ liabilities}$$

$$Quick\ Ratio = \frac{current\ assets - inventory - prepaid\ expenses}{current\ liabilities}$$

A business that suffers a massive, uninsured loss of inventory after a disaster will witness its current ratio tumble (and approach its quick ratio), which could—*ceteris paribus*—make it more difficult for a lender to justify issuing the business a loan. Without context, it is true that ratios do not provide enough information to determine the creditworthiness of a business: a lender will apply a variety of financial tests as well as review a loan applicant's financial statements in detail before underwriting a loan. But the impact of one or more disasters certainly reduces the financial standing of a business for future loans if lost assets are not immediately recovered.

3.7 Business Closure Assessment

After Matthew, 80% of respondents closed, for an average period of 2 weeks. Of those 80%, 4% permanently closed (NC DOC LEAD, 2017b, 2017a). Unfortunately, the 4% number likely underestimates the number of businesses that permanently shut down due to survivorship bias and the short time frame of the study. Businesses that survived the storm were easier to contact and probably more likely to have the capacity to respond to DOC LEAD's fairly extensive survey, therefore introducing selection bias into the survey design. In addition, disaster-affected business owners sometimes operate for years before they shut down the business (Alesch et al., 2001), chiefly *but not only* for reasons related to the initial hazard impact. The potentially long delay between cause and effect, as well as the overdetermined nature of shutdown, would challenge the attribution of closure to the impact of either or both hurricanes.

That said, multiple institutions in North Carolina vouched that relatively few businesses closed immediately after Matthew; the 4% figure might not be wholly unreasonable as a short-term measurement. Institutional interviews also identified three types of businesses particularly likely to close after the storm: businesses financially weak to begin with, businesses with aging owners, and informal "cash" businesses.

Many institutions believe that those businesses that did close after Matthew were likely underperforming prior to the storm. Jennifer Holcomb, President of the Columbus County Chamber of Commerce, recalled that downtown Whiteville only lost a handful of places after Hurricane Matthew, and that those places that did close were already "on the brink" financially before the storm. Kent Hill, Director of the Fayetteville Technical Community College (FTCC) SBC, acknowledged that some Fayetteville businesses closed after Matthew, but that some of these might have been "predestined" to close, that the storm "maybe hastened their inevitable demise." He mentioned "several restaurants" that closed: "Florence may not have been the cause of their closing, but it was the final nail in their coffin, and it didn't make sense to invest [in recovery]." Carol McLaurin, Director of the SBTDC, summarized this sentiment: "If someone has a sustainable business, they'll find a way to survive… But a business that was already not using good business practices to begin with [is] going to have a hard time surviving a disaster."

It is common sense that a weak business is less likely to survive a disaster; yet a subtle ideology of self-reliance subtends this "common sense" notion. This ideology risks rationalizing business closure after the fact as inevitable, assigning blame chiefly on the owner rather than on other accountable parties and forces. The ideology that a well-performing businesses should be by definition sufficient to withstand a disaster raises the minimum bar for doing business in a disaster-struck, disaster-prone geography, naturalizing business demise after devastating, random events as a mere symptom of larger, normal, capitalist cycles of "creative destruction." This ideological maneuver *does* successfully explain business demise post-disaster, but it also elides the role of other economic and non-economic parties and forces that could intervene and change the conditions of doing business in an increasingly risky area. These parties could include community intervention as well as local, state, and federal government policy.

Other institutions pointed out that the disaster accelerated the closure of businesses operated by aging owners approaching retirement, especially in rural contexts. Gary Lanier, Director of Economic Development at Columbus County, acknowledged that many affected business owners in the county were getting older and "eyeing retirement." Why would an owner so close to retirement

reinvest her nest egg into a damaged business? What bank would feel comfortable underwriting such a loan? Carol McLaurin at SBTDC echoed this notion, calling it a particularly salient issue for businesses in rural counties, whose owners tend to be older. Kent Hill at the FTCC SBC identified many closed and soon-to-close businesses as "on the retirement glide path" and singled out tire sales and automotive repair shops as the sort of places that provide income for older, semi-retired North Carolinians. Some older owners "self-sustain and break even," operating their businesses partly for income and partly as a hobby, as indicated by Tina Parker at SBCN Edgecombe/Town of Tarboro; Parker continued: "How do you take those kinds of businesses to the next level" and make them resilient to additional shocks? Again, a break-even "hobby" business would not survive even the most charitable underwriting practices, nor necessarily should it.

Businesses and entrepreneurs operating informally were "dead in the water" after the storm, unable to qualify for debt and without access to insurance products. The informal economy broadly includes individuals and employers who engage in productive activities that are not taxed or registered by the government—for our purposes, informal entrepreneurs who operate cash-only businesses or do not consistently pay taxes. While such businesses could be easily left out of a disaster impact analysis, partly because of the absence of data about their scope and number, national evidence suggests that informal businesses and labor contributed 5-10% of overall US GDP in the 1990s (Nightingale & Wandner, 2016). These often overlooked laborers and businesses likely fill an important economic niche in NC's disaster-affected communities, performing services such as domestic work, personal care, food and accommodation services, and other low-capital services. These economic activities were also uniquely vulnerable to the impacts of the hurricanes. Gary Lanier, Director of Economic Development at Columbus County, noted many businesses operated under the table before the storm: "Businesses that operated under the table or didn't pay taxes and were operating illegally were dead in the water." Carol McLaurin at SBTDC said that in rural areas, many businesses are "cash businesses" that couldn't possibly qualify for a loan.

3.8 Conclusion

While North Carolina's state CDBG-DR Action Plans and county-level Resilient Redevelopment Plans provide some idea of the breadth of the hurricanes' economic impact, and while some of North Carolina's CDFIs have provided some additional impact analysis (e.g. Carolina Small Business Development Fund), detailed data on the economic and financial impacts of the storms is generally not publicly available. Therefore, this section provides unique insight into how the hurricanes damaged businesses and disrupted local employment, how business operations suffered and eventually recovered (or not) after the storms, and to what extent subsidized debt (e.g. SBA debt) penetrated county economies.

Unfortunately, a general absence of data (and the difficulty of compiling such through surveys or other means) leaves much to be desired. The utilization of unsubsidized debt from private lenders is invisible, and unfortunately, the CDFIs interviewed were unable to provide exact statistics on the geography and sectoral distribution of their bridge loans and long-term loans. It is unclear to what extent minority-owned and woman-owned businesses (MWBEs) were disproportionately affected or disproportionately unable to access capital, although it is possible that MWBEs did take longer to apply for debt than non-minority firms. The extent of business closure after the disaster is unclear; in fact, it is too early for longitudinal studies to make conclusions about shutdowns that are likely occur years after the hurricanes' double-impact. And unfortunately, the mystery of informal economies precludes conclusions about the closure of unregistered businesses, though they probably

folded faster and in greater numbers. Finally, the freshness of Hurricane Florence and the delay associated with Hurricane Florence CDBG-DR money expected from HUD (which typically invites the publication of a state-level Action Plan containing valuable secondary data) means conclusions about Florence are even more provisional. Indeed, at the time of their interviews, Carolina Small Business Development Fund and the Rural Center had only just activated their long-term recovery/resilience loan products for damages related to Florence. Hopefully future scholarship, especially of the longitudinal variety, will deepen public understanding of the economic impact of Hurricanes Matthew and Florence.

Limitations aside, the combination of secondary data and interview statements in this section provide key takeaways that corroborate the theory and empirical findings reviewed in Chapter 2 and suggest further questions about business decision-making after the disaster:

Summarizing the Business and Economic Impacts of the Hurricanes:

- Up to 45% of North Carolina businesses sustained damages or losses after Hurricane Matthew, with lost revenue being the most common loss (among 75% of affected businesses) and damage to real estate property ranked the second most frequent loss.

- Almost one third of affected businesses claimed to be struggling nine months after the Hurricane Matthew, frequently citing lasting physical damage, depressed consumer spending, and difficulty accessing capital as their most pressing concerns.

- Generally, well-insured businesses fared well after Matthew, recovering most of their lost revenue and damaged assets. Underinsured and uninsured businesses were probably more likely to take out private or subsidized debt or draw upon savings/reserves after Matthew.

- Relatively few businesses closed immediately after Hurricane Matthew. Those that did close tended to be already weak financially, operate under owners on the edge of retirement, or operate informally without the ability to supply documentation to lenders.

- Regional labor impacts were dramatic but temporary, with noticeable spikes in unemployment in Robeson, Lenoir, Greene and Wayne counties after Hurricane Matthew and a massive influx of unemployment claims visible at the state level after Florence. The quick return to pre-disaster employment trends suggests that relatively few businesses closed immediately after Hurricane Matthew, which corroborates claims from interviews.

- Neither Matthew nor Florence materialized changes to quarterly wages, again suggesting that unemployment and business closures were short in duration, albeit widespread.

- Statistics regarding market sectoral utilization of debt largely confirm the vulnerability analysis compiled from literature in Chapter 2. More asset-exposed, more sensitive, and less adaptive businesses—such as retailers, food and accommodations businesses, certain personal services providers, and arts and entertainment and recreation concerns—tended to more often receive subsidized SBA disaster loans. A similar subset of businesses, by virtue of their large inventories and expensive equipment, also tended to take out larger average SBA loans after both disasters.

- The SBA generally fulfilled its mandate to aid smaller rather than larger firms: the smallest firms, especially sole proprietorships, attracted a disproportionately large share of SBA debt after both storms; however, larger firms tended to qualify for larger loans.

Comparing Hurricanes Matthew and Florence:

- Hurricane Matthew surprised North Carolina by virtue of last-minute changes in forecasting, and perhaps because the effects of Hurricane Floyd (1999) had faded from memory. But North Carolinians were more prepared for Florence thanks to its slow speed and better quality of forecasting, and perhaps owing to their fresh experience with Matthew.

- Although Hurricanes Matthew and Florence tended to cover comparable areas in terms of the number of counties affected, Hurricane Matthew exerted most pressure on the more rural, impoverished, and fastest depopulating counties in North Carolina's coastal plains region. Florence, on the other hand, exerted the pressure on both rural struggling counties as well as highly urbanized coastal centers—Wilmington and Jacksonville, NC.

- The greater concentration of business and wealth in the areas worst affected by Florence explain the almost twice-greater number and dollar amount of loans approved by the SBA after Florence (compared to Matthew). Greater business awareness about disaster recovery programs, and reduced access to reserves/savings among Matthew-affected businesses, might also explain the increased number of SBA loan applications after Florence.

Even though it is too early to make conclusions about the storms' economic impact, the low business closure rates immediately after the hurricanes and even in the two and a half years after Hurricane Matthew are positive signs. In comparison to historic catastrophes like Hurricane Katrina—which precipitated depopulation and dislocation, business destruction, and unemployment that lasted for years (English, 2015)—Hurricanes Matthew and Florence were simply not that devastating. It is also possible rural areas yielded fewer, less dramatic losses simply because they were less populated; a comparable category-one hurricane that struck a huge population center would have unleashed far greater damage (C.f. Superstorm Sandy). Finally, rosy recovery rates could speak to the levels of economic development and capital absorption capacity already attained in rural and suburban North Carolina, in spite of global trends that place disproportionate pressure on rural contexts.

The findings above also raise additional questions: What guided uninsured business's decisions about applying for financing versus utilizing reserves or savings? What does having less "sensitivity" and more "adaptive capacity" actually look like in the days and weeks after a storm, and what lessons could owners and institutions draw from these characteristics when they are contextualized? If North Carolina's level of economic development and capital absorption capacity mitigated disaster impacts, what specific institutions and policies were helpful, which were not, and why? Do disaster-indebted businesses find the added costs of doing business manageable, or do they struggle under the increased financial pressure? And even though relatively few businesses seem to have closed, have economic conditions fully returned to the trajectory they followed prior to Matthew? Chapter 4, which dwells much more on qualitative interview findings from institutions and business owners on the ground, seeks to fill the gaps that remain after the analysis completed here.

CHAPTER 4—FINANCING BUSINESS RECOVERY

4.1 Introduction

Whereas Chapter 3 outlined early, quantitative patterns in economic damage after the hurricanes, Chapter 4 describes the framework of funding and financing for small businesses affected by the disaster and narrates the ways various small businesses navigated the recovery process.

The chapter begins with a detailed description of North Carolina's framework for disaster recovery, which consists of interlocking federal, state, and private frameworks that empower and mobilize a diversity of government institutions, nonprofits, lending institutions, small business development centers (SBDCs), and other parties. North Carolina's existing frameworks paint a picture of a complex but efficient system of collaboration and resource distribution that has the potential to provide ample technical assistance to affected businesses, even if businesses don't always use it. However, while the state's network of technical assistants delivered impressive support and the state's CDFIs succeeded in offering a diversity of attractive, helpful bridge loan and long-term capital solutions to affected businesses, the penetration and speed of the vast majority of actual disaster capital—SBA financing and CDBG-DR financing—leaves much to be desired and has resulted in substantial, lasting unmet need among disrupted firms.

Qualitative interviews with institutions and businesses reveal the mechanics of why larger businesses and certain sectors enjoyed greater latitude and less demand for disaster credit after the hurricanes. Larger businesses tended to mitigate disaster impacts, and therefore reduce their demand for capital, as a function of their superior adaptive capacity. Businesses operating in "essential sectors" or providing "essential goods and services" tended to be less sensitive to disaster impacts, which therefore reduced their demand for capital and improved their ability to self-finance recovery using their relatively stable revenue streams.

The SBA quickly offered the largest, most accessible source of debt for flooded businesses in North Carolina while CDFIs provided a much smaller number of subsidized bridge loans and forgivable CDBG-DR loans. But why did many businesses eschew or fail to utilize these sources of economic relief? In addition to heightened underwriting standards and the slow speed of HUD money, unmet need for capital among businesses is due to the elevated cost of disaster capital for more robust firms, the fact that weak and struggling firms oftentimes cannot qualify for any disaster capital, and many firms' lack of familiarity with their full range of disaster credit options.

In conclusion, the chapter acknowledges a widespread increase in the precariousness and difficulty of doing business in rural, flood-prone North Carolina after the floods and in an era of climate change. The increasing risk and cost of doing business threatens to consolidate more and more economic gains into the largest, most multi-sited businesses and punish harder and harder those businesses that are undercapitalized, small, or brand-new. The threat of this sort of "winner-take-all" risk economy raises the question of debt versus grants for businesses affected by disasters. Although disaster recovery and economic development orthodoxy residualize the role of "free money" for for-profit businesses, the judicious application of grants and greater subsidies might be valid and even necessary in a disaster-prone, precarious state.

4.2 Institutional Response Framework

The framework and institutional network activated by a disaster declaration is complex, involving numerous centralized and decentralized, local, state and federal offices as well as private institutions. The two best sources on North Carolina's public-private recovery apparatus are the state's Disaster Recovery Guide (NC OSBM, NCEM, & NC Office of the Governor, 2015) and the state's Disaster Recovery Framework (NCEM, 2018).

4.2.1 Federal Recovery Framework

On the federal level, the US Small Business Administration (SBA) provides the greatest, most consistent amount of support to storm-affected small businesses after a disaster. For exceptionally large disasters, money from the Department of Housing and Urban Development (HUD) is allocated to business recovery over a longer timeframe. Other programs, such as those under the US Economic Development Administration (EDA), provide pre-disaster and post-disaster capacity building and technical assistance funding. Though beyond the scope of this thesis, the US Department of Agriculture (USDA) provides loans and grants to agricultural business concerns.

The governor of North Carolina may request a presidential emergency or major disaster declaration, which engages a federal disaster recovery framework that authorizes various levels of FEMA individual and public assistance per the Stafford Act (enacted 1988). The SBA follows the lead of FEMA in identifying disaster areas, but the SBA can also act independently of FEMA upon the realization of at least one of several "tests" involving a minimum number of businesses damaged or interrupted, or a minimum percentage of a community's workforce unemployed as a result of business losses (C.F.R., 2009).[23] The SBA typically makes natural disaster designations on a county-by-county basis, but it can recognize a disaster in any sub-state subdivision.

Businesses and homeowners first register damage with FEMA, and FEMA typically refers registrants to the SBA for disaster loans (Murray, 2014). In NC, the SBA has historically established various field offices to conduct intake for home and business loans. After Hurricane Florence, the SBA deployed 21 Disaster Recovery Centers (DRCs) geared toward homeowners and business owners in partnership with FEMA and another nine Business Recovery Centers (BRCs) specifically geared toward business loan applicants (SBTDC, 2018).

The SBA issues four types of subsidized loans following a disaster declaration: home disaster loans, business physical disaster loans, business economic injury disaster loans, and military reservists economic injury loans. According to an interview with SBA Public Affairs as well as a report from the Congressional Research Service (Lindsay, 2015), more than 80% of the loans the SBA originates after a disaster actually go to homeowners, not businesses. For businesses, physical disaster loans cover *uninsured* physical damage or losses in inventory and fixed assets: real property, machinery, equipment, fixtures, leasehold improvements. Economic injury disaster loans (EIDLs) provide working capital to cover *uninsured* disruptions in revenue that result from the disaster and prevent a business from meeting financial obligations—such as paying suppliers or employees. The SBA offers both physical loans and EIDLs in presidentially disaster-declared counties and only offers EIDLs in counties *contiguous* to disaster-declared counties. Independently or in combination, physical loans and EIDLs cannot exceed $2 million for any individual business.

[23] An exhaustive explanation of SBA physical injury and economic injury declaration tests is available in the Code of Federal Regulations 13 CFR § 123.3.

The SBA also offers pre-disaster mitigation loans to homeowners and businesses under the aegis of FEMA's pre-disaster mitigation program. Limited in availability and subject to federal reauthorization every five years, the program offers low-interest, fixed-rate loans to finance investments that mitigate hazard risks for real property, leasehold improvements and contents (13 CFR 123.400). Finally, the SBA can increase the loan amount up to 20% in order to accommodate increased costs including costs associated with the mitigation of future hazards.

Unlike dominant SBA loan programs—7a (SBA Advantage), 504—SBA disaster loans are underwritten and administered directly by the SBA without the intermediation of a private lender. SBA disaster loans have low interest rates and long terms—up to 30 years—compared to typical market lending. After a presidentially declared disaster, SBA disaster loans over $25,000 in value begin to require collateral, although the SBA will not deny a loan if a lack of collateral is the only issue discovered during underwriting (Lindsay, 2015). Real estate collateral is preferred (SBA, 2018b), but the SBA accepts "assets such as equipment, buildings, accounts receivable, and (in some cases) inventory…as possible sources of repayment if they can be sold by the bank for cash" (Lindsay, 2015). The SBA does not make available their minimum or common debt service coverage ratios, loan-to-value ratios, or other underwriting practices; it sizes disaster loans in a discretionary manner, in negotiation with each business.

An important caveat: SBA loan recipients with property that is located in FEMA's Special Hazard Flood Area (SHFA) and is benefiting from or collateralized against disaster loan proceeds must insure the property under FEMA's National Flood Insurance Program (NFIP). Insurance coverage must equal the lesser of the following: the total loan principal, the total insurable value of the property, or the maximum insurance coverage made available—for non-residential properties, $500,000 for building and contents (FEMA, 2013; SBA, 2017).

Like other SBA loans, SBA disaster loans must abide by a **"credit available elsewhere"** requirement. In order to minimize the extension of public credit to projects that could otherwise attract credit in the private market, "SBA loan programs are required by law (15 U.S.C. §636(a)) to serve only borrowers who otherwise would not be able to secure loans from another source." For a lender to refer a business to an SBA loan product, it usually determines (a) the business is unable to generate sufficient NOI to satisfy private-market debt service coverage ratios, (b) the business's collateral is insufficient to satisfy a loan-to-value ratio due to accelerated depreciation or abnormally low resale value, or (c) the business lacks sufficient equity for a down payment (for real estate transactions and development) (Rossman & Theodos, 2008).

For businesses "with credit available elsewhere" (CAE) that apply for disaster loans, the SBA would not deny their applications, but it would require payment of a much higher interest rate—up to twice as much as the advertised disaster rates, according to Elizabeth Dwyer at SBA Public Affairs. Traditional SBA disaster loans carry terms as long as 30 years, but SBA disaster loans with businesses with CAE have maximum 7-year terms (SBA, 2018b).

Table 10: SBA disaster loan interest rates

Loan Applicant Type	Hurricane Matthew		Hurricane Florence	
	No CAE	CAE	No CAE	CAE
Homeowners/Renters	1.563%	3.126%	2.000%	4.000%
Businesses	4.000%	8.000%	3.675%	7.350%
Non-profit Organizations	2.625%	5.250%	2.500%	2.500%

*CAE = Credit Available Elsewhere
SOURCES: (SBA, 2016b, 2018b); Interview with Elizabeth Dwyer, SBA Public Affairs

The other *major* source of federal disaster recovery funding, reserved only for largest disasters nationwide, comes from the US Department of Housing and Urban Development (HUD), specifically through **HUD's Community Development Block Grant-Disaster Recovery (CDBG-DR) program**. These funds must be congressionally approved and often arrive months to a year after the initial disaster event (Martín, 2018, p. 4). Since these funds are primarily administered by a state or local grantee/subgrantee/subrecipient, I describe this funding at the state level, below.

Finally, the **United States Department of Commerce Economic Development Administration (EDA)** makes limited funding available to communities and organizations after disasters. For example, in May 2017, the EDA capitalized a revolving loan fund (RLF) for the Carolina Small Business Development Fund intended to serve small businesses in disaster-affected areas of North Carolina (US EDA, 2017). In October 2018, the EDA awarded $100,000 to the International Economic Development Council (IEDC) to provide North Carolina communities technical assistance to assist in their recovery from Hurricane Florence (US EDA, 2018).

4.2.2 State Recovery Framework

In North Carolina, only the governor may declare a state of disaster, which subsequently accords specific disaster response roles, powers, and responsibilities to the NC Office of the Governor, North Carolina Department of Public Safety (NCDPS), and North Carolina Emergency Management (NCEM) (NC OSBM et al., 2015). Under the NCEM, a short-term Business Emergency Operations Center (BEOC) facilitates the continuation of critical services as well as the discussion and coordination of private sector needs, strategies and donations in the immediate days and weeks after a disaster. BEOC consists of private sector representatives—corporations, chambers of commerce, trade associations, universities, think tanks, and non-profits.

Short and longer-term recovery and reconstruction efforts geared toward local business pivot on a robust system of decentralized business support centers under the NC Small Business and Technology Development Center (SBTDC), the NC Small Business Center Network (SBCN), Golden LEAF Foundation (Long-Term Economic Advancement Foundation), and various CDFIs including the NC Rural Economic Development Center (Rural Center). The SBTDC is a business and technology extension service of the University of North Carolina and North Carolina State University operated in partnership with the SBA.[24] Across 15 offices, the SBTDC normally offers wide-ranging business counseling and technical assistance, including credit access assistance, as well as government procurement assistance, exporting assistance, market research services, venture finance support,

[24] Other states refer to these as Small Business Development Centers, or SBDCs. SBDCs provide local business support and technical assistance in collaboration with local governments and organizations, typically operating out of community colleges and state "land grant" universities. (C.f. agricultural extension offices.)

and other specialized offerings. Even more expansive than the SBTDC, the SBCN operates Small Business Centers (SBCs) at all 58 of North Carolina's community colleges and "within a 30-minute drive of every North Carolinian" (SBCN, 2018). Like SBTDCs, SBCs offer confidential business counseling services and referrals; SBCs also offer free or low-cost seminars and classes targeted toward entrepreneurs, startups, and early-stage businesses.

In a state of disaster, the SBTDC assumes a leadership role in first response and communication. The SBTDC manages a business recovery website and other forms of outreach to affected businesses, provides locations for temporary SBA recovery centers, and offers explicitly disaster-related support including reconstruction of financial records, preparation and submission of SBA disaster loan applications, and formulation of post-disaster recovery strategies. If the state implements a supplemental, state-funded recovery program for businesses (see below), the SBTDC is involved in program implementation (NC OSBM et al., 2015). SBCs also provide disaster recovery technical assistance and seminars to businesses, and many SBC regional directors said their offices put on disaster preparation seminars after the storms.

Business Link North Carolina (BLNC) is yet another state institution active in disaster recovery. BLNC operates under the Economic Development Partnership of North Carolina (EDPNC) and normally caters to new and fledgling businesses;[25] their technical assistance centers around the legal, regulatory, and administrative hurdles involved in business registration. In the advent of Hurricanes Matthew and Florence, they chiefly made referrals to SBTDCs, SBCs, FEMA, SBA, and local CDFIs.

Finally, the North Carolina Department of Commerce's Labor and Economic Analysis Division (NC DOC LEAD) can, with approval and funding, perform or subcontract a survey of businesses in disaster-affected areas. Survey findings inform the General Assembly's decision-making on any supplemental, state-funded recovery programs for businesses. Although DOC LEAD did survey post-Matthew business impacts (cited extensively above), they have not received an appropriation to do so after Florence. Furthermore, it is unclear whether the results of LEAD's Matthew survey led or will lead to any supplemental business disaster aid or programming from the state.

After Hurricane Floyd (1999) and flooding in 2005, the state did make supplemental programs available for damaged businesses (NC OSBM et al., 2015, p. 30). According to Carol McLaurin at SBTDC, these programs sought to make up for the slow speed of the SBA's disaster loan origination process and the large number of SBA loan denials. In one program, the state capitalized a fund and allocated parts to various local banks in coordination with the DOC; the SBDTC reviewed loan applications from area businesses prior to submission to the banks and DOC, whereafter the banks issued long-term loans, with zero interest accrued in the first few years, to approved businesses. In a separate, subsequent rebate program directed toward SBA disaster loan recipients, the state paid off the interest that businesses had paid on their SBA disaster loans (which they had applied

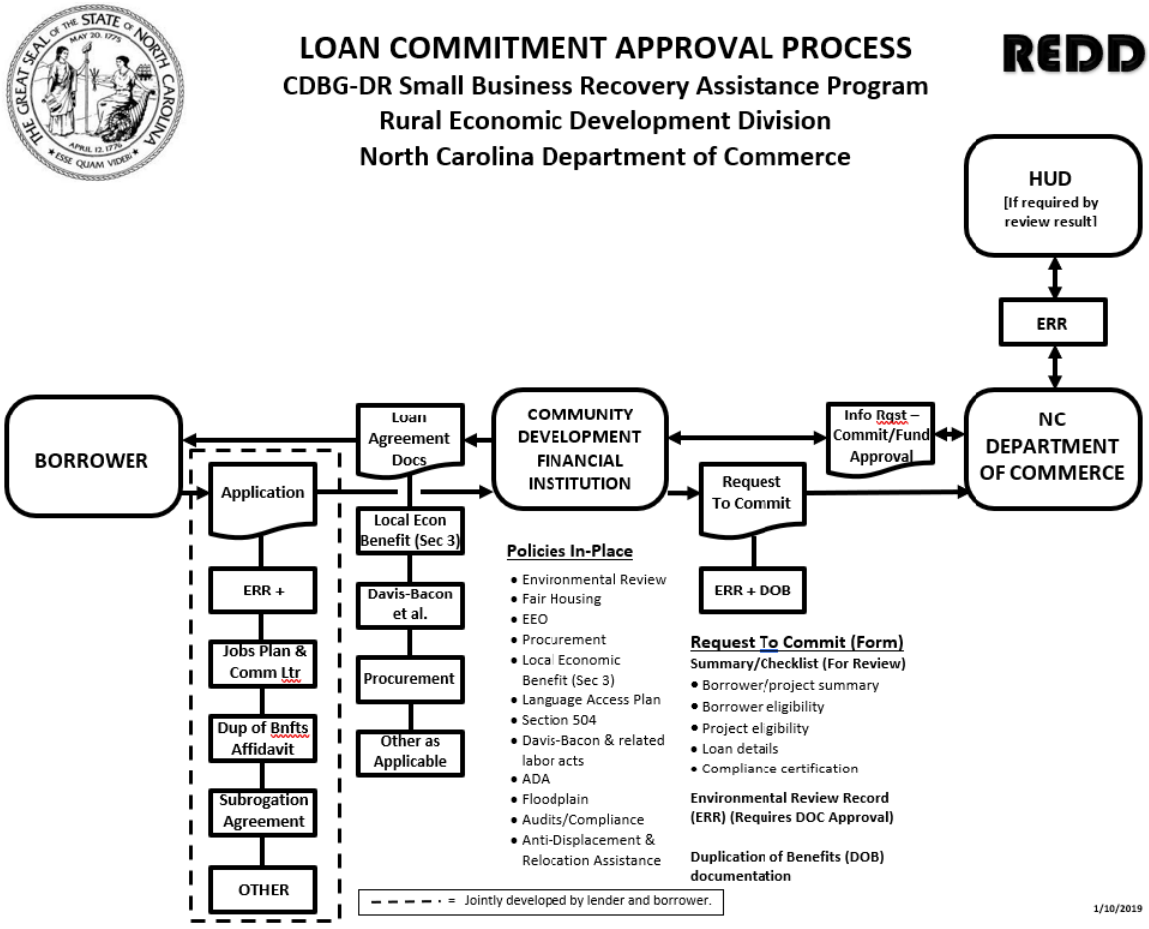
[25] The EDPNC's responsibilities were originally part of the DOC until a 2014 privatization effort. The DOC now focuses on the management of economic incentive programs, economic research and analysis, centralized economic development and infrastructure and workforce planning and policy, marketing, and occasional management of state/federal disaster appropriations. The EDPNC, a nonprofit contracted with the DOC in a public-private partnership (PPP), focuses on marketing the state, recruiting (large) businesses from outside the state, connecting in-state businesses to out-of-state export partners, and attracting film, sport, and events. Both the DOC and EDPNC support tourism (NC GA PED, 2019b).

for before the state made available the zero-interest alternative) in order to establish parity between SBA-approved and SBA-denied beneficiaries.

Sometimes long after the initial emergency response phase, Congress may approve the disbursement of HUD funding through HUD's CDBG-DR block grant mechanism. CDBG-DR funding supports non-duplicative repair and reconstruction (and sometimes hazard mitigation) of housing, infrastructure, and business. It is common to use CDBG-DR funds to issue small loans or grants to small firms, support training or technical assistance geared toward business recovery and post-disaster workforce opportunities, or even pay for programs to restore pre-disaster consumption patterns (e.g. marketing to boost tourism) (ICF, 2013). Unlike FEMA funding, HUD CDBG-DR funding allows considerably more latitude in the use of disaster funding, and some states have developed innovative programs for disaster-affected businesses (See *Section 5.4*).

North Carolina's CDBG-DR-funded Hurricane Matthew Small Business Recovery Assistance Program (SBRAP) currently utilizes $10 million of the state's entire CDBG-DR appropriation. The Rural Economic Development Division (REDD) of the NC DOC disburses this money to qualified CDFIs (maximum of $5 million per CDFI) to enable deferred/forgivable loans to small businesses (**Figure 40** represents roles and responsibilities of REDD DOC, the CDFI intermediary, and the borrower).

Figure 40: NC CDBG-DR Small Business Recovery Assistance Program loan approval process



SOURCE: (NC REDD DOC, 2019a, p. 6)

The SBRAP program originally targeted very small businesses that could not access any other alternatives to financing: "The intended outcome is for small businesses impacted by Matthew with no other source of funding to begin to recover from the physical and economic impacts of the storm, as indicated by retention of existing employees and the addition of new employees" (NC REDD DOC, 2019b, p. 9). However, its target appears to have shifted somewhat since its introduction. As of the third amendment to NC's CDBG-DR Action Plan, REDD increased maximum loan amounts from $150,000 to $300,000 after feedback from the three participating CDFIs and local government officials. According to the amendment, the increase reflects the continuing unmet need of borrowers and the unexpectedly large size of most businesses pursuing the forgivable/deferred loans, which were originally targeted at "smaller businesses and micro-businesses." (NC DOC, 2019, p. 9).

The upside of SBRAP loans for the borrower is the deferral of principal payments and eventual "loan forgiveness"—the erasure of outstanding loan principal from a bank's assets and a borrower's liabilities. A portion of principal is required to be forgiven over the course of three years, with one third of the portion forgiven at the end of each year, as long as the borrower fulfills loan requirements.[26] In theory, a fully compliant borrower would see all or a portion of the loan principal forgiven after three years without paying anything but interest. Disregarding interest, the forgivable loans essentially act as grants, but with strings attached. The downside for the borrower (and the intermediary) is that the strings attached—mostly traditional HUD program monitoring requirements—are extraordinary:

- Duplication of benefits (DOB): Proceeds must not duplicate benefits already received.
- A proportion of loans must meet HUD's "National Objective" to benefit low-to-moderate (LMI) persons or communities.
    - Job Creation/Retention: For LMI-compliant loans, the borrower must commit to create and retain a certain number of jobs, at least 51% of which must go to LMI persons. For job retention, there must be proof the jobs would have expired without the influx of funding and were held by or made available to LMI persons.
- HUD Section 3 hiring and subcontracting requirements.
- Environmental review, as applicable.
- Adherence to Davis-Bacon and Related Acts (DBRA) for construction, as applicable.
- Other standards: EEO, Section 504, floodplain, anti-displacement and relocation assistance.
- Periodic loan monitoring and monthly compliance reporting.
- Audit and program closeout.

Notably, failure to satisfy the job creation/retention standards attached to LMI-compliant loans can potentially spell default regardless of the borrower's financial condition:

> "For Years 1 & 2 of the forgivable loan, if job goals have not been met in either or both years, the lender has the option, but not the requirement, to declare the loan in default. The lender must conclude that the borrower has a reasonable opportunity of meeting the cumulative job goals at the end of the three-year loan term." (NC REDD DOC, 2019b, p. 38)

[26] The SBRAP SOP and Information Guide remain silent on the size of the forgivable portion, but the advertisements of CDFI intermediaries (see below) suggest the portion is $75,000.

