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Economic Shocks and Regional Economic Resilience

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Introduction

Economic shocks occur periodically to metropolitan economies, though the effect that these shocks have varies from region to region as does the region's adjustment and recovery to them. In this chapter we examine the nature and extent of these shocks, their effects on regional economies (some regional economies are resistant to shocks, while others suffer substantial downturns), and the resilience of regional economies to these shocks. We are particularly concerned with regional economic resilience: why are some regional economies that are adversely affected by shocks able to recover in a relatively short period of time while others are not?

Economic resilience is a concept that is frequently used but rarely well defined. Conceptually, Pendall, Foster, and Cowell posit two separate, though not necessarily unrelated, concepts. The first is based on "equilibrium analysis," in which resilience is the ability to return to a pre-existing state in a single equilibrium system. The second defines resilience in terms of complex adaptive systems and relates to the ability of a system to adapt and change in response to stresses and strains. In this chapter we focus on the first definition of resilience.[1]

For regional economic analysis, perhaps the most natural conceptual meaning of economic resilience, and the one we use, is the ability of a regional economy to maintain or return to a pre-existing state (typically assumed to be an equilibrium state) in the presence of some type of exogenous (i.e., externally generated) shock[2]. Although only a few studies explicitly use the term "resilience," the economic literature that deals with the idea of resilience typically is concerned with the extent to which a regional or national economy is able to return to its previous level and/or growth rate of output, employment, or population after experiencing an external shock.[3]

A related concept of resilience is the extent to which a regional economy avoids having its previous equilibrium state disrupted by an exogenous shock. This could involve avoiding the shock altogether (e.g., by having a regional economy that is not dependent on an industry that is

[1] Pendall, Foster, and Cowell (2009, pp. 2, 6).
[2] Note that this "shock-related" definition of resilience does *not* include a consideration of regional response to long-term chronic low levels of growth or what some have referred to as "slow burn." This is clearly an important concern, but one that we do not consider in this chapter.
[3] See, e.g., Blanchard and Katz (1992), Rose and Liao (2005), Briguglio and others (2006), Feyrer, Sacerdote, and Stern (2007). Although these macroeconomic indicators are commonly used, it is also possible to apply this and other resilience concepts to other measures of regional economic performance, such as wage inequality or measures of environmental sustainability.

likely to experience a negative demand shock) or withstanding the shock with little or no adverse impact (e.g., by having sufficiently diversified economy that the shock has little macroeconomic effect).[4]

We conceptualize regional economic resilience as the ability of a region (defined for the purpose of this chapter as a metropolitan area as delineated by the Office of Management and Budget) to recover successfully from shocks to its economy that throw it substantially off its prior growth path and cause an economic downturn. Shocks can be of three kinds: 1) shocks caused by downturns in the national economy (national economic downturn shocks); 2) shocks caused by downturns in particular industries that constitute an important component of the region's export base (industry shocks), and 3) other external shocks (a natural disaster, closure of a military base, movement of an important firm out of the area, etc.).[5] These shocks are not mutually exclusive; a regional economy may experience more than one simultaneously.

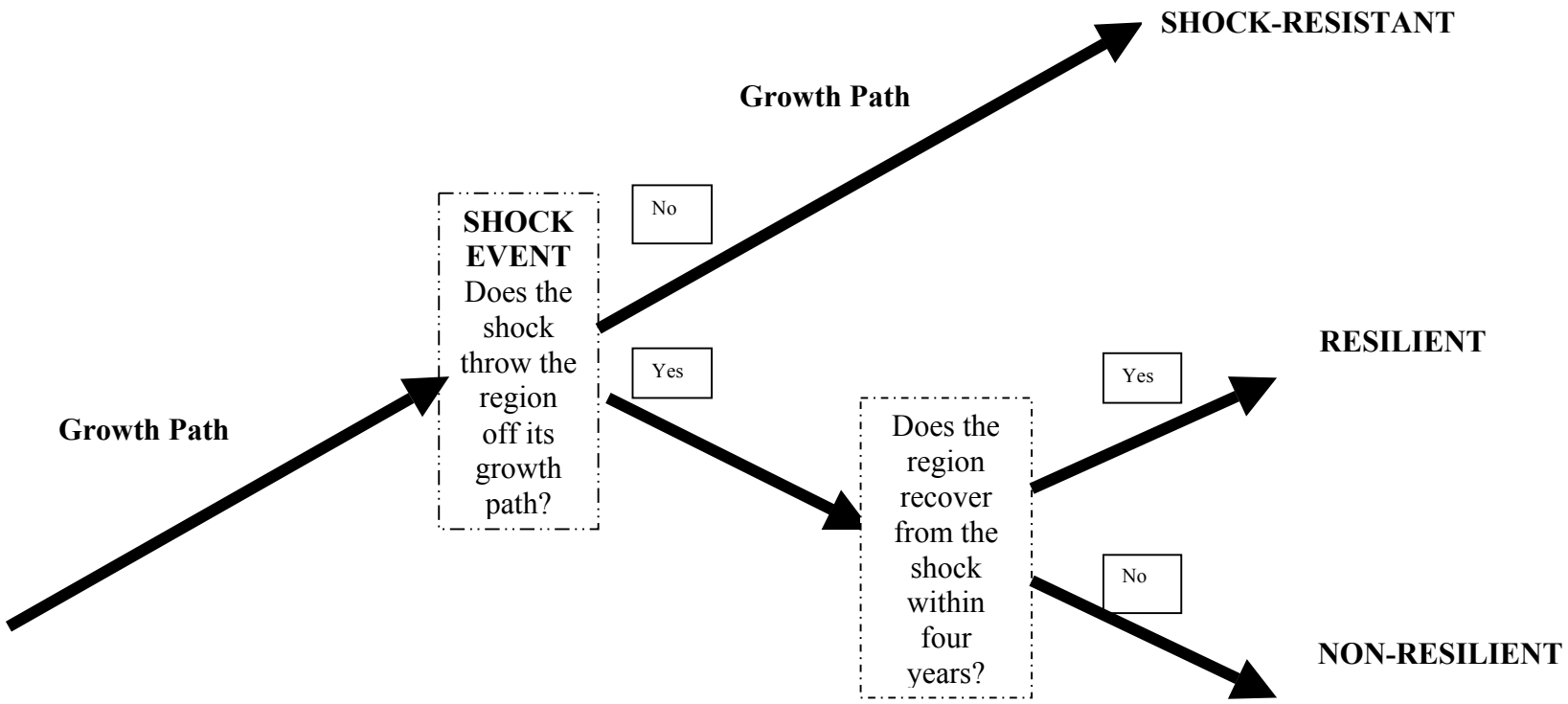
Not all shocks throw an economy substantially off its prior growth path. When a shock occurs that does not cause the region to be thrown off its prior growth path – i.e., it does not experience an economic downturn – we term the region "shock-resistant" to that shock. If the region is adversely affected by the shock, we consider it "resilient" if it returns to at least its prior growth path within a relatively short period of time. If it does not, we consider it "non-resilient." (See Figure 1.) We operationalize these concepts below. Being shock-resistant is the best outcome for a regional economy followed by being resilient. Being non-resilient is the least desirable outcome.

Note that economic resilience can occur because the region's economy simply bounces back (e.g., because of favorable shifts in the demand for its products), as a result of undergoing changes in its industry or occupational structure, or through less radical economic changes (e.g., existing firms adopt better technologies or organizational forms or produce new products). The

[4] Briguglio and others (2006).

[5] In this chapter, we follow common usage in regional economics and use the term "export," at the regional level, to refer to goods and services that are produced in a region but consumed mainly by people who live in other regions. Those other regions may be located in either the United States or other countries.

Figure 1. Resilience Concepts



key question is what is happening to the competitive position of the region's economic base, and how the region responds to changes in the competitive position of its base. Note also that a return to its prior growth path is not necessarily a good thing, particularly if the prior growth path was low or stagnant (although it is presumably a better thing than stabilizing at an even lower level).

Understanding and Accounting for Regional Economic Resilience: Reviewing the Literature

Research describing patterns and determinants of shock resistance and/or economic resilience is sparse. The descriptive literature finds that U.S. states, counties, and metropolitan areas that experience employment shocks generally recover to their pre-shock unemployment rates but not to their pre-shock employment levels within eight or fewer years. The main reason why unemployment rates recover relatively quickly while employment levels do not is that unemployed workers in the United States leave regions that have experienced large job losses, while the lack of in-migration of new job-seekers helps the region's unemployment rate to recover. Employers, on the other hand, do not relocate jobs to regions that have experienced large employment shocks.[6]

The available evidence shows that shocks permanently lower employment in regions that experience them. Blanchard and Katz find that at the state level, employment shocks typically result in employment declines for about four years. After that, states eventually return to their pre-shock employment growth rates (and are, therefore, resilient in the sense in which we use that term) but they start from a permanently lower post-shock employment level.[7] Feyrer, Sacerdote, and Stern reach an even more pessimistic conclusion about economic resilience in their study of counties that lost steel and auto manufacturing jobs between 1977 and 1982. They find that employment and population in these counties grew slightly a few years after

[6] See Blanchard and Katz (1992), Bartik and Eberts (2006), Feyrer, Sacerdote, and Stern (2007).
[7] Blanchard and Katz (1992).

experiencing this employment shock but that they then failed to grow at all during approximately two decades following the shock.[8]

The regional literature points to several features of regions that may contribute to either shock-resistance or resilience[9]. With respect to industrial structure, Feyrer, Sacerdote, and Stern find that counties that experienced auto and steel job losses in the late 1970s and early 1980s had higher post-shock population growth if they had warm, sunny climates and were located near large metropolitan areas.[10] Kolko and Neumark, in a study of the impact of regional and industry employment shocks on establishment-level employment, find that employment in corporate headquarters and, to a lesser extent, in small, locally owned chains, is less likely to decline in response to these shocks.[11] Therefore, high concentrations of these types of businesses would be expected to make regions more shock-resistant. Chapple and Lester find evidence that regions in which technology and knowledge-based work are growing rapidly exhibit greater resilience in terms of average earnings per worker. They also find that regions attracting highly skilled workers have greater increases in average earnings per worker.[12]

Other literature on regional economic growth, although not about resilience per se, suggests hypotheses that may be relevant to the analysis of resilience. One strand of research emphasizes the role of product and profit cycles in regional growth; it suggests that regional economies can be renewed if their firms can introduce new goods or services for export from the region or use new technologies to produce such goods and services.[13] A second strand examines the unresolved question of whether industrial specialization or industrial diversification better promotes growth.[14] It has also been suggested that quality and age of a region's public and private infrastructure is related to cyclical volatility and to growth. Howland finds that state's with new private capital stocks experience more severe recessions. She reasons that such states have a larger proportion of newer and smaller firms and that such firms are more susceptible to bankruptcy during a recession[15]. This contradicts earlier findings by Variaya and Wiseman, who

[8] Feyrer, Sacerdote, and Stern (2007).
[9] See Ficenec (2010) for a review of the literature.
[10] Feyrer, Sacerdote, and Stern (2007).
[11] Kolko and Neumark (2010).
[12] Chapple and Lester, 2007; 2010. See also Foster, 2009 and Christopherson , Michie, and Tylelr, 2010.
[13] Desmet and Rossi-Hansberg (2009), Duranton and Puga (2001). Markusen (1985), Norton and Rees (1979).
[14] Glaeser and others (1992), Henderson, Kuncaro, and Turner (1995), Harrison, Kelley, and Gant (1996), Henderson (2003).
[15] Howland, 1984

argue that regions with older capital stock may experience more severe regional recessions because older (and more obsolete) capital is most likely to be retired during a recession.[16] However, Howland also finds that once small firms are eliminated from the sample, states with older capital stock experience more severe recessions.[17] Age of the metropolitan area is sometimes used as a proxy for the condition of both private and public capital infrastructure as well as a match between an area's urban form and modern transportation needs (with the implication that older areas are likely to have less effective and efficient infrastructure, more prone to breakdown and need for repair)[18]. In the case of both public and private infrastructure, older areas are hypothesized to be less "resilient." A small literature explores whether local government fragmentation within a metropolitan area promotes or inhibits growth, although the findings tend to be inconclusive.[19]

Another line of research suggests that human capital (the educational attainment or skills of the region's workforce) is a major driver of growth.[20] Some accounts of the revitalization of New England in the 1980s posit that low wages for skilled workers were necessary to restart the region's growth.[21] Some research has linked regional economic growth to a low level of income inequality within a region.[22] Finally, some literature suggests that the domination of regional labor markets, suppliers, R&D pipelines, or channels of informal business association and communication by a few large, vertically integrated firms may inhibit the growth of other firms.[23] All these potential determinants of regional growth are potentially determinants of regional economic resilience as well.

The literature on international economic development may also contribute some insights that are relevant to regional economic resilience. Duval, Elmeskov, and Vogel, in a study of the reasons why shocks to national economies occur and persist, find that public policies that restrict firms' ability to lay off or reassign workers make shocks less severe but also make them last longer.[24] At the regional level, this may suggest that state and local policies that inhibit layoffs

[16] Variaya and Wiseman, 1977.
[17] Howland, 1984.
[18] See Blumenthal, Wolman, and Hill (2009)
[19] Carr and Feiock (1999); Hamilton, Miller, and Paytas (2004).
[20] Glaeser and Saiz (2004), Glaeser, Scheinkman, and Shleifer (1995), Gottlieb and Fogarty (2003), Simon (1998).
[21] Flynn (1984), Harrison (1984).
[22] Pastor and Benner (2008); Morrow (2008).
[23] Chinitz (1961), Safford (2009), Christopherson and Clark (2007).
[24] Duval, Elmeskov, and Vogel (2007).

or promote unionization have similar effects. Briguglio and others develop an index of national economic resilience based on several hypotheses about resilience, including the hypothesis that the concentration of a nation's exports in a few industries inhibits resilience.[25] This suggests a similar hypothesis for regional export industries (as distinct from the hypotheses about overall regional economic diversification noted above). Finally, there is a growing body of international quantitative evidence that national and region-specific institutions, behavioral norms and customs, knowledge, and technology have long-lasting impacts on the economic development of countries and regions.[26] Although these concepts are difficult to apply in quantitative studies of regional economies within the United States, they are relevant to regions' ability to avoid or recover from economic shocks.

The broader literature on regional resilience, especially the literature on resilience to natural disasters, also has insights that may be relevant to regional economic resilience. For example, a common finding in that literature is that access to economic resources promotes regional or community resilience in the face of natural disasters.[27] This suggests that regions with higher average incomes or wages (independent of human capital) may recover more quickly from economic shocks.

In this chapter we draw on the literature surveyed above to examine the importance of various potential determinants of regional economic resilience. We do so through quantitative analysis where possible. We supplement that analysis with insights from qualitative case studies of six metropolitan areas. The case studies enable us to look at the role of institutions, norms, and other potential influences on resilience for which we have no quantitative data.

Research Design and Concept Operationalization

We will proceed by first presenting simple descriptive statistics on economic shocks, their effects on regional economies, the extent to which regions are resistant to various types of shocks, and, if they are not shock-resistant, whether they are resilient or non-resilient after suffering the adverse effects of the shocks. We will then present four analytical models. We will attempt to explain 1) the likelihood of a region experiencing a downturn in response to a shock in a given

[25] Briguglio and others (2006).
[26] For a survey of recent studies see Nunn (2009).
[27] Paton and Johnston (2001); Rozario (2005); Norris and others (2008).

year, 2) whether individual shock-episodes resulted in downturns or not, 3) whether individual regions were resilient or non-resilient to downturns, and 4) the time it took for regions, once adversely affected by a shock, to be resilient.

To accomplish these tasks we need to operationalize our key concepts: economic shocks, shock-resistance, downturns, and resilience, as well as terms that are related to these definitions (such as prior growth paths).

We begin with economic shock, of which there can be several kinds. A *national economic downturn* shock is a shock that results from a downturn in the national economy as a whole. We define such a shock to occur when, in any year (which we call the base year), the *national* growth rate (separately for employment and for gross metropolitan product) declines by more than 2.0 percentage points from its annual growth rate over the previous eight years.[28]

An *industry shock* affects one or more of a region's major export industries.[29] A region suffers an industry shock when the job loss experienced by export industries in a particular year represents a one-year annual decline of more than 0.75 percent of aggregate metropolitan employment. Our use of the term "shock" thus refers to an inferred shock; we conclude that a shock occurred based on patterns in our data. Industry shocks can be national (i.e., a shock to an industrial sector nationally) or local (a shock that occurs to an industry at the regional but not the national level).

- A *national* industry shock occurs if the 3-digit industry that contributes the *largest* share of employment loss to the region's export base when the region experiences an industry shock is also in shock at the *national* level.[30]
- A *local* industry shock occurs if the 3-digit industry that contributes the largest share of employment loss to the region's export base when the region experiences an industry shock has *not* experienced a shock at the national level.

[28] The previous eight-year growth rate is measured by the slope of the regression line of the natural logarithm of employment on a time trend for the previous eight years. If the prior eight year growth rate is 4.0 percent or higher, then the growth rate in the base year must decline by the number of percentage points equal to more than half of the prior eight year growth rate. Our use of a decline in the growth rate to measure shocks is analogous to Hausmann, Pritchett, and Rodrik's use of an increase in the growth rate to measure growth accelerations. See Hausmann, Pritchett, and Rodrik (2004).

[29] For a given year, a three-digit NAICS industry is defined as a major export industry in a region if its share of regional employment is at least 1.0 percent and is at least 80 percent above the same industry's share of national employment.

[30] An industry is considered to be in shock at the national level if it meets the same criteria as a national *downturn* shock: the industry's annual employment growth rate declines by more than 2.0 percentage points from its eight-year growth rate.

We define gross metropolitan product (GMP) shocks in the same way as employment shocks except using GMP data. Non-economic shocks to a region's economy can result from natural disasters, terrorist attacks, or other non-economic events that have the potential to adversely affect the regional economy. However, as these shocks are unobserved in the data, we confine our discussion of shocks within this section to the types of shocks discussed above. Some of our case study findings will touch on shocks that are not directly observable in the data.

Not all shocks adversely affect regional economies. A region is adversely affected by a shock if, in the *year of the shock or the year thereafter*, its economy experiences a substantial economic downturn, defined as a decline of more than 2.0 percentage points from the annual *regional* growth rate over the previous eight years.[31] However, if the eight year growth rate was 4.0 percent or higher, then the region's growth rate had to decline by more than half of the previous eight-year average growth rate. If the region did not undergo a downturn in the year of the shock or the year thereafter, it is considered shock-resistant[32].

A region that undergoes an *economic downturn* as a result of a *shock* can be either *resilient* to the shock or *non-resilient* to it. A region is *resilient* if, within four years of the onset of the downturn, its annual growth rate returns to the eight year growth rate prior to the year the downturn occurred.[33] If it does not do so within four years, we term it *non-resilient*.[34]

Counting Shocks and Their Effects on Regions

Using our operational definition and employing metropolitan-level employment data from the economic forecasting firm Moody's economy.com for 1970-2007, we identify 1476 distinct

[31] In the case that two separate industry shocks occur in the years preceding and concurrent with a downturn, one a national industry shock and one a local industry shock, we look at the first year of the shock to determine whether the shock was local or national in nature.

[32] Note that our definition of an economic downturn is thus similar to our definition of an economic shock. The difference is that an economic downturn results from a decline in the growth rate of the metropolitan area's economy. Shocks reflect declines in either the national economy or specific industries.

[33] If a new "secondary" downturn begins before a region has been deemed resilient or non-resilient to the previous downturn, the region will have four years from the *end* of the secondary downturn in which to return to its eight year growth rate from prior to the *original* downturn year.

[34] We also ran separate models in which regions had five years in which to recover from a downturn. It had almost no impact on our quantitative findings.

employment shocks to regions between 1978 and 2007. (See Table A1. An employment shock refers to a shock evident in employment data. GMP shocks refer to GMP data and are presented in Table A2. We confine the discussion in this section to employment data.) Of these, *national economic downturn* shocks, which occurred during 1981, 1990, and 2000-2001, accounted for 661 instances[35], of which 82 occurred in conjunction with a local industry shock and 173 occurred with a national industry shock. There were 663 instances of local industry shocks and 407 instances of national industry shocks to regions. In addition there were 292 downturns due to unidentifiable causes (that is cases where a region's employment growth rate declined by two or more percentage points from that of the prior eight year average even in the absence of a national economic downturn or a national or local industrial shock).

Of the 1,476 identifiable employment shocks, regions were shock-resistant to almost half of those shocks (47 percent); they did not suffer a serious economic downturn as a result of the shock. Regions were less likely to be shock-resistant to national economic downturn shocks and national industry shocks than to local industry shocks. Not surprisingly, they were also less likely to be shock-resistant to multiple shocks, i.e., when two types of shocks occurred simultaneously. Regions were adversely affected, i.e., suffered a substantial economic downturn, in 775 (53 percent) of these shock incidents.

Regions suffering a downturn as a result of a shock were "resilient" 65 percent of the time, i.e., they returned to at least their prior eight year average employment growth rate within a reasonably short period (four years). The average length of time from the onset of the downturn to recovery for a region was 2.9 years.

As Table 1 indicates, regions that were adversely affected by a shock were less likely to be resilient if the shock was a national economic downturn alone (to which 55 percent of adversely affected regions were resilient) than if it was a national industry shock alone (80 percent resilient) or a local industry shock alone (77 percent resilient).

There was virtually no regional variation in the extent to which metropolitan areas were resistant to shock or, once adversely affected, they were resilient. The one exception was that

[35] There were three national economic shocks during the 1978-2007 period: 1981, 1990, and 2000-2001. Since there are 361 metropolitan areas, that should have resulted in nearly 1000 shock instances. However, we have not counted as shock instances those shocks that occurred while a region was still being affected by a prior shock. As a result the total number of national economic shocks amounted to only 661 instances.

metropolitan areas in the northeast were somewhat less likely to be resilient in the face of an economic downturn (53 percent) compared to the national average (65 percent).

Explaining Shock-resistance and Resilience

In this section we move from description to analysis. We consider four questions:

- What accounts for economic downturns as we have defined them, i.e., what are the characteristics associated with areas that experience downturns of their regional economies compared to those that do not?
- Why are some regions adversely affected when an economic shock occurs (i.e., experience an economic downturn as we define it), while others are not (i.e., are shock-resistant)?
- When experiencing an economic downturn, why are some areas "resilient" in that they return to their previous growth rate within a relatively short period of time while others do not?
- What accounts for the length of time it takes a region that is experiencing an economic downturn to recover (i.e., to be "resilient" by our definition)?

We specify and estimate economic models addressed to each of these questions.

Data and Analysis

Our data for all of the models consist of total employment from 1970 through 2007 and gross metropolitan product (GMP) from 1978 through 2007 for the 361 metropolitan statistical areas in the United States.[36] Since our definition of an economic downturn requires eight priors year of employment data, the years available for analysis are limited to the 30 years from 1978 through 2007 for total employment and 22 years from 1986 through 2007 for GMP. Each of the models includes only a subset of observations depending on the variable of interest.

The literature review presented earlier guides the selection of variables we test for the models, though we were unable to find data to test all of the hypotheses. We employ a series of

[36] Since the Office of Management and Budget (OMB) has changed its definition of metropolitan areas over time, we aggregated our data from the county-level where necessary to ensure consistency. The metropolitan area definitions that we use are from 2003.

independent variables in the regressions that attempt to capture features of the different regions' economic structure, labor force, demographic and other characteristics that, based on the literature related to economic resilience reviewed above, might be related to shock-resistance and/or resilience. Our dependent variable in each case is a dummy variable that takes on a value of 1 when the event of interest – either an economic downturn or a recovery, depending on the model – takes place in a given year, and a value of 0 when it does not. (See the appendix for data definitions and sources, regression results, and summary statistics.)

To test whether regional economic resilience is related to characteristics of the region's economy we include the percentages of regional employment that are in selected major export industries: durable manufacturing, non-durable manufacturing, health care and social assistance, and tourism-related industries.[37] While we were unable to include data on employment in higher education (another export industry), we do include a variable consisting of a count of the number of research universities in the metropolitan area involved in high and very high research activity (according to the Carnegie Foundation's classification system). We also include two measures of industrial diversity - a Herfindahl index (which measures the extent to which the regional economy is concentrated in a few industries or diversified among many) - and the number of export industries in the region - to assess the frequently asserted proposition that more diverse and less concentrated regional economies are more resilient. Finally, we also include a variable capturing the rate of growth prior to a downturn to test whether previously rapidly growing regions are more likely to experience economic downturns, be susceptible to shock and/or be less resilient.

To examine the effect of labor force and labor market institutions, we include a skill variable - the percentage of the population aged 25 and older who possess no more than a high school education – to assess whether areas with a higher proportion of low-skilled labor are likely to be more susceptible to economic downturns and less resilient in terms of recovery, as well as demographic characteristics including the percentage of the population that is non-Hispanic black and Hispanic.[38] As one indicator of labor market flexibility, we include a

[37] Health care is combined with social assistance at the two-digit NAICS level. We originally included professional, scientific, and technical services as another category of employment, but removed it from the model when it was found to be highly correlated with other variables and not statistically significant.

[38] For those demographic variables that we obtained from Census data, we applied linear interpolation to gather estimates for non-census years. See the appendix for summary statistics.

variable for whether the region is wholly or predominantly in a state that has a right-to-work law, since, as noted above, such laws may make labor markets more flexible in a way that makes regions both more resilient and less shock-resistant.[39]

We also include background characteristics of metropolitan areas that might affect shock-resistance and/or resilience. To determine whether the size of a region matters (and also to standardize other variables for size differences) we include a lagged employment variable (lagged GMP in the case of the GMP models). Since some literature suggests that resilience is related to resource capacity, we include a variable on wages per employee as a proxy for regional personal income. We also include a variable on the age of the metropolitan area (as expressed by the number of years since the principal city attained a population of 50,000) as an indicator of infrastructure age. The proportion of the metropolitan population residing in the central city is used as a rough proxy for the influence of the central city in regional decision making. Since some of the literature reviewed above argues that income inequality makes flexible regional responses more difficult we use a variable that is the ratio of the income of high-income households to that of low-income households in the region.[40]

We also include variables capturing the three different kinds of shocks (national economic downturn shock, national industry shock, and local industry shock as previously defined) in tandem with each other or alone to test whether shock-resistance and/or resilience are related to shock type.[41] Finally, to capture the effect of omitted variables that might vary by region, we include variables for each of the four regions of the country (Northeast, Midwest, West, and South); the West is the baseline region to which the other regions are compared.[42]

Explaining the occurrence of regional economic downturns. Our first model examines the regional characteristics that influence whether or not a region will suffer a downturn. The main results from this model (shown in detail in Tables A3 and A4) are the following.

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[39] See Blumenthal, Wolman, and Hill (2009).

[40] Technically, we measure the ratio of a region's household income at the 80th percentile to that of its household income at the 20th percentile.

[41] It is, of course, possible to model each of the shocks separately to assess whether the relationship of the independent to the dependent variables differs by type of shock. Initial efforts to do so suggest that this may well be the case.

[42] We also collected data on average July temperature. We discarded the temperature variable as we found it to be highly correlated with the regional dummies.