HUD's steep reporting and employment monitoring requirements, on top of the intermediary's normal underwriting process, represents a daunting and potentially fruitless task for a borrower, especially very small businesses and micro-businesses that lack the financial expertise or professional capacity to handle the documentation and preferential hiring entailed. The requirements also require increased capacity from participating CDFI lenders. (Per typical HUD standards, 15% of CDBG-DR funds may be used by intermediaries to support internal administrative and project delivery costs (NC REDD DOC, 2019b, p. 7)). It is perhaps no surprise that larger businesses with greater amounts of unmet need have gravitated toward the CDBG-DR loan product: these businesses have the capacity to accommodate the increased requirements, likely have more positions (either retained or net new) to fill after the disaster, and have nowhere else to turn for comparably cheap capital.

On the "supply side," three CDFIs participate in the CDBG-DR Forgivable Loan Program: The Carolina Small Business Development Fund, North Carolina Community Development Initiative, and the Self-Help Credit Union (Rhoades, 2018). These CDFIs advertise the forgivable loans in very different ways. The Self-Help Credit Union, which by January 2019 had only handled a handful of CDBG-DR loans, openly advertises SBRAP program and clearly indicates the job creation/retention conditions (Self-Help Credit Union, n.d.). NCCDI subtly notes the availability of forgivable loans up to $75,000 under an *asterisk* to their main recovery loan offerings on their Resilient Communities flyer, without noting the extra HUD requirements (NCCDI, n.d.). The Carolina Small Business Fund does not appear to advertise the forgivable loan program online. Although the CDFIs active in CDBG-DR loan origination did not consistently provide exact figures via interview, the total number of loans originated was approximately 20 as of January 2019. As attractive as these loan terms are, these forgivable loans represent a drop in the bucket of post-disaster debt in North Carolina.

Two reasons explain the minor role of CDBG-DR small business support: (1) the cumbersome nature of HUD requirements for borrowers and intermediaries alike and (2) the state's overall poor track-record for spending such funds quickly and effectively. As stated above, the extraordinary reporting, documentation, and job creation/retention requirements preclude the CDBG-DR loan from being useful to all but a subset of larger firms who, for various reasons, were not able to access credit in the first six or so months after Hurricane Matthew. And as hinted above, the loans have been awkward for CDFIs as well. Barry Ryan, Vice President of the Rural Center, explained the Rural Center did not participate in the SBRAP program and noted that participating CDFIs were still in the learning process with regard to originating such complicated loans. Meanwhile, North Carolina's slow expenditure of CDBF-DR funds in general is a larger problem.

The expenditure of CBDG-DR funds—including small business funds—is badly delayed and mismanaged in North Carolina. HUD ultimately disbursed $236.5 million of Hurricane Matthew CDBG-DR funding to the state, but by the time Florence arrived in September 2018, the state had only disbursed $2 million of the money (Thrush, 2018). By the end of 2018, the state had only spent $3.4 million—or 1% of its total HUD allocation (NC GA PED, 2019a). Only a fraction of that $3.5M consists of CDBG-DR forgivable loans for small businesses. (I was unable to uncover the exact dollar amount or percentage of expenditures dedicated to the Small Business Recovery Program.)

Both HUD and North Carolina have suffered ample political, regulatory and journalistic criticism for NC's status as a "slow-spender" state (Ferebee, 2018; GAO, 2019; Thrush, 2018). Criticism mentions the state's inexperience with CDBG-DR funding, the ponderous documentation, reporting,

compliance, and audit-readiness requirements of HUD funding, as well as the lack of sufficient, quality technical assistance from HUD.

The NC General Assembly's non-partisan Program Evaluation Division (PED) is particularly damning, titling a report released on May 20: "Administrative Missteps and Lack of Expertise Led to Delays and $3.7 Million in Unnecessary State Spending for Hurricane Matthew Recovery" (NC GA PED, 2019a). The PED chalks up delays to North Carolina's—and particularly the NC Department of Public Safety's (DPS)—administrative inexperience and lack of capacity to manage CDBG-DR funding. This inexperience and lack of capacity resulted in subpar program design, the failure to fully leverage CDBG-DR dollars to multiply other federal disaster recovery monies (FEMA PA, FEMA HMGP) via federal match,[27] and non-compliant contracting that violated HUD requirements and produced $3.7 million in "unnecessary" spending from the state in order to cover contracting costs rendered ineligible for HUD CDBG-DR funding. Contractors ultimately paid with state funds, rather than CDBG-DR dollars, included AECOM, United Way North Carolina, and ESP Associates, Inc. DPS ultimately completed a HUD-compliant program management contract with Innovative Emergency Management (IEM) in June 2018, almost two years after Hurricane Matthew (NC GA PED, 2019a).

DEP acknowledges that CDBG-DR funding is somewhat similar to traditional CDBG funding, which suggests DPS could have tapped into state experience with this much more common type of HUD funding package. DEP acknowledges that DPS could not leverage as much CDBG-DR implementation expertise from the NC DOC because DOC has shrunk its CDBG-trained staff due to changing state priorities in recent years. But on the basis of a survey of local governments, DEP avers that DPS failed to leverage the institutional knowledge of North Carolina's dispersed county and city management staff, many of whom had worked with CDBG funding in the past for housing, economic development, and infrastructure projects (NC GA PED, 2019a).

4.2.3 Private Recovery Framework

After Hurricane Floyd in 1999, then Governor Hunt established the NC Disaster Relief Fund, intended to fund local governments and nonprofit organizations to implement disaster recovery projects, and entrusted management of the fund to Golden LEAF (Long-Term Economic Advancement Foundation). Coincidentally, the General Assembly had created Golden LEAF that year to manage the allocation of a very different block of money—half of the state's overall settlement from cigarette manufacturers after a lawsuit—for the benefit of NC's most rural, economically distressed, tobacco-dependent communities.

As part of the Disaster Recovery Act of 2016 after Matthew, the NC General Assembly reactivated the NC Disaster Relief Fund. The Assembly ultimately capitalized the fund with over $65 million of between 2016 and 2018 (Golden LEAF, 2018), including a $5 million appropriation in 2016 specifically intended for CDFIs to support small business recovery loans (Dollar, McGrady, Bell, & Dixon, 2016). Golden LEAF supplemented this appropriation with up to $3,928,900 of its own funds (Golden LEAF, 2018). CDFIs in turn leveraged their own capital funds to maximize the total credit available to qualifying businesses.

[27] In defense of DPS: The use of CDBG-DR funding to match FEMA Public Assistance (PA) and FEMA Hazard Mitigation Grant Program (HMGP) funding is a rare and somewhat arcane strategy, and the slow release of HUD CDBG-DR funding rather limits the usefulness and salience of this strategy in the initial heat of disaster response (versus longer-term recovery).

Presumably, this pool of capital will sustain lending activity beyond the terms of loans issued immediately after Matthew. According the NC DR Framework: "As loan capital is repaid to each entity, half will return to Golden LEAF to establish a loan pool for future disaster recovery lending. Following the event, Golden LEAF may make grants from the disaster loan pool to eligible entities to provide loans to businesses" (NCEM, 2018, p. A-6-8).

In coordination with the DOC and SBTDC, a select number of CDFIs used the funding granted by Golden LEAF to set up emergency-term and longer-term recovery gap-financing programs for small businesses. North Carolina's 2018 Disaster Recovery Framework names three principal CDFIs: the Rural Center and its subsidiary Thread Capital, the Carolina Small Business Development Center (formerly the Support Center), and the NC Community Development Initiative (NCCDI) (NCEM, 2018). The Framework advises on the creation of two loan types: a short-term, low-principal bridge loan with expedited approval, intended to sustain a business with working capital until the arrival of SBA loan proceeds or insurance payouts; and a longer-term, higher-principal recovery loan with attractive interest rates and somewhat lenient payment terms, intended to serve businesses unable to access SBA or private financing. Actual CDFI behavior post-Matthew and post-Florence largely bears these plans out, albeit with minor variation in the specific loan ranges and terms provided by each CDFI (see summary **Table 11**).[28]

Compared to the expenditure of CDBG-DR funds on businesses or in general, Golden LEAF has made faster work quickly distributing state funds to CDFI lending intermediaries that originated bridge loans and longer-term loans. According to the General Assembly DEP's May 2019 report, Golden LEAF had spent $4,309,928 (86%) of its $5M appropriation by September 2018 (NC GA PED, 2019a, p. 7), which outpaced most other state-funded programs in terms of percentage spent. Unfortunately, this metric does not account for the velocity at which individual CDFIs actually originated loans using the grants from Golden LEAF.

Regarding capital focused on Florence: The General Assembly's three acts related to recovery from Hurricane Florence remain mute on funding small business recovery (2018 Hurricane Florence Disaster Recovery Act, 2018; The Hurricane Florence Emergency Response Act, 2018; Lee, Brown, Jackson, & Rabon, 2018). Therefore, perhaps the state's initial $5M investment after Matthew is intended to also support Florence-related lending efforts; alternately, perhaps the state anticipates using a larger tranche of the approved HUD CDBG-DR Florence allocation for business recovery.

[28] Independently of other CDFIs, the Carolina Small Business Development Fund received in May 2017 a $750,000 grant from the US DOC Economic Development Administration (EDA) to establish a small business revolving loan fund (RLF) to serve a "14-county region of southeastern North Carolina that was impacted by Hurricane Matthew" (US EDA, 2017). The Fund also cites Bank of America, Wells Fargo, First Tennessee Bank as additional supporters.

Table 11: CDFI disaster recovery bridge and recovery gap-financing solutions

Community Development Financial Institution	Matthew Recovery Offerings	Florence Recovery Options
Thread Capital (NC Rural Center)	**Rapid Recovery Loan (Bridge)** Max: $15,000 Term: 180 days Rate: 0% Interest for 180 days 1% Interest after term Payment: *no amortization* Collateral: case-by-case	**Rapid Recovery Loan (Bridge)** Max: $50,000 Term: 180 days Rate: 0% Interest for 180 days 1% Interest/mo. after term Payment: *no amortization* Collateral: case-by-case
	Resilient Recovery Loan Max: $250,000 Term: 10 years Rate: 4.99% to 9.99%/yr. Payment: monthly amortization Collateral: case-by-case	
Carolina Small Business Development Fund	**Hurricane Matthew Recovery Loan** Max: $25,000* Term: 24 months Rate: 0% Interest for 6 months .83% Interest/mo. after term Payment: *no amortization* Collateral: Blanket lien on business assets and assignment on recovery claims, if available **unable to verify*	**Hurricane Florence Recovery Loan** Max: $25,000 Term: 24 months Rate: 0% Interest for 6 months .83% Interest/mo. after term Payment: *no amortization* Collateral: Blanket lien on business assets and assignment on recovery claims, if available
	North Carolina Small Business Recovery Fund Min: $1,000, *with no maximum* Term: 10 years Rate: 5% to 9%/yr. Payment: monthly amortization, up to 2 yrs. interest-only or deferred payments. Collateral: case-by-case	
NC Community Development Initiative	**Resilient Communities Loan Program** Amount: $50,000-$150,000 Term: 5 years Rate: 2%-4%/year, fixed Payment: monthly amortization Collateral: case-by-case **Small Business Recovery Assistance Program (SBRAP)** (CDBG-DR Forgivable Loan) Up to $75,000 forgivable	
Self-Help Credit Union	**Small Business Recovery Assistance Program (SBRAP)** (CDBG-DR Forgivable Loan) up to $75,000 forgivable	
NOTE: For Small Business Recovery Assistance Program Loan Terms, see "State Recovery Framework" above.		

4.3 Empirical Business Vulnerability: Sensitivity & Adaptive Capacity

Differences in adaptive capacity and sensitivity explain differences in the vulnerability of businesses, as well as in the speed and quality of business recovery. As observed in the literature and confirmed via secondary data (Ch3) and interviews, businesses that had the most trouble recovering after Hurricanes Matthew and Florence tended to have greater sensitivity to the hurricanes and less adaptive capacity—the capacity to weather, manage, cope with, or adapt to the hurricane impacts (Preston & Stafford-Smith, 2009, p. 11; Smit & Wandel, 2006, p. 286). Specifically, less sensitive businesses tended to operate across more than one location, rely less on local spending and local suppliers, and sell more "essential goods" rather than "luxury goods" and "discretionary goods." Therefore, their revenue was less sensitive to hazards and they were more likely to self-finance recovery from flooding impacts. Businesses with greater adaptive capacity tended to employ more staff, utilize more flexible labor forces, and prepare meaningfully ahead of time. Therefore, these businesses might have been able to mitigate the damage incurred or the length of time they remained closed due to their superior flexibility and adaptability.

4.3.1 Size and Vulnerability

> *"It cannot be understated just how vulnerable sometimes these smaller companies are…even if they've been in business for a long time."*
>
> – Tiffany Creech
> Existing Industry Manager, WCED

NCCDI, the Rural Center, and the Small Business Development Fund all overwhelmingly issued post-disaster bridge loans and term loans to businesses with very small numbers of staff. Tyran Hill at NCCDI indicated most of their loan recipients fell into two camps: 2-3 employees or 10-15 employees. The Rural Center capped their disaster loan programs as open to businesses with 50 or fewer staff and said most of their applicants had fewer than 10 staff or were sole proprietors.

On one hand, a greater demand for post-disaster debt among the smallest businesses signals their acute distress, compared to larger concerns that did not apply or were not targeted. On the other hand, the existing conditions analysis for Matthew and Florence (*Section 3.3*) made clear that the vast majority of businesses in the disaster area (at least 85%) employed fewer than 20 staff. Therefore, it might be no surprise that local institutions devoted so many resources to these businesses; there are so many more of them.

Numbers aside, anecdotal evidence does illustrate the real advantages larger concerns had over smaller businesses and sole proprietorships. Larger businesses were able to rely more on internal capacity and cash reserves rather than outside assistance. A "full-service restaurant" with multiple locations and a "sporting goods store" were the two businesses sampled that employed the most people, at about 145 employees (during high season in the summer) and over 60 employees respectively. Both of these businesses utilized their far greater capacity in three ways. First, they leveraged superior professional capital to plan for potential disasters and establish mechanisms to enable a more rapid recovery, including written emergency operation and disaster preparedness plans as well as pre-arranged contracts with shipping, heating, cleanup and general contractors. By the time most other recovering businesses were reconnoitering damage and scouring the internet and their networks for available contractors, these rapidly responsive businesses already had

multiple contractors onsite cooperating to restore their properties. Second, these businesses dispatched their labor forces to shore up business defenses and relocate loose assets and supplies (to reduce physical hazard exposure and sensitivity) in the days immediately before flooding but before mandatory evacuation orders. The full-service restaurant skillfully operated a "soft-close," gradually winding down operations as its employees loaded all movable foodstuffs, supplies, and equipment onto pre-commissioned trucks and elevated all fixed assets as high as possible. Third, the businesses engaged their large labor forces in the recovery effort rather than relying purely on third-party labor and contractors. After floodwaters receded, the sporting goods store engaged all available employees in the cleanup and re-merchandizing of the flooded store, paying their employees as if they were working fulltime and providing three family-style meals a day to maintain high morale.

While large businesses have the intellectual and professional capacity to devise effective disaster plans and the labor capacity to prepare, respond and recover efficiently, they also have a greater onus to recover faster than other businesses might. Aside from their closure's disproportionate impact on local employment numbers, extremely large businesses often have shareholder interests that behoove them to act efficiently. Kevin Lanier, Economic Development Director of Columbus County, mentions a large industrial establishment outside of Whiteville that had its truck beds fill with floodwater. Even without power and with many of its employees stranded, the establishment was able to deploy generators and vacuum the water. "They had the capital and the resources to get back up and running a lot quicker," he said, adding, "They'll do what they need to do for their shareholders." Tiffany Creech, Existing Industry Manager at Wayne County Economic Development, cited the case of one large, well-resourced business temporarily relocating its critical employees into hotels on its side of the Neuse River before the flood so they could continue delivering work onsite until the water levels receded and transportation networks reopened. In another case, a large industrial plant hired a helicopter to transit its finished product from its islanded worksite to a group of trucks located on higher ground a short distance away so they could continue delivering to clients.

4.3.2 Sector and Vulnerability

> *"They put their barbershop needs on the backburner because they're trying to figure out how to eat."*
>
> -Tina Parker
> Town of Tarboro and SBCN Edgecombe

In their May 2017 Hurricane Matthew Business Impact Survey, DOC LEAD found that retail trade, accommodation and food, agriculture sectors, and health care and social assistance were overrepresented among the 94 establishments that were still struggling nine months after Matthew (NC DOC LEAD, 2017a). (The first three sectors were also overrepresented within the SBA's disaster loan portfolios for Hurricane Matthew and Florence.) These market sectors correspond to those sectors highlighted in prior literature as most vulnerable to natural hazards. Interviews with businesses, lending institutions, and economic development institutions overwhelmingly confirmed the difficulty faced by retail, food, accommodations, and also certain services businesses attempting to sustain operations and recovery after the hurricane.

Locally owned "mom and pop" retailers, restaurants, and consumer services businesses are more likely to be small, and therefore lack the disaster-insensitivity and adaptive capacity of larger

businesses. “For lower and middle-income people,” explained Tyran Hill at NCCDI, “income from these businesses are a form of necessary, month-to-month cash flow.”

Moreover, retail and food and accommodations and consumer services businesses are also more exposed to fluctuations in consumer spending and demand in the weeks and even months after a disaster. When residents of a community evacuate before a long period of flooding, or find themselves stranded by flooded byways, demand for all goods obviously falls. However, even after residents have returned and mobility has improved, demand only normalizes right away for “essential goods”—groceries, gasoline, medical supplies. Demand for less essential goods and services—specialized retail, finer restaurants, discretionary personal care services, etc.—remains depressed. As a result, these “less essential” businesses lack the revenue that would enable them to otherwise speedily recover and qualify for recovery debt.

Kent Hill at SBCN FTCC diagnosed this problem for Fayetteville retailers after Matthew: “There was a lack of shoppers, which affected retailers significantly.” “The biggest issue overall was just that there were no customers. It sucked so much money out of people.” He explained that Matthew exerted its greatest impact before the winter holiday season, and that for many retailers, the post-disaster holidays failed to stimulate enough spending to return to baseline. A small office of optometry employing 25 people also noted a depression in spending after Hurricane Matthew. “Business was off for one month or more because, for people, getting their eyes checked was not their primary concern. They had lost their homes. They had lost their cars.”

Tina Parker, formerly at SBCN Edgecombe, now at Town of Tarboro, related that Hurricane Matthew essentially shattered norms of consumption. “Downtown businesses had a decline in sales for weeks because so many people were displaced and shopping norms were broken.” And “If you have a business like a higher-end restaurant, like the one we have downtown, after a disaster hits… people don’t have the routine to go out to eat after the storm.” Parker shared an anecdote about a flooded barbershop, most of whose clients were local, that endured a long-lasting depression in demand due to factors beyond its control. Flooding after Matthew displaced its mostly lower-income customers, as there wasn’t enough rental housing or available and undamaged hotel space in Edgecombe County to relocate all affected residents close to Tarboro/Princeville. Many displaced residents sheltered 30-50 miles away, which generated extra expenses for them (gasoline, eating out). Not only were they too far removed from town to patronize the barbershop after it reopened, but, “They put their barbershop needs on the backburner because they’re trying to figure out how to eat.” On the other hand, Parker related that gas stations, convenience stores, grocery stores and dry goods retailers fared relatively well after the flooding, likely because of the non-discretionary nature of their goods and services.

Finally, certain food and accommodations businesses face recovery costs above and beyond what other businesses deal with. “Motels are the toughest to get back quickly. When you have damage, the cost of rehabilitation is tremendous,” said Bob Moore, Director at SBCN Robeson, citing a number of large, locally owned motels in Lumberton that remained vacant and derelict when I visited more than two years after Matthew. A typical two-story roadside motel might contain tens of bedroom, up to half of which would have sustained structural damage, furniture within rendered unsalvageable due to mold and mildew. Furthermore, businesses in the restaurant and hotel industry must pass a health department inspection prior to reopening, which potentially poses additional costs and some additional delay before the business can finally start recuperating income.

4.4 Debt and Decision-making

4.4.1 Loan Penetration

North Carolina's third amendment to its CBDG-DR Action Plan paints a critical picture of business and agriculture recovery post-Matthew, stating that as of January 2019, "neither the SBA or USDA has addressed the recovery needs following Matthew" (NC DOC, 2019, p. 38). NC cites the SBA's loan underwriting behavior as a reason why the majority of loan applicants have been denied, and why nearly 8,000 small businesses did not even bother to apply after referrals.

> "The State still estimates that in part due to SBA loan denials and lack of dedicated recovery funding from the USDA for the farming community, the agricultural and small business community continues to have a $263M unmet need… Based on the September 2017 data on business related loans programs, small businesses in North Carolina are seeing more loans denied than approved, with 645 applications approved and 752 denied. In addition to the businesses who were denied an SBA loan, there were 7,740 businesses who were referred to the program but never applied. The State, in consultation with community leaders and through the planning process, believes that many of these businesses, while having unmet recovery need, did not submit the loan package to SBA because they knew they would not qualify." (NC DOC, 2019, p. 38).

SBA loan penetration has remained at comparable levels for both storms, suggesting the vast majority of businesses pursued alternative means of financial recovery—if they chose to continue operating at all. According to the information provided by the SBA per a Freedom of Information Act (FOIA) Request, the SBA received 1,180 Matthew disaster loan applications and approved 462, an approval rate of 39% (SBA, 2019a, 2019b). And as of February 2 2019, the SBA has received 2,557 Florence disaster loan applications and has approved 935, an approval rate of 37% (SBA, 2019c).[29] These approval rates matched the SBA's average nationwide business disaster loan approval rate of 37% in 2017, according to the 2017 SBCS (Battisto et al., 2017, p. 13).

Historically, the SBA realized a much higher approval rate for loans following Hurricane Floyd in 1999. 6,203 businesses applied for SBA business disaster loans after Floyd, about 65% of which were approved for a total of $188 million in financing (NC REDD DOC, 2019b, p. 5).

The comparison between present-day approval rates and historical disaster loan approval rates suggests the state's implicit criticism of SBA loan underwriting standards might have merit, but it is not clear why the SBA's approval rates declined so significantly since the 1990s. It is possible that local economic factors suppressed approval rates: lower incomes, savings, and rural population densities reduced the number of responsible loans the SBA determined it could make. And perhaps the larger forces discussed in Chapter 1—especially increased rates of small business destruction and the secular depopulation of and divestment from rural areas—might have restricted SBA disbursement even further. However, similar economic conditions existed in the NC counties affected by Floyd in 1999, when the SBA's approval rate was higher. Moreover, the SBA's 2017 disaster loan approval rates were comparably low for other more populous, strong-market areas like South

[29] The SBA closed the application period for Florence physical injury loans on December 13, 2018. As of time of writing, businesses could submit applications for Florence economic injury loans until June 14, 2018 (NC Governor's Press Office, 2018). Applications periods for Hurricane Matthew closed in 2017.

Florida and Houston, TX (Battisto et al., 2017). The motivation for reduced approval rates is probably federal in origin. Perhaps internal reckoning with prior losses (after major disasters such as Hurricane Katrina and Hurricane Sandy) led the SBA to tighten its underwriting standards.[30] Unfortunately, the SBA declined to describe their specific disaster loan underwriting procedures and standards during an interview (e.g. DSCRS, LTVs, etc.), and I did not request said information via FOIA. However, interviews with small business loan applicants in North Carolina hinted at varied lending practices and underwriting standards (below). The secular decrease in in SBA loan approval rates might be a good subject for future research in economic disaster recovery.

4.4.2 Financial Decision-making

To ground narratives below about post-disaster decision-making among sampled businesses, I refresh the reader's memory by surfacing data from the previous chapter. By May 2017, NC DOC LEAD (NC DOC LEAD, 2017b, 2017a) reported only 25% of Matthew-damaged businesses (91 out of 365) reported receipt of financial assistance, and that fraction of businesses drew upon a variety of sources:

Table 12: Reported sources of financial assistance after Hurricane Matthew (N~91)—redux

	% of Respondents	Median Proceeds	Mean Proceeds
Insurance Claims	52%	$12,000	$150,000
Credit Cards / Family Loans	10%	$10,000	$9,000
SBA Loans	9%	$31,000	$78,000
"Other Financing"	9%	$25,000	$68,000
Bank Loans	6%	$20,000	$24,000

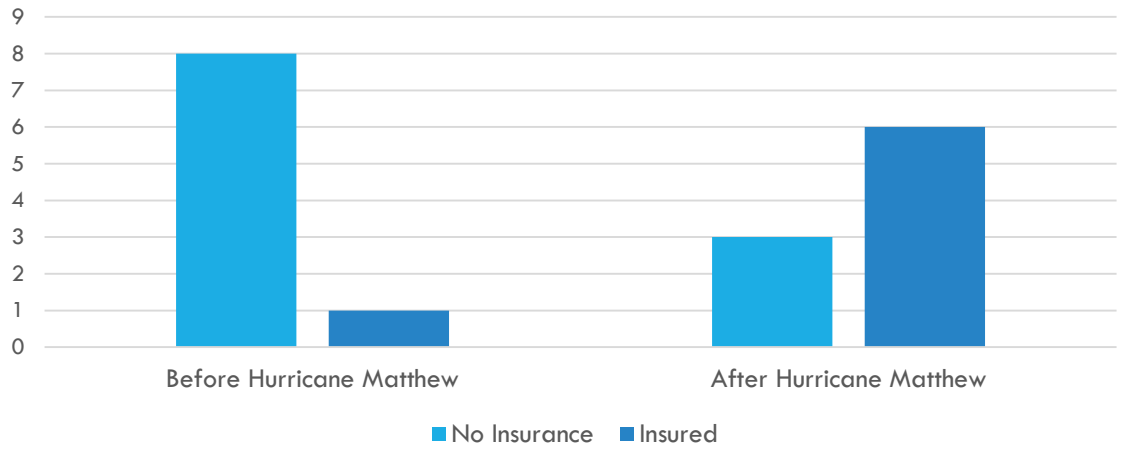
Insurance claims—presumably a combination of NFIP claims and commercial business interruption claims—constituted the majority of business financial assistance. As observed earlier, the average insurance claim restored all damages. SBA loans and other bank loans—presumably private banks and lending institutions such as credit unions and CDFIs—amount to merely 15% of financial assistance. (The balance of establishments receiving financial assistance did not answer this particular survey question.) And presumably, among the 274 businesses that did not claim financial assistance after the disaster, there was some subset that sustained enough damage to have to liquidate capital reserves or personal savings to finance recovery.

30% of damaged establishments (94 businesses) reported ongoing business challenges nine months after Hurricane Matthew, most often citing the repair of physical damage, reestablishment of business with customers, and access to financing as chief operating challenges. These still-struggling businesses were more likely to have received assistance (40% of them received some form of financial assistance), with 83% of them receiving insurance claims. The disproportionate reliance on insurance payouts, and the geographic distribution of these still struggling establishments (See **Figure 30**, *Section 3.4*), confirms that businesses located in hardest-hit areas were most likely to be struggling nine months later. For these still struggling firms, insurance payouts—though crucial for recovery—were broadly insufficient to cover all recovery costs. This cost margin means that these businesses might have been underinsured; as a result, they had to draw on other sources of funding and financing in order to recover, be it ongoing revenues, business reserves, personal or family

[30] The SBA makes available annual loan loss information, for its direct disaster loan and microloan programs, on its website: https://www.sba.gov/document/support--sba-loss-report.

savings, private bank debt, credit card debt, loans from informal sources, SBA disaster loans, or in a few cases bridge loans and recovery loans from local CDFIs.

Figure 41: Insured vs. uninsured businesses (in interview sample) before and after Matthew



Although a slim majority of businesses at large (52%) claimed use of insurance payouts to fund recovery, almost none of the businesses I interviewed owned flood insurance prior to the impact of Hurricane Matthew. This is partly an artifact of my research design (see Appendix): businesses that applied for SBA loans to pay uninsured disaster losses were less likely to have NFIP insurance or other insurance products to begin with. However, several interviewed businesses stated they were not located in a FEMA-designated floodplain prior to Hurricane Matthew; therefore, the environmental risk was not adequately disclosed to these businesses until after the flood event, precluding rational decision-making about insurance based on their probability of flooding. The flip-flop in the ratio of uninsured-to-insured businesses after the hurricane reflects FEMA's subsequent redrawing of floodplains after Hurricane Matthew, which triggered the requirement that SBA loan recipients insure their benefitting/collateralized property (see **Figure 41**). The changed ratio also evinces the efficacy of this SBA requirement as an efficient risk mitigation policy.

4.4.3 Financial and Behavioral Constraints on Debt

> *"…many of these businesses, while having unmet recovery need, did not submit the loan package to SBA because they knew they would not qualify."* (NC DOC, 2019)

Of the 9 business interviewed, 3 decided to avoid disaster debt, and zero (0) claimed to be aware of subsidized alternatives to SBA loans—such as bridge and resilience loans from the Rural Center, the Carolina Small Business Development Fund, and NCCDI. And according to the state's CDBG-DR Action Plan, 7,740 North Carolina businesses did not bother to apply for SBA debt even though they might have qualified (NC DOC, 2019).

Business avoided or skipped disaster debt for reasons that are hard to track, but decisions falls into three categories: (1) businesses did not pursue subsidized debt because they were deemed to have credit available elsewhere, (2) businesses could not qualify due to insufficient financial standing or recordkeeping, (3) businesses did not know about all the debt options available to them. Elizabeth

Dwyer at SBA Public Affairs explained the positions of businesses in the first two categories. The SBA's target of high-need businesses without credit available elsewhere makes SBA disaster financing particularly useful only for a "narrow window" of businesses: businesses that are financially strong enough to pay back the debt, yet not strong enough to qualify for "credit available elsewhere."

Businesses that are financially strong (with high NOI, large and stable amounts of collateral, or sufficient equity) would receive a two-times higher interest rate and **might opt to forego an SBA loan due to the borrowing cost or the cumbersome requirements and timelines of SBA loans compared to other sources of credit or equity**. Tiffany Creech, Existing Industry Manager at Wayne County Economic Development, said, "It is common for businesses to rely on savings or on local institutions to lend them money just because it is so cumbersome and takes so long…" to receive lower-interest debt from sources like the SBA.

In one case, the owner of a small, 18-year-old sporting goods store with nine staff and two locations sustained about six feet of flooding after Matthew, which damaged their main location structure (which they owned) and destroyed their inventory and displays. Rather than deal with an SBA loan process, the owner actually utilized alternative credit. He took out mortgages on the properties he personally rented out "on the side" in order to finance the cost of a general contractor to repair the store's merchandise area and shooting ranges as well as resupply lost sporting goods and displays. For this business, "credit available elsewhere" included the ability of the business owner to blend his business finances with his personal finances, the latter of which supported large amounts of credit that were able to restore his business without damaging his business's financial standing long-term. But in two other cases, otherwise successful businesses without access to alternative, personal credit felt caught between a rock and a hard place: liquidation of savings or an accumulation of debt that they viewed as unnecessarily expensive and slow to arrive.

The owner of a small mechanical contractor (12-15 staff) sustained flooding four times in the last three years, including after Matthew and Florence. After Matthew, he applied for an SBA disaster loan but could not ultimately accept the loan terms, deciding to dip deeply into personal/family savings instead. The SBA offered the business a "very high interest rate" (presumably 8%) based on the relatively strong financial position and credit history of the 12-year-old business. According to the owner, the SBA explained it would have offered a lower interest rate only if his business had demonstrated a *weaker* financial condition (which would have precluded it from accessing "credit available elsewhere" (CAE) in the opinion of the SBA). The owner decided there was "no point" in taking out such expensive debt to make an investment that would merely return the business to its status before the storm. Instead, to recover, the owner and his family "used all of our savings… Everything we had saved for our whole lives we had to put back into the business. It broke us financially." Two years after Matthew, Florence flooded the business a second time with far higher water levels, and floodwaters also destroyed the owner's home, which Matthew had left relatively unscathed. The devastation rendered the owner and his family temporarily homeless until FEMA funding restored their household. Remarkably, the owner did not permanently shut down. Eventually, the owner abandoned the original business property and reopened the business six months later in another location within the limits of the town.

The owner of a small (1-4 employees) general automotive repair business took out an SBA loan after Hurricane Matthew. "I had to jump through a hundred hoops to get it." He has since regretted

it. "Never incur debt for your business," he said. The owner of a vehicle repair shop was referred to the SBA by FEMA after Matthew flooding, but SBA assistance "turned out to be a loan [rather than a grant], and to me, that wasn't advantageous." Instead, "I just used personal funds, which is why it took so long to recover." After three months of closure, he reopened the business in the same location and reinvested any net income into the repair of his damaged equipment. He feels "blessed I didn't have to use any outside resources."

In both of the cases above, the business had sufficient financial standing to obtain an SBA disaster loan but opted to liquidate cash reserves and personal/family savings instead. Unfortunately, this decision to self-finance might have delayed the business's ability to reopen as much as or perhaps more than the SBA loan origination process would have delayed it. On one hand, the decision to self-finance betrays a lack of financial management acumen: a onetime liquidation of a business's savings might spare it the cost of debt, but it permanently shocks the business into a state of reduced liquidity, weakening its fortitude against subsequent shocks and narrowing its future appeal to lenders. The almost ideological idea "never incur debt for your business" suggests that some business owners avoided debt in a knee-jerk reaction rather than with careful consideration. It is likely these businesses could have benefited from immediate technical assistance on post-disaster financing options. On the other hand, there is a logic to a reliance on savings post-disaster. Eschewing debt in favor of accrued savings makes sense for a risk-averse business that may not be confident in the potential for revenue in months to come. Avoiding SBA debt is also the right decision if the applicant cannot expect it to arrive quickly enough to be useful. And finally, a higher interest rate for more robust business that just happened to experience a flood feels, in the words of the general automotive repair business, like a "punishment for success." It is counterintuitive for the SBA to offer a very competitive interest rate (4%) to a riskier class of businesses and only reserve a steeper interest rate (8%) for stronger businesses that the SBA judges to have CAE.