- A region's industry structure affects the probability that the region will experience a downturn. Higher employment in durable goods manufacturing as a percentage of total employment makes a region more susceptible to downturns in both employment and GMP, while higher employment in health care and social assistance makes it less so. A one percentage point increase in a region's employment in durable manufacturing increases a region's risk of seeing an employment downturn in a given year by 2.8 percentage points, and increases its risk of GMP downturn by 2.4 percentage points, all else equal.[43]
- Having a large number of major export industries makes a region *less* likely to experience a downturn in both employment and in GMP, suggesting that the less concentrated the export sector (i.e., the larger the number of industries that are major exporters) the more protected the region is from economic shocks.
- Regions in which a large share of the population has low levels of formal schooling (no more than a high school diploma) are more susceptible to downturns. An increase of one percentage point in population with a high school education or less was associated with an increase of 4.9 percentage points in the risk of experiencing a downturn in employment and 5.6 percentage points in the risk of experiencing a downturn in GMP. [44]
- Regions experiencing a national industry shock are more likely to have a downturn in employment and in GMP than regions facing other types of shocks.
- Metropolitan areas in the Northeast and South are less susceptible to downturns in employment than those in the West, but there is no significant difference among the regions with respect to downturns in GMP.
- A region in a state with a right-to-work law is 23.5 percentage points less likely to experience a downturn in GMP compared to one without such a law, all else

[43] See appendix for additional notes on interpreting the results of a hazard model.
[44] Endogeneity may be a concern insofar as the model does not account for migration. More working age, educated adults may flee from regions that are hard-hit in favor of regions that are doing well. To account for this, we also ran a specification that included a variable for lagged net migration as a percentage of the population. Migration data are only available since 1991, which severely limits the number of observations. When the model was run, all the variables discussed above retained their signs except for the number of export industries, which was no longer statistically significant.

equal. However, there is no relationship between right-to-work laws and employment downturns.

- Regions with large income gaps between high- and low-income households are more susceptible to downturns in employment (but not GMP) than those with lower levels of income inequality.

Most of these results make sense in light of the cyclical nature of employment and output patterns. Durable goods manufacturers will produce more and hire more workers when demand for these goods rises and lay them off when demand falls (a cyclical effect). Export industries, many of which are in manufacturing, may have output and employment patterns that are more cyclical than other industries, but, except in general national economic downturns, they are unlikely to follow similar cycles. Thus, the more major export industries a region has, the less likely that all or a large number of these industries will suffer industry shocks simultaneously; the lack of concentration in a small number of export industries protects them against industry shocks substantial enough to trigger a regional economic downturn (a portfolio diversification effect). The findings on our education/human capital measure are also expected. In response to a decline in the demand for their products or services, employers of all types are more likely to lay off non-professional and non-managerial workers, who typically have lower levels of formal education than professionals and managers.

Explaining Shock Resistance. Our second model examines what makes regions "shock-resistant" (i.e., they do not suffer an economic downturn) once they have experienced a shock as we define it. In contrast to the first model, this model includes only instances in which a region has experienced some sort of identifiable shock. The principal results of this model (shown in detail in Tables A5 and A6), are as follows.

- Some of the regional characteristics that make a region more or less likely to experience a downturn also affect the region's chances of being shock-resistant once a shock has occurred. Regions with a high proportion of employment in durable goods manufacturing and a less educated population are less likely to be resistant to an employment shock, while regions with a large number of major export industries are more likely to be resistant to such a shock. These relationships are similar to those found in Model 1 for the occurrence of

downturns and likely for the same reasons. A less educated workforce affects resistance to a GMP shock in the same way it affects resistance to an employment shock. However, durable goods manufacturing and a large number of export industries do not make the region more resistant to a GMP shock.

- Regions whose export base is more diverse are more likely to be resistant to employment shocks. [45]
- Regions experiencing national economic downturn shocks in tandem with local or national industry shocks are more likely to experience economic downturns.
- Regions that pay higher average wages are more likely to experience both employment and GMP downturns, all else equal.

Explaining regional responses to economic shocks. Our third model examines the regional characteristics that influence whether a metropolitan area economy that experienced an economic downturn was resilient, i.e., it rebounded to its annual average eight year growth rate prior to the downturn.

The results for this model are presented in Tables A7 and A8. For employment they are broadly similar to those of model 1, the model accounting for regional economic downturns. Having a large percentage of the population with a high school education or less and a large percentage of employment in durable manufacturing make metropolitan areas resilient to employment downturns caused by shocks. Just as cyclical demand for durable goods makes employment in that sector susceptible to downturns, so too does the eventual uptick in demand allow it to be resilient. These variables may simply express the cyclical nature of durable goods manufacturing and of the low-skilled labor market.

However, the results for GMP are quite different. There is no relationship between durable goods employment and GMP resilience, nor is there a relationship between educational attainment and GMP resilience. Taken together with the employment results, this suggests that regions with lower levels of education (and substantial employment in durable goods) were

[45] To allow for easier substantive interpretation, tables A5 and A6 display discrete effects, which measure the change in probability that occurs from increasing a variable from half a unit below its mean value to half a unit above, while keeping all other variables at their means. For example, an increase in the number of export industries from 4.5 to 5.5 (half a unit below the mean to half a unit above), holding all other variables constant at their means, results in a decrease in the probability of being adversely affected by an employment shock by 2.3 percentage points. See appendix for additional notes on interpreting the discrete effects of the logit models.

resilient as a result of employment rebounds (presumably during cyclical upswings during which employment in durable goods rebounded) but without major change in productivity.

Other important findings from the model are:

- Right-to-work laws appear to have a positive effect on resilience with respect to both employment and GMP downturns. Regions with more flexible labor markets may be more likely to recover employment after it has been temporarily lost. The probability of a region being resilient to employment downturns is 8.3 percentage points greater and to a GMP downturn 5.1 percentage points greater if it is located in a state with a right-to-work law than if it is located in a state without such a law, all else equal.[46]
- Regional income inequality reduces employment resilience (i.e., the greater the extent of income inequality, the less likely the region is to be resilient) but increases GMP resilience (the greater the income inequality, the more likely the region is to be resilient).
- Having a large percentage of employment in health care and social assistance makes a region less resilient to both employment and GMP downturns. Because employment in these industries is not especially cyclical, health care and social assistance employment makes a region less susceptible to downturns (as shown above) but makes it more difficult for the region to recover from downturns once they occur.
- Metropolitan areas in the West, while, as we have described above, more likely to experience downturns, are significantly more likely to be resilient in the face of employment downturns than are other regions.

Explaining Length of Time to Resilience. In our final model the concern is not what determines *whether* a region is resilient, but what determines *how long* it takes after a downturn occurs for a region to become resilient. The results are presented in Tables A9 and A10.

Some of the same results of this model are the same as those of model 3. A high percentage of the population with no more than a high school education, a high percentage of employment in durable manufacturing, a low percentage of employment in health care and social

[46] This is calculated with all other variables set to their mean values.

assistance, the presence of right-to-work laws, and low levels of income inequality all reduce the amount of time it takes the region to become resilient following a regional employment downturn. For GMP downturns, as in the previous model, low health care and social assistance employment, right-to-work laws, and high inequality reduce the amount of time to become resilient.[47] In addition:

- For both employment and GMP downturns, the higher a region's pre-downturn growth rate, the longer it will take for the region's economy to become resilient.
- Neither the degree of concentration of a region's economy, as measured by its Herfindahl index, nor the diversity of its export sector is significantly related to resilience to either employment or GMP downturns.
- The presence of a large number of research universities appears to enable a region's economy to recover more quickly from employment, but not GMP, downturns.

Summary of the Quantitative Analysis

Our analysis shows that there are no "magic bullets" that both insulate regions from the harmful impacts of economic downturns and help them recover quickly from downturns. No regional characteristics or public policies do everything that one might like with respect to both employment and GMP. Table 2 summarizes our major findings about the impacts of regional characteristics and public policies on regions' vulnerability and resilience to downturns. It shows that some characteristics make regions less susceptible to downturns but also make it more difficult for them to recover. For example, a high percentage of employment in durable manufacturing and a poorly-educated population make a region more likely to suffer from an employment downturn but make it easier for the region to recover from such a downturn, while a high percentage of employment in health care and social assistance has the opposite effects. The table also shows that some regional characteristics that have desirable impacts on employment have negligible or even undesirable impacts on GMP, and vice versa. For example, low educational attainment promotes employment resilience but has no effect on GMP resilience,

[47] As with model 1, we re-estimated model 4 adding a variable for lagged net migration as a percent of the population. This enabled us to address potential sources of simultaneity, though the decreased number of observations made it more difficult to achieve statistically significant results. All the variables discussed achieved the same sign in the re-estimated model, with the exception of the 80-20 income ratio.

while a high degree of income inequality promotes GMP resilience but actually undermines employment resilience. Finally, every regional characteristic or policy shown in Table 2 effects some outcomes but has no meaningful impact on others.

Table 2. Major Impacts of Regional Characteristics and Public Policies on Resilience Outcomes

	Immunity to downturn		**Shock resistance**		**Resilience**		**Speed of resilience**	
Regional characteristic or public policy	**Employment**	**GMP**	**Employment**	**GMP**	**Employment**	**GMP**	**Employment**	**GMP**
Durable manufacturing employment	-	-	-	0	+	0	+	0
Low educational attainment	-	-	-	-	+	0	+	0
Export industry diversity	+	+	+	0	0	0	0	0
State right-to-work law	0	+	0	0	+	+	+	+
High income inequality	-	0	0	-	-	+	-	+

+ indicates positive impact that is substantively significant and statistically significant
- indicates negative impact that is substantively significant and statistically significant
0 indicates impact that is not statistically significant or, if statistically significant, not substantively important.
Source: Tables A3-A10 of this chapter.

There are two regional characteristics or policies that seem to have some desirable impacts and no undesirable ones: export industry diversity and right-to-work laws. However, it is difficult to diversify a region's export base through intentional action, especially in a short period of time, and a diversified export base if more likely to be attainable in a large metropolitan area than in a small one. Our findings on right-to-work laws suggest that labor market flexibility is beneficial, but there are other forms of labor market flexibility in addition to the wage flexibility that may exist in nonunion firms, and those forms of flexibility may exist independently of unions or right-to-work laws but be geographically correlated with them.[48] In addition, right-to-work laws may be undesirable for other reasons (such as their impact on worker representation or wage inequality) even if they are beneficial for resilience outcomes.

[48] For extended discussions of alternative forms of labor market flexibility, see Piore (1986); Piore and Schrank (2008).

Therefore, our findings on right-to-work laws should not be interpreted as an endorsement of those laws.

Case Studies of Regional Resilience and Non-Resilience

The descriptive and explanatory quantitative analyses presented above describe and explain regional economic downturns, shock-resistance, and resilience after having experienced a downturn. But they do not provide information on the processes that occurred, on the nature of interventions or changes of behavior, or on their effects. In short, the quantitative analysis lacks depth and context. To provide a richer understanding of economic shock and resilience we undertook intensive case studies in six regions: Charlotte, Cleveland, Detroit, Grand Forks, Hartford, and Seattle. We chose regions to reflect different kinds of shocks (cyclical shocks for Detroit and Cleveland; industry shocks for Charlotte, Hartford, and Seattle; and a major natural disaster shock and military base closing for Grand Forks) and different degrees of resilience in response (from high resilience in Charlotte and Seattle to a lack of resilience in the 1980s in Hartford and in the 1990s in Grand Forks and, since 2000, in Cleveland and Detroit). While we make no claim that these six regions are a representative slice of regions nationally, they do vary in the kinds of shocks that they have experienced and in their responses.

Table 3 summarizes the major shocks and responses in the case study regions.

Table 3. Case Study Regions

Region	Location	Major Shocks	Response	Population (2000)*	Major Export Industries
Detroit	Midwest	National economic downturn shocks (auto sales)	Resilient to shocks in early 1980s and early 1990s; non-resilient to 2000 national economic downturn shock	4.5 million	Auto manufacturing
Cleveland	Midwest	National economic downturn shocks	Resilient to shocks in early 1980s and early 1990s; non-resilient to 2000 national economic downturn shock	2.1 million	Auto manufacturing
Charlotte	South	Industry shock (textile manufacturing in 1980s)	Resilient; shifted away from textile manufacturing to banking	1.3 million	Textile manufacturing, Banking
Grand Forks	Midwest	Natural disaster (1996 flood), Military base closing	Non-resilient	100,000	Military, Agriculture. Higher education
Seattle	West	Industry shocks (aerospace in 1980s, information technology in the 2000s)	Non-resilient in 1980s; resilient in 1990s and 2000s	3.0 million	Information technology, Aerospace
Hartford	Northeast	Industry shocks (aerospace in early 1980s, insurance in late 1980s)	Resilient in early 1980s, non-resilient in the late 1980s	1.1 million	Insurance, Aerospace

*Rounded to nearest 100,000.
Source: Authors' analysis.

We made at least two trips to each of the regions, during which we conducted semi-structured interviews with individuals who were either major "players" in area economic development (including important private firms in the region), were owners or managers of firms in the region's major export industries, or were reputed to be acute observers and/or analysts of the regional economy. We conducted additional telephone interviews with selected individuals we were unable to interview during our trips. We identified interviewees through a "snowball" process that began through initial contacts we had in each region, with the list ultimately expanded through referrals to other potential interviewees and organizations of interest. In most regions we interviewed individuals from organizations concerned with the region's economic future, including public and private economic development organizations, local and regional

government, trade association or cluster association organizations, workforce development programs, universities (both researchers – as observers and analysts – and officials – as participants), foundations, leading private sector firms in the export sector, and business and economic sections of local newspapers and economic journals.

Detroit

Economic Background and Shocks. The Detroit region[49] has been dominated for nearly 100 years by the "Big Three" automakers (now, Ford, General Motors, and Chrysler) and their suppliers. It now faces the decline of those firms and their supply chains as a result of both increasing competition from abroad and lower cost production sites within the United States.

Periodic regional economic downturns as a result of economic shocks have been the norm for the Detroit region. National economic downturns are shocks that disproportionately affect the sales and, thus, the production of motor vehicles, as consumers cut back on their purchases of durable goods. During the economic downturn that Detroit experienced from 1979-1982 employment in the region declined by 276,660 (15.2 percent) and employment in the automobile industry fell by 69,900 (33.9 percent). During a similar period of decline a decade later, the region's employment fell by 51,600 jobs (2.6 percent) between 1989 and 1991. The downturn that began in 2000, however, has emphatically not been normal; it has been far more severe and more prolonged. From 2000 through 2008, the Detroit region lost 304,670 jobs (13.7 percent) overall and employment in the automobile industry has fallen from 240,465 to 205,350 (or 14.6 percent).

Regional Economic Resilience/Non-Resilience. In the past, the Detroit region was resilient to economic shocks. When the national economy suffered, the automobile industry, and thus the region, suffered, and when the economy expanded, the auto industry and region grew. The region ultimately was resilient to economic downturns that occurred as a result of shocks in 1979

[49] For purposes of the data presented in this chapter, the Detroit region consists of the Detroit Metropolitan Statistical Area (Wayne County, which includes the city of Detroit) plus the contiguous counties of Lapeer, Livingston, Macomb, Oakland, and St. Clair. However, Washtenaw County, home of Ann Arbor and the University of Michigan, is increasingly linked to the officially defined Detroit metropolitan area through economic ties and our discussion acknowledges this.

and 1989-90.[50] Total employment rebounded after each national recession and actually increased from its 1978 level to its peak of 2,223,000 in 2000.

However, the most recent shock and response has been a different story. Prior to 2000, the region averaged an eight-year annual employment growth rate of 1.9 percent. Between 2000 and 2001 employment fell by 3.0 percent and continued to decline every year after that through 2009. Over that nine-year period total employment in the region declined by 20.1 percent.

Explaining Resilience/Non-Resilience. The explanation for resilience to the earlier shock-induced downturns is obvious; the national economy simply recovered. There was virtually unanimous agreement among those we interviewed that the recovery had nothing to do with policy or strategic interventions but rather to national economic turn-around. In effect, the region simply "held its breath" until things got better.

Unlike the previous two economic downturns, the Detroit region has not bounced back from the 2000-2001 downturn, and the effects of the national recession that began in 2008 have been piled on top of that. As one of our interviewees said, the region was hit by a truck; no one is resilient when hit by a truck. The collective regional response has been characterized as a movement from denial in the face of trends that were long evident (indeed, during the past 40 years regional leaders did little to adjust to trends in the automobile industry that some observers predicted would ultimately have a severe long-term effect on the region's economy) to hopelessness and despair.

Business and civic leaders now publicly state (and many political leaders also believe, though they do not always say so publicly) that the automobile industry, while it still will play the major role in the regional economy, is not going to be the job engine for the region that it has been in the past, at least as far as providing substantial employment for relatively low-skilled workers. Most people we interviewed predicted (or hoped), however, that the region would remain the international center of automobile research, development, and engineering, and that these parts of the automobile industry would continue to be the major driver of the regional economy. Nobody we interviewed thought that motor vehicle production employment,

[50] Prior to the 1979 shock, the Detroit region's prior average eight year employment growth rate was 2.2 percent. However, the annual growth rate was -7.9 percent between 1979 and 1980 before rebounding by 14 percentage points by 1983 and an additional 0.9 percentage points over the next year. Prior to the 1989 shock, the Detroit region's prior average eight year employment growth rate was 3.0 percent. However, the annual growth rate was -0.4 percent between 1989 and 1990 but rebounded by 4 percentage points by 1993.

particularly in automobile assembly work, was likely ever to return to anywhere close to pre-2000 levels.

The difficulty that the region has had in developing collective responses and strategies to the downturn is, in part, a reflection of its historical legacy of adversarial and confrontational relationships. That legacy includes not only union-management conflict, but also conflict between blacks and whites, the city of Detroit and its suburbs, and county against county. As a consequence, positive social capital has been in short supply and there is little history of cooperation at the regional level or across jurisdictional or racial lines. Despite this, many interviewees agreed that the severity of the economic downturn has resulted in greater recognition of the need for cooperation and that some collaborative efforts are now taking place.

In addition, many of those we interviewed said that the prolonged domination of the Big Three created a "culture of dependence and entitlement." Area residents have long believed that they and their children will be able to find well-paid employment with relatively little education in the auto industry. Several of our interviewees said that suppliers to the auto industry were characterized by a "procurement culture"; they have been able to prosper through procurement contracts from the Big Three and consequently did not try seriously to find other markets. This "culture," according to interviewees who mentioned it, has stifled entrepreneurship, risk taking, and small business creation not tied to the automobile industry in the region.

Responses. There have been efforts to devise strategies and responses, some by existing organizations and some by new or restructured ones. The Detroit Regional Chamber of Commerce runs several traditional business attraction and promotion programs, including the Detroit Regional Economic Partnership. It, along with several other economic development organizations and local governments in the region, is also one of the leading promoters of a plan to develop "Aerotropolis," a major transportation and logistics center encompassing both Detroit's Metropolitan Airport and the Willow Run Airport in Ypsilanti and the surrounding areas. Detroit Renaissance, a CEO-led organization that emerged after the Detroit riot in 1967 and focused primarily on the city of Detroit for most of its history, launched a plan for regional economic development in 2006 (*Road to Renaissance*). However, the organization changed its name in 2009 to Business Leaders for Michigan and directed its concerns completely to the state level with a focus on reducing business costs (particularly taxes) in the state. City and county

economic development organizations (such as the Detroit Economic Growth Corporation in the city and similar county-level organizations) continue to perform their traditional functions of promotion and attraction for their own jurisdictions. The most innovative of these is Ann Arbor Spark in Washtenaw County, which serves as the County's economic development and business attraction organization; however, while its goal is locating companies within the county, its leaders told us that they will help businesses locate elsewhere in the region or state if a better location can be found.

Foundations have played an increasing role in the region. The New Economy Initiative for Southeast Michigan, sponsored by the Community Foundation of Detroit, was set up in 2008 to help transition the region to what the Initiative termed the "new economy." It was funded with $100 million by 10 foundations with links to the region, including Ford and Kresge, two foundations that, after having built their fortunes within the region, have, until recently, devoted most of their funding elsewhere. The Kresge Foundation also recently launched a new initiative, Re-Imagining Detroit 2020, an effort to coordinate the foundation's activities and those of other organizations focused on development in the city. Re-Imagining Detroit 2020 has the support of Detroit Mayor Dave Bing and is focused on nine modules – the green economy, entrepreneurial development, urban health care, land-use reform, the Woodward Creative Corridor, mass transit, neighborhood strategies, education, and arts and culture.

Realization that the automobile industry is not going to bounce back as it has in the past has produced a variety of new proposals, some serious and some more fanciful, for regional development alternatives. These include proposals to promote the Detroit region as: an amenity-rich region to attract highly educated professionals (since high levels of human capital are now seen as critical to the economic development of the region), a potential wind power and water-resource leader, a region well-placed to produce the next generation of batteries for electric automobiles, a major supplier in the defense production industry through diversification of automobile production technologies and facilities, a major medical center and exporter of health care services (building on the presence of several major research hospitals and medical centers and the legacy of expansive health care provided by the automobile industry), and an international transshipment center (bcause of its location on the border with Canada, presence of major highways utilized by cargo being transported across the NAFTA corridor, and presence of an airport with direct flights to China and other developing economies). However, virtually all

of these concepts are either at the very beginning of the implementation stage or are simply proposals still being developed. Every one of these plans will require long-term commitment and development before they yield visible economic results.

The region's economic development policymakers and practitioners have few overarching goals or strategies that could show immediate effects on the economy, outside of efforts to promote entrepreneurship in the region, most notably through the establishment of TechTown, a small business incubator with a wide variety of services located on the campus Wayne State University. TechTown has a variety of partners and funders, including the New Economy Initiative, the Ewing Marion Kauffman Foundation, and the city of Detroit. Efforts are also underway to encourage collaborative research and commercialization among the three major universities in or near the region, Wayne State University, The University of Michigan, and Michigan State University.

Many proposals are directed to the problems of the city of Detroit rather than those of the region. Kresge's Re-Imagining Detroit, for example, focuses almost exclusively on the city, which everyone we interviewed agreed is in desperate shape. While the city suffers from population loss, poverty, and crime, the most often noted concern expressed by those we interviewed was the dysfunctional school system. Interviewees described Detroit public schools as some of the worst in the nation, although many noted that the recent actions taken by Robert Bobb, an emergency financial manager appointed by the Governor for a year and subsequently renewed, were at last beginning to show hope.

At the rhetorical level most (but not all) people that we interviewed emphasized that, while the economic problem is a regional one, it cannot be solved without successfully addressing the severe social, economic, and fiscal problems of the city of Detroit. However, some argue that it is unclear whether improving the condition of the city of Detroit is indeed a precondition for regional economic revival. As one interviewee observed to us, until recently the region was doing very well thanks to the automobile industry while the city has been declining for decades; it is unknown whether the new focus on the importance of the city to the region is a late recognition of the city's role or a matter of "political correctness" and political necessity that provides actors with political legitimacy to participate in regional interactions that still will not bring the city many benefits.

The most important activities related to the region's economic future are being undertaken by the individual Big Three auto industry firms and their suppliers as they struggle to maintain their viability. While some suppliers have made inroads in diversification to meet the needs of related industries (such as defense), these efforts have been limited, especially due to the past rebounds in the auto industry, which drew supplier attention away from needed changes. Other industries, notably health care and higher education, have achieved greater importance, both in their impact on the regional economies and in terms of a conscious effort to affect the region.

Results. Currently there are few, if any, tangible effects of the above actions on Detroit's regional economy. Most of those interviewed acknowledged that the current economic situation was the result of the region's long-term dependence on the automobile industry, a period that had brought them unparalleled (though somewhat cyclical) prosperity, but which was now coming to an end. Most interviewees did not regret the reliance and the benefits it brought, although many did regret regional leaders' inability to see some time ago that the region's motor vehicle industry would decline. Even the most optimistic felt the effects of any changes will take years to show substantial results.

Cleveland

Economic Background and Shocks. The Cleveland region[51] was traditionally a manufacturing powerhouse, but between 1980 and 2005, it lost 42.5 percent of its manufacturing jobs (over 110,000 jobs). Because many of its primary industries have been related to automobile and truck manufacturing, Cleveland, like Detroit, is susceptible to regional economic downturns when national downturns occur. Thus, the Cleveland region experienced downturns during the national economic shocks around 1981, 1990, and 2000. It did not experience additional local industry shocks. It lost 98,500 jobs between 1979 and 1982. The 1991 downturn was smaller,

[51] The Cleveland region is the Cleveland-Elyria-Mentor Metropolitan Statistical Area, which consists of five counties: Cuyahoga, Geauga, Lake, Lorain and Medina.[51] In 2000, almost two-thirds of the region's 2.1 million population was contained in Cuyahoga County (1.39 million residents, 65 percent), with 478,403 located in the city of Cleveland (22 percent of the region). Prior to 1993 the metropolitan area consisted of only four counties. (Lorain was not included.) This chapter uses the 2000 metropolitan statistical area definition for all data unless otherwise indicated.

with the region losing 24,450 jobs between 1990 and 1992. Each year from 2000 through 2007, the Cleveland region experienced a loss in employment, losing a total of 64,000 jobs over the period.

Regional Economic Resilience/Non-Resilience. Is the Cleveland region resilient to economic shocks? The similarity to Detroit continues: when the national economy suffered, the region followed, and when the national economy expanded, regional employment increased. The region ultimately was resilient to economic downturns that occurred as a result of shocks in 1979 and 1990. Total employment rebounded after each national recession downturn, increasing to a new peak. Although it took 10 years for the region to regain its 1979 level of employment, by 1983 it had regained its prior growth rate and employment was increasing by 3.7 percent. The recovery from the 1990 downturn occurred even more quickly. However, the downturn that began as a result of the 2000 shock has been different; the region has yet to recover.
This is a region that has been fighting to remain on a positive trajectory. The eight year average employment growth rate for Cleveland between 1979 and 2006 ranged from -0.85 percent to 1.85 percent.[52] And despite its former resilience, Cleveland is no longer winning that fight; employment growth has been negative every year but one since 2000.

Explaining Resilience/Non-Resilience. The Cleveland region's resilience to previous shock-induced downturns, like Detroit's, reflects recovery of the national economy. The regional economy is driven by manufacturing, with its strength in producers' durables, making it susceptible to national shocks. It has, however, avoided local industry shocks.

Leaders in the region recognized as early as 1980 the need to engage in economic development to diversify and grow the local economy, hiring both the RAND Corporation and McKinsey & Company to conduct studies on the economy and propose strategies. Numerous studies have been conducted since that time to assess the economy and recommend actions to make Cleveland more competitive. Unlike Detroit, this is a region whose leaders understood that an economic transition was occurring and that they needed to respond. Foundations,

[52] It is important to note that the first eight year average employment growth rate in our study, in 1979, was just under 1 percent per year for the Cleveland region. By 1979, Cleveland's growth trajectory had already slowed; at no time during our study did it reach 2 percent.

corporations, and governments spent significant sums during the last 25 years to address the region's challenges. Despite their efforts, Cleveland has continued to struggle.

An editorial in 1992 stressed the important role of manufacturing to the Cleveland economy: "Manufacturing matters to Cleveland and it is a major reason why it has survived the current recession as well as it has. The recessions of 1979 and 1982 flushed out uncompetitive firms and disciplined labor and, more importantly, management. The result is a highly competitive manufacturing segment, where productivity continues to grow."[53] While this was accurate in 1992, when Cleveland was able to recover from the national downturn of 1991, more recent experiences suggest that changes in national and international markets have left Cleveland with a mix of firms and industries that make the region especially susceptible to downturns.

Responses. The Cleveland region has experience with the "typical" range of responses. Its business leaders asked both academics and consultants to provide analyses and recommendations. It has created, restructured, and merged economic development organizations. A strong philanthropic community, led by the Gund and Cleveland foundations, has invested in the community, funding community development, physical redevelopment, research studies, and many other forms of contributions. Despite the steps its leaders took, the region continued to experience slow job growth. Beginning in 2000, this turned into slow decline in employment with virtually no growth in real gross regional product (2.7 percent from 2000 to 2007) and in wages per worker (1.3 percent over the same seven-year period).
Two notable sets of responses occurred. The first was in the early 1980s in the wake of the 1979 recession with the election of George Voinovich as mayor, the formation of Cleveland Tomorrow by the CEOs of the 50 largest Cleveland businesses, the funding of studies conducted by Rand and McKinsey on the Cleveland economy and projects resulting from these activities. The second major phase, which occurred in the early 2000s, involved consolidation and coordination. The foundation community in a broader 17-county region, which included the Cleveland region, began coordinating resources and focusing on a regional approach. Meanwhile, the business organizations in the city of Cleveland consolidated to remove duplication, improve coordination, and lower their combined operating costs as they created a renewed set of economic development intermediaries with a narrower agenda.