On the other hand, businesses under financial duress did *not* qualify for SBA loans—or perhaps any loans—because they had insufficient cash flow or valuation or credit histories, or because of their unacceptable recordkeeping. Jennifer Holcomb, President of Columbus County COC, shared one of the first lessons-learned post-Matthew: "There are no resources for a business, outside of lending, that can help a business after a disaster. That was a hard lesson to learn." And given the rural nature and economic distress of the Columbus County community, "our businesses could not afford to take on debt." Of the "dozens" of flooded businesses she communicates with along the downtown corridor, she knows of only three that actually pursued an SBA loan. Bob Moore, Director of SBC Robeson, explained that after Matthew, many county businesses had been profitable, "but not to the point where they could take out a loan and start over again." When Florence flooded the community two years later, the assorted businesses with SBA loans or other debt had to refinance it, and some businesses had to close permanently due to the double impact.

The Town of Princeville, NC—the oldest town incorporated by African Americans in the United States—was nearly destroyed in 1999 by flooding after Hurricane Floyd, prompting many business owners to take out SBA disaster loans to recover. Ms. Parker relates that by the time Matthew flooded the town again, submerging it for days, many of these businesses were still repaying their Floyd SBA loans. If they had sufficient credit, they had the option of applying for a second SBA disaster loan for Matthew, but "Most businesses didn't have the credit scores this time around to apply to SBA loans…or from local lending institutions."

Others businesses might have been stable or growing but did not maintain the records to prove it. Directors at North Carolina's various SBCs paint a picture of wildly varied levels of financial sophistication and preparedness among area business owners, some of whom had enough professional capacity and financial expertise to pursue SBA loans without assistance, others of whom lacked basic records and required extensive help. Katelyn Edmonson at SBCN Edgecombe witnessed "a lack of recordkeeping [and] basic bookkeeping" among many businesses that arrived at the SBC for technical assistance after Florence. Kent Hill at SBCN FTCC said "A lot of businesses are frustrated with the [loan] process… I don't think it's terribly exacting… A lot of people aren't prepared." Mr. Hill recounted one anecdote of an owner that sought help from SBA personnel temporarily stationed at SBCN FTCC; the owner attempted to file loan paperwork but ended up lacking a tax return because he had not filed taxes the previous year because he had not made enough income. Businesses that lack the documentation necessary for a loan approval process—due to a lack of financial education or experience, a lack of professional labor capacity, or a decision to operate informally as a "cash business"—face enormous struggle qualifying for any financing to unbury them from disaster damage.

Finally, some businesses lacked knowledge or understanding of the financing options available to them. Alternatives to SBA disaster debt do not receive sufficient publicity to appeal to affected businesses. Again, zero (0) interviewed firms claimed to be aware of subsidized alternatives to SBA loans—such as bridge and resilience loans from the Rural Center, the Carolina Small Business Development Fund, and NCCDI. Carol McLaurin at SBTDC cited this illiteracy as a principal problem in the state's business recovery system. "The message that most citizens have in their mind is that business recovery means an SBA loan. We are trying to spread the notion that there are other ways to recover from a disaster," she said. McLaurin shared that after Matthew, only about 30 calls came in through the SBDTC's emergency technical assistance 1-800 number. The SBTDC and CDFIs "do not have as loud a voice" as the SBA, so their technical assistance and emergency communication is crowded out. In the future, McLaurin suggested the SBDTC could more closely partner with the Rural Center, the governor's office, and the SBA to advertise emergency loan programs. She also anticipates further improvements to the SBTDC's emergency response website, which would clarify the sources and uses of various state/federal debt capital options.

Although the majority of interviewed parties stated that increased or improved technical assistance would improve post-disaster business outcomes, evidence suggests that utilization of technical assistance is spotty. According to Mr. Hill, "We tried to hold one orientation to help them with paperwork and I thought we'd have mobs of people show up, but not one person showed up….Attendance has been really low….Part of it is that people are too busy getting back to where normal was." It is possible the SBCs don't hold seminars frequently enough, or at sufficiently convenient times, but is also likely that business owners—especially of small, low-capacity establishments—simply would not have time to receive assistance regardless of the time it is made available. Many affected business owners are also affected homeowners or renters in the community; therefore, the quantity of property they must repair and reconstruct effectively doubles compared to that of the average household. Ms. Parker explained, "You've got a business owner…they're not only worried about their business but they also have their own personal homes [or families]." Reopening the business competes in priority with other life-critical needs, further reducing the owners' bandwidth to seek out and absorb any technical assistance made available.

Finally, mistrust and cultural differences hinder cross-scale interaction and between federal agents and rural businesses, despite the mediation of local SBCs and SBTDCs, and thus hinder business's grasp of their debt options. Tina Parker, formerly at SBCN Edgecombe and now at the Town of Tarboro, acknowledges some businesses' lack of preparedness, but she also chalks up businesses' difficulty to a lack of trust and relationship-building between applicants and SBA officials. "The SBA is going to bring in people from various states…they're not from the area, they don't understand the people, they don't understand the issues. They bring in these very formalized materials…" As a result, "The loan process is completely intimidating for these businesses. They require step-by-step assistance. Otherwise their business will end up failing because they don't have the trust or the relationships to be able to carry out this process."

4.4.4 A State of Precariousness

It remains too early to tell the effect the hurricanes had on business closure and performance, but the disasters have raised normal costs of doing business and engendered a state of precariousness, especially for small, rural businesses. A state of precariousness here refers to conditions of heightened financial instability and environmental instability, and above all a greater probability that failure and closure may follow any single financial or operational mistake.[31] Businesses that weathered the storm and sustained damage face steeper operating costs, and in some cases lower revenues over time. Six (6) of the businesses interviewed incurred SBA disaster loans to recover and, as a result, adopted SBA-mandated NFIP insurance policies. Many were thankful for the security of the required NFIP policy, but some also considered the debt and insurance a burdensome condition. Other businesses shelled out cash to build flood mitigation into their property beyond simple repair and reconstruction, or they incurred unanticipated emergency costs in the initial weeks after the flooding. And as stated above, businesses—especially those that provided nonessential retail trade, food, healthcare, and personal care services—dealt with reduced consumer traffic for weeks and months post-disaster, further stressing their month-to-month and year-to-year cash flow.

The owner of a small art dealer employing 1-4 staff qualified for an SBA disaster loan to repair catastrophic damage to her building and contents, which also required her to take out flood insurance. About the combined costs, she said, "It's burdensome. I'm taking a hit for it. It's a new cost…. I'm trying to get these loans paid, but it's going to take decades." Above beyond her increased liabilities, she has since spent about $6,000 on hazard mitigation, including digging holes and trenches around her property. "That's money that I can't put into my business." She also acknowledged unexpected recovery costs in the weeks after the storm. Until her town secured funding to haul debris from streets and local properties, she found herself paying $300-$400 per day on dumpsters in order to quickly trash ruined assets, supplies and inventory. In addition to the dumpsters, she rented and powered heaters in order to "literally bake" the interior of her building for two weeks in order to fend off mold and mildew. She rented climate-controlled storage for her art. It took 14 months to return to baseline operation, and "All that time, I had to pay storage

[31] Compare with "precarity": a designation originating from the European social science academe, referring to the common condition of unstable, contingent labor in increasingly exploitative and volatile regimes of capitalism (see Neilson & Rossiter, 2008). While precarity's sense of heightened risk and uncertainty aligns with my much more general and much less academic notion of "precariousness," my analysis does not at all presume that systems of disaster credit, on their own or as quasi-market instruments within a capitalist economy, are inherently or purposefully exploitative of business and labor.

costs… And I lost sales, because sometimes people would want that [stored] art" rather than the art she had managed to return to the site. For the owner, a combination of unexpected short-term expenses amid a long delay in debt proceeds shocked her business almost to the point of permanent closure. Her ability to take out a mortgage on her personal home in order to provide working capital, as well as extensive volunteer assistance and $5,000 in donations from friends and community members via GoFundMe.com, might have made the difference between surviving and shutting down that autumn. SBA loan proceeds finally arrived five months later, in January 2017.

The owner of a small general automotive repair business employing 1-4 staff explained his SBA loan required him to purchase NFIP insurance, since the arrival of Matthew abruptly recast FEMA's maps of local flood plains. He is thankful he has the policy; he has sustained flooding at least four times over the last four years, taking about two weeks to recover after each flood. However, he acknowledges the combination of debt service and insurance premiums is expensive. "It [flood insurance] costs more than my liability coverage, and it has nowhere near the amount of coverage as in my liability insurance." Regarding the SBA loan, "It helped initially, but after I recovered, the payments have been aggravating…it's one of those payments that fall through the cracks." The owner rents his building, so the SBA secured the loan on his other fixed assets, the repair equipment he uses for his trade. "If you miss payments, you lose all your stuff," he says, hinting at the precariousness of operating in a flood-prone area with tight profit margins, increased and nonnegotiable fixed costs, little no margin for error, and the potential to lose everything.

Larger businesses also cited increased costs and sometimes extraordinary debt requirements post-disaster. The manager of an office of optometry employing 25 people across two locations summarized a close call for an otherwise thriving practice. Mid-September 2016, prior to Matthew, the practice had closed on a non-disaster SBA loan through a local bank in order to finance a second location, refinancing all of their debt into a consolidated loan to build and start the new office. At this point the business was steeply leveraged: "The original SBA loan we got to buy the second building was the first time I had ever heard the term 'over-collateralize,'" the manager explains. To borrow the $2 million principal, the owner had had to pledge his home mortgage and the businesses' equipment in order to provide collateral equivalent to 125% of the loan principal. Then "Two weeks after the closing, we had Matthew, without flood insurance…. It put us in a precarious position. The owner had no more collateral; he'd put his house up for the prior loan." An extended process of loan negotiation ensued over the course of six months, and the practice made the decision to open up their second location ahead-of-schedule and un-renovated. Ultimately, because the damage incurred was relatively minor—$180,000—and because the practice realized additional income and accounts receivable from their new location, the practice was able to sidestep its lack of unsecured collateral and receive another SBA disaster loan with a below-market interest rate. Regarding managing the business's increased debt service post-disaster, the manager says "It's manageable. And it's getting better all the time. The new location is doing better each day… Things are still tight. But that's the nature of the business." Although the practice's story represents a success, it is easy to imagine how the flooding could have precipitated a much worse outcome: a greater amount of damage might have overstretched the practice's ability to support its existing debt with the SBA; the absence or delay of a new, second location would have deprived the business of the supplemental net income that is helpful for servicing its unexpected, new debt.

The two largest businesses interviewed also cited debt payments as sufficiently burdensome for them to avoid in the future, despite the advantage of their greater size and market share. The

owner of the multi-sited full-service restaurant relied on SBA disaster financing to recover from Matthew, but he used cash reserves and present-day cash flow to fund recovery after Florence, explaining: "I can't keep borrowing from FEMA every time it floods… I'd have no money." The owner of the large, two-sited sporting goods store expressly regretted his first use of SBA financing: "I made the mistake of getting an SBA loan in 1999 [after Floyd]. 1.5 million dollars. Relative to the interest rates at the time, 4% interest was really good. And it was the only thing that could help me at the time." But a caveat in the loan terms required that once he turned a profit, 10% of his annual net income had to go to the SBA as an additional principal payment over and above his base monthly amortization. While his business was still "stressed," he had no choice but to start paying down the loan more aggressively the moment he enjoyed greater financial leeway.

The narratives above pivot around businesses acting quickly and resourcefully to secure post-disaster financing only to deal, afterward, with heightened minimum operating standards due to increased liabilities, strict debt terms, and sometimes reduced revenue. Unfortunately, the debt only serves to bring the businesses back to baseline, rather than enable new investment that would could eventually help service the debt by generating net new revenue. As long as it arrives quickly, the use of debt to fund repairs and restoration can be more effective than liquidating a staggering amount of capital to pay for large amounts of damage. However, debt-financed repairs do not in and of themselves stimulate *net new* income, which subverts the logic of debt as a tool for business development and expansion and instead transforms debt, in a way, into an expensive license to continue operating after the storm. Although my sample only included businesses that remain in operation after the hurricanes due to the difficulty of navigating survivor bias, the experiences of some failed businesses likely involve instances where increased costs of debt or insurance pushed a low-margin business over the edge into unsustainable financial losses, or the addition of substantial fixed costs in combination with extended revenue depression rendered the business nonviable.

4.4.5 Small Business in a Changing Climate

> *"It's going to take us decades, truly, to get back on our feet again… And not everybody is willing to face that. I've got my heart and my soul in this business… otherwise, I wouldn't do this. But if you're just starting out your business…there's no reason—you'd have to be absolutely insane—to start here."*
>
> *"Devastated and non-reboundable….Who is going to invest money into an area that just destroys your investment?"*

Given the probability of future flooding and hurricanes, businesses seemed split between optimism and pessimism about operating and growing in coming years. Generally, business owners exhibit short-term optimism. SBCS respondents in North Carolina disaster-declared areas appeared just as optimistic about the future as respondents beyond the areas. 97% of disaster-area establishments expected revenue to increase in the following 12 months, versus 94% of non-disaster-area establishments. Expectations about future employment levels were similarly optimistic between both subsets of businesses. Longer-term attitudes about the future varied significantly among affected businesses and appeared to be based primarily on the owners' own experiences during past storms, mainly as a function of their business's capacity and resources, rather than on a generalized understanding of economic and climate trends.

Among businesses interviewed, larger businesses and businesses located in or near urban areas seemed to be more optimistic and ambitious after Matthew and Florence. The large sporting goods store explicitly stated it planned to open a second location in 2019 partly as a means of diversifying their environmental risk. The four-site full-service restaurant shared a similar plan: "We're not going anywhere, but we're looking at other cities" in order to develop "a new revenue stream in order to deal with this if it [flooding] happens again, or if keeps happening more often." The two largest businesses interviewed are optimistic about their ability to survive future storms by virtue of their outstanding adaptive capacity, and they are considering geographic diversification as a means of reducing future flood sensitivity across their firms.

Another business, which was located in Cumberland County, the only urban/suburban county within the geographic scope of this thesis, based its optimism on its urban location: "I'm pretty optimistic. We seem to be a growing community." Finally, the vehicle repair shop acknowledged his optimism was based on good fortune, thanks to a number of successful drainage improvements in his low-lying area associated with the development of a baseball stadium up the street from his property. (After Hurricane Matthew but prior to the announcement of the drainage improvement project, every other business on his street had relocated to avoid dealing with further flooding.) These latter two businesses, though smaller, benefited from the colocation in suburban or urban areas with stronger markets and superior infrastructure, which provides positive spillover effects on their own exposure and sensitivity to future disasters.

In comparison, smaller and more isolated businesses tended towards resignation and pessimism. The owner of the general automotive repair business, which has flooded four times in the last four years, said "It's almost impossible to start a business here, and it's almost impossible to keep one going… I'm not very optimistic because every day it gets worse; every day it gets harder." He also mentioned labor recruitment challenges more related to his rural location than recurring flooding: "I'm in a trade field, and there's no one out here who I can get to do the work." When I asked his attitude about the future, the owner of the small sport goods store laughed; he framed planning for the future as futile: "I don't really have a choice, since I own the building. It's not as if I can move." The art dealer was ambivalent about remaining in her community despite the steep costs of continuing to do so. "I love this community. I want to stay in this community. Like I said, I wouldn't be here if it hadn't been for the help of my friends and family [and volunteers]—not so much the government, but the people." However, "It's going to take us decades, truly, to get back on our feet again… And not everybody is willing to face that. I've got my heart and my soul in this business… otherwise, I wouldn't do this. But if you're just starting out your business [*pause*] there's no reason—you'd have to be absolutely insane—to start here." Finally, one business owner shared how the disasters had exacerbated existing economic distress in his community and threatened to erode its social capital, at least in his mind. "Whiteville [in rural Columbus County] used to be a really nice place, but all the money moved out, and I hate to say it, but when the money leaves, the community crumbles…collapses in on itself." The owner continued: "I'm more skeptical about putting my money into other things around here besides my personal business now." That is, the owner is less likely to invest in the community or donate to the community causes for two reasons: (1) he cannot be certain of a return on his investment given the vulnerability of the community, and (2) he explained that when his business flooded, no one from the community helped him. "When you fall back and you need that community's help, they're not there." Broadly, these businesses recognize the difficulty of bootstrapping toward disaster preparedness and improved adaptive capacity

when overwhelming economic and environmental pressures suppress the recovery and growth of their entire community, in every direction they look.

The hurricanes might have dampened entrepreneurial activity in rural areas, at least temporarily. Given that high levels of uncertainty enervate investment and encourage conservatism (in the stock market as in business development), it is logical that rates of entrepreneurship and business creation would fall after a disaster. However, reduced entrepreneurial activity is probably more related to short-term, personal financial contractions post-disaster rather than changes in broader, long-term expectations about economic and environmental changes in North Carolina. Bob Moore, Director of SBCN Robeson, cited a noticeable reduction to the number of business startups coming through the SBC after Hurricane Matthew: "People were less entrepreneurially minded for two years after the storm…. When you don't have basic needs, it's hard to be entrepreneurial." Future research could measure rates of business creation to discover whether the impacts of Hurricane Matthew and Florence could have adjusted these rates in the worst-affected areas.

Market failures beyond any one business owner or institution's control still drag down local economies. Apart from broken norms of consumption, larger-scale damages—ruined public facilities, mass vacancies, and the exorbitant cost of demolition—also suppress economic recovery. Neither large-scale damages nor long-term depressions in consumer spending tractably respond to infusions of capital into individual businesses, regardless of how fast these infusions take place. In this case, debt is insufficient and leaves a financial gap for large, complex, environmentally risky projects. And when it comes to local purchasing power, debt is sometimes even counterproductive, depending on the weight that debt service payments exert on revenue.

Gary Lanier at Columbus County EDC mentioned several situations where a business with considerable real property and capital equipment—like a motel—could not feasibly repair the building after the flood, either due to catastrophic damage after the flood, advanced mold and mildew, the presence of lead and asbestos, or all three. Moreover, the cost to rebuild to modern floodplain regulations, above the updated floodplain with an additional two feet of freeboard, was not only costly, but also seemed pointless, since base flood elevation plus two feet (BFE+2) proved ultimately insufficient to protect businesses from Florence.[32] Bob Moore at SBCN Robeson cites the need for modern structures to stand on large amounts of dirt fill, since much of Robeson County is essentially on the edge of swampland. The cost of fill dirt is so high in the coastal plains, due to the need to transport it from elsewhere, that the cost of rebuilding per modern requirements is too much, even with subsidized debt. Therefore, several businesses have remained vacant, abandoned, and deteriorating in town—for instance, the large shell of the old Ramada Hotel visible right off I95 in the commercial area of Lumberton, NC (See **Figure 42**).

[32] FEMA and ASCE design standards specify that buildings must be elevated at least to design flood elevation (DFE), which is at least equal to Base Flood Elevation (BFE), which is the level of floodwater associated with a FEMA 100-year flood event. DFEs that exceed BFE incorporate a locally determined extra level of elevation known as "freeboard."

Figure 42: Old Ramada Hotel site in Lumberton, NC (Hunter, 2018b)

The abandoned hotel site is not only unsightly, but also exerts negative externalities on adjacent properties. Its two years' offline might have prevented adjacent restaurants and fast food joints on the highway exit from enjoying the volume of tourist/traveler traffic that existed prior to the two hurricanes. Indeed, Robeson derives a large portion of its economic activity from vehicle traffic along I95: the cover of the guide I retrieved from the visitor's center featured a map that highlighted Lumberton and I95, with New York City and Miami at either end: "When you stop here, you're halfway there!" The desolation of multiple roadside motels in Lumberton undermines one of the town's greatest economic development assets.

Downtown Fair Bluff, NC is the most dramatic example of this type of market failure. Hurricanes Matthew and Florence both caused the Lumber River to flood, unleashing catastrophic flooding throughout the small town's main street. Since Matthew, the town's population has shrunk from 1,000 to about 350-400 permanent residents, with many evacuees never returning. "It has been a ghost town for about two years," the town's Mayor said (Hill, 2018). During our interview, Gary Lanier handed me a map of downtown Fair Bluff with a red box traced around two and a half downtown blocks. Columbus County was in the process of procuring an environmental analysis on the potential demolition and reconstruction of the entire town, which could cost upwards of $3 million.

A brownfield is a lot or area that remains undeveloped, due to the need to redevelop an existing abandoned structure or resolve suspected environmental contamination. Large, disaster-destroyed lots resemble brownfields, given the costs associated with redevelopment and the negative externalities they exert on proximate development. These abandoned, deteriorating sites—sometimes near main thoroughfares and along main streets, or in the case of Fair Bluff, encompassing the entire downtown—are market failures that cannot bootstrap off existing market rate or subsidized debt products due to the sheer cost of demolition, reconstruction, and mitigation. Grants are crucial to meet the financial gap; otherwise, these "disaster brownfields" will remain a drag on community recovery.

4.4.6 The Question of Disaster Debt

> *"There are no resources for a business, outside of lending, that can help a business after a disaster. That was a hard lesson to learn."*
>
> -Jennifer Holcomb
> Director of Columbus County Chamber of Commerce

The short-term shock of flooding and the long-term fixed costs of flood insurance and disaster loans threaten to destabilize even successful small businesses, and it is possible that they suppress rates of entrepreneurial activity and new business creation. The resulting state of precariousness makes it harder to do business in North Carolina's more rural areas.

Therefore, to what extent should small, rural businesses continue to bear the onus for rising fixed and variable costs and increasing flood risk, and after what threshold should other parties—government institutions, nonprofits—step in to facilitate cost-splitting and risk transfer that is equitable, sustainable, yet fiscally responsible? While I do not propose to do away with disaster credit as a means of recovery, I do argue that disaster debt serves a certain purpose—to return to baseline—that is separate and distinct from that of traditional debt financing, which supports investment that stimulates net new growth. This distinction between disaster debt and traditional debt drives a philosophical argument below and in Chapter 5 about the appropriate cost of disaster debt and the role of grants.

The cost of debt and the role of grants for disaster-affected small businesses has been historically controversial. In 2011, a senate bill (S.1709) attempted to "temporarily reduce interest rates for certain small business disaster loans, and for other purposes" to 1% per year for businesses without credit available elsewhere (CAE) and 3% per year for businesses with CAE (Casey, 2011). The bill failed and provoked outcry (Muhlhausen, 2013). After Superstorm Sandy in New York State, the NYS Senate Bipartisan Task Force on Hurricane Sandy Recovery painted a dire picture of small business recovery and argued that SBA loans were unaffordable and bogged down in red tape. Its preliminary report recounts stories from Staten Island businesses in particular:

> "Businesses…could not get SBA loans because they would have to use their personal residences as collateral, which in many cases are all they have left. And while they felt the SBA was doing a good job in administering the loans available to them, many felt that even loans with a 1 percent rate and 6 months grace period are too much in light of the financial struggles they are facing. They recommended direct grants similar to what homeowners are anticipating they will receive from Sandy relief money…also suggested that the State consider a superfund for businesses who are suffering due to a natural disaster." (Skelos, Klein, Lanza, & Smith, 2013, p. 17)

The Task Force recommended the New York State Legislature consider a direct grant program that utilized recovery dollars (presumably the state's then incoming war chest of CDBG-DR funding) for businesses underserved by or without access to disaster debt (Skelos et al., 2013). This ultimately transpired, in the form of the CDBG-DR Small Business Recovery program under the New York State Governor's Office of Storm Recovery. There were also various CDBG-DR and non-CDGB-DR programs focused on small businesses within New York City (Magdaleno, 2016).

A recent report 2015 from the Congressional Research Service also raised the question of whether post-disaster business grants were appropriate or practical. The Service noted the NYS Task Force's recommendation on the role of grants after a disaster. However, it observed that such grants would significantly increase federal outlays in disaster assistance, and noted arguments that businesses should internalize the risk of disasters by considering insurance as a key element of their business plans (Lindsay, 2015). Unfortunately, the Service's report highlights criticism of business disaster grant proposals yet omits relevant details about markets for flood insurance. First, property owners tend to systematically underestimate the probability of hazards due to efficient yet flawed heuristics, leading to suboptimal insurance uptake (Kousky, 2010). Second, FEMA NFIP flood insurance has been fundamentally misaligned with actual flood risk due to the decoupling of policy premiums from actual risk as well as the systemic outdatedness, inconsistency, and inaccuracy of FEMA flood mapping (Kousky & Michel-Kerjan, 2017; Kunreuther & Michel-Kerjan, 2011; Kunreuther, Pauly, & McMorrow, 2013; Wing et al., 2018). Indeed, the potential benefit of flood insurance was not salient to most North Carolina (and New York) business owners because, prior to Superstorm Sandy and Hurricanes Matthew and Florence, FEMA's maps did not reflect these business owners' actual vulnerability. Therefore, on the basis of individual "myopia" and inadequate information (Neumayer, Plümper, & Barthel, 2014), natural disasters are "market failures" that require substantive government intervention beyond the free market.

In North Carolina, a few business owners and institutions expressed bafflement or indignation that the sort of FEMA grants available homeowners after a disaster were not made available to businesses. Yet others maintained that grants for businesses were impractical. Carol McLaurin at SBTDC said, "No one is going to come through, not even the federal government…to hand out $5,000 grants to businesses, or even $1,000 grants. It's just implausible." She acknowledged that one of the SBTDC's important post-disaster tasks was to snuff out distracting and unproductive rumors of grants for businesses. The news was upsetting to businesses. She related an anecdote she heard from more than one field office: a community holds an information session on business disaster recovery that attracts decent attendance, but when one of the subject matter experts clarifies that there are no grants available, a majority of the business owners stand up and leave. Apart from anecdotal grants that cropped up in interviews—a few thousand dollars provided to a business by a trade association, a small pool of grant funds accumulated and apportioned by Jennifer Holcomb at Columbus County COC after Hurricane Florence—McLaurin is correct about their nonexistence. That said, it is important to repeat (as McLaurin observed) that North Carolina spent significant amounts of money after Hurricane Floyd and the 2005 floods on SBA loan interest rebates for storm-damaged businesses. In addition, NC DOC's CDBG-DR forgivable loan program theoretically acts as a grant-making program, even though it is currently in its infancy.

Recent news about the Old Ramada hotel site reinforce the need for grant money to supplement debt and owner equity in order to nudge an unworkable project into feasibility. In 2018, the new owner of the hotel site (who had to continuously pay taxes on the unusable property for the two and a half years after Matthew) proposed demolition and redevelopment of the site to the city, which applied on his behalf for $500,000 in CDBG-DR grant money to fund the teardown (Hunter, 2018a, 2018b). In spring 2019, the state approved $400,000 of grant funds for the teardown, which will eventually make way for three restaurants and possibly a motel. Notably, the demolition money accompanied another $700,000 to support construction of a flood protection berm around a large foam products factory in southwest Lumberton, judged critical to the local economy due to

the 200 jobs it provides the community (Woolverton, 2019). These two narratives are examples of large amounts of federal grant money put to positive use in the aid of both individual business owners and general economic development, enabling projects that were otherwise impossible.

In conclusion, the current precariousness of a post-disaster economy loaded with debt and hard-strapped for cash is not tenable without intervention. In Chapter 5, I make recommendations to improve small business recovery and resilience in the future, including recommendations to adjust the cost of disaster debt and to make selective use of disaster grants to offset the costs of post-disaster economic development projects and jumpstart individual businesses' investments in resilience or relocation.

CHAPTER 5—CONCLUSION AND RECOMENDATIONS

5.1 Review of Findings

Hurricane Matthew and Hurricane Florence deluged North Carolina's coastal plains in the span of two years, overtopping the state's major rivers and tributaries for days and causing immense physical damage, residential dislocation, and economic loss. Certain communities in the southeastern-most areas of the state were twice flooded—e.g. Whiteville, Lumberton, NC. And many areas affected—with the exception of Brunswick and New Hanover Counties—were already saddled with the tripled pressures of disproportionately high poverty rates, secular rural depopulation, and decreasing entrepreneurship. The disasters could have been worse, perhaps. The category one storms prompted relatively small percentages of affected businesses to pursue external financing for recovery, suggesting that a majority of affected firms were spared the worst damages. But post-disaster conditions for businesses in North Carolina's more vulnerable coastal plains communities remain more precarious than they were before the storms.

For small businesses, relatively competitive forms of debt comprised the only widespread forms of economic relief after the disasters, overwhelmingly in the form of SBA business disaster loans. In some cases, both SBA and CDBG-DR forgivable loans were slow to penetrate flooded areas, leaving businesses to tide themselves over on insurance proceeds if they had them, and if they did not: alternative forms of financing, or internal reserves/savings. And although CDBG-DR loans had the best terms of all loan products made available after the disaster, they were bogged down by the state's slow speed of implementation as well as their extraordinary compliance requirements, which might have required additional learning time among participating CDFI lenders. While three of North Carolina's CDFIs provided faster-paced bridge loans using state-appropriated disaster monies administered by Golden LEAF, the number and volume of loans paled in comparison to the federal debt made available. Apart from isolated stories of donations from social circles and professional organizations, businesses did not have access to recovery grants. All of these facts point to substantial unmet need for financing/funding among storm-affected NC small businesses.

Among individual businesses, businesses with fewer staff as well as businesses selling more discretionary, nonessential goods and services were disproportionately more likely to seek and receive subsidized SBA disaster recovery loans (and presumably less likely to return to baseline in the absence of loan proceeds). In theory, insured businesses had more options to consider when recovering from the storm, but a large number of businesses were uninsured or underinsured due to inaccurate flood risk maps prior to Hurricane Matthew, the difficulty of patching together the correct insurance coverage, and perhaps powerful cognitive biases that dissuade from investments in adequate disaster preparation in the first place.

Uninsured, badly damaged businesses found themselves considering two costly means of returning to baseline: applying for a disaster loan, or liquidating reserves or personal/family savings. Both options would reduce a business's adaptive capacity to handle future disasters and other economic shocks. The new or increased debt service associated with a disaster loan, as well as attendant NFIP insurance requirements (for SBA debt), promised a long-term bump in fixed costs. And the collateralization of loan recipients' assets reduced their ability to secure additional debt, if needed. Collateralization also raised the consequences of default; business owners' use of personal assets as business disaster loan collateral means the consequences of default can be dramatic and life-changing. And unfortunately, unlike normal debt capital, disaster loans do not—*and shall not*—be

used for net new investments, thereby prohibiting loan proceeds from generating net new revenue to offset increased fixed costs. On the other hand, liquidating capital, personal, or family assets would spare the owner the burden of debt, but would deprive the owner of adaptive capacity and flexibility in the event of a future disaster. The fate of the small auto repair shop, whose owner liquidated his family's savings to recover after Matthew only to sustain worse flooding post-Florence and find himself and his entire family homeless, illustrates the harsh implications of reduced adaptive capacity in the face of closely recurring shocks in a vulnerable community.

Finally, generalized market failures exerted additional drag on community-wide economic recovery and augmented small businesses' already heightened economic precariousness. The sheer cost involved in the demolition, environmental remediation, and reconstruction of large damaged properties—sometimes entire sections of downtowns—paralyzed recovery in the worst-hit communities (e.g. Fair Bluff, NC). And depressed rates of consumption, due to forced dislocation as well as the generalized liquidation of household savings for individual recoveries, hobbled purchasing power post-disaster, rendering economic recovery all the more challenging.

Fortunately, North Carolina operates a robust and sophisticated system of business development that combines centralized management and policy with distributed sources of lending, technical assistance, and disaster recovery support that responsibly invests public dollars while maximizing the leverage of private capital. A true program evaluation of the state's business development apparatus, in general or with respect to the state's hurricane recovery, is beyond the scope of this thesis. However, it is highly likely that North Carolina's already successful business development framework was well-adapted to handle the economic shocks of Hurricanes Matthew and Florence.

◆ ◆ ◆

While some loss is inevitable after a natural disaster, adequate preparation and effective response can mitigate loss and speed the pace of recovery. However, measures to recover must mind the tradeoff between (1) rebuilding stronger in place according to existing policies and financing programs and (2) rebuilding differently, perhaps in safer areas, while using new policies and financial tools that favor far-sighted adaptation and adaptive capacity over status-quo-oriented resilience (see *Section 2.6*). Transformative adaptation does not have to mean massive managed retreat, which could precipitate the even faster decline of vulnerable rural communities. Adaptation ideally entails local, county, state, and federal stakeholders collaborating and negotiating in order to determine how vulnerable, rural areas in North Carolina can adapt to and better dodge the impacts of climate change using a combination of careful and limited retreat, targeted subsidy, technical assistance capacity building, faster and cheaper disaster-related funding and financing, and increased disaster capital absorption capacity. Rather than preserve relationships between advantaged and disadvantaged groups in the name of stability and resilience, adaptation seeks to redesign financing and funding products in order to balance regional economic recovery against the need for equity and fairness. In the spirit of adaptation, I propose a battery of sometimes ambitious recommendations, based on my findings in the preceding chapters, in order to improve the fate of small businesses in the face of future disasters and flooding especially as foretold by the advent of climate change. In general, recommendations on *local* response protocols seek to improve the already impressive activity of the state's lending intermediaries and other economic development organizations. Recommendations on *federal* recovery programs are more far-reaching and extreme, but they are grounded whenever possible in existing precedent.