[53] Hill (1992).

In 1981, after recognizing the region's chronic and persistent poor economic performance, a group of 50 CEOs formed Cleveland Tomorrow to focus on jobs and economic vitality.[54] Some of the initiatives that Cleveland Tomorrow supported included:

- Work in Northeast Ohio Council (WINOC), an independent labor-management organization established in 1981 that promoted productivity programs and quality of work life programs in manufacturing industries.
- Cleveland Advanced Manufacturing Program (CAMP), a partnership among the state government, Cleveland Tomorrow, local universities, and the community college to expand research and services to promote advanced manufacturing, beginning in 1984. (CAMP was later incorporated into the federal Manufacturing Extension Partnership's network of manufacturing assistance centers and in 2006 was renamed the Manufacturing Advocacy and Growth Network (MAGNET).)
- Center for Venture Development, created and funded with grants from the Cleveland and Gund foundations and the Greater Cleveland Growth Association to assist entrepreneurs with business plans, build their boards, identify professional services and find funding.
- Technology Leadership Council, established in 1988 to coordinate development activities across the region's highest potential technology sectors: bioscience and health care, information technology, electronics, polymers and advanced materials, and power and propulsion. (This organization was succeeded by NorTech in 1999.)

Although our interviewees generally identified Cleveland Tomorrow as an "effective" and "impactful" organization, it was unable by itself to put the Cleveland region on a sustained higher-growth path or to avoid the major downturn in the regional economy that began in 2000 and continues today. While the impact of Cleveland Tomorrow on the regional economy is difficult to assess, that impact declined over time. Many of the founding CEOs were with companies that subsequently were acquired and/or moved. The CEOs had more demands on their time and more traveling, decreasing the personal connections among them and less time to devote to civic causes. The leaders had less autonomy over corporate money as their firms became branches of larger firms. As the CEOs of the large companies became less available, smaller firms became more important in the economy and non-profit organizations, particularly

[54] Cleveland Tomorrow Committee (1981).

universities and hospitals, also became more important to both the economy and to civic leadership.

Partly as a response to the sustained downturn after 2000, Cleveland Tomorrow and two other regional business groups, the Greater Cleveland Growth Association and the Greater Cleveland Roundtable, merged in 2004 to form the Greater Cleveland Partnership (GCP). The stated rationale for the merger, according to one of the Board Members, "was to use savings from removing duplication to expand economic development activities." However, the new organization also reflected the change in composition of Cleveland's regional leadership. Compared to Cleveland Tomorrow, which consisted of 50 CEOs from the largest companies, GCP's 60 board members included 26 members from large firms, 14 from small firms, three from mid-sized firms, eight from professional services, three from higher education (Case Western Reserve University, Cleveland State University, Cuyahoga Community College), and six others. The new organization reflects the growing role of non-profit institutions as well as banks and law firms. One interviewee explained that banks have replaced utilities and manufacturers as the "go to" companies.

The Greater Cleveland Partnership decided to adopt a focused, holistic economic development strategy. It supports five intermediary development organizations that now work on the broad regional scale that includes the Cleveland, Akron, and Youngstown metropolitan areas and much of nonmetropolitan northeast Ohio. Two of these intermediaries continue from the original set established by Cleveland Tomorrow: NorTech and MAGNET. BioEnterprise grew out of a NorTech initiative around bioscience.

Foundations have always played an important role in the Cleveland area, but that role has increased markedly in the economic development arena during the past decade. The two primary foundations in the region are the Cleveland and Gund foundations. These two foundations have supported economic development by funding research, supporting initiatives introduced by Cleveland Tomorrow, and participating in other regional projects. For example, the Gund Foundation funded the Cleveland Tomorrow Committee and McKinsey study in 1980, while the Cleveland Foundation funded the RAND study in 1980 to develop regional economic indicators and evaluate economic development opportunities for the Cleveland region.

After many years of struggling to make a difference in economic development in the region, often supporting bricks and mortar projects as well as various business-led initiatives, the

Cleveland and Gund Foundations, together with the GAR Foundation of Akron, were instrumental in creating the Fund for Our Economic Future, a collaboration among philanthropic organizations in Northeast Ohio. Formed in 2004, this collaboration of 70 private and corporate foundations in 16 Northeastern Ohio counties, adopted a larger regional focus, incorporating all of Northeast Ohio rather than solely the Cleveland region. The Fund's goal is to frame a regional economic development agenda "that can lead to long-term economic transformation," track overall regional progress, and financially support highly promising initiatives. It brings more foundation players to the table and gets them to agree on a common strategy. The Fund follows a strategy similar to Cleveland Tomorrow by using its resources to fund intermediary organizations. As mentioned above, many of the organizations it funds are entities that grew out of Cleveland Tomorrow's initial programs.

Five intermediary organizations are supported by both the Greater Cleveland Partnership and Fund for Our Economic Future: Team NEO, NorTech, JumpStart, MAGNET, and BioEnterprise. The most important departure from previous efforts is a determined concentration on a regional approach and the creation of a set of intermediaries each with a fairly narrow focus and a commitment to performance measurement.

Team NEO was formed in 2003 to market the greater Northeast Ohio region and attract firms. As an interviewee explained, this was a response to a common complaint that marketing organizations focused on specific jurisdictions instead of the entire region.

NorTech is the successor organization to the Technology Leadership Council, established in 1988 by Cleveland Tomorrow. NorTech supported the creation of BioEnterprise, facilitated the formation of the Ohio Polymer Strategy Council, and was a founding member of the Ohio Technology Partnership. This set of programs is intended substantially to increase entrepreneurial support and activity *within* and, especially, *at the intersections* of Northeast Ohio's technological strengths in biosciences and health care, polymers, advanced materials and manufacturing, electronics, information and communication technology, and advanced energy.

JumpStart was formed in 2002 to stimulate early-stage business development and investment by providing financial, technical, and managerial support to new and promising enterprises. It has three primary tasks: to connect entrepreneurs with successful entrepreneurs, provide technical assistance, and assist with venture development. The programs provided by

JumpStart are designed to address some of the challenges to entrepreneurship, such as establishing personal connections and securing adequate capital.

MAGNET, the Manufacturing Advocacy and Growth Network, assists small and medium-sized manufacturers with technological modernization, work reorganization, product quality, and innovation. Its goal is to support, educate and champion manufacturing to transform the region's economy into a powerful, global player. It provides manufacturing process and productivity improvement services, product design and development services, and fee for service training. It also brokers commercial and university intellectual property in selected manufacturing areas and delivers federal/state manufacturing small business assistance programs.

BioEnterprise (BioE), created in 2002, provides management counsel, clinical access, business development, and capital access services to newly forming bioscience companies, with the aim of accelerating their growth. The Cleveland Clinic, University Hospitals Health System, Case Western Reserve University, and Summa Health System jointly committed to raising a half billion dollars to support new ventures in the biosciences. By 2005, this joint initiative had raised more than half of the necessary funds and had created, recruited, and accelerated expansion of more than 40 companies. As with JumpStart and TeamNeo, BioE was the outgrowth of a McKinsey report that recommended that the entity be a catalyst for health care services and innovations and proposed two primary strategies: focus on small private companies that need funding to grow and promote broader healthcare initiatives across the region. This included supporting research institutes, attracting larger companies, helping companies expand, addressing workforce development, and advocating for changes in state policy.

Results. Cleveland's leaders have reorganized its economic development institutions, focused on the macro-region, and undertaken a series of initiatives described above that can be considered at the forefront of current economic development strategy and thinking, but it is too soon to assess the effectiveness of these activities. One area of concern as to future outcomes is an incipient split in the Fund for Our Economic Future. The Cleveland Foundation was the largest investor in the Fund and supported the broad regional effort through two rounds of funding. In 2009 it largely pulled out of the Fund in a very public manner. The Cleveland Foundation's withdrawal may be the result of the Fund's insistence on regional funding approaches combined with the Foundation's desire to be more directly active in investing in

development activities in the city of Cleveland and to support development activities that are responsive to strategies developed by its leadership and board.

The region's economy continues to stagnate, but the economic development activities described in this case study may have softened the blow and laid the groundwork for future growth. However, even the most aggressive and innovate approaches to regional economic development may be insufficient to address a forced economic transformation on the scale of that facing Cleveland.

Charlotte

Economic Background and Shocks. The economic face of the Charlotte region during much of the 20th century was manufacturing, which accounted for about one-third of the region's jobs in 1980.[55] Textile mills, textile product manufacturing, and apparel manufacturing accounted for more than half of manufacturing jobs and just under one sixth of all jobs in 1980. Global competition eroded the profitability of these three subsectors between1980-2005; the three industries collectively shed 49,800 jobs, declining 82 percent, even as the region as a whole had a net gain of 393,032 jobs over this period for a 96.3% gain.

While the manufacturing sector was in decline, Charlotte banks grew and in the wake of federal banking deregulation Charlotte became the nation's second largest financial center as measured by assets.[56] Bank mergers and acquisitions allowed the region to prosper even as employment in its textile and apparel industries declined at a precipitous rate. By 2005, manufacturing had dropped to 10 percent of regional employment (from over 30 percent in 1980) and finance and insurance had doubled (from 3.7 to 7.4 percent). .[57] Jobs in credit intermediation and related activities (commercial banking and related industries such as

[55] The Charlotte Metropolitan Statistical Area includes York County in South Carolina and five counties in North Carolina: Anson, Cabarrus, Gaston, Mecklenburg, and Union.
[56] The ranking of the top ten banking centers appears on Charlotte Chamber of Commerce, http://www.charlottechamber.com/business-profile/leading-financial-center/ Accessed 4/30/2010, in a table titled "Major Banking Centers." The source for the table is SNL Securities, December, 2008. The asset totals include Bank of America acquisition of Merrill Lynch.
[57] Some manufacturing firms have replaced a segment of their permanent manufacturing positions with temps in order to better handle shifts in demand, suggesting that the decline of employment within manufacturing may not be as drastic as it appears.

mortgages and credit cards) increased 287 percent during 1980-2005, growing from 9,000 to 35,000.

The Charlotte region experienced four shocks over the time period we examined. Three of these included national economic downturn shocks in 1981, 1990, and 2000 each of which resulted in a regional downturn in the Charlotte economy. In each case, Charlotte never lost more than 1.3 percent of employment (5,000 jobs, 7,000 jobs, and 2,000 jobs, respectively) and the region proved resilient to the shock within three years. The other shock, to which the region was resistant, was an industry shock that occurred in 1984 as a result of transformations occurring in textiles and apparel manufacturing. The textile mills industry also had an industry shock in 1981, but that was piggybacked to the national economic downturn shock.

The decline in total manufacturing employment resulted primarily from the decline of the textile and apparel industries. Textile and apparel manufacturers, unable to integrate advanced machinery and move into higher value-added product lines, struggled to keep their firms afloat; many did not survive. A few manufacturing sectors with at least 6,000 employees in 2005 had major employment gains during 1980-2005, including plastics and rubber products (58.6 percent), fabricated metal products (61.7 percent), and transportation equipment (94.9 percent). Their growth was connected to the expansion of motorsports in the region.

The most recent national recessionary period, beginning in the late 2000s, resulted in the collapse of large financial corporations nationally, and the dependence of the Charlotte region's economy on financial institutions made it especially vulnerable to the recession. The Bureau of Labor Statistics showed a decline of 5.7 percent in jobs for the region between 2007, the beginning of the financial crisis, and 2009.

In December 2008, San Francisco-based Wells Fargo took over Charlotte-based Wachovia. Bank of America, another local presence, acquired Merrill Lynch in the fall of 2008.. The acquisitions by Wells Fargo and Bank of America of these other firms gave them redundant employees in some divisions, leading to employment reductions to reduce duplication. Wachovia, weakened by troubled mortgages it inherited in its 2006 acquisition of Golden West Financial, had begun employee reductions even before its takeover by Wells Fargo. The cumulative effect for the Charlotte region of these financial upheavals was employment loss. By mid-2009, mortgage-related jobs had declined from their 2006 high; employment in commercial banking declined from a 2007 peak; and jobs in administrative and support services fell

significantly from their 2008 high point.[58] Jobs loss within the financial institutions in the region was one part of the recessionary picture. Retrenchment of past years' generous salary and bonus compensation had additional recessionary effects upon the regional economy.

Regional Economic Resilience/Non-Resilience. Between 1978 and 2007, the Charlotte region was resilient in the face of three national economic downturns (1981, 1991, and 2000) and was resistant to a national industry shock that occurred in 1984. The region's downturns tracked national economic downturns and its recoveries tracked national upturns. Leading into the 1981 national economic downturn, the region's prior average eight year employment growth rate was 3.1 percent. Between 1981 and 1982, employment declined by 1.3 percent, but by 1983 the economy was growing again at an annual rate of 7.44 percent. The region's annual growth rate did not turn negative again until the 1990-1991 national economic downturn, when employment declined by 1.2 percent before rebounding to 4.3 percent two years later. Employment was essentially flat between 2000 and 2002. In 2005, growth had returned to a healthy 4.4 percent. Much of the regional resilience throughout those 20 years was a function of the shift from manufacturing to tradable service-providing industries that both financed the national recoveries and insulated the regional economy.

Explaining Resilience/Non-Resilience. The transformation of the regional economy was not the result of conscious policy or planning by the public sector or by civic alliances. Instead it was largely due to the success of Charlotte's banking sector. Beginning in the 1980s, the region's banks experienced explosive growth, and they became the region's new economic engine, cushioning manufacturing's decline. Two interacting factors accounted for Charlotte's rise in banking and finance: favorable state laws and two entrepreneurial corporate banking CEOs who took advantage of them.

Branch banking had historically not been allowed in most U.S. states; fear of monopoly by the large northeastern banks led most states to prohibit branching.[59] Given the legal authority by their state legislature to branch statewide, North Carolina banks learned how to acquire other

[58] Data in this paragraph are from Employment Security Commission of North Carolina, Industry Information: Employment and Wages by Industry, 1990 to Most Recent, http://www.ncesc1.com/lmi/industry/industryMain-NEW.asp Accessed 4/30/2010.
[59] Roussakis (1997, p. 43).

banks, merge their operations, and run the merged bank as a branch facility, exhibiting expansion-minded behavior as early as the 1950s. In 1982, North Carolina National Bank was expanding beyond state lines fully two years ahead of any competitors and before the Supreme Court ruled that interstate banking compacts were permitted. Southerneastern states' legislatures, including North Carolina's, passed cooperative permissive regional reciprocal banking bills, the most uniform collection of state banking laws that existed in 1984, providing a common banking market in their Southeastern compact. Experience with handling multiple branches statewide, and the Southeastern compact's protection of interstate expansion, gave North Carolina banks yet another advantage going nation-wide when interstate banking was declared constitutional by the U.S. Supreme Court in 1985.[60] Although it would be a decade before Congress passed the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994, repealing restrictions on interstate banking, banks were allowed before then to service large borrowers through loan offices outside of their state and to conduct nationwide advertising for deposit customers.[61]

While the southern state laws permitting branch banking provided the opportunity for expansion of Charlotte's financial sector, it was two visionary figures, Hugh McColl and Edward Crutchfield, who seized the opportunity this provided. McColl was named CEO of North Carolina National Bank (NCNB) in 1983. Crutchfield became CEO of First Union Bank in 1985. Both McColl and Crutchfield pursued an aggressive strategy of consolidation, buying banks in large and fast-growing markets such as Florida, Texas, and Georgia. More conservative banks that did not follow a similar growth strategy were acquired or disappeared.[62]

Interviewees told us that as the banking industry grew, McColl, Crutchfield, and other financial sector leaders feared downtown Charlotte was not an attractive destination to new financial talent (particularly during the national economic downturn of 1981). Thus, even as they began their aggressive bank expansion strategies in the mid-1980s, McColl and Crutchfield, along with Bill Lee, the head of Duke Power (a regional energy company), pushed a downtown development strategy, using their relationships with city officials to forge public-private partnerships and a division of labor whereby the city government handled crime-prevention and

[60] Frieder (1988).
[61] Bernstein (1987)
[62] Dan Fitzpatrick, "Charlotte Reveling in its Role as a Giant; How it Outpaced Pittsburgh Banks," *Pittsburgh Post-Gazette*, June 25, 2006, p. A-1.

infrastructure such as street lighting and parks while the private sector assumed a role in amenities-building, housing provision, commercial construction, and regional place-marketing. From all accounts, the public and private sectors in Charlotte worked remarkably well together over this time period and the open display of harmony reduced transaction costs, including lost time, waste of political capital, and public ill-will.

Many of those who were interviewed asserted that the region's residents held to some common principles that characterized public and private activities, including effective use of social networking, civic optimism, careful strategizing that left nothing to chance - thus reducing risk, and a sense of stewardship.

As the community reinvented the Charlotte region as an attractive location, banking talent from outside of the region settled in Charlotte. This in-migration enabled the financial industry to mitigate the effects of a lack of skilled administrative workers in the region and a public education system that may have otherwise prevented the banking sector from obtaining the number and level of educated workers that it required.

Responses. The public sector's response to massive losses in textile and apparel firms' employment was simply not to respond. In the 1980s, as such firms diminished, there were no deliberate public policies to confront this economic loss, such as reports or agendas for programs to help larger textile and apparel firms shore up core competencies or strengthen their supply chains.[63] Some officials acknowledged being taken off guard by the sudden unwinding of the industry, but there was little that could have been done to preserve the sector in the face of international competition at lower wage levels.

In 1991 McColl, Crutchfield, Lee, Stuart Dickson (Ruddick Corporation), and John Belk (Belk department stores) formed the Charlotte Regional Partnership, a public-private organization with a mandate to attract firms (especially foreign) and investment to the 16 counties in the broader Charlotte region (including some not a part of the strictly defined metropolitan area)

The Charlotte Chamber of Commerce, which served the city and Mecklenburg County, was another visible public agency. It campaigned on bond sales, advocated for the business community, and focused on attraction and retention of businesses with such programs as its 2006

[63] Conway and others (2003).

initiative called Business First. In 1998, the Charlotte Chamber initiated the Advantage Carolina project. A total of 17 key initiatives would grow out of the project, including Pathways to Employment, a three-month welfare-to-work program managed by Central Piedmont Community College. McColl led the Chamber's efforts to hire students from the program, and 76 percent of Chamber members participated.

The civic elite recognized the importance of a research university, but, in 1989, Charlotte was the largest metropolitan area without a doctoral degree-granting university. With help from McColl and Crutchfield, university officials started a capital campaign to fund the offering of doctoral degrees and, by 2005, the Carnegie Foundation classified the University of North Carolina, Charlotte, as a research-intensive institution.

The motorsports industry expanded in the region, most recently with the NASCAR Hall of Fame in 2010, brought to the region by public-private efforts. Earlier, the Charlotte Motor Speedway coordinated with area jurisdictions to establish a garage tour of the race cup teams headquartered in the region, and the Speed Channel's headquarters, originally in Chicago under a different name, expanded in Charlotte in 2008, assisted by the state's One North Carolina Fund.

There were no overarching public sector economic development strategies or public policy decisions that explained the region's phenomenal growth. Rather there was an attitude within the public sector, itself taking pride in its business-like demeanor, that "the business of Charlotte is business." In 1993, the city government reorganized itself to take on a more pronounced business mindset.[64] The public sector operated to help the business community to thrive in the Charlotte region.

The recent takeover by Wells Fargo of Wachovia opened a new financial chapter for the region, where homegrown talent and homegrown philosophy could hold less sway. We were told, however, that Wells Fargo, unlike Wachovia, has a decentralized management style that retains more local management. Now that Charlotte employees have become the "local" employees of a distant corporate owner, the philosophy could work to reduce the impact of the new ownership by outsiders.

Other financial institutions, including GMAC Financial, are picking up some of the newly unemployed financial talent pool. The Chamber of Commerce, desiring to show that the region was still open for business, mailed a pitch signed by McColl to several thousand financial

[64] City of Charlotte, "The Charlotte Story: Public Service Is Our Business," April 2000, p. 13.

institutions. Former First Union and Bank of America executives have filed paperwork to establish a new bank in Charlotte, looking to benefit from purchase of problem banks.[65]

Results. This bank-led, business-friendly trajectory worked well for 25 years, and the Charlotte region nearly doubled its employment during the time span from 408,000 to 801,000 jobs. While a business-friendly attitude invited business, it did not require public economic development policy efforts. With the private sector putting its own funds into job training, and recruiting many of its employees from elsewhere, there was little incentive for the public sector to worry about taking these initiatives.

Charlotte's resilience was thus a product of the strategy and fortunes of its major private sector firms, and the entrepreneurs who led them. Its "resilience strategy" was ultimately dependent upon two very large banking firms and the power company. Wells Fargo (a presence via its Wachovia takeover) and Bank of America now face difficult and changed environments. Duke Power, the member of the triumvirate that maintained the lowest profile during the growth years, is emerging out of the Great Recession as a major national and international policy leader in green energy and in nuclear power. Duke Power under Lee's guidance established the World Association of Nuclear Operators and has a major role in the Carolinas' Nuclear Cluster Group.

The energy sector may be the emerging face of a new regional economy for Charlotte, because the financial crisis has created retrenchment and uncertainty in the banking world. The Great Recession in the Charlotte region through local eyes was "nothing like we have ever seen before. These jobs are not coming back." Observers believe that the "new normal" that the region returns to will no longer exhibit unprecedented growth in the financial sector. How resilient the financial sector proves to be in the face of the Great Recession, how well the energy sector performs to carry an economy bolstered by niche industries like motorsports, and whether the qualities said by residents to underpin the region's economic bounce still come into play – all of these factors will tell the future of the Charlotte region's resilience following the Great Recession.

Grand Forks

[65] Rick Rothacker, "Former First Union, Bank of America Execs Organizing New Bank," *Charlotte Observer*, April 26, 2010.

Economic Background and Shocks. Grand Forks is a small region that encompasses portions of two states (North Dakota and Minnesota) and has a population of slightly less than 100,000, of which slightly more than 67 percent is on the North Dakota side.[66] The region has historically had an agricultural economy, with major crops of wheat (largest crop by acreage), sugar beets (largest cash crop), potatoes, and soybeans. Other large employment sectors are the military, specifically Grand Forks Air Force Base, established in 1955, and state government, which includes the University of North Dakota. In 1980, the region's economic drivers were military (l4.5 percent of the region's employment in 1980), state government (13 percent of employment), and agriculture (12 percent of employment). The region is thus susceptible to shocks resulting from decisions at the national level (e.g., military base reductions) and the state level, as well as nature. The regional economy is diverse, but local policymakers have few levers to respond to economic shocks.

The Grand Forks region experienced a large number of shocks during our period of study. These included local industry shocks in 1978, 1980, 1985, and 1996, national industry shocks in 1983 and 1989, and a national economic downturn shock in 2000. Nearly all of the industry shocks involved shocks to its military employment sector. It was shock-resistant to the 1978, 1983, 1985, and 2000 shocks, but it experienced economic downturns as a result of shocks in 1980, 1989, and 1996. The region was resilient to the first one of these downturns, but not to the second two.

The 1980 shock-induced downturn appears to primarily have been the result of the national recession rather than local events. Thus, when the nation rebounded, so did the Grand Forks region. In 1989-90, however, the region suffered a one year loss of 7 percent of its military employment (likely a result of the inactivation of some missile wing units), followed by a 4 percent employment loss in state government in 1991. The region was not resistant to these shocks. The 1996 downturn involved an additional 7 percent decrease in military employment (1500 employees), this time the result of the 1995 round of military base closings. Contributing to this downturn was the flood in April 1997, which damaged 83 percent of homes and 62 percent of commercial units in the city of Grand Forks and all but eight homes in East Grand

[66] The Grand Forks region is defined in this chapter as the Grand Forks metropolitan statistical area, which consists of Grand Forks County, ND, containing the city of Grand Forks, and Polk County, MN, containing the city of East Grand Forks, with the Red River dividing the states.

Forks, resulting in almost $2 billion of damage in the Grand Forks area. The agricultural industry suffered distress, presumably related to the flood, particularly with the spring wheat crop.[67] In 1997 alone, the region's total employment fell by 2 percent, the region's largest decrease in our study period.

Regional Economic Resilience/Non-Resilience. Grand Forks differs from the other case study regions profiled in this,chapter because it has a small economy, with regional employment below 60,000 and a GMP of $3.6 million. Downturns in Grand Forks reflect, for example, a 2 percent employment decline, which means 1,200 people losing their jobs. Another difference is that while Grand Forks experienced a decline in its annual growth rate of employment in 1989, its employment otherwise continued to increase until the greater downturn of 1996 occurred.[68] At that point, it experienced a fast flash rather than a "slow burn."[69] Finally, Grand Forks experienced different kinds of shocks than the other case study regions. In Grand Forks the shocks were military base closings brought about by BRAC followed by a major natural disaster (the 1997 flood). Is the Grand Forks region resilient to economic shock-induced downturns? The data indicate that while it was resilient to the 1981 recession, it otherwise has not been resilient. Prior to the 1980 shock, the Grand Forks region's average eight year employment growth rate was 1.6 percent. While the annual growth rate fell to -1 percent in 1980**,** it rebounded to its prior level within two years. However, the region was, by our definition, not resilient to the downturn caused by the 1989 shock; it did not return to its prior growth rate within a four year period. Nonetheless, employment continued to increase every year for the next six years – until the year of the flood and base reduction. Prior to the 1996 downturn, the Grand Fork region's prior average eight year employment growth rate was 1.8 percent. In 1996, the annual growth rate fell to -2.2 percent, remaining negative or under 1 percent until 2002, when the annual employment growth rate was 1.3 percent. From 2002-2006 the average annual employment growth rate was 1.5 percent. In short, the Grand Forks region seems to have established a new equilibrium at a growth rate about one-third of its prior rate.

[67] Another factor mentioned by some interviewees was reduced retail sales from the rise of the U.S. dollar in relation to the Canadian dollar, which discouraged Canadians from coming to the region.
[68] Similarly, Grand Forks recovered quickly from GMP downturns in 1988 and 1993, rebounding within a year. However, it was not resilient to the shock in 1997, when GMP fell from $3.4 million to $3.1 million, then continued to fall, dropping to $2.9 million in 1999.
[69] Pendall, Foster, and Cowell (2009).

While Grand Forks was non-resilient based on annual and eight-year growth rates, the region's leaders view it as resilient because it ultimately recovered from the flood and other shocks of 1997, with population, employment, and GMP all having surpassed their pre-1997 levels. During and after the Great Recession (from late 2007 through mid-2010), the Grand Forks region's unemployment rate was low, peaking at just over 5 percent. In addition, inflation-adjusted wages per worker increased by 17.7 percent between 1995 and 2007.

Explaining Resilience/Non-Resilience. Although the flooding of 1997 was only one of the shocks to the Grand Forks region that year, our interviewees saw it as a catalyst, changing the region, in particular, improving the relationships between the Grand Forks' and East Grand Forks' governments and the self-image of residents throughout the region. When asked how they perceived the region after 1997, interviewees consistently responded that the region was better. Two reasons were identified: (1) increased collaboration among the different groups in the area, particularly the business community and local government in the city of Grand Forks, as well as improved interactions between Grand Forks and East Grand Forks, and (2) a belief that, working together, they can improve their community. A third reason often mentioned was the huge influx of money, primarily from the federal government, which enabled new investment in the region. The reliance on federal funding, which often takes several years to disburse, may be part of the explanation for a recovery time frame exceeding that of our "resilience" definition.