5.2 Improve the Penetration of Disaster Insurance among Small Businesses

Data from North Carolina and other post-disaster contexts illustrate that possessing catastrophe insurance—e.g. property, flood, wind, business interruption, etc.—preserves a business owner's financial options after a disaster. Yet businesses nationwide were systemically underinsured in 2017 according to the Federal Reserve Bank's 2017 Small Business Credit Survey (Battisto et al., 2017), for a variety of reasons. Although flood insurance constitutes an additional fixed cost for a small business—a fixed cost likely to rise in the near future given imminent flood insurance reforms (Flavelle, 2019a, 2019b)—its costs might compare favorably to that of post-disaster disaster debt by virtue of its upside in the event of disaster damage. Fortunately, SBA post-disaster debt products already require beneficiaries to obtain an NFIP policy on the properties in question. North Carolina should take further steps to broaden the mandate to obtain appropriate insurance policies to as many small businesses as possible while also considering ways of making insurance policies more understandable, affordable, and accessible.

Evolve the accuracy of FEMA flood insurance rate maps to reflect current and anticipated flood risk in light of climate change while still balancing equity and accessibility. To date, FEMA's NFIP has continuously misrepresented actual flood risks due to outdated, uncertain and internally inconsistent flood mapping, which underestimates the number of households, businesses, and other structures that stand in the path of coastal storm surges and riverine flooding (Kousky & Michel-Kerjan, 2017). Indeed, the surprising reach of flooding after storms like Hurricane Sandy in New York and Hurricane Harvey in Texas has repeatedly forced FEMA to substantially redraw its flood insurance rate maps (FIRMs) in order to include structures formerly well beyond established 100-year and even 500-year floodplains (Hunn, Dempsey, & Zaveri, 2018; Pralle, 2019). Recently, Wing et al. (2018) reanalyzed the number of US households at risk of flooding from a 100-year storm and determined that FEMA underestimated the number of at-risk households by a factor of three: FEMA did accurately measure current risk along the coast, but FIRMs could not account for the sort of inland coastal flooding that struck North Carolina in 2016 and 2018. Regarding these inland communities in NC, The New York Times recently pegged household flood insurance rates at less than 1% (Walsh, 2018); the low penetration is partly due to the lack of information available about how much risk these communities actually face. Hence the claims of eight of the nine business owners interviewed: prior to Hurricane Matthew, they had not technically been situated within any floodplain at all, which rendered an investment in flood insurance apparently irrational.

Recent reforms of the NFIP intend to link flood insurance premiums to actual flood risk by October 2020 and plan to furnish FEMA with private sector flood and rain risk data, which is far more accurate than the data and methods that currently supply FEMA's FIRMs; although this means that FEMA will improve the accuracy with which it conveys risks to households and businesses, it also means premiums will increase (Flavelle, 2019b). While these policy changes represent a much-needed evolution in policy, two additional measures are needed to shore up the NFIP. First, NFIP data must transcend current risk and account for predicted risk as a function of sea level rise and changed rainfall due to climate change. Merely linking risk to *existing* hazards undercounts the future risk associated with rapidly changing environments (Pralle, 2019). Although climate science remains uncertain on the specific impacts and exact timing of climate change, the use of vetted confidence intervals and margins of error adopted from or developed in collaboration with local expertise—e.g. the National Oceanic and Atmospheric Administration (NOAA), the US Climate

Change Science Program—and international organizations—the Intergovernmental Panel on Climate Change (IPCC) foremost among them—should provide a starting point. Second, FEMA must balance the improved cost recovery granted by higher premiums with the need to provide accessible insurance to the most vulnerable households and businesses. Previous calls to reform the NFIP have insisted on the need for a voucher system, or similar method, to increase accessibility to lower-income households while preserving the important risk signal of an unsubsidized insurance price (Kunreuther & Michel-Kerjan, 2009, 2011). Such redistributive policies for households should also extend to the most vulnerable businesses, as identified by this thesis and prior empirical study.

Finally, North Carolina can continue to pass policy savings onto households and businesses under the NFIP's Community Rating System (CRS) program. If the state continues to align hazard mitigation investments with activities worthy of credit under CRS—including public information and educational campaigns, flood hazard mapping and regulations, flood damage reduction activities and infrastructure, and superior warning and emergency response technologies and protocols (FEMA, 2017)—flood insurance premiums will fall even further across the board for all insured households and business regardless of their ability to pay. As of 2016, the top-five scoring North Carolina cities—Charlotte, Grifton, Kinston, Topsail Beach, and Wilson, NC—had achieved a rank of five (5 out of 10) in FEMA's CRS ranking system. This rank vouches residents a 25% reduction to NFIP premiums if they are beyond the SFHA and a 10% discount for those within the SFHA (FEMA, 2016). (The Special Hazard Flood Area (SFHA) is a FEMA-determined area vulnerable to a 100-year flood event; residents of the SFHA are required to own flood insurance (FEMA, 2019).) Some of North Carolina's CRS-participating communities have made good progress on the CRS ranking scale, but given that first-class-ranked cities can garner discounts of up to 45% on NFIP premiums, all participating communities will benefit by chaining further improvements to emergency response and hazard mitigation to annual savings for the state's constituents. Many of the programs proposed by the 50 Resilient Redevelopment Plans produced by disaster-affected counties in North Carolina after Hurricane Matthew contain activities likely to qualify for CRS credit on the city or county level.

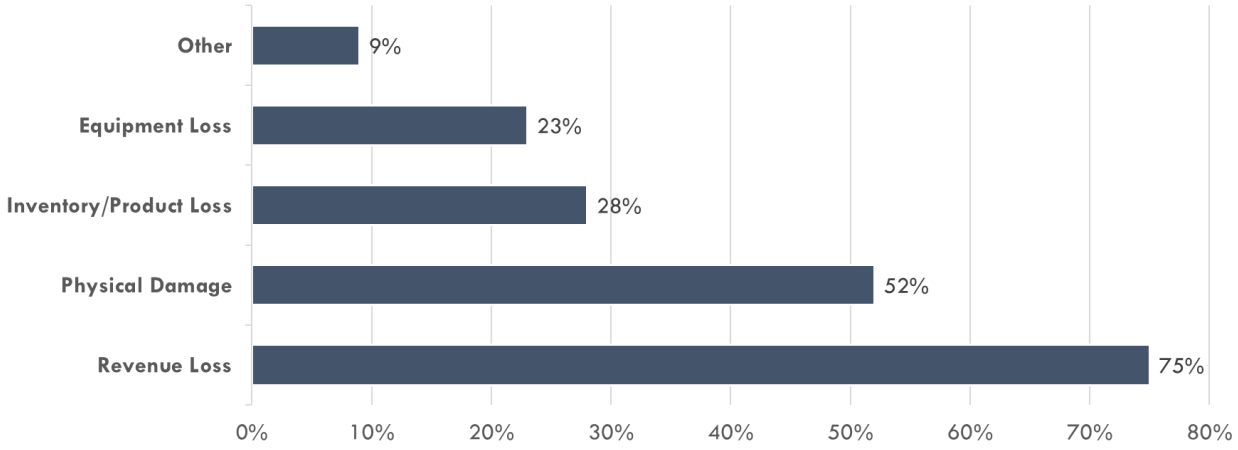
Broaden the uptake of disaster insurance—including but not limited to flood insurance—through advertising, technical assistance, and improved enforcement. Surveys, local reports, and my own interviews hint that only a small percentage of business owners nationwide and in North Carolina owned sufficient disaster insurance prior to 2017 (Battisto et al., 2017; Walsh, 2018)—especially in the inland, riverine areas of the coastal plains region. In order to ensure the solvency of NC insurance markets and bolster the adaptive capacity of businesses at large, North Carolina should devote more resources toward broadcasting disaster insurance information and better enforcing FEMA NFIP uptake by businesses in the SFHA.

The state's existing business development system is more than adequate to support greater insurance uptake through advertising and technical assistance. To increase penetration among new and inexperienced entrepreneurs, the DOC and Economic Development Partnership of North Carolina (EDPNC) should empower Business Link North Carolina (BLNC) to link new startups in the state with expertise about various types of disaster insurance. For both new and more established businesses, the state's diverse network of SBCs, SBTDCs, COCs, etc. can raise awareness multiple ways. Organizations can refer business constituents and clients to the NC Department of Insurance (DOI), exchange knowledge and expertise with the DOI in order to build their own capacity for insurance-related technical assistance, and host more seminars dedicated specifically to the availability and conditions of various traditional as well as disaster-related insurance products.

Training can pay special attention to how different products exclude certain types or sources of damage, illustrating how an apparently well-insured business might actually be underinsured for a specific event. Trainers could assist clients with weighing the costs and benefits of various policies given best available estimates of the firm's market risk profile—e.g. its sensitivity to rapid post-disaster swings in demand—and environmental risk profile—e.g. its projected geographic exposure to various natural hazards, as per publicly available data.

Although flood insurance may get more attention in discussions about disaster-readiness in North Carolina and similar contexts, advisement on insurance products should recognize the primary sources of economic loss after disasters and recommend relevant insurance products accordingly. As reviewed in *Section 3.4*, the most common economic loss among small businesses after Hurricane Matthew, and after 2017 disasters in general, was lost revenue rather than damaged property (Battisto et al., 2017; NC DOC LEAD, 2017a). Therefore, advertisement and technical assistance may wish to emphasize business interruption insurance (cost allowing), since lost revenue is the most probably form of disaster loss.

Figure 43: Prevalence of losses among all surveyed storm-affected businesses—redux



Regarding the enforcement of flood insurance uptake, the state should carefully use lending requirements as a path of least resistance. While the SBA already requires recipients of SBA disaster loans that are situated within the SFHA to purchase NFIP policies, North Carolina should consider encouraging or mandating other lenders to require flood insurance policies among the worst-exposed businesses in the state, if they do not already. As a caveat, linking SBA lending requirements to increasingly expensive NFIP policies is part of what has increased financial precariousness for storm-affected businesses in the state after the previous hurricanes, and moving forward, it may make lending less accessible to growing firms. Therefore, lending-based enforcement policies will only succeed in tandem with a serious commitment to subsidizing insurance costs for the most vulnerable firms, through vouchers or other means.

5.3 Improve the Accessibility and Speed of Disaster Capital

The slower speed of SBA disaster lending, and the treacly pace of HUD CDBG-DR spending by the state, left many businesses in a difficult financial spot as they applied for and awaited SBA proceeds. Other businesses simply bypassed the opportunity to apply for disaster lending, due to

manageable levels of damage or discouragement at the cost and pace of available debt capital. To improve business recovery and improve overall economic resilience after a similar disaster—which hinges in part on the rapid absorption of emergency capital—I recommend changes to both federal and local disaster credit and grant-making policies. Rejecting the ethic of self-reliance that underlies the absence of grants for small businesses, I start with an endorsement of CDBG-DR-funded small business grants with far fewer strings attached.

Suspend the CBDG-DR Small Business Recovery Assistance Program and refocus on efficient grant making by public institutions to the most vulnerable small businesses. The current iteration of the CDBG-DR SBRAP carries HUD requirements originally developed and suited for local government grantees and sub-grantees, not for private sector lenders and least of all for small business owners. Requirements such as environmental review, Section 3 hiring and subcontracting, prevailing wage requirements, and LMI job retention/creation are too onerous and complex for all but the largest of businesses. Rather than shift these HUD requirements onto small business loan recipients and lending intermediaries and rendering loan forgiveness a condition of HUD compliance, the state DOC's Rural Economic Development Division (REDD) should bear the compliance risk and spare CDFIs and small businesses needless cost and risk.

REDD, if it has the capacity, should administer small business grants in a way that mainstreams HUD requirements in the form of predetermined disbursement goals and outreach priorities. For example, REDD could aim to allocate a certain minimum percentage of funds to LMI business owners, or to businesses that employ some percentage of LMI employees. REDD should also consolidate extraordinary administrative requirements such as LMI verification, environmental review, and prevailing wage monitoring and verification—if prevailing wage is judged necessary—across all CDBG-DR small business grants and accomplish said scope in-house or with the aid of a consultant. As the current CDBG-DR SBRAP already functions like a grant, and already entails non-negligible project delivery and administrative (PD/Admin) costs across DOC REDD and qualified intermediaries (as well as uncaptured PD/Admin costs incurred by the business), transforming the structure of the program should not occasion extensive net new costs.

CDBG-DR small business programs in New York State after Hurricane Sandy provide a potential example. It is not entirely appropriate to compare CDBG-DR procedures in New York City and New York State to those employed in North Carolina; the Disaster Relief Appropriations Act of 2013 granted New York about $28 billion in federal funding through multiple agencies (DHS, HUD, DOT, USACE, SBA, etc.), nearly $9 billion of which came through HUD in the form of separate allocations for New York City and New York State (NYS GOSR, 2017). While the $2 billion in CDBG-DR dollars split between NC and SC for both Matthew and Florence (mostly to NC) is not paltry in comparison, it does mean North Carolina has less to work with. That said, New York City and New York State's mature CDBG-DR small business programs illustrate the potential of issuing grants to small businesses with fewer strings attached.[33]

[33] Florida's CDBG-DR Action Plan after Hurricane Irma also includes a business recovery grant program that could serve as another example (FL DEO, 2018, p. 120), but the recentness of Irma (2017) might limit lessons-learned. Texas's CDBG-DR Action Plan after Hurricane Harvey (2016) appears to describe a small business deferred payment, forgivable loan program essentially identical to that used in North Carolina, but with a forgivable debt ceiling of $250,000 versus NC's $75,000 (TX GLO, 2018).

New York's state-level "NY Rising" small business program authorized grants of up to $50,000 to small businesses that submitted documentation similar to that expected by the SBA, as long as the businesses satisfied eligibility requirements (verifiable storm damage, non-duplication of previous SBA proceeds, etc.). Coastal fishery, seasonal businesses, and businesses demonstrating "severe economic hardship" were eligible for an additional $50,000 in grants. And during its first year of operation, the program also issued "preliminary awards" of up to $10,000 to support applicants' working capital needs during the full grant "underwriting" process. Finally, NY Rising itself verified the disbursement of grant monies in ways that met HUD National Objectives (LMI, etc.) rather than delegating this task to sub-grantees or intermediaries that may have had less experience with or capacity to handle HUD requirements (NYS GOSR, NYS HCR, NYS HTFC, & NYS OCR, 2017). Comparable New York City programs include the New York City Department of Small Business Services (SBS) Hurricane Sandy Loan and Grant Program, which authorizes low-interest loans of up to $150,000 with matching grants of up to $60,000 to qualified firms. Firms with demonstrable unmet need sometimes qualified for higher debt and grant ceilings (NYC SBS, n.d.).

The NYS Rising and NYC SBS programs—and perhaps Florida's post-Irma business recovery grant program (see *footnote 33*)—exemplify more efficient, lower-risk methods for disbursing federal grant money to businesses in ways that still adhere to HUD requirements, depend on levels of documentation comparable to that required by SBA loan underwriters, allocate risk more appropriately between public agencies and private businesses, and make additional allowances to the most vulnerable businesses with the greatest economic hardship—arguably those that are more exposed, more sensitive, and less adaptive to storms for reasons theorized and confirmed in this thesis. Again, since this recommendation merely reorganizes the governance, implementation, and risk structure of the existing CDBG-DR SBRAP, it should not entail greater costs apart from transition costs, at least in theory.

Improve the accessibility and appropriateness of SBA business disaster loans by minimizing interest rates for businesses without credit available elsewhere and pegging interest rates for more robust businesses equal to or below the federal prime rate. By accessibility, I mean the availability of affordable capital that overcomes market failures, the failures of market-rate debt products to reasonably accommodate small and disadvantages businesses. By appropriateness, I refer to policy that controls for unintended or undisclosed economic consequences and fully addresses the market failures inherent in an uncertain, risk economy vulnerable to climate change.

In order to maximize the accessibility of SBA disaster loans for rural small businesses, especially in light of compounding socioeconomic, macroeconomic, and climate change pressures suppressing business creation and expansion in rural North Carolina, the SBA must minimize interest rates for rural businesses without credit available elsewhere (CAE) to the greatest extent feasible. This lowest possible rate might in fact be equal to the current rate of ~4%, knowing that businesses without CAE are relatively high-risk investments for the SBA and based on the fact that two of NC's CDFIs offer their longest-term disaster recovery and resilience loans at rates that do not fall south of 5% (see Chapter 4, *Section 4.2.3*). But additional research and analysis would be appropriate in order to justify the SBA's current 4% interest rate. While all businesses should pay a non-zero interest rate on disaster debt in order to avoid the problem of "moral hazard," requiring businesses to support too much interest on investments that do not generate net new income is unreasonable and poses potentially disastrous pressure on already strained rural and small-town economies.

Furthermore, in order to maintain the *appropriateness* of federal disaster debt programs, the SBA should increase the competitiveness of interest rates for more robust businesses with CAE. At time of writing, a rate no greater than the federal prime rate (5.50%) would be more appropriate than 8.0%.[34] Normally, the SBA's bar against lending to businesses with CAE is a judicious federal policy that limits "capital substitution": the expenditure of public funds on projects that could be satisfied with private sector capital. However, the SBA's ability to flex this rule after a disaster and offer discretionary debt pricing to businesses based on their "ability to pay," rather than their creditworthiness, is economically inappropriate. Discretionary pricing in a situation where businesses must take out disaster debt in order to finance repair and resupply to return to baseline operations, rather than finance investments that would in turn generate net new income, effectively penalizes more successful businesses that are otherwise more creditworthy. It is also inappropriate owing to the fact that in an economy rendered uncertain by uncertain climate change impacts, the inaccurate communication of present-day flood risk, and the compounding effects of depopulation and divestment, small rural businesses have relatively little information about and little agency to control their potential costs and exposure regardless of their financial standing and access to credit; even with considerable mitigation, diversification and insurance, a business can only somewhat control its level of flood damage without complete relocation.

A potential counterargument against lowering interest rates for businesses with CAE could point to and celebrate the equitable outcomes that the current policy of discretionary pricing implies. By counter-intuitively offering higher interest rates to disaster-affected businesses that are otherwise more financially robust, the SBA effectively cross-subsidizes its below-market-rate loans to businesses without CAE (assuming a sufficient number of businesses *with* CAE sign up for SBA loans). This arrangement may help the SBA recover more of its administrative costs, and it possibly accomplishes a slight, progressive redistribution of financing cost away from strained businesses and toward stronger businesses. With the right justification and stated aims (e.g. ameliorating wealth inequality), this policy could potentially make sense. But the cross-subsidization has the unfortunate side-effect of driving some robust businesses towards other debt products (some of which could very well be cheaper, others of which could be more expensive than SBA debt but, at least, faster) or even towards personal/family savings, which could condemn the business to reduced adaptive capacity and greater precariousness in years to come.

A second counterargument might point out that further reducing interest rates for businesses with and without CAE is simply an impracticably large federal outlay. But someone has to pay, and the other public actors that could bear the costs of preventing mass destruction of under-insured small businesses—local and state governments in North Carolina, for instance—simply do not possess the balance sheets necessary for such an outlay. Among private actors, individual small businesses clearly do not have the financial capacity to fully handle disaster risk either, and large financial institutions such as private banks do not have the incentive to take on such risk. The unwillingness or

[34] The federal prime rate comprises the federal funds rate (2.25-2.50%) plus a "spread" of about 3%. It is essentially the rate that a "consensus" of major US banks offer their most creditworthy customers. Prime rates are tracked by the Wall Street Journal's "Market Data Center" and are the result of a periodic survey of major banks ("Markets Data Center: Money Rates," 2019).

inability of any market actor to resolve mass small business recovery thus constitutes a market failure, which should act as a cue for costly yet necessary government intervention.[35]

Finally, I do acknowledge that the SBA's long-term interest rates should remain positive and non-negligible. By requiring businesses to internalize some of the risk of doing business in a disaster-prone area, disaster lenders incentivize against "moral hazard" and motivate defensive behavior such as hazard mitigation, strategic relocation or expansion, flood insurance, and general improvements to adaptive capacity (e.g. disaster planning, strategic labor force organization, increasing savings). The SBA cannot be found to provide undue subsidy to operate in a demonstrably dangerous area, a form of perverse maladaptation that has been found to be the case with FEMA's NFIP (Bakkensen & Mendelsohn, 2016). In addition, SBA disaster lending must realize some level of interest on its disaster credit as compensation for its risk-taking and to pay for its basic administrative costs, which—all things being equal—may be expected to increase over time in tandem with accelerating and worsening natural disasters.

Decrease SBA loan application times by improving the advertisement and verifying the quality of technical assistance to small businesses. The weeks and sometimes months-long period of time it takes to complete FEMA registration, complete an SBA loan application, and wait for SBA loan underwriting and approval is the very period of time where even large businesses are most vulnerable to temporary or permanent closure after a disaster. There are two components of the SBA loan process that could benefit from greater speed: (1) the time it takes for a small business to complete the oftentimes extensive paperwork to file a loan application, and (2) the time it takes for the SBA to underwrite, approve and disburse loan proceeds to a small business. Improving the accessibility and verifying the quality of existing technical assistance should increase rates and outcomes associated with the first component.

SBCN directors and the SBTDC represented that adequate technical assistance is already in place, but that time-pressed and overwhelmed small business owners (oftentimes balancing the reconstruction of their family home with the reopening of their business) frequently lack the wherewithal to confer with a technical assistant at a local SBC, SBTDC, SBA BRC/DRC, or even CDFI before filing their loan application. Assuming this is the case, and acknowledging that North Carolina's network of distributed business resource centers is already geographically comprehensive, technical assistants have two options: increase the quality and quantity of online support (in the form of recorded webinars, manuals, process diagrams, checklists, etc.) and physically travel to businesses in worst-hit areas (e.g. in a computer and Wi-Fi-equipped van). Physical, onsite interaction is particularly helpful to businesses whose owners are less savvy with internet technology, or who may at first mistrust or ignore actors they perceive to be acting on behalf of the state or federal government.

Although this research found no reason to believe that state-sponsored post-disaster technical assistance is subpar, it might be within the state's interest, though not a priority, to evaluate the quality of said TA at the various levels of NC's institutional disaster recovery framework; an office such as the NC General Assembly Program Evaluation Division (PED) would be adequate to the

[35] It is possible that a well-administered loan guarantee program could incentivize fast-acting private banks to lend to disaster-affected small businesses at below-market rates, which would accomplish the same goal as lowering interest rates on SBA direct disaster loans, especially to business with CAE. I address the possibility of a disaster loan guarantee program below.

task. A greater penetration of quality-assured technical assistance should decrease business application periods and decrease SBA denial rates, reducing time-consuming appeals.

Accelerate SBA loan application times by increasing capacity within the SBA and piloting novel SBA disaster loan guarantee programs. While acknowledging that disasters are virtually impossible to predict long-term, previous reports have noted the SBA's slow capacity-building after major disasters like Hurricane Katrina and Hurricane Sandy (Lindsay, 2015). After Hurricane Sandy, the SBA took on average 45 days and 38 days to physical injury loans and EIDLs, respectively (GAO, 2014). However, a more recent report from the Government Accountability Office judged that the SBA had reasonably responded to 2008 legislation that required it to increase its capacity—for instance, by establishing a secondary facility in Sacramento, CA (GAO, 2017). Future research may determine whether the SBA's loan origination speeds in the year 2017, which featured unprecedented levels of natural disaster damage across the United States (Smith, 2019), reflected a sufficient increase in capacity. Provided capacity remains lacking, additional staffing or even subcontracting may be appropriate.

The SBA must also mobilize faster forms of capital by introducing a disaster bridge loan program and by guaranteeing faster, private sector disaster loans made at below-market interest rates.[36] These recommendations might seem ambitious, but they actually stand on well-trod ground: the aforementioned Small Business Disaster Response and Loan Improvements Act of 2008 (2008 Act)[37] mandated the SBA to, among other things, introduce by 2009 three supplemental disaster loan programs that guaranteed loans by private sector lenders:

- **Private Disaster Assistance Program**: PDAP would guarantee up to 85% of private loans of up to $2 million made by SBA-preferred lenders and otherwise qualified lenders to small businesses and homeowners (U.S. Congress, 2008, pp. 2180–2181).

- **Immediate Disaster Assistance Program**: IDAP authorizes the SBA to guarantee 85% of a private loan less than or equal to $25,000 and requires the SBA to make a "decision approving or disapproving of the application within 36 hours after the Administration receives the application" (U.S. Congress, 2008, p. 2183). Proceeds from normal SBA 7a loans must pay down the outstanding balance of any IDAP loans.

- **Expedited Disaster Assistance Loan Program**: EDALP authorizes the SBA to confer with relevant stakeholders to finalize the terms of a guaranteed emergency bridge loan program including the following provisional terms and conditions: a maximum principal of $150,000, a maximum term of 180 days unless otherwise justified, and an interest rate no

[36] A **loan guarantee program** is a basic tool for expanding the supply of capital to small firms and higher-risk projects by private intermediaries. A loan guarantor compensates the private lender for losses in the event of uncollected loan payments from a borrower in default, therefore shifting risk from the private lender to the third-party guarantor. Usually a guarantor guarantees a portion of the loan (e.g. 85%) so that the private lender retains some risk and thus retains an incentive to underwrite and monitor loans in a responsible manner. One downside to loan guarantee programs is the difficulty of estimating the appropriate size of the guarantee in order to balance both the borrower, lender and guarantor's interests and financial capacities', especially in uncertain market conditions where default rates/loan loss rates and resulting collection costs are difficult to predict (Seidman, 2005, p. 162,165).

[37] Public Law 110-246, Title XII, subtitle B, 122 Stat. 2168 (U.S. Congress, 2008).

greater than the federal funds rate plus 300 basis points (U.S. Congress, 2008, p. 2184). (The interest rate would be 5.25-5.50% at time of writing, essentially the "prime rate").

Unfortunately, over the previous 10 years, the SBA has failed to pilot these programs due to information technology challenges as well as alleged (poorly documented) concerns and pushback from private lending stakeholders they consulted (GAO, 2014). Furthermore, and for reasons that are unclear, SBA failed to report the IT issues and negative stakeholder feedback to Congress, which could have at least adjusted the provisional terms and conditions that reportedly troubled lenders (GAO, 2017). The SBA has yet to introduce any of the three programs but has stated it would pilot IDAP first and then base PDAP and EDALP off IDAP once it is optimized (GAO, 2017).

In order to add faster forms of capital to its disaster loan arsenal, the SBA must immediately and formally solicit, document and disclose all relevant stakeholders' feedback on the 2008 Act, implement negotiated changes quickly, and then pilot IDAP in a post-disaster context with unmet need. Possible changes, in negotiation with private sector lenders, could include increasing the IDAP principal cap from $25,000 to $50,000, or another amount. This recommendation is based on the Rural Center's post-Matthew realization that bridge loans smaller than $50,000 were insufficient to attract much small business interest and perhaps were not worth the associated transaction costs.

Finally, while a similar loan guarantee program is possible at the state level (see immediately below), a loan guarantee program is more appropriately handled by the SBA due to its extensive experience with loan guarantees (see the 7a loan program), private intermediaries' historical experience with working in concert with the SBA, and the SBA's large reserves, which are subject to theoretically undefined increases courtesy of congressional appropriation.

Roll out a state-sponsored, CDFI-managed loan guarantee program to expand capital availability for North Carolina's most vulnerable businesses. Especially if the SBA continues to delay implementation of its federal disaster loan guarantee programs, it would behoove North Carolina to coordinate the rollout of a state-based disaster loan guarantee program. The North Carolina Disaster Relief Fund under Golden LEAF could potentially service a guarantee program. Using the NC DR Fund would require the NC General Assembly to recapitalize the fund above the current $5 million and set aside a subset of the fund to serve as a guarantee pool. The pool could guarantee private intermediaries' losses associated with unpaid principal, unpaid interest, debt collection costs, or a mixture of these three loss types. Since the state's CDFIs already have experience interacting with Golden LEAF and the NC DR Fund, they are best positioned to execute the management of such a program in coordination with the SBTDC and the DOC. As a second-best method, the state could also siphon some portion of Matthew/Florence CDBG-DR money, rather than state funds, to serve as the basis for a loan guarantee program, which is similar to the use of CDBG monies to support a HUD 108 loan program in normal times (more on this below).

In a theoretical disaster loan guarantee program, even as private intermediaries engaged in riskier lending to disaster-affected businesses than they otherwise would, only a fraction of loans would actually default (provided that intermediaries lent responsibly): thus "each dollar of loan guarantee capital generates a large multiple in private loans" without erasing the original guarantee pool (Seidman, 2005, p. 164). One advantage to practicing a loan guarantee program locally instead of federally is that such programs link small businesses directly to *local* lending institutions, which potentially forms longer-term relationships between banks and businesses (Seidman, 2005; Vogel & Adams, 1997). These strengthened local financial relationships serve to shore up regional

adaptive capacity and capital absorption capacity. Disadvantages to loan guarantee programs include the complexity of valuing the appropriate percentage guarantee and correctly anticipating losses amid changing market conditions, factoring these programs (sometimes hidden) setup and transaction costs (Vogel & Adams, 1997), and restraining the tendency to incentivize firms to over-substitute debt for equity capital or to borrow more funds than they strictly need (Li, 1998).

An example of a state-run disaster loan guarantee program is the California Small Business Disaster Relief Loan Guarantee Program, operated by the California Infrastructure and Economic Development Bank. The program guarantees "up to 80%-95%" of a loan (the guarantee is capped at $2.5 million) for loans of up to $20 million for as long as 7 years (CA SBFC, n.d.).

Alternatives to loan guarantee programs include Loan Participation Programs (LPP) and Capital Access Programs (CAPs), examples of which are currently operated by the North Carolina Rural Center at scale in non-disaster environments.[38] While these programs function well in traditional market contexts, it is perhaps best that the state has not tapped them as resources in its process of financing small business disaster recovery. The Rural Center's LPP allows the Rural Center to purchase up to 15% of a term loan made to a small business by a partner lender in any county in the state, with a maximum buyout of $250,000 (NC Rural Center, n.d.). Unfortunately, since an LPP requires the actual purchase of loan principal, LPPs at scale might be more expensive in the short term than a guarantee program that supports the same amount of capital. That said, the Rural Center's LPP program, as it stands, has probably helped a few, more robust firms negotiate market-rate loans with private banks in order to both recover *and expand* after the hurricanes. The Rural Center's CAP, in contrast, requires the borrower and partner lender to jointly contribute an amount between 2 and 7% of the loan principal, which the Rural Center then matches dollar-for-dollar (NC Rural Center, 2018); these contributions capitalize a small reserve account accessible to each participating lender, across all of their CAP loans, which offsets loan losses in the event of default and thereby incentivizes the lender to charge lower interest rates or allow more forgiving collateral requirements. Again, disaster-related CAP loans would only be useful to robust firms willing and able to stomach putting up a portion of the reserve fund capital upon signing the loan; it is unlikely and inappropriate for smaller businesses to relinquish capital upfront immediately after sustaining large disaster losses.

Expand the role of CDFIs in post-disaster loan origination processes due to their nimble operations and greater license to operate in local communities. Regardless of whether the SBA or a local institution enacts a loan guarantee program, North Carolina should expand the role of CDFIs and the reach of their direct loan products in the event of another disaster. CDFIs are effective operators of fast-paced capital absorption programs because they are more knowledgeable of local economic contexts and enjoy greater licenses to operate, especially in lower-income or otherwise underserved communities (Vasiloff, 2015). CDFIs' greater social capital resolves Tina Parker's stated concern about a lack of trust and relationship-building between temporary SBA officers and local businesses. And Tyran Hill at NCCDI pointed out that NCCDI's closer interaction with its target communities both increases its reputation in the community and lowers its risk as a

[38] **Loan participation** is the practice of one lender (e.g. a CDFI or government institution) partially funding a loan that is underwritten and administered by another lender (e.g. a private lender or intermediary) (Seidman, 2005, p. 456). A **capital access program** is an alternative to traditional loan guarantee programs: the borrower and lender pay joint fees, which are matched by the guarantor, at the time of loan origination, that capitalize a loan loss reserve that the lender may access to offset loan losses (Seidman, 2005, p. 172).

lender by revealing, for instance, which businesses possess a level of social capital that will help them survive a difficult financial period by virtue of customer loyalty and goodwill. Furthermore, the bridge loans released by the Rural Center and the Carolina Small Business Development Fund appear to readily fulfill a gap in the supply of *fast* capital, especially while businesses manage the sometimes lengthy and perilous period in between the disaster itself and the first day they see proceeds from long-term SBA disaster loans or insurance policies.

Any expansion in the advertisement and penetration of direct bridge loans from CDFIs might require careful monitoring of both the capacity of the CDFIs active in the DR space as well as the size and sustainability of the NC DR fund, which limits the amount of bridge loans that NC actors can make immediately after the disaster. With advance buy-in and capacity-building (if necessary) from interested CDFIs, as well as an additional appropriation of funding to the NC DR Fund (again, if necessary), the state would be poised to quickly disperse "fast capital" to businesses struggling to survive in the 90-180 days after floodwaters recede.

Focus on formalizing informal rural businesses, when feasible, to boost rural capital absorption capacity in advance of another disaster. As stated in *Section 3.7*, informal "cash" businesses without records or recognition were "dead in the water" after Hurricanes Matthew and Florence destroyed their property. These informal businesses found themselves totally uninsured and unable or unwilling to apply for federal assistance. To better prepare this population of businesses for the next inevitable disaster, the state in partnership with SBCs, SDTDCs and other outreach offices should launch an effort to formalize and register the state's most vulnerable informal businesses, particularly those among rural and immigrant communities, in order to improve record-keeping and accounting practices and improve access to credit. NC's already existing SBTDCs and SBCs are already sufficient for this task. The "formalization drive" should emphasize the upside for unregistered businesses and, *if legally feasible*, emphasize a "no questions asked" policy that does not punish, or minimizes punishment for, theretofore unregistered firms that shirked required taxes and fees and bypassed laws.