Responses. Since the Grand Forks region spans two states, the need for a cross-state regional approach is evident as the river is all that separates the two cities. East Grand Forks has a population of fewer than 8,000, leaving it with little power in Minnesota politics, compared to Grand Forks, which is the third largest city in North Dakota. Additionally, during the flood recovery, the two cities were served by different Federal Emergency Management Administration and Economic Development Administration field offices, and Grand Forks was a Community Development Block Grant (CDBG) entitlement city while East Grand Forks received its CDBG fund through the state. This meant that as Grand Forks and East Grand Forks engaged in rebuilding, they had different directions and restrictions from their federal partners. "You could do things in Minnesota that you couldn't do in North Dakota, and vice versa, which

pulled us apart instead of putting us together." Although the river separates the cities, it also brings them together with a shared Greenway (funded as state parks by each state).

Rebuilding. Recovering from the flood required reinvestment in the region, but investment requires security. This was accomplished through the flood protection programs implemented by each of the cities. Grand Forks residents paid $92 million toward its flood protection system in three tax assessments. After enhancing the flood protection system, state and local governments and businesses were able to rebuild the region with the help of federal funds. As one person explained, "We did about 20 years of redevelopment in five years." Similarly, "that flood did in a week what urban renewal couldn't do in 40 years." Almost every person interviewed noted that the physical redevelopment represented: an important symbol of the region's recovery; evidence of what the community could accomplish when working together and an incentive to continue striving for improvement; and a source of important amenities to make the region more attractive to both existing and potential residents (including University of North Dakota graduates).[70]

Both cities redeveloped their downtowns, which were destroyed by the flood because of their location along the banks. East Grand Forks was able to take an industrial downtown, populated by old railroad tracks and dilapidated warehouses, and create an area for retail, restaurants, and a movie theater. It used CDBG funds to attract Cabela's, an outdoor specialty store. According to one city official, an area that previously had $500,000 in taxable value has increased to $12-15 million. In Grand Forks, Mike Maidenburg, publisher of the Grand Forks Herald at the time, drove the vision for a revitalized downtown. In addition to convincing the city to invest in the downtown, he committed to maintaining the newspaper in its downtown location, although that resulted in a bifurcated location, with production occurring elsewhere in the city. Brownstones and condominiums were built and occupied, creating a residential presence downtown, which had been missing prior to the flood.

Federal and state funds in both cities enabled redevelopment which increased amenities in the region; interviewees consistently commented on the improved quality of life following the flood. Yet as one person said, "The basics remained. Agriculture and the university didn't go

[70] Several interviewees mentioned that it was difficult to attract educated workers to the Grand Forks region,, with the harsh winters being only part of the problem. Some companies, we were told, had moved certain functions to Minneapolis, where it is easier to attract workers, because of the greater amenities of the Twin Cities.

away." The flood response/recovery was a small piece of a larger, longer-term economic development approach in the city of Grand Forks which appears to seek growth and diversification of the region's economic drivers by pursuing manufacturing, encouraging entrepreneurship and innovation through centers affiliated with the university, and re-envisioning the region as a "destination" location.

General Economic Development. Although some interviewees credited the flood with fueling economic development activities in the Grand Forks region, many of the economic development activities were underway prior to 1997. The flood served as a reminder of the importance of economic development as the region struggled to stem population loss, employment loss, and revenue loss.

One of the means by which the city of Grand Forks supports economic development is through its Growth Fund. Adopted in 1988, the growth fund is funded in part by 0.25 percent of the retail sales tax revenues. The fund provides gap and early-stage financing of construction and capital costs for new and expanding firms. For example, the Growth Fund contributed $500,000 toward the Research Enterprise and Commercialization Center.[71] In April 2010, the Growth Fund Committee approved loans to three manufacturers, LM Wind Power, a wind turbine manufacturer; Ideal Aerosmith which makes testing equipment for aircraft and missiles; and American Defense, which makes metal components for military vehicles.[72] Ideal Aerosmith came to East Grand Forks in 1984 as the first occupant of a new industrial park that had been built with federal funds and the benefits of tax-increment financing.

Destination City. In his 2003 State of the City address, Mayor Mike Brown stated, "My vision is that we become a destination city," a great place not only to live and do business, but to visit. He asked for an increase in the sales tax, which was defeated, as well as a commitment to the Greenway, the Water Park, and the community center by the Alerus Center. This vision, according to interviewees, gave leaders and residents a direction as they left the flood behind them. The goal is to attract visitors from Winnipeg, a city of 800,000 located 145 miles to the north. Part of that strategy builds on promoting air service to Phoenix and Las Vegas (popular

[71] State, federal, and foundation funds accounted for the remainder of the $8.75 million to build the Center.
[72] Tu-Uyen Tran,, "GF Loans for Manufacturers on Track," *Grand Forks Herald*, April 21, 2010.

vacation spots), which is cheaper from Grand Forks than Winnipeg because of Canadian taxes and fees. . Grand Forks recently attracted Allegiant Air, which runs a few flights a week between Grand Forks and these other locations.

University. The University of North Dakota plays a major role in the region, not just as an employer but as a source of innovation. The university was able to maintain its enrollment of over 10,300 students following the flood and has experienced continued growth, increasing 25 percent between 1998 and 2003 (when enrollment reached over 13,000). Between 2009 and 2010, enrollment increased over 7 percent from 13,172 students to 14,194 (with the city of Grand Forks having a population of 51,000 in 2009, University students are a significant portion of the population). The University is affiliated with four independent research centers: the Energy and Environment Research Center (which has 10 Centers of Excellence); the Innovation Center; the Odegard School of Aerospace Sciences; and the newest addition, REAC, which houses the State's Center of Excellence in Life Sciences and Advanced Technologies.

Military. The most recent shock to the community was the loss of its last tanker group at the Air Force base as part of the 2005 round of military base closings. In its place, the base was to prepare itself for an unmanned aerial systems (UAS) mission, in anticipation of receiving Predator and Global Hawk unmanned aerial vehicles. Regional leaders' response to this shock was to embrace the change and proactively develop a community plan to support this new mission. The activities that have occurred in the Grand Forks region with respect to the UAS mission suggest that changes that occurred following the flood have been institutionalized, resulting in a new culture within the community. This includes recognition of the importance of understanding the region's strengths and weaknesses. For example, the UAS mission builds on the region's competitive advantage in energy research (conducting cold weather testing, renewable energy, tactical fuels), engineering (developing payloads and sensors), pilot training programs, the Minnesota community college's aircraft maintenance program (with its new certificate in unmanned aircraft vehicle maintenance). It also benefits from the base's location in a sparsely populated area with uncrowded airspace.

Results. The economy resembles its traditional roots to an extent. The railroad rumbles through town pulling freight. Sugar beet trucks head to Crystal Sugar in East Grand Forks. The air base is once again threatened. While the methodology we used indicate a region that is not resilient, perhaps because of the few local levers available to a region of under 100,000 people, the region of Grand Forks is weathering the current economic environment well.

In 1980, only three sectors – military, state government, and agriculture – made up at least twice as large a share of Grand Forks employment as of nationwide employment. In 2007, food manufacturing and mining had joined the original three. Yet these growing industries each employ fewer than 5 percent of the region's workers (1,400 and 675 employees, respectively). The original three export industries continue to be economic drivers, with the university the largest employer in the region (6,385 employees in 2009).

Seattle

Economic Background and Shocks. The Seattle region has two major export industry clusters.[73] The first, consisting of aerospace manufacturers and suppliers, is anchored by Boeing, which has had its major production facilities (and, until 2001, its headquarters) in the region since 1916. The second, consisting of information technology developers, manufacturers, suppliers, and major users, is anchored by software giant Microsoft, which moved to the region in 1979. Other major firms that use information technology intensively were started in the region between the 1970s and 1990s; these include coffee retailer Starbucks, warehouse club Costco, and online bookseller Amazon.com. In addition, new export industries that draw on the skill and technology bases of the aerospace and information technology clusters, notably medical device production, have begun to develop in the region.

Employment growth downturns in the Seattle regional economy have occurred around the time of national recession periods. The region experienced shock-induced employment growth downturns in 1980-81, 1990, 1993, and 2000-01. The region's GMP growth downturns occurred in 1990, 1994, 1999-2000, and 2003. The regional economic development policymakers and practitioners we interviewed perceived the Great Recession as the region's

[73] The region is the Seattle-Tacoma-Bellevue. WA, metropolitan statistical area, which consists of King, Snohomish, and Pierce counties.

most severe economic downturn since the early 1970s. When we conducted our interviews (July 2009 and July 2010) the region's employment was lower, as a percentage of pre-recession employment, than at the same time after any of the previous three recessions, although by mid-2010 it had begun to rebound from its post-recession employment trough.

Employment growth downturns in the region's major export industries preceded or accompanied the aggregate regional employment growth downturns. Wood products (a major regional export industry prior to the mid-1980s) suffered employment growth downturns in 1978-79. Software had such downturns in 1993 and 2000-01, although these downturns appeared as sharp reductions of the industry's employment growth rate rather than as job losses. (Microsoft, the region's largest information technology employer, laid off workers for the first time during the Great Recession.) Aerospace experienced downturns in 1980-82, 1990-93, 1998-99, and 2002, and all these downturns were employment declines. However, their impact on the region as a whole probably became less severe over time as Boeing, the region's largest manufacturer, accounted for a declining (though still substantial) share of the region's employment. Moreover, industry employment growth downturns were mostly not severe enough to qualify as shocks by our definition.[74]

Seattle experienced rapid growth of employment and near-average growth of its average wage between 1980 and 2005. The total number of jobs rose by 78 percent during that time period, well above the national average job growth rate of 43 percent. The average inflation-adjusted wage rose by 27 percent, just below the national average of 28 percent.

During the late 20th and early 21st centuries the region's export base became less centered on wood products and (to a lesser extent) aerospace and more centered on information technology. Wood products manufacturing jobs, which made up nearly 3 percent of total jobs in the region in 1980, fell by 30 percent between 1980 and 2005 and accounted for less than 0.5 percent of total employment in 2005. Jobs in transportation equipment manufacturing (overwhelmingly aerospace) were 25 percent of regional employment in 1980, fell by 20 percent during 1980-2005, and were only 4 percent of regional employment in 2005. The number of jobs in publishing (most of which were in software in the Seattle area) grew by 555 percent

[74] Of the region's industry employment downturns, only the 1982 and 1998 aerospace downturns were large enough to meet our definition of a shock, and because the 1982 aerospace downturn occurred in the midst of an overall regional shock, it did not count as an industry shock by our definition. Therefore, the region's only industry shock occurred in aerospace in 1998.

during 1980-2005, accounting for just under 1 percent of regional employment in 1980 and just under 3 percent in 2005.

Regional Economic Resilience/Non-Resilience. Seattle has been very resilient and shock-resistant since 1980, and increasingly so over time, at least until the Great Recession. The region was resilient to the 1993 and 2000-01 shock-induced employment downturns but not resilient to the 1980 downturn. The region was also resilient to the 1994 GMP downturn. (There was little opportunity for resilience to the 1990 employment and GMP downturns and the 2000-2001 GMP downturn because other downturns occurred so soon thereafter, and our data series ends too soon to permit an assessment of the response to the 2003 GMP downturn.)

As noted above, the region experienced export industry employment growth downturns that were, for the most part, not very severe. Seattle was shock-resistant to the one export industry downturn (aerospace in 1998) that was severe enough to count as an industry shock.

The Great Recession of 2007-2009 had relatively little impact on the region's aerospace industry because Boeing was completing the development of a new airplane model (the 787 Dreamliner) at the time and was, therefore, ramping up employment and supplier orders for that project. This compensated for the loss of aircraft demand from airlines experiencing a decline in air travel.

The 2008 failure of Seattle-based Washington mutual was the largest bank failure in U.S. history. It cost the region about 4500 jobs. However, banking has never been a major export industry in Seattle, and the collapse of this bank does not seem to have had major regional implications according to either or interviews or out data analysis.

Explaining Resilience/Non-Resilience. Seattle's economic resilience was mainly a result of two things. The first was the absolute and relative decline in the importance of its most shock-prone major export industries, wood products and aerospace. The second was the absolute and relative rise in the importance of the software industry. As a newer industry built around a relatively new technology and lacking the high fixed costs of durable manufacturing industries, software was less prone to job growth downturns than the other major export industries, and its downturns were less severe. As a consequence of both the decline of wood products and aerospace employment and the rise of software, the region's export base became more

diversified; as our quantitative analysis showed, a diverse export base contributes to regional economic resilience.

Diversification of the region's export base came about not as a result of any deliberate policy or strategy but because of a historical accident: Bill Gates moved Microsoft to the region in 1979. Other information technology-intensive firms (Starbucks, Amazon, and Costco, as well as suppliers to them and to Microsoft) sprang up subsequently, in part to take advantage of proximity to Microsoft and the large pool of information technology workers that it attracted to the region. (Additional local information technology companies were then founded by former Microsoft managers or engineers.)

The presence of both aerospace and information technology in the region may have contributed to regional economic resilience by helping to spur the growth of new export industries such as medical device production. The two core export industries employ many mechanical and electrical engineers, who sometimes form new firms that apply their skills outside of the core industries. Layoffs of engineers from Boeing and, more recently, from Microsoft, have been a source of new firm formation. The wealth generated by the region's information technology industry has helped support a local venture capital industry, which has been a source of funding for these new firms.

Both the region's overall export base and its aerospace suppliers have become more diversified since the 1990s. In the past Seattle's aerospace suppliers mainly supplied components to Boeing, but over time they gained an increasing share of their business from other aircraft manufacturers located outside the region and even outside the United States. Thus, the suppliers are now more insulated from downturns in Boeing's business than they once were.

Responses. After the severe early 1970s recession, policymakers perceived a need to diversify the region's economy away from its strong reliance on aerospace manufacturing in general and Boeing in particular. The Chamber of Commerce accelerated its business recruitment efforts. Local government and business leaders created the King County Economic Development Council, now called Enterprise Seattle, to recruit new firms to the region. In the wake of the 1970s recession the organization conducted a major campaign to market Seattle to businesses located elsewhere. Enterprise Seattle continues to recruit businesses but now also commissions consulting reports on the region's economy and connects businesses to sources of public and

private financial and technical assistance to help them get established, remain in business, or expand in the region.