Unfortunately, a drive like this is a double-edged sword. Many businesses run "off the books" might be run in such a way due to the owner's lack of trust in government actors, or due to the additional cost of operating a formalized business. A formalization drive might easily be viewed as unfairly and destructively targeting informal economies in low-income or immigrant communities.

Introduce technical assistance about disaster-related financial and advisory resources at the point of business registration. Empower Business Link North Carolina (BLNC) to provide simple information about state and federal disaster relief and resilience programs and funding opportunities beyond just SBA disaster loans when they provide technical assistance and referral services to new businesses. Also empower other relevant tax, registration, utility, and other authorities to provide information at their first point of interaction with new businesses operating in disaster-prone areas. Informing new businesses of disaster loan options at the outset of their formal registration and setup with the state maximizes awareness of disaster resources among new, *formal* firms at low cost.

Prioritize technical assistance about the tradeoffs between taking on debt and drawing on savings. In the midst of recovery, many businesses owners face the high-stakes and complex calculus of weighing debt versus accessing business/personal reserves. In the case of a business that melds business and family accounting, taking on debt will preserve personal or family finances, which the

owner can fall back on in the event of another shock, or during retirement; it also preserves the integrity of the family finances and the family's ability to undertake other commitments, such as education and health expenses and other shocks that occur in personal arenas. On the other hand, taking on debt might put unproductive stress on the business. Absent major reforms to the availability of grants and the cost of disaster debt, there may be no right answer to this dilemma for the most vulnerable business owners. However, a trained technical assistant at a local SBC/SBTDC/BRC/DRC should be able to help a business owner weigh all financial options on the table, given the deeply personal ramifications of blending finances and personal wealth in order to keep operating.

5.4 Use Subsidies and Redesign Debt to Encourage Resilience and Adaptation

The failure to meaningfully prepare for disaster, or for climate change in general, is a market failure whose solution cannot depend just on market rate debt or individual exhortation. Even with competitive financing and sufficient technical assistance on mitigation/adaptation technologies and techniques, many businesses and institutions will face a financing gap that prevents them from reaching a worthwhile state of preparation. It is no wonder that the relatively minor forms of mitigation currently undertaken by (mostly large) firms does not have an effect on their survival or performance rate: much greater changes are needed before businesses and towns realize measurable reductions in vulnerability. Unless market rate loan terms lengthen to acknowledge longer timeframes associated with climate change and 100-year flood probabilities, at least some forms of subsidy, either direct or inherent in redesigned debt products, are necessary to fill the financing gap that prevents adequate levels of mitigation or adaptation.

Precisely deploy CDBG-DR grant funding in order to resolve large-scale market failures and maximize public and private resilience. Recent announcements of Matthew-related CDBG-DR grant awards (e.g. Woolverton (2019)) hint that North Carolina's Department of Public Safety (DPS) and related offices are building their capacity to successfully administer CDBG-DR money, hopefully in ways that resolve intractable financing gaps associated with expensive demolition, reconstruction, and redevelopment projects that would redound positively to private and public benefit. The examples of using CDBG-DR funding to raze the Old Ramada Hotel Site and build a berm around Lumberton's foam factory illustrate the positive spillover effects that the public subsidy of private disaster recovery projects can provide to local tourism, workers, and residents. The former example may siphon increased tourist traffic from I95 to adjacent restaurants and stores. The latter preserves about 200 local jobs, avoiding the cost of up to 200 temporarily/permanently unemployed persons and the second-order drag their reduced spending and potential dislocation would inflict on the local economy.

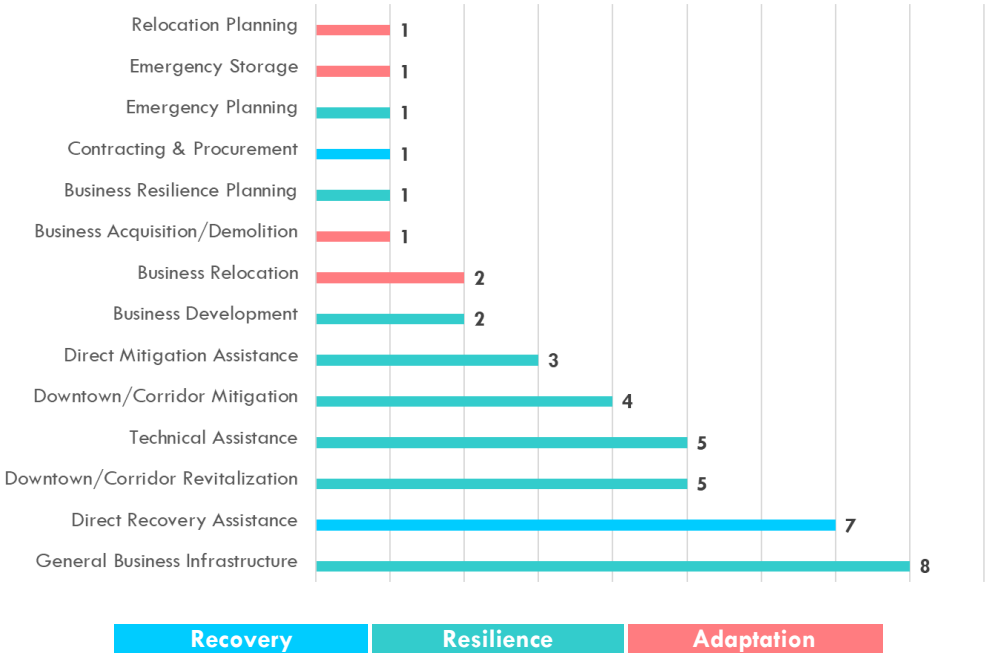
CDBG-DR funding for these types of large-scale construction projects should remain in the hands of the state and local governments—e.g. counties, cities—rather than in the hands of CDFIs. Although CDFIs are generally nimbler and sometimes enjoy greater trust with underserved communities, local government institutions have greater experience and capacity to handle the extensive compliance monitoring and reporting associated with federal funds from HUD, specifically CDBG funds. Local government institutions have also long been in the business of handling formal procurements of construction and professional services in ways that comply with intersecting regimes of local, state, and federal regulation. The NC General Assembly PED notes 25 CDBG "entitlement communities" in NC with experience managing CDBG funds, including Cumberland County and eight (8) cities located in the Matthew-affected counties in the state. These communities have valuable expertise.

There is room in this governance structure for quasi-public and private input. Ideally, the states could rely on resources and "consulting" expertise from SBTDC, SBCN and CDFIs in order to fine-tune its processes when the expenditure of CDBG-DR money has downstream effects on small business. Such knowledge exchange might also build capacity and deeper knowledge of CDBG-DR requirements within North Carolina's lending community, which might further improve the state's overall capital absorption capacity in the event of another, future disaster.

Balance resilience with transformative adaptation projects by considering disaster costs over both the short and the long term. North Carolina's 50 county-level Resilient Redevelopment Plans (RRPs), mandated by the 2016 Disaster Recovery Act (Dollar et al., 2016), provide a starting point for assessing the state's longer-term plans after Matthew. I sampled 24 county RRPs on the basis of disaster damage (see the **Appendix** for my selection methodology), netting 517 individual resilient planning initiatives. Among the 517 projects, 42 were explicitly related to business resilience.

The majority (37) of these 42 projects aim for a status-quo oriented forms of recovery and resilience (see **Figure 44**). These projects concern the recovery/reconstruction of existing commercial spaces, maintenance of existing businesses or sectors by improving or extending infrastructure for existing businesses corridors/main streets, investment in large-scale or individual-level hazard mitigation, attraction or retention/development of businesses, and expansion of technical assistance to firms and non-profits seeking to survive and return to baseline after Matthew or future disasters.

Figure 44: Thematic analysis of business-related Resilient Redevelopment Planning initiatives



In certain cases, the RRPs prioritization of resilience approaches what seems like "maladaptation"—well-intended actions that actually allow economic activities to persist in highly vulnerable areas. For example, Bladen County's "Downtown Redevelopment and Revitalization" strategy "encourage(s) business to return to downtown Bladenboro after being displaced by Hurricane Matthew as well as focus on rebuilding with risk reduction in mind for a more resilient community

through use of street and walkway re-designs, infrastructure improvements, and other economic incentive programs." Yet the same recommendation acknowledges: "Nearly the entire downtown area is in a floodplain" (Bladen County, 2017, pp. 4–10). While the infrastructure improvements the strategy mentions could potentially mitigate damages after a future hurricane or flood, it is unclear whether continuing to flood-proof, elevate, and harden infrastructure in a highly vulnerable area is worth the continued evacuation, displacement, and emergency cash infusion that repeated riverine flooding will probably still entail for downtown Bladenboro.

These sorts of maladaptive initiatives may be popular, since they preserve existing patterns of development and community, and they may be easy, since they enable path-dependence in post-disaster planning, but they also threaten to subject economic activity to repeated flood hazards—even if some mitigation is accomplished. Indeed, authors have noted that underinsurance and suboptimal mitigation can reduce or completely eliminate the usefulness of mitigation in promoting greater survival and performance post-disaster (see *Section 2.4*). Unfortunately, persistent exposure to flood hazards means demand for disaster capital among vulnerable businesses will persist, which stultifies this sincere attempt at resilience and further stresses the community.

Unlike notions of resilience that maintain status quo operations, more transformative forms of adaptation could potentially afford greater protection to individual businesses and economic activities more broadly. However, only five (5) sampled initiatives embody such forms of **adaptation**, which in this case involve the selective or wholesale reconsideration of commercial land use in advance of future flooding. Examples include largescale or individual relocation projects, and one proposal to build a structure to serve as an emergency inventory warehouse for businesses anticipating flooding. I further detail these initiatives in the *Appendix (A.7)*.

In general, the state's resilient redevelopment planning process should balance the benefits of **resilience**—of investing in hazard mitigation and economic development to preserve status quo commercial operations in vulnerable areas—versus **adaptation**—of fundamentally reconsidering patterns of commercial operations in order to limit or change the way businesses interact with flood hazards in the future. While dramatic adaptation—such as relocation programs organized on the county level—may pose intimidating upfront costs, it is possible that "business as usual" in vulnerable areas will entail even *greater* outlays of emergency recovery resources over a long time horizon.[39]

Formalize small business relocation programs that still preserve the economic and social integrity of communities. Systematic business relocation poses another appropriate use for federal grant funds. To date, federal buyout and demolition/relocation programs—primarily funded by FEMA's Hazard Mitigation Grant Program (HMGP), which relies on a local governmental match of at least 25% (FEMA, 2018)—are the most widespread means of permanent flood hazard adaptation and retreat in the United States. A growing body of scholarship documents the procedures and outcomes of government buyouts of households after disasters, but Siders (2019) notes that most of said literature parses the reasons homeowners consent to or reject relocation offers, that some documents social, economic and psychological harms of relocation, and that relatively little concerns how governments prioritize and select communities for buyout/acquisition

[39] It is important to acknowledge that certain areas are more predisposed to adaptive planning on the basis of their geography. Pamlico County's RRP, for instance, alludes to specific, higher-altitude sites ideal for commercial relocation. Yet Robeson and Columbus Counties, for instance, are principally flat and low-lying, which drastically constrains these areas' options.

programs. Furthermore, little to no scholarship reviews systematic relocation and retreat programs for *businesses*. While individual counties in North Carolina proposed selective small business relocation in individual Resilient Redevelopment Plans after Hurricane Matthew, it is unclear how many communities in the United States or internationally have engaged in largescale, coordinated projects to relocate small businesses out of the floodplain, if any. Future research is needed on small business post-disaster relocation.

Scholarship to date paints historical (residential) buyout and relocation programs as a mixed bag. Dabson and Jimenez-Magdaleno (2017) at UNC Chapel Hill provide a recent literature review on buyout programs nationwide, while Salvesen et al. (2018), also at UNC, ground their findings and recommendations on buyout programs that took place specifically in North Carolina. Both pieces acknowledge that mismanaged buyout programs have inflicted psychological and social harm on affected communities, left behind expensive and unproductive vacant lots, and torn into communities' fiscal tax bases; unsuccessful programs have also failed to leverage relationships with on-the-ground community groups in the design, implementation, and advertisement of programs. Unfortunately, repeated mismanagement over time and across the country suggests practitioners have neither learned from nor exchanged lessons about past failures (Greer & Binder, 2017).

Lessons learned from household relocation programs would likely also apply to systematic business relocation, if it were put into practice. Salvesen et al. (2018) recommend governments buy out contiguous properties in order to create areas large enough to support public amenities that generate more fiscal or environmental value (e.g. parks, open space). Governments should also incentivize bought-out individuals to relocate in areas within their community in order to preserve the social, economic and fiscal integrity of the city, county, or other relevant subdivision. Although most business owners interviewed did not have substantive policy recommendations for small business resilience, the owner of the large sporting goods store proposed "resilience pods" along the lines of the recommendations above—the construction of concentrated, bulwarked business districts constructed close to existing neighborhoods in a manner that spreads the cost of relocation and hazard mitigation across many individual businesses as well as the government. "Resilience pods" or another systematic business relocation program that incorporates policy learning from previous, homeowner-focused programs may represent an ideal use of CDBG-DR funding, if there is enough political will.

Expand advertisement and appeal of SBA loans for relocation rather than reconstruction in place. The SBA currently offers loans to support voluntary or involuntary relocation after a disaster, but it does not provide details about "relocation loans" apart from encouraging interested homeowners and businesses to discuss specifications with an SBA representative (SBA, 2017, 2018b). Greater advertisement and information about this program could motivate individual owners to choose to relocate their operations, which would spare them and their community from expending costs associated with repetitive losses (e.g. the general automotive repair businesses that has flooded four times since 2016). Beyond raising awareness, the SBA or certified SBA lenders should incentivize businesses in the most hazard-prone areas (e.g. the SFHA) to accept loans for relocation by offering these loans as separate products with lower interest rates or relaxed collateral requirements.

Acknowledging the concerns about relocation highlighted above, a pro-relocation federal loan program must operate closely in concert with local county governments in order to minimize the

effects "un-managed retreat" programs might have on a county's social, economic, fiscal integrity. Linking federal, state and local adaptation and retreat programs is a lofty recommendation, one whose details justify an entirely separate research process. Part of the challenge lies between the different and sometimes contradicting interests across these various levels of government.[40] Program design would require extensive coordination among diverse stakeholders at all levels of government; it would almost necessarily entail false-starts, all-out failures, the management of unintended consequences, but with any luck the internalization and dissemination of lessons-learned over time. Such a program might involve delegating relocation lending to local lending intermediaries, who are incentivized or mandated to work with local governments to minimize economic loss and preserve development in safe, local areas to the greatest extent feasible.

As an aside: in order to further incentivize relocation, the SBA might ultimately *index physical injury disaster loan rates to businesses' flood risk*; businesses facing higher risk of disruption and destruction from flooding would be forced to spend more on recovery capital than a more optimally located establishment. *Successful* implementation of this policy would require granular, up-to-date, consistent, and accurate flood risk data, which is not currently publicly available; *equitable* implementation would require the SBA to offer cheaper financing for relocation, since this policy would otherwise discriminate against owners without sufficient capital to relocate or who are unable to find buyers for their original, at-risk property. Finally, while this recommendation appears to be at odds with the recommendation further above (to reduce disaster loan interest rates as much as possible), it is important to note that the idea of linking interest rates to physical flood risk is a long-term measure; it is hardly practicable today and would be best implemented gradually, if at all, so as to minimize violent market corrections to the valuation of at-risk businesses, real property, and land. Finally, because disaster loan interest rates are less salient than broadly mandated insurance premiums, interest rates will always be an inferior means of signaling risk to a public.

Restructure debt products to incentivize long-term hazard mitigation and disaster preparation. Among businesses that choose not to relocate, experiment with debt forgiveness policies that are conditional on proof of disaster preparedness planning or hazard mitigation of owner properties. The SBA already authorizes 20% increases in total loan principal for costs of mitigation above and beyond the cost of reconstruction (e.g. elevation, landscaping, dry flood proofing, wet flood proofing, etc.). And North Carolina's disaster-engaged CDFIs offer products geared toward longer-term, resilient business development and mitigation; examples include the Carolina Small Business Development Fund's "North Carolina Small Business Recovery Fund" and the Rural Center's "Resilient Recovery Loan" (Refer to **Table 11** in *Section 4.2.3*). However, the costs of appropriate flood mitigation will exceed the feasibility of debt financing for many firms—particularly those needing to elevate large properties above newly drawn design flood elevations (DFEs). Even minor elevations can run into the hundreds of thousands of dollars, rendering the SBA's 20% mitigation ceiling unrealistic. While partial loan forgiveness in the event of demonstrable mitigation will not totally resolve the costs of resilience, it might provide an attractive incentive—especially for larger or higher-margin firms already saddled with disaster debt—to invest in self-protection.

[40] A retailer "retreating" from the SFHA in Columbus County to a safer downtown in Asheville, NC bites into the former county's tax base (not to mention its economic, social integrity) but might not ruffle the feathers of the North Carolina Department of Revenue, or of a federal regulator whose peers will still receive income, payroll, and corporate levies from the business owner and her employees regardless of their ultimate location.

There is precedent for SBA loan forgiveness *en masse*: in 1965, Congress and President Lyndon B. Johnson authorized partial SBA debt forgiveness nearly across the board for businesses affected by Hurricane Betsy (Lindsay, 2015, p. 14). As an aside, businesses and policymakers should recall that debt forgiveness normally manifests as income taxable by the IRS unless additional arrangements are made to insulate it from a business owner's tax base.

Support hazard mitigation using separate, smaller starter grants combined with technical assistance. Although the optimal level of mitigation—elevation to BFE/DFE, berms, etc.—exceeds the feasibility of available equity, debt, or grants available to any one owner, small grants can motivate "down payments" on small steps toward business continuity planning, self-protection, and emergency recovery.

Again, two smaller-scale, recent grant programs from New York City can serve as examples. The NYC SBS Preparedness Response and Recovery Program (PREP) dispatches a team of insurance and emergency planning professionals to a business owner's property to conduct a free risk assessment. Assessed businesses then receive a grant of up to $3,000 usable towards activities or items recommended during the assessment, including technological upgrades—digital point of sale technology, digitization of sales and records, cybersecurity systems, inventory systems or software, elevated data centers or IT equipment—and equipment—flood barriers, floodwater pumps, risers (for equipment), and backup generators (NYC SBS, 2018, p. 7). NYC Resiliency Innovations for a Stronger Economy (RISE) invited entrepreneurs to compete to implement grant-funded resiliency and mitigation innovations in Sandy-affected small businesses in New York City (RISE NYC, 2013).

Capitalize the NC Disaster Recovery Fund with CDBG-DR Funding in order to harness the inherent strengths of the state's CDFI lending intermediaries. As an *inferior* alternative to the business-oriented CBDG-DR funding proposals above, a least-resistance pathway for small business-oriented CDBG-DR funding is the recapitalization of the NC DR Fund currently used by three CDFIs—the Rural Center, the Carolina Small Business Development Fund, NCCDI—to more rapidly originate small business loans. A CDBG-DR-backed loan guarantee program would function like a HUD 108 loan program, merely on a faster time frame. Since CDFIs such as the Rural Center have extensive experience and a high success rate operating loan guarantee programs, loan participation programs, and capital access programs in North Carolina, these intermediaries are ideally suited to implement similar programs using federal disaster funds. And while the slow pace of CDBG-DR funding obviates its use for fast-paced loan programs, it could potentially capitalize guarantee pools for longer-term resilience loans administered by selected intermediaries.

That said, capitalizing the NC DR fund is an inferior use of HUD CDBG-DR funding for two reasons. First, HUD funding typically arrives too slowly for it to be a primary mode of small business recovery financing. Second, HUD CDBG-DR funding expires after a number of years. North Carolina's current CDBG-DR Action Plan for Matthew commits to spending the entire allocation within six years of the grant date (NC DOC, 2019, p. 67). This short time-frame far undercuts the minimum terms for existing SBA DR loan programs (7-30 years, depending on CAE), which would force the state to choose between a number of unpalatable options: limit the terms of CDBG-DR-guaranteed loans and thereby limit their accessibility to smaller businesses, buy out the CDBG-DR loan guarantee pool after six years with another source of funding in order to continue guaranteeing the loans, or devise another way to transfer the increased credit risk after six years (such as significantly mounting interest rates in year seven).

5.5 Support Additional Research and Planning

Chapter 2 (*Section 2.3*) summarized the myriad challenges associated with tracking and estimating individual business outcomes as well as overall economic recovery after a disaster. To make this research task easier, I briefly propose three means of increasing the quantity and quality of information about North Carolina post-disaster small business recovery and economic resilience.

Empower North Carolina's DOC Labor and Economic Analysis Division to conduct a post-Florence survey of business impacts and financial decision-making. Despite the fact that NC DOC LEAD completed a large survey of businesses 9 months after Hurricane Matthew, as of time of writing, LEAD has not seen a state appropriation directing it to survey business owners in counties affected by Hurricane Florence. Authorizing the institution to leverage its considerable manpower, institutional credibility, and analytical resources to clarify business impacts and decisions after the second storm, and to confirm/disconfirm an overall increase in precariousness among firms that suffered impacts from both hurricanes, would dramatically improve future scholarship and enable North Carolina to implement more data-driven policy once it receives its HUD CDBG-DR money for Florence. If authorized to conduct another survey, LEAD may consider collecting ethnic and demographic data on respondents in order to determine whether minority groups (women, ethnic minorities) were less able to access credit or otherwise respond to damage sustained.

Delegate surveying authority to local economic development institutions in order to complete simple longitudinal analyses of post-disaster business outcomes over time. Individual institutions exhibited first-hand knowledge of the number and nature of the businesses that closed right after the hurricanes, but this knowledge remains informal. The state of North Carolina could request individual institutions on the ground—such as economic development institutions or chambers of commerce—to provide their best estimates of the change in the number and type of businesses in their communities or counties. Well in advance of disasters, North Carolina could develop protocols to train these local institutions to collect such data in order to ensure this data collection capacity is in place by the time a disaster strikes. Pooled at the level of the state, and with proper data protection to ensure the anonymity of any one business owner, a bottom-up survey completed at least once after a disaster, or preferably at intervals after a disaster, could furnish valuable information to emergency managers, economic developers, policy analysts, and academic researchers in North Carolina and elsewhere.

In general, support commitments to longitudinal research that gathers quantitative as well as qualitative data. Although a longitudinal study is well beyond the scope of this thesis, it is by far the best means of tracking disaster recovery patterns over time. The National Institute of Standards and Technology (NIST) is currently conducting brief interviews with small businesses in Lumberton, NC that were flooded after Hurricane Matthew. Their study may serve as a model for future disaster recovery scholarship in North Carolina and elsewhere. Ideally, research designs will accommodate both quantitative survey questions—e.g. *what type(s) of debt did you apply for?*—as well as in-depth, qualitative questions—e.g. *why did you favor SBA debt over CDFI loan products?* Although qualitative interviews are time-consuming and expensive, such findings are valuable. The nine interviews completed for this thesis were revelatory; a larger sample size would enable more assertive and precise conclusions and recommendations.

Build durable administrative capacity to handle complex funding streams in the event of continued adaptation planning and future disasters. North Carolina recently established the NC

Office of Recovery and Resiliency (NCORR), which houses 45 time-limited positions dedicated to manage disaster recovery programming including CDBG-DR programs. The NC General Assembly Program Evaluation Division (PED) acknowledges the time-limited nature of these positions stymies recruitment efforts and risks the loss of valuable institutional knowledge after the time limit expires. The PED smartly recommends the permanent institution of some subset of NCORR positions as well as the requirement of minimum competencies about CDBG-DR funding or other disaster recovery areas of expertise (NC GA PED, 2019a, p. 27). I add that if the state follows PED's recommendations, it should go "all the way" and empower a newly permanent NCORR to carry out truly long-term, transformative adaptation that considers longer timescales than those entertained by typical loan terms or CDBG-DR grant time limits. In addition, the state should commit to encouraging the buildup and preservation of CDBG-DR and disaster recovery/climate change adaptation expertise on the level of individual counties and municipalities in the state.

5.6 Final Word

Hurricane Matthew and Florence shocked North Carolina's coastal plains, the rural parts of which were already suffering decline due to a number of global, secular forces. Although not nearly as destructive as previous storms—e.g. Hurricane Katrina, Sandy—the storms badly impacted certain rural communities and brought about a state of precariousness that has outlasted the floodwaters due to a combination of increased indebtedness and widespread asset collateralization, temporarily and sometimes permanently decreased population and consumption, and pockets of persistent infrastructural and community damage. The hurricanes would have occurred regardless of climate change, but the back-to-back flooding they generated over coastal and inland North Carolina might foretell the more or less constant environmental pressure entailed by a changing climate: more frequent floods, more intense precipitation and storms, and higher sea levels.

It is unwise to frame North Carolina's economic disaster recoveries as isolated events of resilience, of efforts to return to a baseline. This baseline is ultimately unsatisfactory, even maladaptive. Instead, the state must recognize its recovery within the context of climate change. Foresighted recovery comes to involve *adapting* the conditions of capital distribution and absorption in order to help individual firms and community economies withstand future, worsening storms while hopefully still abiding other pressures: depopulation, divestment, and increasing economic stratification. To this end, I have provided the analytically as well as normatively influenced recommendations above.

To ignore the long-term need to adapt economic recovery tools to a changing climate is to accept all of the punishing inevitabilities of a winner-take-all "risk economy." The acceptance of nuisance flooding and the advent of periodic catastrophe naturalizes the damage of real assets and the disruption of operations as an expected cost of doing business, of owning land, in places like North Carolina's coastal plains. These increased risks and costs of doing businesses will increasingly displace rewards toward larger, multi-sited firms due to their invulnerability to hazards while increasingly punishing smaller, more exposed firms. The logical extension of this trend is a continued evanescence of small and mid-sized businesses—a continued winnowing away of the livelihoods and purchasing power of North Carolinians and Americans more broadly. To ignore or refuse the advent of climate change, and to permit the unchecked economic subordination of rural households and firms, is to condemn fiscal coffers to "uncreative destruction": to capitalize and recapitalize endlessly and unsustainably in the face of global change.

WORKS CITED

2018 Hurricane Florence Disaster Recovery Act. , Pub. L. No. Senate Bill 3 (2018).

Acs, Z., Audretsch, D., Braunerhjelm, P., & Carlsson, B. (2006). *Growth and Entrepreneurship: An Empirical Assessment* (CEPR Discussion Paper No. 5409). Retrieved from C.E.P.R. Discussion Papers website: https://econpapers.repec.org/paper/cprceprdp/5409.htm

Acs, Z. J., & Malecki, E. J. (2003). *Entrepreneurship in Rural America: The Big Picture*. 9. Retrieved from https://pdfs.semanticscholar.org/3ed1/1e89ccf3f0f08131ccf4e325974489544866.pdf

Aldrich, D. P. (2012). *Building Resilience: Social Capital in Post-Disaster Recovery*. Chicago: University of Chicago Press.

Aldrich, D. P., & Meyer, M. A. (2015). Social Capital and Community Resilience. *American Behavioral Scientist*, *59*(2), 254–269. https://doi.org/10.1177/0002764214550299

Alesch, D. J., Holly, J. N., Mittler, E., & Nagy, R. (2001). *Organizations at Risk: What Happens When Small Businesses and Not-for-Profits Encounter Natural Disasters*. Retrieved from http://www.chamberofecocommerce.com/images/Organizations_at_Risk.pdf

Alesch, D. J., Taylor, C., Ghanty, A. S., Nagy, R. A., & Consortium (CUSEC), U. S. C. U. S. E. (1993). Chapter 5 : Earthquake risk reduction and small business. *National Earthquake Conference Monograph 5: Socioeconomic Impacts*, 133–160. Memphis, TN: U.S. Central United States Earthquake Consortium (CUSEC).

Alexander, D. E. (2013). Resilience and disaster risk reduction: an etymological journey. *Natural Hazards and Earth System Sciences*, *13*(11), 2707–2716. https://doi.org/10.5194/nhess-13-2707-2013

Bakkensen, L. A., & Mendelsohn, R. O. (2016). Risk and Adaptation: Evidence from Global Hurricane Damages and Fatalities. *Journal of the Association of Environmental and Resource Economists*, *3*(3), 555–587. https://doi.org/10.1086/685908

Battisto, J., Choi, L., Mills, C. K., Mattiuzzi, E., Perlmeter, E. R., & Storey, S. (2017). *2017 Small Business Credit Survey: Report on Disaster-Affected Firms* (p. 26) [Small Business Credit Survey]. Retrieved from Federal Reserve Banks of Dallas, New York, Richmond, San Francisco website: https://www.fedsmallbusiness.org/survey/2018/report-on-disaster-affected-firms

Bidgood, J., Blinder, A., & Katz, J. M. (2017, December 21). North Carolina, Saturated and Surprised, Reels from Hurricane Matthew. *The New York Times*. Retrieved from https://www.nytimes.com/2016/10/10/us/north-carolina-saturated-and-surprised-reels-from-hurricane-matthew.html

Bladen County. (2017). *Hurricane Matthew Resilient Redevelopment Plan: Bladen County* (No. 1.2). Retrieved from Bladen County website: https://www.rebuild.nc.gov/resiliency/hurricane-matthew-resilient-redevelopment-plans

Bourque, L. B., Shoaf, K., & Nguyen, L. (2003). Survey Research. In R. A. Stallings, *Methods of Disaster Research* (pp. 157–193). Philadelphia: Xlibris.

Boyd, A. (2014). Long-term Recovery Planning: Goals and Policies. In J. Schwab (Series Ed.), *Planning Advisory Service Reports: Vol. 576. Planning for Post-Disaster Recovery: Next Generation* (p. 204). Retrieved from https://www.planning.org/publications/report/9026899/

Bradley, C., Hirt, M., & Smit, S. (2018). *Strategy Beyond the Hockey Stick: People, Probabilities, and Big Moves to Beat the Odds* (1 edition). Wiley.

Brand, F., & Jax, K. (2007). Focusing the Meaning(s) of Resilience: Resilience as a Descriptive Concept and a Boundary Object. *Ecology and Society*, *12*(1). https://doi.org/10.5751/ES-02029-120123

CA SBFC. (n.d.). Small Business Finance Center (SBFC): California Infrastructure Economic Development Bank (IBank). Retrieved April 23, 2019, from California Infrastructure and Economic Development Bank website: http://www.ibank.ca.gov/small-business-finance-center/

Casey, R. P. *Small Business Disaster Assistance Act of 2011.* , Pub. L. No. S.1709 (2011).

CDC. (2018). *Flooding from Hurricane Matthew in North Carolina* [Public Health Emergency Preparedness (PHEP) Report]. Retrieved from Centers for Disease Control and Prevention website: https://www.cdc.gov/cpr/readiness/stories/nc.htm

C.F.R. How are disaster declarations made? , 13 CFR § 123.3 Code of Federal Regulations § (2009).

Chang, S. E., & Falit-Baiamonte, A. (2002). Disaster vulnerability of businesses in the 2001 Nisqually earthquake. *Global Environmental Change Part B: Environmental Hazards*, *4*(2), 59–71. https://doi.org/10.1016/S1464-2867(03)00007-X

Chang, S. E., & Rose, A. (2012). *Towards a Theory of Economic Recovery from Disasters* (No. 203). Retrieved from University of Souther California: Center for Risk and Economic Analysis of Terrorism Events website: http://create.usc.edu/research/publications/2678

Collier, B. L., Haughwout, A. F., Kunreuther, H. C., Michel-Kerjan, E. O., & Stewart, M. A. (2016). *Firms' Management of Infrequent Shocks* (Working Paper No. 22612). https://doi.org/10.3386/w22612

Cooper, R. (2019, January 9). *President Trump Shutdown Letter*. Retrieved from https://files.nc.gov/governor/documents/files/President%20Trump%20Shutdown%20Letter.pdf

Corey, C. M., & Deitch, E. A. (2011). Factors Affecting Business Recovery Immediately after Hurricane Katrina. *Journal of Contingencies and Crisis Management*, *19*(3), 169–181. https://doi.org/10.1111/j.1468-5973.2011.00642.x

Cromartie, J. (2019). *Rural America at a Glance, 2018 Edition* (Economic Information Bulletin No. EIB-200; p. 6). Retrieved from USDA Economic Research Service website: https://www.ers.usda.gov/publications/pub-details/?pubid=90555

Cromartie, J., & Vilorio, D. (2019). *USDA ERS - Rural Population Trends*. Retrieved from USDA Economic Research Service website: https://www.ers.usda.gov/amber-waves/2019/february/rural-population-trends/

Cutter, S. L., Ash, K. D., & Emrich, C. T. (2016). Urban–Rural Differences in Disaster Resilience. *Annals of the American Association of Geographers*, *106*(6), 1236–1252. https://doi.org/10.1080/24694452.2016.1194740

Cutter, S. L., Burton, C. G., & Emrich, C. T. (2010). Disaster Resilience Indicators for Benchmarking Baseline Conditions. *Journal of Homeland Security and Emergency Management*, *7*(1). https://doi.org/10.2202/1547-7355.1732

Dabson, B., & Jimenez-Magdaleno, K. (2017). *FEMA-Funded Property Buyouts: The Impacts on Land and People* [Literature Review]. Retrieved from NC Growth, UNC Chapel Hill, Kenan-Flagler Institute website: http://www.ncgrowth.unc.edu/wp-content/uploads/2018/01/Buyouts_Impact_LIteratureReview_Final.pdf

Dahlhamer, J. M., & D'Souza, M. J. J. (1995). *Determinants Of Business Disaster Preparedness In Two U.S. Metropolitan Areas*. Retrieved from http://udspace.udel.edu/handle/19716/632

Dahlhamer, J. M., & Tierney, K. J. (1996). *Winners and Losers: Predicting Business Disaster Recovery Outcomes Following the Northridge Earthquake* (Preliminary Paper No. 243). Retrieved from University of Delaware, Disaster Research Center website: http://udspace.udel.edu/handle/19716/651

Danes, S. M., Lee, J., Amarapurkar, S., Stafford, K., Haynes, G., & Brewton, K. E. (2009). Determinants of Family Business Resilience After a Natural Disaster by Gender of Business Owner. *Journal of Developmental Entrepreneurship*, *14*(4), 333–354.

Davidson, J., Jacobson, C., Lyth, A., Dedekorkut-Howes, A., Baldwin, C., Ellison, J., … Smith, T. (2016). Interrogating resilience: toward a typology to improve its operationalization. *Ecology and Society*, *21*(2). https://doi.org/10.5751/ES-08450-210227

Davis, C. (2018, September 18). Rapid Reaction: Record Rainfall and Flooding Follow Florence. Retrieved March 25, 2019, from State Climate Office of North Carolina website: http://climate.ncsu.edu/climateblog?id=266

Davlasheridze, M., & Geylani, P. C. (2017). Small Business vulnerability to floods and the effects of disaster loans. *Small Business Economics*, *49*(4), 865–888. https://doi.org/10.1007/s11187-017-9859-5

Dollar, N., McGrady, C., Bell, J., & Dixon, J. *Disaster Recovery Act of 2016.* , Pub. L. No. House Bill DRH30005-MDfa-1 (2016).

Drabek, T. E. (1994). *Disaster Evacuation and the Tourist Industry* (Photocopy edition). Boulder: Univ of Colorado Natural Hazards.

Drabek, T. E. (1995). Disaster Planning and Response by Tourist Business Executives. *Cornell Hotel and Restaurant Administration Quarterly*, *36*(3), 86–96. https://doi.org/10.1177/001088049503600325

Drabenstott, M., Novack, N., & Abraham, B. (2003). Main streets of tomorrow: growing and financing rural entrepreneurs--a conference summary. *Economic Review, Federal Reserve Bank of Kansas City*, *88*(3), 73–85. Retrieved from Academic OneFile.

Duplin County. (2017). *Hurricane Matthew Resilient Redevelopment Plan: Duplin County* (No. 1.2). Retrieved from Duplin County website: https://www.rebuild.nc.gov/resiliency/hurricane-matthew-resilient-redevelopment-plans

Eadie, C. C. (1998). Earthquake case study: Loma Prieta in Santa Cruze and Watsonville, California. In J. Schwab, K. Topping, C. C. Eadie, R. Deyle, & R. Smith, *Planning for post-disaster recovery and reconstruction: Vol. 483/484*. Retrieved from https://www.planning.org/publications/report/9026831/

Eckles, D. L., & Wise, J. (2011). Prospect Theory and the Demand for Insurance. *Working Paper*.

EDA. (2016). *Comprehensive Economic Development Strategy (CEDS) Content Guidelines: Recommendations for Creating an Impactful CEDS*. Retrieved from US Economic Development Administration website: https://www.eda.gov/ceds/content/economic-resilience.htm

English, E. (2015, August 20). New Orleans, 10 Years after Katrina. *Federal Reserve Bank of Atlanta*. Retrieved from https://www.frbatlanta.org:443/economy-matters/2015/08/20/new-orleans-10-years-after-katrina

ERS. (2000). *North Carolina*. Retrieved from Economic Research Service website: https://www.ers.usda.gov/webdocs/DataFiles/53180/25587_NC.pdf?v=0

Felbermayr, G., & Gröschl, J. (2014). Naturally negative: The growth effects of natural disasters. *Journal of Development Economics*, *111*, 92–106. https://doi.org/10.1016/j.jdeveco.2014.07.004

FEMA. (2013). *NFIP Summary of Coverage for Commercial Property* (p. 4). Retrieved from Federal Emergency Management Agency website: https://www.fema.gov/media-library/assets/documents/34505

FEMA. (2016). *October 2016 NFIP Flood Insurance Manual, Change Package*. Retrieved from Federal Emergency Management Agency website: https://www.fema.gov/media-library-data/1476294162726-4795edc7fe5cde0c997bc4389d1265bd/CRS_List_of_Communites_10_01_2016.pdf

FEMA. (2017). *Community Rating System*. Retrieved from National Flood Insurance Program, Federal Emergency Management Agency website: https://www.fema.gov/media-library/assets/documents/9998

FEMA. (2018, September 19). Hazard Mitigation Grant Program. Retrieved May 9, 2019, from Federal Emergency Management Agency website: https://www.fema.gov/hazard-mitigation-grant-program

FEMA. (2019, March 18). Flood Zones. Retrieved May 12, 2019, from Federal Emergency Management Agency website: https://www.fema.gov/flood-zones

Ferebee, J. (2018, October 30). With over $1 billion in HUD funds on the way, when will the state spend Hurricane Matthew money? Retrieved March 25, 2019, from Port City Daily website: https://portcitydaily.com/local-news/2018/10/30/with-1-4-billion-hud-funds-on-the-way-when-will-the-state-spend-its-hurricane-matthew-money/

FL DEO. (2018). *State of Florida Action Plan for Disaster Recovery Substantial Amendment 1* (No. Amendment 1). Retrieved from Florida Department of Economic Opportunity website: http://www.floridajobs.org/docs/default-source/office-of-disaster-recovery/hurricane-irma/actionplanamend1substantial.pdf?sfvrsn=2

Flavelle, C. (2019a, March 12). Insurance Rates Seen Rising in Flood-Prone Areas With Trump Plan. *Bloomberg*. Retrieved from https://www.bloomberg.com/news/articles/2019-03-12/insurance-rates-seen-rising-in-flood-prone-areas-with-trump-plan

Flavelle, C. (2019b, March 18). Climate Advocates Cheer Trump Policy Shift on Flood Insurance. *Bloomberg*. Retrieved from https://www.bloomberg.com/news/articles/2019-03-18/climate-advocates-cheer-trump-policy-shift-on-flood-insurance

Flynn, D. T. (2007). The impact of disasters on small business disaster planning: a case study. *Disasters*, *31*(4), 508–515. https://doi.org/10.1111/j.1467-7717.2007.01022.x

Fothergill, A. (1996). Gender, Risk, and Disaster. *International Journal of Mass Emergencies and Disasters*, *14*(1), 33–56.

FRB. (2019). *SBCS North Carolina Disaster Areas Request*. Federal Reserve Banks of Dallas, Richmond, New York, San Francisco.

Fuller-Love, N., Midmore, P., Thomas, D., & Henley, A. (2006). Entrepreneurship and rural economic development: a scenario analysis approach. *International Journal of Entrepreneurial Behaviour & Research; Bradford*, *12*(5), 289. http://dx.doi.org/10.1108/13552550610687655

GAO. (2014). *Small Business Administration: Additional Steps Needed to Help Ensure More Timely Disaster Assistance* (No. GAO-14-760; p. 69). Retrieved from Government Accountability Office website: https://www.gao.gov/products/GAO-14-760

GAO. (2017). *Small Business Administration: Actions Taken to Help Improve Disaster Loan Assistance* (No. GAO-17-566T). Retrieved from Government Accountability Office website: https://www.gao.gov/products/GAO-17-566T

GAO. (2019). *Disaster Recovery: Better Monitoring of Block Grant Funds Is Needed* (No. GAO-19-232; p. 91). Retrieved from U.S. Government Accountability Office website: https://www.gao.gov/products/GAO-19-232?utm_source=linkedin&utm_medium=social&utm_campaign=dlip

Garber, M., Unger, L., White, J., & Wolford, L. (2006). *Hurricane Katrina's effects on industry employment and wages*. Retrieved from US Bureau of Labor Statistics: website: https://www.bls.gov/opub/mlr/2006/article/hurricane-katrinas-effects-on-industry-employment-and-wages.htm

Gillard, R. (2016). Questioning the Diffusion of Resilience Discourses in Pursuit of Transformational Change. *Global Environmental Politics*, *16*, 13–20.

Goetz, S. J., Partridge, M. D., Deller, S. C., & Fleming, D. A. (2010). Evaluating U.S. Rural Entrepreneurship Policy. *Journal of Regional Analysis and Policy*, *40*(1). Retrieved from https://ageconsearch.umn.edu/record/132438/

Golden LEAF. (2018). FAQ: Golden LEAF Hurricane Disaster Recovery and Relief Programs. Retrieved April 2, 2019, from Golden LEAF Foundation website: https://www.goldenleaf.org/news/faq-golden-leaf-hurricane-disaster-recovery-and-relief-programs/

Gotham, K. F. (2008). From 9/11 to 8/29: Post-Disaster Recovery and Rebuilding in New York and New Orleans. *Social Forces*, *87*(2), 1039–1062. https://doi.org/10.1353/sof.0.0131

Greer, A., & Binder, S. B. (2017). A Historical Assessment of Home Buyout Policy: Are We Learning or Just Failing? *Housing Policy Debate*, *27*(3), 372–392. https://doi.org/10.1080/10511482.2016.1245209

Gunderson, L. H. (2000). Ecological Resilience—In Theory and Application. *Annual Review of Ecology and Systematics*, *31*(1), 425–439. https://doi.org/10.1146/annurev.ecolsys.31.1.425

Hacke, R., Wood, D., Grace, K., & Urquilla, M. (2013). *The Capital Absorption Capacity of Places: A Self-Assessment Tool* (p. 10). Retrieved from Initiative for Responsible Investment; Living Cities website: http://iri.hks.harvard.edu/files/iri/files/the_capital_absorption_capacity_of_places_self_assessment_tool_4.1_2013.pdf

Haltiwanger, J., Jarmin, R. S., & Miranda, J. (2009). *Business Dynamics Statistics: An Overview* (SSRN Scholarly Paper No. ID 1456465). Retrieved from Kauffman Foundation website: https://papers.ssrn.com/abstract=1456465

Haynes, G. W., Danes, S. M., & Stafford, K. (2011). Influence of Federal Disaster Assistance on Family Business Survival and Success. *Journal of Contingencies and Crisis Management*, *19*(2), 86–98. https://doi.org/10.1111/j.1468-5973.2011.00637.x

Headd, B. (2003). Redefining Business Success: Distinguishing Between Closure and Failure. *Small Business Economics*, *21*(1), 51–61. https://doi.org/10.1023/A:1024433630958

Henderson, J. (2006). *Understanding Rural Entrepreneurs at the County Level: Data Challenges* [Working Paper]. Retrieved from Federal Reserve Bank of Kansas City, Center for Economic Studies, Census Bureau website: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.170.118&rep=rep1&type=pdf

Hill, R. (2018, October 2). North Carolina town may never fully recover from double whammy of storms - Reuters. *Reuters*. Retrieved from https://www.reuters.com/article/us-storm-florence-fair-bluff/north-carolina-town-may-never-fully-recover-from-double-whammy-of-storms-idUSKCN1MC2UH

Hiramatsu, T., & Marshall, M. I. (2018). The long-term impact of disaster loans: The case of small businesses after Hurricane Katrina. *Sustainability (Switzerland)*, *10*(7). https://doi.org/10.3390/su10072364

Holling, C. S. (1973). Resilience and Stability of Ecological Systems. *Annual Review of Ecology and Systematics*, *4*(1), 1–23. https://doi.org/10.1146/annurev.es.04.110173.000245

Hunn, D., Dempsey, M., & Zaveri, M. (2018, March 30). In Harvey's deluge, most damaged homes were outside the flood plain, new data show. *Houston Chronicle*. Retrieved from https://www.houstonchronicle.com/news/article/In-Harvey-s-deluge-most-damaged-homes-were-12794820.php

Hunter, T. C. (2018a, August 8). City to seek $500,000 grant to raze Ramada Inn. *Robesonian*. Retrieved from https://www.robesonian.com/top-stories/114193/city-to-seek-500000-grant-to-raze-ramada-inn

Hunter, T. C. (2018b, August 18). Owner has plans for old Ramada site. *Robesonian*. Retrieved from https://www.robesonian.com/news/114533/owner-has-plans-for-old-ramada-site

ICF. (2013). *Small Business Loan and Grant Program Overview, Considerations, and Strategies* (p. 8). Retrieved from US Department of Housing and Urban Development website: https://www.hudexchange.info/resource/3187/small-business-loan-and-grant-program-overview/

IPCC. (2014). *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (No. AR5). Retrieved from Intergovernmental Panel on Climate Change website: https://www.ipcc.ch/report/ar5/syr/

IPCC. (2018). *Global Warming of 1.5 °C* (Special Report No. SR15). Retrieved from Intergovernmental Panel on Climate Change website: http://www.ipcc.ch/report/sr15/

Jones County. (2017). *Hurricane Matthew Resilient Redevelopment Plan: Jones County* (No. 1.2). Retrieved from Jones County website: https://www.rebuild.nc.gov/resiliency/hurricane-matthew-resilient-redevelopment-plans

Kahneman, D. (2013). *Thinking, Fast and Slow* (1st edition). New York: Farrar, Straus and Giroux.

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, *47*(2), 263–291.

Kapucu, N., Hawkins, C. V., & Rivera, F. I. (2013). Disaster Preparedness and Resilience for Rural Communities. *Risk, Hazards & Crisis in Public Policy*, *4*(4), 215–233. https://doi.org/10.1002/rhc3.12043

Keenan, J. M. (2016). The Resilience Problem: Part 1. In J. Graham, C. Blanchfield, A. Anderson, J. Carver, & J. Moore (Eds.), *Climates: Architecture and the Planetary Imaginary* (pp. 159–162). New York, NY: Lars Müller.

Keenan, J. M. (2018). *Climate Adaptation Finance and Investment in California*. https://doi.org/10.4324/9780429398759

Killian, L. M. (2003). An Introduction to the Methodological Problems of Field Studies in Disasters. In R. A. Stallings, *Methods of Disaster Research* (pp. 157–193). Philadelphia: Xlibris.

Klomp, J. (2016). Economic development and natural disasters: A satellite data analysis. *Global Environmental Change*, *36*, 67–88. https://doi.org/10.1016/j.gloenvcha.2015.11.001

Klomp, J., & Valckx, K. (2014). Natural disasters and economic growth: A meta-analysis. *Global Environmental Change*, *26*, 183–195. https://doi.org/10.1016/j.gloenvcha.2014.02.006

Kousky, C. (2010). Learning from Extreme Events: Risk Perceptions after the Flood. *Land Economics*, *86*(3), 395–422. https://doi.org/10.3368/le.86.3.395

Kousky, C. (2019). The Role of Natural Disaster Insurance in Recovery and Risk Reduction. *Annual Review of Resource Economics*, *11*(1), null. https://doi.org/10.1146/annurev-resource-100518-094028

Kousky, C., & Michel-Kerjan, E. (2017). Examining Flood Insurance Claims in the United States: Six Key Findings. *Journal of Risk and Insurance*, *84*(3), 819–850. https://doi.org/10.1111/jori.12106

Kroll, C., Landis, J., Shen, Q., & Stryker, S. (1990). The Economic Impacts of the Loma Prieta Earthquake: A Focus on Small Business. *Berkeley Planning Journal*, *5*(1). Retrieved from https://escholarship.org/uc/item/6s67g8mh

Kunkel, K. (2015). Observed Changes in Weather and Climate Extremes. In US CCSP, *Weather and Climate Extremes in a Changing Climate: Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands*. CreateSpace Independent Publishing Platform.

Kunreuther, H., & Michel-Kerjan, E. (2009). *Encouraging Adaptation to Climate Change: Long Term Flood Insurance* (Issue Brief No. 09–13). Retrieved from Resources for the Future website: https://www.rff.org/publications/issue-briefs/encouraging-adaptation-to-climate-change-long-term-flood-insurance/

Kunreuther, H., & Michel-Kerjan, E. (2011, July). Redesigning Flood Insurance. *Science*, 408–409.

Kunreuther, H., Pauly, M. V., & McMorrow, S. (2013). *Insurance and Behavioural economics: improving decisions in the most misunderstood industry*. https://doi.org/10.1017/CBO9781139050319

Lam, N. S. N., Arenas, H., Pace, K., LeSage, J., & Campanella, R. (2012). Predictors of Business Return in New Orleans after Hurricane Katrina. *PLoS ONE*, *7*(10). https://doi.org/10.1371/journal.pone.0047935

Lazzaroni, S., & van Bergeijk, P. A. G. (2014). Natural disasters' impact, factors of resilience and development: A meta-analysis of the macroeconomic literature. *Ecological Economics*, *107*, 333–346. https://doi.org/10.1016/j.ecolecon.2014.08.015

LEAD, N. (2018, November 29). Most of NC's key monthly economic indicators returned to trend in October as NC began its recovery from Hurricane Florence. Two areas to watch: high Initial Unemployment Insurance Claims & declining Residential Building Permits. Read more at #NCToday https://files.nc.gov/nccommerce/documents/files/October_2018_NC_Today.pdf …pic.twitter.com/bK4K3a1VrT [Tweet]. Retrieved January 18, 2019, from @LeadNC website: https://twitter.com/LeadNC/status/1068215966440611841

Lee, M., Brown, H., Jackson, B., & Rabon, B. *An Act to Provide Flexibility in the School Calendar, to Facilitate Compensation to School Employees, and to Provide Relief to Students Enrolled in an Educator Preparation Program to Accommodate Extraordinary Circumstances due to Hurricane Florence.* , Pub. L. No. Senate Bill DRS35003-MVa-2E (2018).

Lenoir County. (2017). *Hurricane Matthew Resilient Redevelopment Plan: Lenoir County* (No. 1.2). Retrieved from Lenoir County website: https://www.rebuild.nc.gov/resiliency/hurricane-matthew-resilient-redevelopment-plans

LeSage, J. P., Kelley Pace, R., Lam, N., Campanella, R., & Liu, X. (2011). New Orleans business recovery in the aftermath of Hurricane Katrina. *Journal of the Royal Statistical Society*, *174*(4), 1007–1027. https://doi.org/10.1111/j.1467-985X.2011.00712.x

Li, W. (1998). *Government Loan, Guarantee, and Grant Programs: An Evaluation* (SSRN Scholarly Paper No. ID 2126288). Retrieved from Social Science Research Network website: https://papers.ssrn.com/abstract=2126288

Lindsay, B. R. (2015). *The SBA Disaster Loan Program: Overview and Possible Issues for Congress* (No. R41309; p. 23). Retrieved from Congressional Research Service website: https://crsreports.congress.gov/product/pdf/R/R41309

Loayza, N. V., Olaberría, E., Rigolini, J., & Christiaensen, L. (2012). Natural Disasters and Growth: Going Beyond the Averages. *World Development*, *40*(7), 1317–1336. https://doi.org/10.1016/j.worlddev.2012.03.002

Lowrey, Y. L. (2010). Race/Ethnicity and Establishment Dynamics, 2002-2006. *SBA Office of Advocacy*. https://doi.org/10.2139/ssrn.1732225

MacKenzie, L. r. (1992). Fostering entrepreneurship as a rural economic development strategy. *Economic Development Review*, *10*(4), 38–44.

Magdaleno, J. (2016, October 28). Four Years After Sandy, NYC Businesses Still Need Help With Disaster Readiness. *Next City*. Retrieved from https://nextcity.org/daily/entry/four-years-after-sandy-nyc-businesses-still-need-help-with-disaster-readine

Manyika, J., Ramaswamy, S., Bughin, J., Woetzel, J., Birshan, M., & Nagpal, Z. (2018). *The superstar firms, sectors, and cities leading the global economy* [Discussion Paper]. Retrieved from McKinsey & Company: McKinsey Global Institute website: https://www.mckinsey.com/featured-insights/innovation-and-growth/superstars-the-dynamics-of-firms-sectors-and-cities-leading-the-global-economy

Markets Data Center: Money Rates. (2019, April 22). Retrieved April 23, 2019, from Wall Street Journal website: http://www.wsj.com/mdc/public/page/2_3020-moneyrate.html

Marshall, M. I., Niehm, L. S., Sydnor, S. B., & Schrank, H. L. (2015). Predicting small business demise after a natural disaster: an analysis of pre-existing conditions. *Natural Hazards*, *79*(1), 331–354. https://doi.org/10.1007/s11069-015-1845-0

Marshall, M. I., & Schrank, H. L. (2014). Small business disaster recovery: a research framework. *Natural Hazards*, *72*(2), 597–616. https://doi.org/10.1007/s11069-013-1025-z

Martín, C. (2018). *The Evidence Base on How CDBG-DR Works for State and Local Stakeholders* (p. 12) [Statement before Subcommittee on Oversight and Investigations Committee on Financial Services, United States House of Representatives]. Retrieved from Urban Institute website: https://www.urban.org/sites/default/files/publication/98463/the_evidence_base_on_how_cdbg-dr_works_for_state_and_local_stakeholders_0.pdf

Martin, R., & Sunley, P. (2015). On the notion of regional economic resilience: conceptualization and explanation. *Journal of Economic Geography*, *15*(1), 1–42. https://doi.org/10.1093/jeg/lbu015

Martinelli, D., Cimellaro, G. P., Terzic, V., & Mahin, S. (2014). Analysis of Economic Resiliency of Communities Affected by Natural Disasters: The Bay Area Case Study. *Procedia Economics and Finance*, *18*, 959–968. https://doi.org/10.1016/S2212-5671(14)01023-5

McCall, J. R. (2018). *Hurricane Florence: Potential Small Business Impacts of the Storm* [Research Spotlight]. Retrieved from Carolina Small Business Development Fund website: http://carolinasmallbusiness.org/wp-content/uploads/2018/12/Florence-Impacted-Firms-Spotlight.pdf

McGregor, A., Gray, J., & Matthews, E. (2009). *Funding Our Rural Future: Creating vibrant communities through homegrown philanthropy* (p. 56). Retrieved from NC Rural Economic Development Center website: https://www.ncruralcenter.org/wp-content/uploads/2018/02/Funding-Our-Rural-Future-2010-1-1.pdf

Meerow, S., Newell, J. P., & Stults, M. (2016). Defining urban resilience: A review. *Landscape and Urban Planning*, *147*, 38–49. https://doi.org/10.1016/j.landurbplan.2015.11.011

Miller, S. R. (2014). Three Legal Approaches to Rural Economic Development. *Kansas Journal of Law & Public Policy*, *23*(3), 345–367.

Morelix, A., Hwang, V., & Tareque, I. S. (2017). *State of Entrepreneurship 2017: Zero Barriers: Three Mega Trends Shaping the Future of Entrepreneurship* (p. 32) [Annual Report]. Retrieved from Kauffman Foundation website: https://www.kauffman.org/-/media/kauffman_org/resources/2017/state_of_entrepreneurship_address_report_2017.pdf

Moser, S., Meerow, S., Arnott, J., & Jack-Scott, E. (2019). The turbulent world of resilience: interpretations and themes for transdisciplinary dialogue. *Climatic Change*. https://doi.org/10.1007/s10584-018-2358-0

Muhlhausen, D. (2013, March). *Business Disaster Reform Act of 2013: Review of Impact and Effectiveness*. Testimony presented at the Committee on Small Business and Entrepreneurship, United States Senate, Washington, D.C. Retrieved from /article/testimony-business-disaster-reform-act-2013-review-impact-and-effectiveness

Murray, K. (2014, April 1). SBA's Disaster Loan Program Explained. Retrieved April 1, 2019, from US Small Business Administration website: https://www.sba.gov/blogs/sbas-disaster-loan-program-explained

NC DOC. (2019). *North Carolina Department of Commerce CDBG-DR Action Plan Under Public Law 114-223/254 & PL 115- 31* (No. Amendment 3). Retrieved from North Carolina Department of Commerce website: https://www.rebuild.nc.gov/reporting-and-compliance/action-plans

NC DOC. (n.d.). ReBuild NC: Hurricane Matthew Resilient Redevelopment Plans. Retrieved May 20, 2019, from Rebuild NC website: https://www.rebuild.nc.gov/resiliency/hurricane-matthew-resilient-redevelopment-plans

NC DOC LEAD. (2017a). *Hurricane Matthew Business Impact Survey*. Retrieved from Provided by Jeff DeBellis at NC DOC LEAD

NC DOC LEAD. (2017b). *Ongoing Business Challenges from Hurricane Matthew*. Retrieved from Provided by NC Small Business Technology and Development Center

NC DOC LEAD. (2018, September 12). As #Florence approaches, a look back at how Hurricane Matthew impacted employment in hard hit NC counties - temporarily doubling num of employed in Lenoir & Robeson Counties. This storm is much bigger. #StaySafepic.twitter.com/5Cg9l1Gigu [Tweet]. Retrieved March 31, 2019, from @LeadNC website: https://twitter.com/LeadNC/status/1039881734748291073

NC GA PED. (2019a). *Administrative Missteps and Lack of Expertise Led to Delays and $3.7 Million in Unnecessary State Spending for Hurricane Matthew Recovery: Final Report to the Joint Legislative Program Evaluation Oversight Committee* (No. 2019–05; p. 60). Retrieved from North Carolina General Assembly Program Evaluation Division website: https://www.ncleg.gov/PED/Reports/documents/Disaster/Disaster_Report.pdf

NC GA PED. (2019b). *Economic Development Partnership of North Carolina Should Increase Private Funding and Improve Formal Coordination with Department of Commerce: Final Report to the Joint Legislative Program Evaluation Oversight Committee* (No. 2019–02). Retrieved from NC General Assembly Program Evaluation Division website: https://www.ncleg.net/PED/Reports/documents/EDPNC/EDPNC_Report.pdf

NC Governor's Press Office. (2018, December 12). NC DPS: Thursday is the Last Day to Apply for Florence Disaster Assistance from FEMA, SBA. Retrieved March 31, 2019, from North Carolina Department of Public Safety website: https://www.ncdps.gov/news/press-releases/2018/12/12/thursday-last-day-apply-florence-disaster-assistance-fema-sba

NC Office of the Governor. (2018). *Hurricane Florence Recovery Recommendations: Building Communities Stronger and Smarter--Based on Preliminary Damage and Needs Assessment* (p. 77). Retrieved from North Carolina Office of the Governor website: https://files.nc.gov/ncosbm/documents/files/Florence_Report_Full.pdf

NC OSBM, NCEM, & NC Office of the Governor. (2015). *2015 North Carolina Disaster Recovery Guide*. Retrieved from North Carolina Office of the Governor website: https://www.ncdps.gov/document/north-carolina-disaster-recovery-guide

NC REDD DOC. (2019a). *Hurricane Matthew CDBG-DR Small Business Assistance Program: Standard Operating Procedures* (p. 32) [SOP]. Raleigh, NC: Rural Economic Development Division, North Carolina Department of Commerce.

NC REDD DOC. (2019b). *Small Business Recovery Assistance Program Information and Procedures Guide*. Raleigh, NC: North Carolina Department of Commerce.

NC Rural Center. (2015). About Us. Retrieved April 23, 2019, from NC Rural Center website: https://www.ncruralcenter.org/about-us/

NC Rural Center. (2018). Capital Access Program. Retrieved April 22, 2019, from NC Rural Center website: https://www.ncruralcenter.org/lending/capital-access-program/

NC Rural Center. (n.d.). Loan Participation Program. Retrieved April 23, 2019, from NC Rural Center website: https://www.ncruralcenter.org/lending/loan-participation-program/

NCCDI. (n.d.). Resilient-Communities: Smallbiz Flier. Retrieved January 1, 2019, from North Carolina Community Development Initiative website: https://ncinitiative.org/wp-content/uploads/2017/11/resilient-communities-smallbiz-live-link.pdf

NCEM. (2018). *2018 North Carolina Disaster Recovery Framework*. Retrieved from North Carolina Emergency Management website: https://www.ncdps.gov/documents/north-carolina-disaster-recovery-framework

Neilson, B., & Rossiter, N. (2008). Precarity as a Political Concept, or, Fordism as Exception. *Theory, Culture & Society*, *25*(7–8), 51–72. https://doi.org/10.1177/0263276408097796

Neumayer, E., Plümper, T., & Barthel, F. (2014). The political economy of natural disaster damage. *Global Environmental Change*, *24*, 8–19.

Nigg, J. M. (1995). Disaster recovery as a social process. *Wellington After the Quake: The Challenge of Rebuilding Cities (Report)*, 81.

Nightingale, D. S., & Wandner, S. A. (2016). *Informal and Nonstandard Employment in the United States* (Brief No. 20; p. 8). Retrieved from The Urban Institute website: https://www.urban.org/research/publication/informal-and-nonstandard-employment-united-states

NOAA. (2019, March 19). Hurricane Florence: September 14, 2018. Retrieved March 25, 2019, from National Weather Service website: https://www.weather.gov/ilm/HurricaneFlorence

Noble, I., Huq, S., Anokhin, Y., Carmin, J., Goudou, D., Lansigan, F. P., … Villamizar, A. (2014). Adaptation Needs and Options. In *Assessment Report: Vol. 5. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 833–868). Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.

North, D., & Smallbone, D. (2006). Developing entrepreneurship and enterprise in Europe's peripheral rural areas: Some issues facing policy-makers. *European Planning Studies*, *14*(1), 41–60. https://doi.org/10.1080/09654310500339125

NYC SBS. (2018). *Business Preparedness and Resiliency Program: Program Procedures and Guidelines: Resiliency Assessments and Grants* (No. Version 6; p. 106). Retrieved from New York City Department of Small Business Services website: http://www.nyc.gov/html/nycbe/downloads/pdf/BPREP_October2018PP.pdf

NYC SBS. (n.d.). *Hurricane Sandy Business Loan & Grant Program: FAQ*. Retrieved from New York City Department of Small Business Services website: http://www.nyc.gov/html/sbs/nycbiz/downloads/pdf/home/NYCBusinessRecoveryLoan_FAQ.pdf

NYS GOSR. (2017). *Digging Deeper: Understanding Disaster Recovery in the U.S. and New York State*. Retrieved from New York State Governor's Office of Storm Recovery website: https://stormrecovery.ny.gov/community-documents/digging-deeper-understanding-disaster-recovery-us-and-new-york-state

NYS GOSR, NYS HCR, NYS HTFC, & NYS OCR. (2017). *NY Rising Small Business Recovery Program Policy Manual* (Policy Manual No. Version 4.7; p. 99). Retrieved from New York State Governor's Office of Storm Recovery website: https://stormrecovery.ny.gov/sites/default/files/crp/community/documents/NY%20Rising%20Small%20Business%20PO%204_7_R1%20%281%29.pdf

Olsson, L., Jerneck, A., Thoren, H., Persson, J., & O'Byrne, D. (2015). Why resilience is unappealing to social science: Theoretical and empirical investigations of the scientific use of resilience. *Science Advances*, *1*(4), e1400217. https://doi.org/10.1126/sciadv.1400217

Pamlico County. (2017). *Hurricane Matthew Resilient Redevelopment Plan: Pamlico County* (No. 1.2). Retrieved from Pamlico County website: https://www.rebuild.nc.gov/resiliency/hurricane-matthew-resilient-redevelopment-plans

Pant, R., Barker, K., & Zobel, C. W. (2014). Static and dynamic metrics of economic resilience for interdependent infrastructure and industry sectors. *Reliability Engineering & System Safety*, *125*, 92–102. https://doi.org/10.1016/j.ress.2013.09.007

Pato, M. L., & Teixeira, A. A. C. (2016). Twenty Years of Rural Entrepreneurship: A Bibliometric Survey. *Sociologia Ruralis*, *56*(1), 3–28. https://doi.org/10.1111/soru.12058

Pendall, R., Foster, K. A., & Cowell, M. (2010). Resilience and regions: building understanding of the metaphor. *Cambridge Journal of Regions, Economy and Society*, *3*(1), 71–84. https://doi.org/10.1093/cjres/rsp028

Pender, J., Marré, A., & Reeder, R. (2012). *Rural Wealth Creation: Concepts, Strategies, and Measures* (Economic Research Report No. ERR-131; p. 87). Retrieved from USDA Economic Research Service website: http://www.ers.usda.gov/publications/pub-details/?pubid=44962

Pickett, S. T. A., Cadenasso, M. L., & Grove, J. M. (2004). Resilient cities: meaning, models, and metaphor for integrating the ecological, socio-economic, and planning realms. *Landscape and Urban Planning*, *69*(4), 369–384. https://doi.org/10.1016/j.landurbplan.2003.10.035

Piketty, T. (2017). *Capital in the Twenty-First Century* (Reprint edition; A. Goldhammer, Trans.). Belknap Press: An Imprint of Harvard University Press.

Poontirakul, P., Brown, C., Seville, E., Vargo, J., & Noy, I. (2017). Insurance as a Double-Edged Sword: Quantitative Evidence from the 2011 Christchurch Earthquake. *The Geneva Papers on Risk and Insurance - Issues and Practice*, *42*(4), 609–632.

Pralle, S. (2019). Drawing lines: FEMA and the politics of mapping flood zones. *Climatic Change*, *152*(2), 227–237. https://doi.org/10.1007/s10584-018-2287-y

Preston, B., & Stafford-Smith, M. (2009). *Framing vulnerability and adaptive capacity assessment: Discussion paper* (Working Paper No. 2). Retrieved from CSIRO Climate Adaptation Flagship website: https://research.csiro.au/climate/wp-content/uploads/sites/54/2016/03/2_Working-Paper2_CAF_PDF-Standard.pdf

Rash, M. (2017, February 6). Rural Matters. Retrieved April 24, 2019, from North Carolina Insight website: http://ncinsight.nccppr.org/2017/02/rural-matters/

Rhoades, D. (2018, August 22). NC Commerce: Help Available for Small Businesses Hurt by Hurricane Matthew. Retrieved March 29, 2019, from NC Commerce website: https://www.nccommerce.com/news/press-releases/help-available-small-businesses-hurt-hurricane-matthew

RISE NYC. (2013, September 4). Competition Objectives. Retrieved April 29, 2019, from RISE NYC website: http://rise-nyc.com/competition/objectives/

Robesonian. (n.d.). About Us. Retrieved April 8, 2019, from Robesonian website: https://www.robesonian.com/about-us

Rose, A. (2004). Defining and measuring economic resilience to disasters. *Disaster Prevention and Management; Bradford*, *13*(4), 307–314.

Rose, A., & Liao, S.-Y. (2005). Modeling Regional Economic Resilience to Disasters: A Computable General Equilibrium Analysis of Water Service Disruptions*. *Journal of Regional Science*, *45*(1), 75–112. https://doi.org/10.1111/j.0022-4146.2005.00365.x

Rossman, S. B., & Theodos, B. (2008). *Key Findings from the Evaluation of the Small Business Administration's Loan and Investment Programs* [Executive Summary]. Washington, D.C.: The Urban Institute.

Runyan, R. C. (2006). Small Business in the Face of Crisis: Identifying Barriers to Recovery from a Natural Disaster. *Journal of Contingencies & Crisis Management*, *14*(1), 12–26. https://doi.org/10.1111/j.1468-5973.2006.00477.x

Rupasingha, A., & Wang, K. (2017). Access to capital and small business growth: evidence from CRA loans data. *The Annals of Regional Science*, *59*(1), 15–41. https://doi.org/10.1007/s00168-017-0814-9

Sadeghi, A., Talan, D. M., & Clayton, R. L. (2016, November). Establishment, firm, or enterprise: does the unit of analysis matter? : Monthly Labor Review: U.S. Bureau of Labor Statistics. Retrieved February 24, 2019, from Bureau of Labor Statistics website: https://www.bls.gov/opub/mlr/2016/article/establishment-firm-or-enterprise.htm

Salvesen, D., BenDor, T. K., Kamrath, C., & Ganser, B. (2018). *Are Floodplain Buyouts a Smart Investment for Local Governments?* (p. 43). Retrieved from UNC Policy Collaboratory website: https://ie.unc.edu/files/2018/11/Buyout-Final-Report.pdf

Samenow, J. (2016, August 19). No-name storm dumped three times as much rain in Louisiana as Hurricane Katrina. *Washington Post*. Retrieved from https://www.washingtonpost.com/news/capital-weather-gang/wp/2016/08/19/no-name-storm-dumped-three-times-as-much-rain-in-louisiana-as-hurricane-katrina/

Sauser, B., Baldwin, C., Pourreza, S., Randall, W., & Nowicki, D. (2018). Resilience of small- and medium-sized enterprises as a correlation to community impact: an agent-based modeling approach. *Natural Hazards*, *90*(1), 79–99. https://doi.org/10.1007/s11069-017-3034-9

SBA. (2016a, November 2). NC 14911 - SBA Disaster Assistance for Hurricane Matthew Expands to More North Carolina Counties. Retrieved March 28, 2019, from U.S. Small Business Administration website: https://www.sba.gov/offices/disaster/dfoce/resources/1548392

SBA. (2016b, December 2). Last day to apply for an SBA Disaster Loan is Dec. 13. *SCNow*. Retrieved from https://www.scnow.com/news/hurricane_matthew/article_efa001d2-b8a5-11e6-8612-771a6c3d6ce6.html

SBA. (2017, August 31). *SBA Disaster Loan Program: Frequently Asked Questions*. Retrieved from https://www.sba.gov/sites/default/files/articles/sba-disaster-loans-faq.pdf

SBA. (2018a). Hurricane Florence. Retrieved March 28, 2019, from U.S. Small Business Administration website: https://www.sba.gov/disaster-assistance/hurricane-florence

SBA. (2018b). *US Small Business Administration Fact Sheet: Disaster Loans: South Carolina Declaration 15698 & 15699* (Fact Sheet No. SC-00054; p. 2). Retrieved from US Small Business Administration website: https://www.sba.gov/sites/default/files/resource_files/SC_Hurricane_Florence_Disaster_Delcaration_Fact_Sheet_1.pdf

SBA. (2019a, February 27). *SBA Disaster Loan Statistics for NC-00081 (DR#14911)*. Retrieved from Obtained via FOIA Request #2019-000273

SBA. (2019b, February 27). *SBA Disaster Loan Statistics for NC-00086 (DR#14970)*. Retrieved from Obtained via FOIA Request #2019-000273

SBA. (2019c, February 27). *SBA Disaster Loan Statistics for NC-00099 (DR#15696)*. Retrieved from Obtained via FOIA Request #2019-000273

SBCN. (2018). What is the North Carolina Small Business Center Network? Retrieved April 1, 2019, from North Carolina Community College System Small Business Center Network website: https://www.ncsbc.net/

SBTDC. (2018). Business Recovery Assistance: NC Open for Business. Retrieved April 1, 2019, from North Carolina Small Business Technology Development Center website: http://www.sbtdc.org/hurricaneflorence/

Schmidt, U. (2016). Insurance Demand Under Prospect Theory: A Graphical Analysis. *Journal of Risk and Insurance*, *83*(1), 77–89. https://doi.org/10.1111/jori.12098

Schrank, H. L., Marshall, M. I., Hall-Phillips, A., Wiatt, R. F., & Jones, N. E. (2013). Small-business demise and recovery after Katrina: Rate of survival and demise. *Natural Hazards*, *65*(3), 2353–2374. https://doi.org/10.1007/s11069-012-0480-2

Scott, M. (2013). Resilience: a Conceptual Lens for Rural Studies? *Geography Compass*, *7*(9), 597–610. https://doi.org/10.1111/gec3.12066

Seidman, K. F. (2005). *Economic Development Finance*. Thousand Oaks, CA: Sage Publications, Inc.

Seidman, K. F., & Siegel, B. (2008). Economic Recovery after the 9/11 Disaster: Lessons from New York State's Response in Lower Manhattan. *Applied Research in Economic Development*, *5*(2), 5–20.

Self-Help Credit Union. (n.d.). Small Business Recovery Loans. Retrieved April 24, 2019, from Self-Help Credit Union website: https://www.self-help.org/business/loans/all-business-loans/small-business-recovery-loans

Siders, A. R. (2019). Social justice implications of US managed retreat buyout programs. *Climatic Change*, *152*(2), 239–257. https://doi.org/10.1007/s10584-018-2272-5

Skelos, D. G., Klein, J. D., Lanza, A., & Smith, M. (2013). *Bipartisan Task Force on Hurricane Sandy Recovery: Preliminary Response and Recovery Report* (p. 32). Retrieved from The New York State Senate website: https://www.nysenate.gov/newsroom/articles/bipartisan-task-force-hurricane-sandy-recovery-preliminary-report

Smit, B., & Wandel, J. (2006). Adaptation, adaptive capacity and vulnerability. *Global Environmental Change*, *16*(3), 282–292. https://doi.org/10.1016/j.gloenvcha.2006.03.008

Smith, A. B. (2019, February 7). 2018's Billion Dollar Disasters in Context. Retrieved April 18, 2019, from Climate.gov website: https://www.climate.gov/news-features/blogs/beyond-data/2018s-billion-dollar-disasters-context

Sperling, G. B., & Mills, K. G. (2012). *Moving America's Small Businesses & Entrepreneurs Forward: Creating an Economy Built to Last* (p. 87). Retrieved from National Economic Council website: https://www.sba.gov/sites/default/files/files/small_business_report_final.pdf

Stanford, J. (2017, July 5). Examining Decline in North Carolina's Municipalities. Retrieved November 27, 2018, from Carolina Demography website: https://demography.cpc.unc.edu/2017/07/05/examining-decline-in-north-carolinas-municipalities/

Stewart, S. R. (2017). *National Hurricane Center Tropical Cyclone Report: Hurricane Matthew* (No. AL142016). Retrieved from NOAA National Hurricane Center website: https://www.nhc.noaa.gov/data/tcr/index.php?season=2016&basin=atl

Sydnor, S., Niehm, L., Lee, Y., Marshall, M., & Schrank, H. (2017). Analysis of post-disaster damage and disruptive impacts on the operating status of small businesses after Hurricane Katrina. *Natural Hazards*, *85*(3), 1637–1663. https://doi.org/10.1007/s11069-016-2652-y

The federal definition of 'rural'—times 15. (2013, June 8). *The Washington Post*. Retrieved from https://www.washingtonpost.com/politics/the-federal-definition-of-rural--times-15/2013/06/08/a39e46a8-cd4a-11e2-ac03-178510c9cc0a_story.html?noredirect=on&utm_term=.3afe6ade6c26

The Hurricane Florence Emergency Response Act. , Pub. L. No. House Bill 4 (2018).

Thrush, G. (2018, November 1). North Carolina, a 'Slow Spender' State, Struggles to Hand Out Storm Aid. *The New York Times*. Retrieved from https://www.nytimes.com/2018/09/24/us/north-carolina-florence-matthew-disaster-aid.html

Tierney, K. J. (1995). *Impacts of Recent U.S. Disasters on Businesses: The 1993 Midwest Floods and the 1994 Northridge Earthquake* (No. 230). Retrieved from University of Delaware: Disaster Research Center website: http://udspace.udel.edu/handle/19716/638

Tierney, K. J. (2007). Businesses and Disasters: Vulnerability, Impacts, and Recovery. In H. Rodríguez, E. L. Quarantelli, & R. R. Dynes (Eds.), *Handbook of Disaster Research* (pp. 275–296). https://doi.org/10.1007/978-0-387-32353-4_16

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, *5*(2), 207–232. https://doi.org/10.1016/0010-0285(73)90033-9

Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, *5*(4), 297–323. https://doi.org/10.1007/BF00122574

TX GLO. (2018). *State of Texas Plan for Disaster Recovery: Amendment 2: Hurricane Harvey - Round 1* (No. Amendment 2; p. 410). Retrieved from Texas General Land Office website: http://recovery.texas.gov/action-plans/hurricane-harvey/index.html

UNISDR. (2017, February 2). Terminology on disaster risk reduction. Retrieved February 25, 2019, from UNISDR website: https://www.unisdr.org/we/inform/terminology

US Census Bureau. (2018, June 12). Statistics of U.S. Businesses (SUSB): Glossary. Retrieved February 24, 2019, from US Census Bureau website: https://www.census.gov/programs-surveys/susb/about/glossary.html

U.S. Congress. Small Business Disaster Response and Loan Improvements Act of 2008. , Pub. L. No. 110–246, § Title XII, subtitle B, 15 USC 636e Commerce and Trade 2168 (2008).

U.S. Department of Treasury. (2016). *State Small Business Credit Initiative: A Summary of States' Quarterly Reports*. Washington, D.C.: US Department of Treasury.

US EDA. (2017, May 1). U.S. Department of Commerce Invests $750,000 to Establish Small Business Revolving Loan Fund in Disaster-Impacted Southeastern North Carolina. Retrieved November 5, 2018, from U.S. Economic Development Administration website: https://www.eda.gov/news/press-releases/2017/05/01/nc.htm

US EDA. (2018). EDA And Disaster Recovery. Retrieved April 2, 2019, from US Economic Development Administration website: https://www.eda.gov/programs/disaster-recovery/

Vasiloff, J. (2015). *Best Practices from Participating States: Partnering with Community Development Financial Institutions (CDFIs)* (p. 13). Retrieved from US Department of Treasury website: https://www.treasury.gov/resource-center/sb-programs/Documents/SSBCI%20CDFI%20Paper%202-27-15%20-%20final.pdf

Vogel, R. C., & Adams, D. W. (1997). The Benefits and Costs of Loan Guarantee Programs. *The Financier*, *4*(1 & 2), 22–29.

Walsh, M. W. (2018, September 20). Millions of Carolina Homes Are at Risk of Flooding. Only 335,000 Have Flood Insurance. *The New York Times*. Retrieved from https://www.nytimes.com/2018/09/19/business/flood-insurance-florence.html

Wayne County. (2017). *Hurricane Matthew Resilient Redevelopment Plan: Wayne County* (No. 1.2). Retrieved from Wayne County website: https://www.rebuild.nc.gov/resiliency/hurricane-matthew-resilient-redevelopment-plans

Webb, G. R., Tierney, K. J., & Dahlhamer, J. M. (2000). Businesses and Disasters: Empirical Patterns and Unanswered Questions. *Natural Hazards Review*, *1*(2), 83–90. https://doi.org/10.1061/(ASCE)1527-6988(2000)1:2(83)

Webb, G. R., Tierney, K. J., & Dahlhamer, J. M. (2002). Predicting long-term business recovery from disaster: a comparison of the Loma Prieta earthquake and Hurricane Andrew. *Global Environmental Change Part B: Environmental Hazards*, *4*(2), 45–58. https://doi.org/10.1016/S1464-2867(03)00005-6

Williams, N., & Vorley, T. (2014). Economic resilience and entrepreneurship: lessons from the Sheffield City Region. *Entrepreneurship & Regional Development*, *26*(3–4), 257–281. https://doi.org/10.1080/08985626.2014.894129

Wing, O. E. J., Bates, P. D., Smith, A. M., Sampson, C. C., Johnson, K. A., Fargione, J., & Morefield, P. (2018). Estimates of present and future flood risk in the conterminous United States. *Environmental Research Letters*, *13*(3), 034023. https://doi.org/10.1088/1748-9326/aaac65

Woolverton, P. (2019, April 16). $1.1M in grants to help protect, rebuild hurricane-damaged Lumberton. *The Fayetteville Observer*. Retrieved from https://www.fayobserver.com/news/20190416/11m-in-grants-to-help-protect-rebuild-hurricane-damaged-lumberton

Yoshida, K., & Deyle, R. E. (2005). Determinants of Small Business Hazard Mitigation. *Natural Hazards Review*, *6*(1), 1–12. https://doi.org/10.1061/(ASCE)1527-6988(2005)6:1(1)

Zhang, Y., Lindell, M. K., & Prater, C. S. (2009). Vulnerability of community businesses to environmental disasters. *Disasters*, *33*(1), 38–57. https://doi.org/10.1111/j.1467-7717.2008.01061.x

Zolin, R., & Kropp, F. (2007). How surviving businesses respond during and after a major disaster. *Journal of Business Continuity & Emergency Planning*, *1*(2), 183–199.

North Carolina Resilient Redevelopment Plans

North Carolina Resilient Redevelopment Plans (RRPs) are available at the following source:

NC DOC. (n.d.). ReBuild NC: Hurricane Matthew Resilient Redevelopment Plans. Retrieved May 20, 2019, from Rebuild NC website: https://www.rebuild.nc.gov/resiliency/hurricane-matthew-resilient-redevelopment-plans

Chapter 5 (*Section 5.4*) of this thesis cites 24 specific RRPs. See the Appendix for my RRP selection methodology.

HUD CDBG-DR eligible counties:

- Cumberland County
- Edgecombe County
- Robeson County
- Wayne County
- Beaufort County
- Bertie County
- Bladen County
- Carteret County
- Columbus County
- Craven County
- Duplin County
- Greene County
- Hyde County
- Jones County
- Lenoir County
- Martin County
- Nash County
- Pamlico County
- Pitt County
- Tyrrell County
- Wilson County

Other SBA-declared counties:

- Dare County
- Harnett County
- Johnston County

APPENDIX

A.1 About the Author

Alex Meeks—a child of a military family—grew up around the east, west, and gulf coasts of the United States, but he spent the most of his adolescence in New Mexico, where there are neither hurricanes nor much water to speak of. (Despite living in several other east coast communities, his family never made it to North Carolina.) He completed a bachelor's degree in Anthropology at Yale University and then moved to New York City, where he became involved in construction management and regulatory compliance consulting for various HUD CDBG-DR-funded recovery and resilience projects in New York State after Hurricane Sandy. In 2019, he completed his Master of City Planning at the Massachusetts Institute of Technology's Department of Urban Studies and Planning, where he focused on economic development, climate change mitigation and adaptation, and municipal finance.

A.2 List of Institutions Interviewed

I conducted 16 interviews—the majority of them in person, some over the phone—with local institutions active in the disaster(s), all of which spoke on the record *with one exception*:

1. Carolina Small Business Development Fund (formerly, The Support Center)
2. North Carolina Rural Center and its subsidiary, Thread Capital
3. North Carolina Community Development Initiative (NCCDI)
4. Columbus County Economic Development Commission (CCEDC)
5. Columbus County Chamber of Commerce (CCCC)
6. Columbus County Agricultural Extension (CCCES)
7. US Small Business Administration (SBA), Office of Public Affairs
8. Small Business Center (SBCN) Robeson Community College (RCC)
9. *Multiple departments of a city in North Carolina (Confidential)*
10. Small Business Technology Development Center (SBTDC)
11. Wayne County Economic Development Corporation (WCED)
12. Small Business Center (SBCN) Fayetteville Technical Community College (FTCC)
13. NC Department of Commerce Labor and Economic Analysis Division (DOC LEAD)
14. North Carolina Economic Development Association (NCEDA)
15. Small Business Center (SBCN) Edgecombe Community College (ECC)
16. Town of Tarboro, NC

To select institutional interviews, I identified institutions directly involved in the supply of capital, emergency communications, or technical assistance to disaster-affected businesses. In some cases, one institution encouraged me to speak to another institution in lieu of themselves or after a completed interview, which led me to speak to institutions #6, 7, 9, 13, 14. A number of local economic development offices and one chamber of commerce also provided business recovery anecdotes and information about the general socioeconomic effects of the hurricanes. I corresponded with but did not interview Self-Help Credit Union (SHCU). North Carolina DOC's CDBG Director did not respond to multiple written and phone requests for an interview.

A.3 List and Characteristics of Small Businesses Interviewed

In addition, I conducted nine interviews over the phone with small business owners, whom I have kept anonymous. I identify them in the thesis using 6-digit NAICS descriptions (e.g. 441120 = "Used Car Dealer") and occasionally more specific descriptions if judged necessary for clarity. I do not specify businesses' county or city in the interests of their privacy. When I do specify a business's location, I do not provide its NAICS description.

Business Description	**Size**	**Locations**	**Disaster Experience**	**SBA Matthew Debt?**	**Flood Insurance?**
"Mechanical Contractor" (811310: Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance)	12-15	1	Matthew & Florence	NO	NO
General Automotive Repair (811111)	1-4	1	Matthew & Florence	YES	After Matthew
"Vehicle Repair" (811490: Other Personal and Household Goods Repair and Maintenance)	3	1	Matthew & Florence	NO	NO
Office of Optometrists (621320)	25	2	Matthew	YES	After Matthew
"Specialty Trade Contractor" (238990: Building and Property Specialty Trade Services)	10-14	1	Matthew	YES	After Matthew
Sporting Goods Store (451110)	9	1	Matthew	NO	NO
Full-Service Restaurant (722511)	100-145	4	Matthew & Florence	YES	After Matthew
Art Dealer (722511)	1-4	1	Matthew	YES	After Matthew
Sporting Goods Store (451110)	62+	2	Matthew & Florence	*NO**	YES
**Used SBA Debt to finance recovery from Hurricane Floyd, but not Matthew*					

A.4 Description of Small Business Interview Sampling Methodology

To source small business interlocutors, I used a list of approved SBA loan applicants for Hurricane Matthew and Hurricane Florence disaster loans provided by the SBA in response to a FOIA request. *Not every business on the SBA's list actually proceeded with the loan the SBA approved for them.*

To narrow the sampling scope, I filtered out "Lessors of Residential Buildings and Dwellings," "Agriculture, Forestry, Fishing and Hunting," "Religious Organizations," and other nonprofits, since recovery of these businesses, while important, was beyond my research scope. I then cold-called businesses by searching their business name or address online (Google search engine) and using whatever phone number was made available, ideally on their website or dedicated social media page (Facebook), but sometimes using Yelp.com, Yellowpages.com, or a similar online contact database. I focused on businesses affected by Matthew, regardless of their experience of Florence, in order to select for businesses that could narrate longer periods of operation post-disaster.

A plurality of businesses was unreachable due to disconnected lines or formal closure, announced on Google.com and confirmed, when possible, over the phone. Another subset of businesses did not respond to my calls or messages. Approximately 7% of businesses I reached out succeeded in a phone interview.

In addition to using the list of SBA loan applicants, I placed a print classified advertisement for my research in the Robesonian, a local newspaper in Lumberton, NC/Robeson County with a circulation of over 60,000 individuals (Robesonian, n.d.). However, the ad did not net any additional contacts.

Finally, a small number of businesses kindly referred to me other business owners who weathered a hurricane but did not seek SBA financing. These referrals ultimately led to two (2) interviews.

A.5 Aside: Estimating Business Destruction

Business closure numbers and rates are difficult to estimate and even more difficult to attribute (discounting, for now, DOC LEAD's 4% survey estimate). A crude method to estimate business churn after a disaster is to analyze longitudinal changes in the number of businesses, by size or by sector, over a number of years leading up to and after the event. The granularity and accessibility of the U.S. Census's CBP dataset makes it sufficient, if not ideal, for the task. Unfortunately, the release of CBP data for 2017 (initially expected in spring 2019) is delayed until fall 2019. Therefore, this remains a task for future scholarship.

An analysis may draw upon CBP 2017 data, once it is available, to perform a crude before-and-after study of business destruction and creation—"churn"—between the years leading up to Hurricane Matthew and the year after Hurricane Matthew (2017) in the North Carolina's most vulnerable counties (presumably using FEMA, SBA, or HUD CDBG-DR county declarations as an indicator of vulnerability or invulnerability to Matthew). The analysis would specifically compare CBP data on (a) the number of businesses employing fewer than 20 people or (b) the number of businesses in the most vulnerable sectors (e.g. retail, food and accommodations, etc.) between 2016 and 2017. If vulnerable sectors in the most badly affected counties experienced a rate of business destruction that exceeded their historical rates of business destruction, or exceeded the rates of destruction in unaffected "control" counties, the study could suggest that Hurricane Matthew directly or indirectly caused a greater number of small businesses, or small businesses of certain selected sectors, to shut down or relocate than would have been expected in a counterfactual case.

That said, this method of analysis has many limitations:

1. Businesses might close or relocate for many other reasons besides a disaster.
2. Relocation from one county to another would falsely register as a unit of destruction.
3. The creation of new businesses—especially given U.S. economic growth in the late 2010s—would wash out some of the disaster's effects on business closure rates.
4. The county is an insufficiently granular geography to estimate the very spatially circumscribed effects of Hurricane Matthew, especially with regard to closure due to physical damage rather than economic injury.

Alternative and more accurate methods would require the use and parsing of proprietary datasets, such as ReferenceUSA or Dun & Bradstreet (D&B). The latter of these was used by Schrank et al. (2013) in Mississippi after Katrina to estimate small business demise post-disaster.

A.6 Additional Tables and Figures

Table 13: Hurricane Matthew, Florence SBA loans per sector vs. number of businesses per sector

Including 53: "Real Estate and Rental and Leasing"

NAICS Sector(s)	Sector Description	SBA Loans	%	Biz. per Sector*	% Area Biz.	Difference
11	Agriculture, Forestry, Fishing and Hunting	35	2.51%	424	0.44%	2.07%
21	Extractive Industry	0	0.00%	77	0.08%	-0.08%
22	Utilities	0	0.00%	263	0.27%	-0.27%
23	Construction	43	3.08%	9504	9.86%	-6.78%
31-33	Manufacturing	31	2.22%	2990	3.10%	-0.88%
42	Wholesale Trade	19	1.36%	4119	4.27%	-2.91%
44, 45	Retail Specialized Goods, General, Misc.	137	9.81%	15190	15.76%	-5.95%
48, 49	Transportation, Mail, Warehousing, Storage	36	2.58%	2316	2.40%	0.17%
51	Information	8	0.57%	1595	1.65%	-1.08%
52	Finance and Insurance	10	0.72%	5408	5.61%	-4.89%
53	*Real Estate and Rental and Leasing*	*644*	*46.10%*	*4801*	*4.98%*	*41.12%*
54	Professional, Scientific, and Technical Svcs.	64	4.58%	11074	11.49%	-6.91%
55	Management of Companies, Enterprises	0	0.00%	624	0.65%	-0.65%
56	Admin, Support, Waste Mgmt., Remediation	31	2.22%	5320	5.52%	-3.30%
61	Educational Services	8	0.57%	1265	1.31%	-0.74%
62	Health Care and Social Assistance	54	3.87%	10710	11.11%	-7.24%
71	Arts, Entertainment, and Recreation	30	2.15%	1520	1.58%	0.57%
72	Accommodation and Food Services	74	5.30%	9188	9.53%	-4.23%
81	Other Services	173	12.38%	9822	10.19%	2.20%
99	Public Administration	0	0.00%	198	0.21%	-0.21%
		1,397		96,408		

* Only counting businesses in counties declared for either Hurricane Matthew or Hurricane Florence by SBA
SOURCES: SBA (2019) (FOIA), U.S. Census Bureau County Business Patterns (2016)

Table 14: Hurricane SBA disaster loan summaries by sector, including all sectors

Hurricane Matthew SBA Loan Summary (NC-00081)

NAICS	NAICS Category Description	Total Loans	%	Dollars Approved	%	Average Loan
11	Agriculture, Forestry, Fishing, Hunting	18	3.90%	$792,400	2.45%	$ 44,022
23	Construction	12	2.60%	$955,000	2.95%	$ 79,583
31	Food & Textile Manufacturing	0	0.00%	$0	0.00%	$ -
32	Non-metallic, Chemical Manufacturing	0	0.00%	$0	0.00%	$ -
33	Metallic, Electronic, Misc. Manufacturing	5	1.08%	$1,773,800	5.49%	$ 354,760
42	Wholesale Trade	8	1.73%	$1,069,400	3.31%	$ 133,675
44	Retail Specialized Goods	28	6.06%	$2,242,200	6.94%	$ 80,079
45	Retail General & Misc. Merchandise	7	1.52%	$814,900	2.52%	$ 116,414
48	Transportation	9	1.95%	$211,700	0.65%	$ 23,522
49	Mail, Warehousing and Storage	0	0.00%	$0	0.00%	$ -
51	Information	4	0.87%	$801,300	2.48%	$ 200,325
52	Finance and Insurance	2	0.43%	$57,700	0.18%	$ 28,850
53	Real Estate and Rental and Leasing	221	47.84%	$11,490,900	35.55%	$ 51,995
54	Professional, Scientific, Technical Svcs.	14	3.03%	$503,800	1.56%	$ 35,986
56	Admin, Support, Waste Mgmt, etc.	8	1.73%	$658,800	2.04%	$ 82,350
61	Educational Services	1	0.22%	$15,000	0.05%	$ 15,000
62	Health Care and Social Assistance	16	3.46%	$1,365,800	4.23%	$ 85,363
71	Arts, Entertainment, and Recreation	8	1.73%	$365,700	1.13%	$ 45,713
72	Accommodation and Food Services	25	5.41%	$3,494,300	10.81%	$ 139,772
81	Other Services (except Public Admin)	76	16.45%	$5,712,700	17.67%	$ 75,167
		462		$32,325,400		

Hurricane Florence SBA Loan Summary (NC-00099, NC-00100)

NAICS	NAICS Category Description	Total Loans	%	Dollars Approved	%	Average Loan
11	Agriculture, Forestry, Fishing, Hunting	17	1.82%	$450,200	0.72%	$ 26,482
23	Construction	31	3.32%	$1,820,500	2.91%	$ 58,726
31	Food & Textile Manufacturing	6	0.64%	$393,800	0.63%	$ 65,633
32	Non-metallic, Chemical Manufacturing	7	0.75%	$972,100	1.56%	$ 138,871
33	Metallic, Electronic, Misc. Manufacturing	13	1.39%	$1,598,100	2.56%	$ 122,931
42	Wholesale Trade	11	1.18%	$1,350,900	2.16%	$ 122,809
44	Retail Specialized Goods	55	5.88%	$5,434,700	8.70%	$ 98,813
45	Retail General & Misc. Merchandise	47	5.03%	$2,404,600	3.85%	$ 51,162
48	Transportation	26	2.78%	$1,819,800	2.91%	$ 69,992
49	Mail, Warehousing and Storage	1	0.11%	$43,900	0.07%	$ 43,900
51	Information	4	0.43%	$110,300	0.18%	$ 27,575
52	Finance and Insurance	8	0.86%	$672,800	1.08%	$ 84,100
53	Real Estate and Rental and Leasing	423	45.24%	$20,435,800	32.70%	$ 48,312
54	Professional, Scientific, Technical Svcs.	50	5.35%	$2,817,500	4.51%	$ 56,350
56	Admin, Support, Waste Mgmt, etc.	23	2.46%	$2,328,700	3.73%	$ 101,248
61	Educational Services	7	0.75%	$291,500	0.47%	$ 41,643
62	Health Care and Social Assistance	38	4.06%	$1,945,200	3.11%	$ 51,189
71	Arts, Entertainment, and Recreation	22	2.35%	$3,233,400	5.17%	$ 146,973
72	Accommodation and Food Services	49	5.24%	$5,975,800	9.56%	$ 121,955
81	Other Services (except Public Admin)	97	10.37%	$8,396,600	13.44%	$ 86,563
		935		$62,496,200		

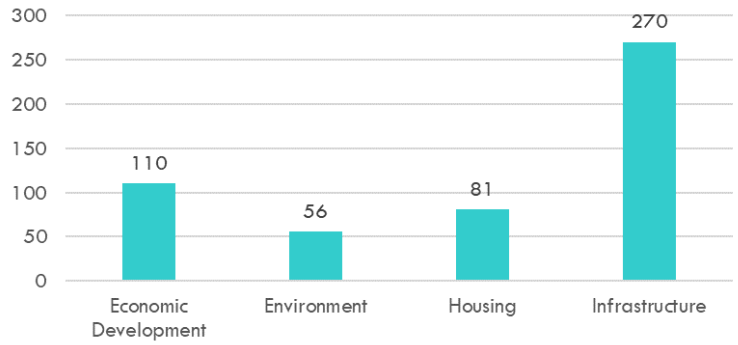
A.7 Resilient Redevelopment Plans

In December 2016, North Carolina's General Assembly authorized the funding of resilient redevelopment planning among 50 counties that sustained damages from Hurricane Matthew. County Resilient Redevelopment Plans (RRPs) described and prioritized various projects across four pillars—*economic development, environment, housing, infrastructure*—that would drive resilience in the face of future storms. Although projects within the RRPs are not guaranteed funding, these RRPs formed the basis for North Carolina's Hurricane Matthew CDGB-DR Action Plan to HUD and are designed to leverage funding from HUD as well as state and local funding/financing (Dollar et al., 2016; NC DOC, n.d.)

To analyze county-level RRPs and specify conclusions about business-related resilience initiatives, I completed a desktop review of 24 of the 50 plans. I selected RRPs on the basis of HUD CDBG-DR Tier I and Tier II classifications (see *Section 3.2*), which included 21 counties judged worst-damaged by Hurricane Matthew: Cumberland, Edgecombe, Robeson, Wayne, Beaufort, Bertie, Bladen, Carteret, Columbus, Craven, Duplin, Greene, Hyde, Jones, Lenoir, Martin, Nash, Pamlico, Pitt, Tyrrell, and Wilson Counties. I also reviewed RRPs from Dare County, Harnett County, and Johnston County because these counties suffered economic damages that were not captured by HUD's CDBG-DR eligibility determinations. In terms of the dollar amount of SBA business disaster loans approved after Matthew, these counties ranked 4th, 15th and 5th respectively.

Aggregating RRP initiatives by "pillar" reveals that RRPs generally privileged infrastructural projects, with "economic development" projects proposed second-most frequently (**Figure 45**). The pillar classification (and my subsequent classifications made below) are crude. Certain economic development solutions—e.g. extending a gas line to a business park—were seemingly infrastructural in nature but portended clear benefits to business actors. Other infrastructural solutions—e.g. increasing the resilience of transportation networks through road-raising and drainage improvement—were obviously infrastructural in nature but would have positive spillover effects in terms of economic resilience after flooding. In reality, most resilient actions prescribed by the RRPs exert multiple, systemic benefits to the communities that are difficult to neatly classify.

Figure 45: Number of initiatives per "Resilience Pillar" among 24 Sampled NC RRPs



In addition to considering the "four pillars" listed above, I reviewed all initiatives multiple times and iteratively developed 24 "themes" in order to further characterize the variety of RRP initiatives:

Table 15: Dominant themes among sampled Resilient Redevelopment Plans in North Carolina

Theme	Number of Initiatives
Drainage Improvement	69
Resilient Transportation	43
Water Utilities	38
Energy	29
Critical Infrastructure Repair/Resilience	28
Housing Relief/Repair/Elevation	27
Small Business	24
Emergency Response	25
Stream Maintenance	24
Environmental Planning	24
Flood Damage Reduction	22
Business Infrastructure	18
Real Estate Redevelopment	16
Warning & Response	16
Residential Buyout & Acquisition	16
Agriculture	17
Tourism	14
Planning	14
Affordable Housing	11
Open Space & Dunes	9
Mapping & Regulations	7
Public Facility Relocation	7
Community Infrastructure	7
Other	12
	517

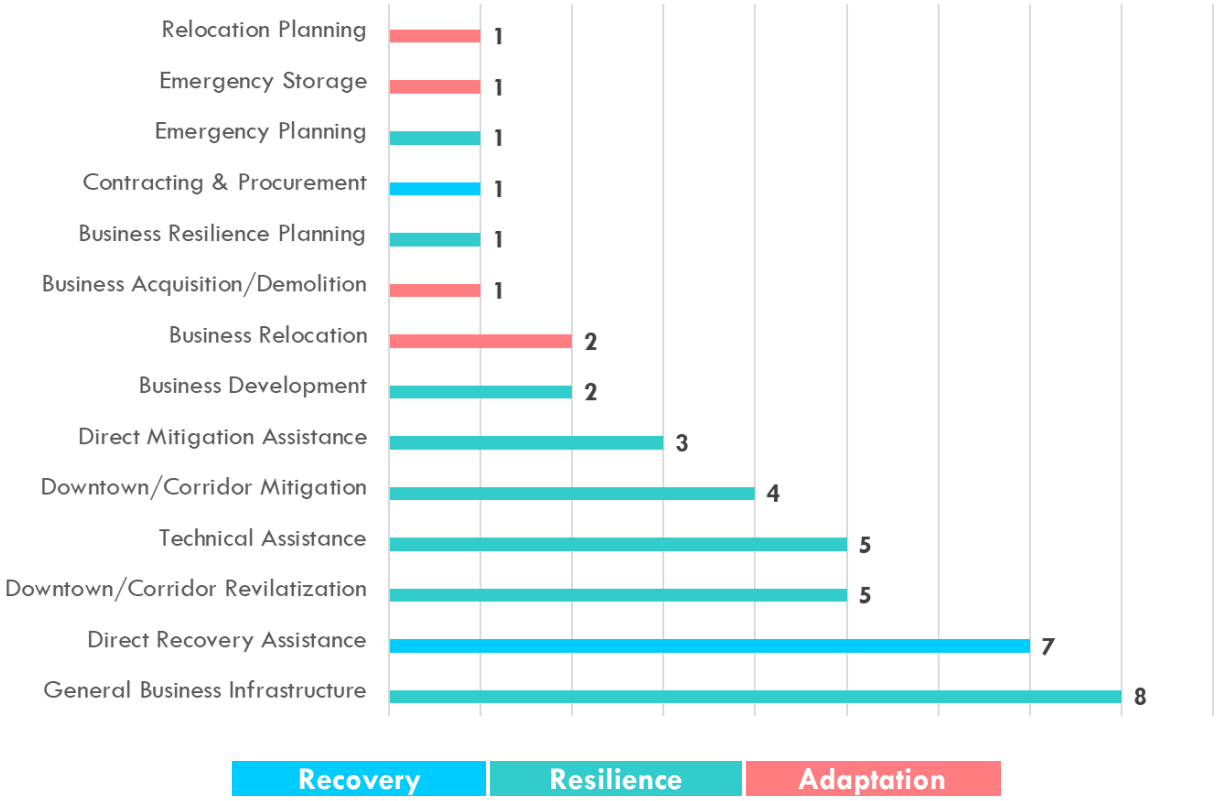
A plurality of initiatives plans for drainage improvement, improvements to transportation networks (e.g. road raising, bridge repair/refurbishment), and the recovery/mitigation of "lifeline" utilities related to drinking water, wastewater, and electrical power. 24 relate explicitly to non-agricultural small business and another 18 concern the general improvement of downtown or corridor infrastructure—e.g. sidewalks, signage, public transportation, etc.—to directly attract or retain businesses in key areas. The rest of this section explores these 42 business-related RRP initiatives, which are parsed even further into "sub-themes" in **Figure 46** and detailed—using explanations copied directly from county RRPs—in **Table 16**.

The majority of business-related RRP initiatives aim for a status-quo oriented form of **resilience**. These 42 projects prize the maintenance of existing businesses or business sectors by improving or extending infrastructure for existing businesses corridors/main streets, investing in large-scale or individual-level hazard mitigation, attracting or retaining/growing businesses through an incentive program or an arts incubator, and expanding technical assistance to firms and non-profits seeking to survive and return to baseline after Matthew or future disasters.

In certain cases, the priority of resilience approaches what seems like "maladaptation"—well-intended actions that actually allow economic activities to persist in highly vulnerable areas. For example, Bladen County's "Downtown Redevelopment and Revitalization" strategy "encourage(s) business to return to downtown Bladenboro after being displaced by Hurricane Matthew as well as focus on rebuilding with risk reduction in mind for a more resilient community through use of street

and walkway re-designs, infrastructure improvements, and other economic incentive programs." Yet the same recommendation acknowledges: "Nearly the entire downtown area is in a floodplain" (Bladen County, 2017, pp. 4–10). While the infrastructure improvements the strategy mentions could potentially mitigate damages after a future hurricane or flood, it is unclear whether continuing to flood-proof, elevate, and harden infrastructure in a highly vulnerable area is worth the continued evacuation, displacement, and emergency cash infusions that repeated riverine flooding will probably still entail for downtown Bladenboro.

Figure 46: Thematic analysis of business-related Resilient Redevelopment Planning initiatives



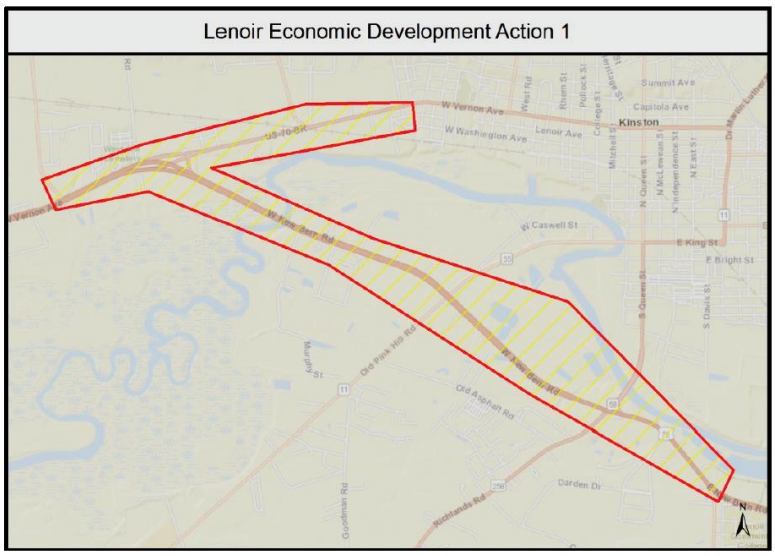
These sorts of maladaptive initiatives may be popular, since they preserve existing patterns of development and community, and they may be easy, since they enable path-dependence in post-disaster planning, but they also threaten to subject economic activity to repeated flood hazards even if some mitigation is accomplished. Indeed, authors have noted that under-insurance and under-mitigation can reduce or completely eliminate the usefulness of mitigation in promoting greater survival and performance post-disaster (see *Section 2.4*). Unfortunately, persistent exposure to flood hazards entails the persistent demand for disaster capital among vulnerable business establishments, which stultifies this sincere attempt at resilience and further stresses the community.

Unlike notions of resilience that maintain status quo operations, more transformative forms of adaptation could potentially afford greater protection to individual businesses and economic activities more broadly. However, only five (5) sampled initiatives embody such forms of

adaptation, which in this case involve the selective or wholesale reconsideration of commercial land use in advance of future flooding:

- **Lenoir County** proposed a "Business Relocation Program," which would target a group of businesses along US-70 south of Kinston, NC that lie in the floodplain (see **Figure 47**), identify suitable and comparable commercial sites for them to relocate, and then offset the costs of relocation by providing the businesses with tax incentives, direct assistance with relocation costs, and ready-made infrastructure in the suitable commercial sites for relocation. Although RRPs are implied to primarily draw on CDBG-DR funding, Lenoir suggests the project could (also) use the state's existing tax increment financing program (Lenoir County, 2017, pp. 4–13).

Figure 47: Hazard area considered by Lenoir County's "Business Relocation Program" proposal



SOURCE: (Lenoir County, 2017, pp. 4–13)

- **Pamlico County** proposed to relocate a major business development corridor out of FEMA's 100-year and 500-year floodplains, citing "multiple high areas within the County (out of the SFHA) which could be considered for potential relocation during future discussions with the County" with exceptions for firms whose business operations depend on access to the water. "Since the county is trying to attract businesses to come to the County and survive, establishing a corridor at resilient locations is going to be very beneficial and in line with the County's development goals" (Pamlico County, 2017, pp. 4–17).

- **Duplin County** proposed a process of small business relocation suitability analysis. The planning process would leverage Geographic Information Systems (GIS) analysis to identify underdeveloped parcels with sewer and water access that are outside of the floodplain. The county would inform relocating businesses of pre-determined, vetted sites in order to encourage relocation within the county but outside of vulnerable areas (Duplin County, 2017, pp. 4–16).

- **Wayne County** proposed a warehouse for emergency product storage before a forecasted flood. Wayne County's RRP notes, "During the hurricane several industries were displaced and needed a place to operate as well as store their equipment, material and inventory to minimize damage. There were very few places for them to utilize for this purpose. A warehouse facility would minimize loss and make it easier for industries to rebound. During times of normal operation, the facility would be used for overflow storage of crops or other inventory" (Wayne County, 2017, pp. 4–21). Although this emergency response plan seems like basic resilience/emergency preparedness, it does develop an alternate site for certain business's inventory and operations that obviates the need for beneficiaries to individually expend so many resources keeping their inventory safe and secure. In this way, it transforms the way a local economy might go about insulating its assets from future storms.

- **Jones County** proposes the acquisition and demolition of one small business that currently resides in a floodplain. After the transaction and demolition is complete, the county plans to deed the site into a "perpetual green space easement to prevent redevelopment in a floodprone [sic] area" (Jones County, 2017, pp. 4–20). The project was originally included in the county's FEMA HMGP application and was presumably denied by FEMA.

In general, the state's resilient redevelopment planning process should balance the benefits of resilience—of investing in hazard mitigation and economic development to preserve status quo commercial operations in vulnerable areas—versus adaptation—of fundamentally reconsidering patterns of commercial operations in order to limit or change the way businesses interact with flood hazards in the future. While dramatic adaptation—such as relocation programs organized on the county level—may pose intimidating upfront costs, it is possible that "business as usual" in vulnerable areas will entail even *greater* outlays of emergency recovery resources over a long time horizon.

Table 16: 42 Business-related Resilient Redevelopment Planning initiatives in North Carolina (Sample = 24 Counties)

County	Theme	Subtheme	Action Title	Description	$$$ Range
Columbus County	Small Business	Direct Recovery Assistance	Establish Assistance Programs for Businesses Impacted by Matthew with No Insurance or Under-Insured	Many businesses impacted by Hurricane Matthew were small, local business. Many were un-insured or under-insured and do not have adequate cash to rebuild their businesses. Direct Recovery Assistance programs other than SBA loans are needed to reopen these businesses. This action will allow businesses to reopen rehire and contribute to the economy of the County.	$1M+
Cumberland County	Small Business	Contracting & Procurement	Cumberland County Qualified Local Contractor Program for Reconstruction	The City of Fayetteville and Cumberland County are applying for grants to help hundreds to thousands of homeowners with repairs and mitigation improvements post-Hurricane Matthew. This project is to establish a qualified local contractor program that can provide the needed repair and mitigation services once these grants are awarded to property owners. It can also be used for PA work. This will benefit local workers, who may have also been impacted by Matthew, and provides a screened and qualified labor pool for homeowners to select from, reducing opportunities for fraud. It could also be used as a model for neighboring counties like Robeson, Hoke, Harnett, Sampson and Bladen. It helps keep the disaster recovery construction funding in local hands as long as the contractors are qualified to do the work.	$251K - $500K
Cumberland County	Business Infrastructure	Downtown/ Corridor Revitalization	Downtown Fayetteville and Corridor Revitalization	**Location:** Dowtown Fayetteville efforts in: 1) Downtown Historic District: 2) Market House Square; 3) Liberty Row. Corridor revitalization efforts: 1) Murchison Road; 2) Center City Action Park; 3) Williams St., 4) River Walk. Downtown Revitalization and Affordable 'above the shop' Housing: The CBD District, Murchison Road, Center City Action Park, Williams St. Business District, River Walk - Festival Park to Botanical Gardens (eco-tourism). Disasters stall and sometimes cause on-going downtown revitalization efforts to decline because small businesses that populate downtowns can quickly go out of business. By reinvesting in a pleasant walkable urban environment the shop owners are encouraged get back in the market. There exists great opportunities to capture retirees and millennials to move into the affordable downtown units bringing new life to the urban streets and making the city more economically resilient.	$1M+

County	Theme	Subtheme	Action Title	Description	$$$ Range
Edgecombe County	Small Business	Direct Recovery Assistance	Low-Income Grant Program for Small Business Recovery	This project would provide funding for recovery assistance to businesses that did not qualify for Small Business Association (SBA) loans or other recovery programs for non-residential uses. There are many small businesses in Edgecombe County, and because of the lower-income profile of households, many of these businesses do not have the excess capital to bear the impacts of the storm. Impacts to small businesses included damaged infrastructure, damaged capital investments—both real and other property, lost inventory, lost revenues from both displaced customers and business disruption, payments to employees who were not able to work, and disrupted operations from employees being unable to get to work. This program would in some cases prevent enterprises from going out of business preventing lost employment as well as lost services for residents in some areas.	$1M+
Johnston County	Small Business	Technical Assistance	Johnston County Hurricane Matthew Business Recovery Advisor	Because most of the businesses that were flooded during and after Hurricane Matthew did not have Business Preparedness or Recovery Plans in place, the business owners weren't sure how to start the recovery process. Many months later, these businesses still feel unsure about how to rebuild and become more resilient. Johnston County wants to hire a dedicated recovery person (24-month position) to assist businesses with recovery/preparedness planning, rebuilding advice, connecting to funding assistance, etc.	$501K - $1M
Hyde County	Business Infrastructure	General Business Infrastructure	Construct Resilient Docks over Water in Swan Quarter	The docks are located over water and are used for unloading fish and crabs caught in Pamlico Sound and in the Atlantic Ocean. The docks, which cannot be insured, are damaged in almost every coastal storm and must be reconstructed before fishing industry activities can resume. Construction will entail using treated lumber and poles to reinforce existing docks. The project will reduce the number of days that the fishing catch cannot be unloaded in Hyde County. This will also reduce the number of days that people who work in the fishing industry, both near the water as well as inland, are out of work.	$251K - $500K
Hyde County	Business Infrastructure	General Business Infrastructure	Construct Resilient Docks over Water in Engelhard	The docks are located over water and are used for unloading fish and crabs caught in Pamlico Sound and in the Atlantic Ocean. The docks cannot be insured; the docks are damaged in almost every coastal storm and must be re-constructed before fishing industry activities can resume. Construction will entail using treated lumber and poles to reinforce existing docks. The project will reduce the number of days fishing catch	$1M+

County	Theme	Subtheme	Action Title	Description	$$$ Range
				cannot be unloaded in Hyde County and reduce the number of days that people who work in the fishing industry, both near the water as well as inland, are out of work.	
Lenoir County	Small Business	Business Relocation	Business Relocation Program	This project would target businesses along US 70 that were impacted by the flood waters following Hurricane Matthew. This project would identify suitable/comparable commercial sites for businesses to relocate. In addition, the project would help create financial incentives that could include tax incentives, installation of infrastructure, and assistance with relocation costs. The project could utilize the state's tax increment financing program.	$501K - $1M
Lenoir County	Small Business	Technical Assistance	Small Business Program	This project involves the development of a small business program that will work to help existing small businesses and promote new small businesses in the County. This program will include training for business owners and/or potential business owners, identify ideal sites for new businesses, and identify new business opportunities where gaps in the local business offerings exist. Impacted businesses included several hotels, Cardinal Chemicals, and Mills International.	$101K - $250K
Pitt County	Small Business	Direct Recovery Assistance	Renewal of Restaurant/Businesses	A grant program will be created for those that would like to open a business within the County, with preference given to locally owned businesses that were previously located within the County but had to close as a result of Hurricane Matthew. The following categories of business within the County will be eligible for the grant program: those that existed prior to the hurricane but were not able to reopen, those that had an intention of opening but were not able to, and those that would like to provide a service in place of a now-closed business.	$501K - $1M
Robeson County	Small Business	Direct Recovery Assistance	Provide Assistance Programs for Businesses Impacted by Matthew with Little or No Insurance	Establish a grant programs for small businesses/churches to assist with the financial burden of returning to operation and preparing for next event. These programs would provide funding for recovery assistance to businesses that did not qualify for Small Business Association (SBA) loans or other recovery programs for non-residential uses. There are many small businesses in Robeson County, and because of the lower-income profile of households, many of these businesses do not have the excess capital to bear the impacts of the storm. Impacts to small businesses included damaged infrastructure, damaged capital investments—both real and other property, lost inventory, lost revenues from both displaced customers and	$1M+

County	Theme	Subtheme	Action Title	Description	$$$ Range
				business disruption, payments to employees who were not able to work, and disrupted operations from employees being unable to get to work. Businesses identified as "in need" are located across the county.	
Robeson County	Business Infrastructure	Downtown/ Corridor Mitigation	Implement Downtown Rehabilitation/Revitalization Projects	Address physical components like infrastructure and buildings to make structures "move-in ready" with façade and basement foundation improvements as well as modern utilities. This strategy involves providing additional public amenities and improvements to infrastructure and buildings to make them more flood-resistant. One area for economic development was identified in the Town of Pembroke and is shown in the figure below.	$1M+
Wayne County	Small Business	Emergency Planning	Cooperative Business Response and Mitigation Strategy—Countywide	During Hurricane Matthew, the business community pulled together to assist each other, when possible, in continuing operations. However, while individual businesses may have had contingency plans, there were no cooperative plans in place across the community to indicate what resources could be made available or how to contact key members to coordinate. This strategy would assist the local business community in developing a countywide disaster preparedness plan that can be used as a guide to make decisions and continue operations during a disaster. If a comprehensive plan is developed and distributed, businesses will know how to respond, what to do, where to go, and what resources are available to them to continue their operations during and after a disaster.	$251K - $500K
Wayne County	Small Business	Emergency Storage	Warehouse for Product Storage—could be used in off-season for rotating stock/crops	During the hurricane several industries were displaced and needed a place to operate as well as store their equipment, material and inventory to minimize damage. There were very few places for them to utilize for this purpose. A warehouse facility would minimize loss and make it easier for industries to rebound. During times of normal operation, the facility would be used for overflow storage of crops or other inventory.	$501K - $1M
Wayne County	Small Business	Business Development	Business attraction/incentives for vacant structures—Seven Springs	To protect the town's legacy and its historic significance to the county and state, this economic development strategy focuses on developing new uses to generate operating funds for the town. Of the businesses within the historic center of Seven Springs, it is estimated that 3 to 4 of them will not return. One business owner cited repair costs of approximately $100,000 as being a hinderance. This project would:1. Provide administrative resources to the town to assist in locating and	$251K - $500K

County	Theme	Subtheme	Action Title	Description	$$$ Range
				administering a business attraction program.2. Provide a pool of funds to incentivize targeted businesses to locate in Seven Springs, with a guarantee of a set term of required operations. Emphasis to be placed on maintaining the historic exterior as much as possible, making necessary repairs, floodproofing the building/operations, and on businesses that support Seven Springs tourism development goals (e.g. restaurants, outfitters).	
Wayne County	Business Infrastructure	General Business Infrastructure	Downtown Parking Deck	This strategy would provide a new downtown parking garage to support the investment in downtown and encourage location of new businesses there. It would alleviate some pressure to demolish buildings, often historic, to accommodate surface parking.	$1M+
Wayne County	Business Infrastructure	Downtown/ Corridor Revitalization	Downtown Entryway and Pedestrian Improvements	This strategy would provide landscaping, gateway improvements, and a dedicated lighted walkway for pedestrians, with the goal of tying the area north of Ash Street to the heart of downtown in the City of Goldsboro, leveraging private developments that are anticipated for the area.	$501K - $1M
Wayne County	Business Infrastructure	General Business Infrastructure	Downtown Dedicated Transit Service	This strategy would provide a downtown shuttle service to enhance circulation in the downtown area.	$101K - $250K
Wayne County	Business Infrastructure	General Business Infrastructure	Gas Line Expansion—Fremont	The Town of Fremont would like to extend natural gas lines into the town and to development parcels at the interchange with I-795, to provide homes with natural gas for fuel as well as to create new development opportunities for business attraction and highway retail/service development. [$150000 in damages from Matthew.]	$1M+
Wayne County	Business Infrastructure	General Business Infrastructure	Downtown and Neighborhood Pedestrian Improvements	This action would provide improvements to sidewalks to connect Downtown Goldsboro with nearby neighborhoods. Currently, approximately half of the pedestrian system is broken and beyond repair requiring a total replacement. According to stakeholder response the sidewalks were in poor repair before Matthew and lack of proper sidewalk elevations/curb/gutters allowed flooding. Providing enhanced connections between residences/businesses can encourage additional spending for retail/services. City submission estimates impacts of $3.4 million and 169 jobs	$1M+
Wayne County	Business Infrastructure	Downtown/ Corridor Revitalization	Slocumb Street Redevelopment	Slocumb Street terminates at one of three Seymour Johnson Air Force Base entry gates. It connects many of Goldsboro's low and moderate income areas to Ash Street, our community's	$101K - $250K

County	Theme	Subtheme	Action Title	Description	$$$ Range
				major commercial thoroughfare and is dotted by vacant lots where buildings once stood before falling victim to neglect and condemnation. Of the buildings/homes that remain, many are in poor condition and are slated for demolition. Many neighborhoods that connect to Slocumb Street via several dozen cross streets have lost identity because of their use as a cut-through rather than entrances. With over 150 homes and businesses with a frontage along Slocumb Street, the view is cluttered and travel is slow and unsafe for those entering and exiting off the street. The sidewalks are not protected by curb and gutter or a landscaped buffer and there are no pedestrian crosswalks.	
Wayne County	Small Business	Direct Recovery Assistance	Build a Better Downtown Incentive Program	This strategy supports a program to spur economic development by providing incentives for building rehabilitation, exterior building improvements, and business development in the downtown area. Forty-four percent of the downtown's buildings are vacant or underutilized, including upper–story square footage. This program would aim to reduce that rate and improve the overall condition of downtown. The City reexamined the two programs and created one, the Build A Better Downtown Incentive Program, and has three project categories for which applicants can compete, quarterly, for award. These three categories are: Building Rehabilitation, Exterior Building Improvements and Business Development. These grants/loan are tied to jobs, upper-story residential development, private investment and transformation of vacant square footage.	$251K - $500K
Wayne County	Small Business	Business Development	Arts Business Incubator Space	This strategy would develop a new arts business incubator space in Downtown Goldsboro, continuing an ongoing relationship with the Arts Council of Wayne County and further developing the vision of Downtown as a regional cultural destination.	$251K - $500K
Wayne County	Business Infrastructure	General Business Infrastructure	Union Station Rehabilitation	This strategy seeks to provide funds for an exterior rehabilitation of the historic train station on the National Register that the North Carolina Department of Transportation (NCDOT) Rail Division plans to serve as a hub for passenger rail service between Raleigh and Wilmington in the future. A complete exterior rehabilitation would protect this asset for future use, enhancing transportation options, maintaining the	$1M+

County	Theme	Subtheme	Action Title	Description	$$$ Range
				architectural legacy of the county, and potentially spur additional private investment.	
Bladen County	Business Infrastructure	Downtown/ Corridor Mitigation	Downtown Redevelopment and Revitalization	Problem: Downtowns across the state, but in particular in rural areas, have suffered downturns as building stock has aged and major retailers have moved out to shopping centers. Bladenboro's water system was built in the 1970s and sewer system was built in the 1930s. Added to these issues, flooding during Hurricane Matthew forced medical providers and retailers to relocate and many have chosen not to return to their previous locations of business. **Nearly the entire downtown area is in a floodplain.** Strategy: Encourage business to return to downtown Bladenboro after being displaced by Hurricane Matthew as well as focus on rebuilding with risk reduction in mind for a more resilient community through use of street and walkway re-designs, infrastructure improvements, and other economic incentive programs.	$251K - $500K
Bladen County	Business Infrastructure	General Business Infrastructure	Upgrade Existing Water, Sewer, Gas Facilities	Problem: Elizabethtown Industrial Park needs natural gas to encourage and handle future industrial growth. Bladenboro Industrial Park has insufficient water and sewer capacity for current and future development. Strategy: Natural gas service needs to be extended to Elizabethtown Industrial Park in order to foster economic development in the area and provide a consistent source of gas to this important area. Currently gas service has been extended to an area northwest of Elizabethtown and needs to be extended roughly 5 miles to the southeast side of Elizabethtown where the park is located. Sewer capacity needs to be increased at the Bladenboro Industrial Park in order to foster economic development in the area and provide a consistent source of sewer to this important area. Currently the system has a 500,000 gallons per day capacity and in high rain events they are at roughly 1,000,000 gallons per day. Bladenboro Industrial Park also needs expansion of water capacity. Currently the park is serviced by 2 wells – but an additional well is needed to support current needs and future growth. As a first step, this strategy may include a needs assessment study to identify current and future capacity needs for extending gas, sewer and water services in the county. The study should address multiple concerns to include current shortfalls in capacity as well as expected growth, developing resilience for future disasters by determining	$251K - $500K

County	Theme	Subtheme	Action Title	Description	$$$ Range
				viability of bringing rural communities online to county services and provide an analysis of infrastructure support to encourage the future development of the Industrial Park.	
Harnett County	Small Business	Direct Recovery Assistance	Business Acquisition and Recovery Planning	During and following Hurricane Matthew, flooded businesses did not have Business Preparedness or Recovery Plan in place and weren't sure how to start recovery. Funding is needed to assist local business owners, to help them minimize future disruption and losses. Projects include: • Provide a $10,000 grant to a total of 5 locally-owned small businesses to help business owners create Business Preparedness and Recovery Plans. • Acquire law office at 804 W Broad St in Dunn and use property to re-route stormwater piping to allow better flow. After demolition, use the area as a permeable overflow parking lot for area businesses. The law office will relocate to another location in town that is not floodprone.	$101K - $250K
Beaufort County	Business Infrastructure	Business Resilience Planning	Alternative Service Options	Provide alternative retail/service options for impacted areas of the county: The inability of some area businesses to recover from the damage caused by Hurricane Matthew has left portions of the county without easy access to necessary goods and services. This strategy would support the recovery of existing businesses and, where necessary, would help facilitate the establishment of new businesses in the place of those that are no longer open. In addition to directly stimulating the economy through protection or creation of jobs, this strategy will also reduce the risk of residents moving out of the county because essential services are not readily available. One option would be to support elevation and/or retrofit projects for small businesses, where appropriate and feasible, to support the mitigated homes that are sustaining residents in the area. A logical next step would then be to increase/enhance/mitigate infrastructure to support the mitigated businesses and mitigated homes to allow all of these assets to function fully during and following a flood event such as Hurricane Matthew.	$1M+
Bertie County	Business Infrastructure	Downtown/ Corridor Mitigation	Windsor Central Business District	It is especially notable that there is significant potential for economic development to be integrated with redevelopment efforts in Bertie County. This project, which is aimed at economic development and redevelopment, focuses on downtown Windsor, NC. Businesses in downtown Windsor experience significant capital losses during flood events. They face structural damage, loss of inventory, and loss of business.	$1M+

County	Theme	Subtheme	Action Title	Description	$$$ Range
				The project would elevate the interior of the affected buildings, which is feasible with tall ceilings in older buildings. Flooding has reached 6 feet and affects 42 different businesses and the community building downtown. This has a direct impact on 250 employees and a broader population of 750.	
Carteret County	Business Infrastructure	Downtown/ Corridor Revitalization	The Port of Morehead City	The port supports approximately 200 direct jobs in Carteret County. Indirectly, the port supports multiple sectors, employing many hundreds of people in logging, manufacturing, agriculture, rubber, rail and other industries. Continued investment in port development and facilities could enhance the opportunity for the region to become a major gateway for world shipping. This project consists of developing investment strategies needed to secure the port's future success by: Identifying ways to improve four-lane highway access along US 70. Identifying and recruiting clean export/import businesses. Identifying and creating additional foreign trade zone(s) to encourage international trade. Securing funding for the continuous dredging of the port's inlet.	$1M+
Carteret County	Business Infrastructure	Downtown/ Corridor Revitalization	Development around Military Facilities	Due to the proximity of Cherry Point and Camp Lejeune, there is growth opportunity in Carteret County to support—directly and indirectly—these military installations. These nearby military facilities have provided high-paying quality jobs in the past; potential changes in the military force structure and/or missions could lead to facility expansion, restriction, or closures. Strategies for further development include: [abridged]	$1M+
Craven County	Small Business	Direct Mitigation Assistance	Mills Country Store, Complete Floodproofing of	Local businesses become flooded and cannot operate, which impacts their revenues as well as workers' incomes. Mills County Store is an information hub for this part of the county, and was flooded during Hurricane Matthew. This project seeks to construct a berm/bulkhead around the store to protect it from flooding. The project also will elevate utilities to the BFE + 2 feet wherever possible, otherwise as high as possible. Inside the store, the project will elevate shelves above the BFE and/or construct platforms that can be raised and lowered using pulleys suspended from the ceiling. For business continuity, the project will support the owners to develop a storm preparedness plan, which will include strategies for storing hard and electronic copies of critical records at a floodproof location and/or on the Cloud.	$251K - $500K

County	Theme	Subtheme	Action Title	Description	$$$ Range
Craven County	Small Business	Direct Mitigation Assistance	A&J Canvas, Complete Floodproofing of	Local businesses become flooded and cannot operate, which impacts their revenues as well as workers' incomes. A&J Canvas serves the boating industry and was flooded during Hurricane Matthew. This project seeks to construct a berm/bulkhead around the store to protect it from flooding. The project also will elevate utilities to the BFE + 2 feet wherever possible, otherwise as high as possible. Inside the store, the project will elevate shelves above the BFE and/or construct platforms that can be raised and lowered using pulleys suspended from the ceiling. For business continuity, the project will support the owners to develop a storm preparedness plan, which will include strategies for storing hard and electronic copies of critical records at a floodproof location and/or on the Cloud.	$251K - $500K
Duplin County	Small Business	Relocation Planning	Small Business Readiness Site Program	This project would provide businesses damaged from the Hurricane within the flood plain developable sites OUTSIDE the flood plain that they could relocate and redevelop on. This strategy enhances economic development recovery by adopting flood protection measures to protect underdeveloped economic assets in the community and spur re-development. At-risk sites include properties along existing creeks or streams that might be subject to frequent erosion or abandoned industrial sites with buildings that could be retrofitted for new uses. GIS analysis of underdeveloped parcels with sewer and water access are necessary to target for future growth and development. Data integration of local floodplains, historical flood levels, combined storm and sanitary sewer outfalls and sewer sheds, can be used to identify underdeveloped parcels in sewer and water districts that have a higher risk for flooding.	$0 - $50K
Duplin County	Small Business	Technical Assistance	Non-Profit Disaster Response Assistance	The program will assist local non-profit relief agencies in applying for additional grants and funding to expand their educational programs and relief activities in the event of a disaster.	$0 - $50K
Greene County	Small Business	Technical Assistance	Assist Non-Profits with Staffing	Following Hurricane Matthew, several area non-profit organizations addressed immediate unmet needs and provided critical assistance to affected members of the community. This project would assist local non-profits with funding and staffing to help them increase their capacity in providing relief assistance.	$0 - $50K

County	Theme	Subtheme	Action Title	Description	$$$ Range
Greene County	Small Business	Technical Assistance	Develop Small Business Program	This project involves the development of a small business program that will work to help existing small businesses and promote new small businesses in the County. This program will include training for business owners and/or potential business owners, identify ideal sites for new businesses, and identify new business opportunities where gaps in the local business offerings exist.	$51K - $100K
Jones County	Small Business	Business Acquisition/Demolition	Acquisition of one priority flood-prone non-residential property	This project supports acquisition of a non-residential floodprone structure in the Pink Hill area of Jones County through a traditional real estate transaction between the property owner and the County. Once the sale is complete, the property structures will be demolished, the site stabilized and the property deeded into perpetual green space easement to prevent redevelopment in a floodprone area. The project was included in the county's HMGP application.	$0 - $50K
Martin County	Small Business	Direct Recovery Assistance	Renewal of Restaurant/Businesses Countywide	A grant program will be created for those that would like to open a business within the County, with preference given to locally owned businesses that were previously located within the County but had to close as a result of Hurricane Matthew. The following categories of business within the County will be eligible for the grant program: those that existed prior to the hurricane but were not able to reopen, those that had an intention of opening but were not able to, and those that would like to provide a service in place of a now-closed business.	$501K - $1M
Nash County	Small Business	Downtown/ Corridor Mitigation	Hazard Mitigation Provisions for Commercial Properties	This project would elevate critical infrastructure and provide flood proofing at businesses in repetitive flood areas through financial and other assistance. Although this program would be a county-wide program the county officials did note areas that were subjected to flooding as a result of Hurricane Matthew. Some of the commercial areas that were identified by the county officials include: • US 64 and Highway 58 in Nashville • Business at US 64 and Business 301 in Rocky Mount • West of 301 and South of 64 in Rocky Mount • West of 301 and North of 64 in Rocky Mount • Country Club, 64, and Hunter Hill Road in Rocky Mount • South of Stony Creek, Country Club Road and Weed Road in Rocky Mount	$1M+
Pamlico County	Business Infrastructure	Business Relocation	Relocate Business Development Corridor	The County should focus future development of and relocation of the existing business development corridor to outside of the	$1M+

County	Theme	Subtheme	Action Title	Description	$$$ Range
				100- and 500-year floodplains. There are multiple high areas within the County (out of the SFHA) which could be considered for potential relocation during future discussions with the County. This project will help ensure resilience of business activity into the future as well as during minor coastal flooding events. Exceptions to this can be made for businesses that rely on access to the water. There are multiple high areas within the County (out of the SFHA) which could be considered for potential relocation during future discussions with the County. Since the county is trying to attract businesses to come to the County and survive, establishing a corridor at resilient locations is going to be very beneficial and in line with the County's development goals. Proposed locations should be identified through discussions with the County, therefore a map of proposed locations could not be included for this submittal.	
Wilson County	Small Business	Direct Mitigation Assistance	Beacon Street, City of Wilson	Four businesses located along Beacon Street experienced flooding following Hurricane Matthew. The businesses are located in close proximity to Hominy Swamp, and overbank flooding also contributes to the flooding of the businesses. The proposed project recommends multiple strategies and actions. Relocation of the business, cleaning of the ditches along Beacon Street and elevating some of the equipment at these businesses are potential solutions to mitigate the problem.	$1M+