Although regional leaders do not consider further diversification of the regional economy to be as high a priority today as it was in the 1970s, some still think that the region is too dependent on Boeing and Microsoft. In 2008 the state established an Economic Development Commission to promote an innovation-based economy that was less dependent on Boeing and Microsoft. The Commission has advocated that the state's Commerce Department add to its traditional focus on attracting and retaining businesses by trying to increase the educational attainment of state residents, bring entrepreneurially oriented faculty to state universities, promote electric car usage, and boost exports by improving transportation links between Seattle and the East and Midwest. The Commerce Department has reorganized to enable it to carry out this strategy.

Rather than diversify away from reliance on Boeing, many of our interviewees thought that retaining Boeing's aircraft production in the region was necessary to preserve the regional economy's strength, at least in the short run. Many interviewees told us that the biggest threat to Seattle's economy was the possibility that Boeing would increasingly move production to lower-wage parts of the United States or abroad. The move of Boeing's headquarters to Chicago in 2001 and a recent history of strained union-management relations at Boeing exacerbated fears that Boeing would leave the area. When Boeing considered the possibility of building some of its new 787s outside the state, local governments and economic development agencies lobbied former Governor Gary Locke and the state legislature for a tax incentive package to retain production of the new aircraft. The package was enacted into law, but Boeing nevertheless decided to build some (but not all) of its 787s at a newly acquired plant in South Carolina.

Another response to the threat of Boeing's relocation of production was the formation of the Prosperity Partnership in 2003. This joint initiative of the region's metropolitan planning organization and economic development district mainly conducts research and planning around five of Seattle's industry clusters and activities: aerospace, information technology, international trade (including the Port, logistics, transportation, and related support services), biotechnology and life sciences, and clean technology (energy efficiency, renewable energy generation, environmental remediation, and green building). The Partnership also does some public policy advocacy around these clusters and has started membership organizations for the aerospace and

clean technology clusters. The Partnership's goal is to support all five clusters, neither focusing exclusively on retaining aerospace jobs nor on further diversifying the economy away from aerospace.

In addition to policies and strategies designed to preserve or increase the region's economic resilience, Seattle has several economic development organizations that target specific industries or other activities in the regional economy. None of these organizations was established with the goal of making the regional economy more resilient or of responding to specific economic shocks. The Trade Development Alliance, jointly sponsored by local governments, the Chamber of Commerce, the Port of Seattle, and unions, promotes international trade in the heavily trade-dependent Seattle area by sponsoring trade missions for regional business and government leaders, promoting Seattle exports abroad, and providing local businesses with information about trade. The Washington Technology Industry Association, founded in 1984, is the regional trade association for high technology businesses (initially software companies, but now also telecommunications, and medical device firms). It engages in lobbying at the state and federal levels and provides members with business networking opportunities and discounted services. The Technology Alliance, founded in 1996 by Bill Gates, Sr., is a statewide organization that advocates for state-level public policies to improve K-12 and higher education, research capacity, technology transfer and commercialization of inventions, and the entrepreneurial climate. The Pacific Northwest Aerospace Alliance, the organization of primarily small and medium-sized aerospace suppliers that was founded by the Prosperity Partnership, is a trade association that provides its member with information, business networking opportunities and industry advocacy. The Center for Advanced Manufacturing Puget Sound is a similar membership organization that was founded in 2008 with the specific goal of helping small and medium-sized manufacturers (primarily in aerospace) succeed in the face of international competition. It emphasizes information and services directed at innovation, business development, and supply chain positioning.

Results. It is difficult to evaluate the success of any of the specific policies and strategies that Seattle's leaders undertook to diversify the region's economy, respond to the threat of Boeing's departure, or promote specific industries or activities in the region. The regions' export base did diversify since the 1970s but, as noted above, that diversification came about for reasons that

were unrelated to any regional policies or strategies. Boeing maintained its existing production capacity, including one production line for its new 787 airplane, in the Seattle area, while opening a second 787 production line in South Carolina. We have no evidence about whether either the tax incentives that the state provided to Boeing or the recent creation of organizations to improve the competitiveness of Seattle's aerospace suppliers had any role in inducing Boeing to maintain production in Seattle.

As of July 2009, no public or private organization had undertaken or planned any policy or strategy to restructure the regional economy in response to the Great Recession. Our interviewees did not think any such restructuring was necessary. They viewed the regional economy as sufficiently diverse because it is built around two large firms, Boeing and Microsoft, which have steadily introduced new products and around which distinct industry clusters (in aerospace and information technology, respectively) have formed. Our interviewees believed that the region's eventual recovery from the Great Recession would be a continuation of pre-recession trends, including further growth of the information technology industry and the gradual movement of Boeing away from the region (including the relocation of the firm's headquarters to Chicago and its opening of a new aircraft production line in South Carolina, its first outside the Seattle area). They also anticipated further growth of the nonprofit sector, which has been fueled largely by funding from current and former Microsoft executives.

Hartford

Economic Background and Shocks. The economy of the Hartford region is propelled by its strengths in insurance and aerospace manufacturing.[75] Hartford has long been called "the insurance capital of the world" and it is home to the headquarters of multiple large insurance companies such as The Hartford Financial Services Group, Aetna, Phoenix, and major operations of Travelers, CIGNA, and MetLife. The region's aerospace manufacturing industry is anchored by the family of companies owned by the United Technologies Corporation, including Pratt & Whitney, known primarily for its production of aircraft engines; aerospace systems manufacturer Hamilton Sundstrand; and helicopter manufacturer Sikorsky Aircraft.[76] These firms, especially

[75] The Hartford metropolitan area consists of the Connecticut counties of Hartford, Middlesex, and Tolland.
[76] Sikorsky is headquartered in Stratford, CT, just outside the Hartford metropolitan area.

Pratt & Whitney, support a large network of aerospace component manufacturers throughout the region that form the region's aerospace supply chain. The region has had slow overall job growth and extremely fast wage growth which reflects its concentration of jobs in industries and firms producing high value-added but mature products that have not generated rapid job growth.

Employment growth downturns in the Hartford region have generally coincided with national recessions, although the region's downturn in the late 1980s preceded the 1990 national recession by two years and its job losses following that downturn persisted well beyond the period of the national recession. It experienced downturns in 1980, 1988, and a shock-induced downturn in 2001, with the 1988 downturn registering as the most severe in terms of job losses. Our analysis did not reveal any local or national industry shocks affecting the Hartford region during our study period.

Employment in Hartford transportation equipment manufacturing (which includes aerospace manufacturing) has been cyclical, with the industry shedding large numbers of jobs during the years 1974-78, 1980-84, and 1991-95.[77] The early 1990s downtown was the most severe of the three industry downturns. It followed several years of relatively moderate job losses that began several years earlier. From 1987 to 1991, the industry lost 2,400 jobs (a decline of 5.7 percent), while from 1991 to 1995 it lost an alarming 16,800 jobs, cutting the number employed in the industry by 41.4 percent in just four years. By comparison, the 1974-78 downturn resulted in a loss of 12,900 jobs and the 1980-84 downturn resulted in the loss of 7,900 jobs. None of the recoveries that followed these downturns was sufficient to regain what had been lost.

Employment has been less cyclical in Hartford's insurance industry than in its aerospace industry. The region's insurance industry had consistent job gains during much of 1970s and 1980s, before large scale job losses led to industry's downsizing in the 1990s.[78] Employment in insurance declined by 2,200 jobs (or 3.4 percent) percent from 1987 to 1990, increased slightly from 1990 to 1991, and then declined from 1991 to 1996 by 19,800 jobs (or 31.1 percent). As in transportation equipment manufacturing, job levels in insurance remained relatively stable from the late 1990s onward.

[77] None of the region's industry employment downturns was large enough to meet our definition of an industry shock.

[78] The insurance industry lost 1,200 jobs from 1973 to 1975, which coincided with a national recession, in addition to losing 2,200 jobs from 1987 to 1990, which preceded the 1990 national recession.

The impact of the Great Recession in Hartford was not as severe as that of the early 1990s or early 2000s recession. By the third quarter of 2010 (11 quarters after the official start of the Great Recession), the region had gained jobs for two consecutive quarters and its employment was higher, as a percentage of pre-recession employment, than at comparable points following the start of the 1990 and 2001 recessions. The early 1980s recession in Hartford was comparable in its depth to the Great Recession, but recovery in the early 1980s was much swifter than the current recovery.

By the end of our study period Hartford's economy was more industrially diverse than in 1980, due primarily to its loss of manufacturing jobs. Manufacturing accounted for 11.9 percent of Hartford's jobs (1.16 times its nationwide share), down by 14.4 percentage points from 1980. The share of jobs in health care and social assistance increased by 5.4 percentage points since 1980. By the early 21st century, health care and social assistance employed more people than any other major industry in Hartford.. The share of jobs in finance and insurance was down modestly (0.4 percentage points), while shares in administrative services and professional and business services increased by 2.3, and 1.6 percentage points, respectively.

Regional Economic Resilience/Non-Resilience. Hartford was resilient to two of the three downturns that it experienced since 1980. It was non-resilient to the third, which severely altered its growth path for many years. The downturn experienced in 1980 was relatively mild and the region was resilient to it by 1983. From 1980 to 1982, the region lost 7,300 jobs (a decline of 1.3 percent), but by the following year it had more than made up for these losses. The 1988 downturn was far more severe and the region proved non-resilient to it. From 1988 to 1993, Hartford lost 68,000 jobs (a decline of 10.2 percent) and it continued to slowly lose jobs for another two years. While the region subsequently gained jobs from 1995 to 2000, it failed to reach its 1988 level of employment before the 2001 downturn halted its recovery.[79] Hartford lost 20,600 jobs (decline of 3.2 percent) from 2001 to 2003, but the region proved resilient to this downturn by 2004. By 2007, employment in the region had nearly returned to its 2000 level, but was still well below its 1988 level of employment, illustrating the tremendous impact of the 1988 downturn.

[79] Hartford actually lost jobs from 2000 to 2001, but this decline did not mark a large enough departure from its prior growth trend to qualify it as the beginning of an employment shock by our definition.

Explaining Resilience/Non-Resilience. Hartford's economic resilience reflects national economic cycles, except in the early 1990s recession, when downturns in aerospace and insurance combined to prolong that regional downturn.

During the 1980-82 downturn, aerospace manufacturing lost more jobs than any other industry., Transportation equipment manufacturing lost 5,000 jobs, while the related industries of fabricated metal product and machinery manufacturing lost 2,500 and 2,300 jobs, respectively.[80] However, during that same period the insurance industry added 4,100 jobs. While growth in insurance was not enough to offset the losses in aerospace, it was substantial enough to dampen the impact of the recession.

The early 1990s recession was a different story. The timing and magnitude of losses in insurance and aerospace contributed to an aggregate economic downturn in the region that occurred earlier and lasted longer than the nationwide recession that began in 1990. Aerospace manufacturing was especially hurt by decreased demand for spare parts due to the nationwide recession as well as cuts in defense spending.[81] Hartford's insurance companies, which had invested heavily in commercial real estate during the 1980s, were hurt by the bursting of the commercial real estate bubble of the late 1980s and early 1990s. A cycle of strong hurricanes in the early 1990s, including Hurricane Andrew, also harmed the region's insurance companies. Furthermore, insurers were shedding jobs in Hartford as structural changes enabled firms in the insurance industry to outsource jobs to lower-cost regions.

Hartford's 2000-03 downturn, which began before and ended later than the nationwide recession, affected a broad swath of industries. State government was the hardest-hit industry, but fabricated metal product manufacturing and administrative and support services each lost more than 3,000 jobs during this period. Meanwhile, health care, education, and leisure and hospitality added the most jobs.

Responses. Hartford is notable for its lack of large-scale responses to either short-term economic shocks or the long-term decline of its major industries. One possible reason for this, which interviewees frequently mentioned, is that the Hartford region has had very high median income and productivity, and that these measures of economic success led to inaction by

[80] Not all of the jobs in these industries were tied to aerospace manufacturing, but it is probably safe to assume that many, if not most, were tied to the aerospace supply chain in some way.
[81] Jonathan Hicks, "United Technologies' Bumpy Ride," *New York Times,* May 1, 1991.

policymakers. Another reason for the lack of large-scale response might be the region's highly fragmented structure of local government, which has made cooperation around region-wide efforts very difficult. Yet a third possibility is that for much of our study period, the region lacked a unified business leadership that was substantially engaged in the economic and political arenas of the region. Until the early 1980s, an informal group of insurance executives referred to as "the Bishops" did fill this role, but their influence waned as firms from outside the region acquired local owned insurance companies and as politicians and corporate leaders left their posts.[82] Consequently, major economic development efforts in the region have primarily been the responsibility of the state government. Hartford is also notable for its many small to medium-sized economic development organizations, the size and number of which mirror the political fragmentation in the region. Although these organizations have helped individual firms in certain industries, they did not appear to have been large enough to shift the economic trajectory of the region.

In the late 1990s, Governor John Rowland's administration (1995-2004) launched a major economic development initiative that sought to develop formal, statewide industry clusters. The Rowland administration began the cluster initiative on the heels of the wrenching 1990s downturn that resulted from what the administration called the state's "'three eggs in one basket' economy."[83] The administration identified six broad industry groupings for the initiative to target—financial services, telecommunications and information, health care services, manufacturing, high technology, and tourism—and convened Industry Cluster Advisory Boards for each. The boards were expected to develop recommendations aimed at enhancing the global competitiveness of Connecticut's firms and residents. They were also asked to determine whether or not a state cluster initiative should be formalized.[84] The industry groupings selected by the administration were intentionally very broad "so as not to 'pick winners.'"[85] After a year of deliberation the advisory boards concluded that the broad industry groupings should be formalized as industry clusters and that additional clusters should be encouraged. The summary report of the boards' recommendations described two general principles necessary for any cluster strategy to succeed: "Firms within a cluster must cooperate to identify problems and generate solutions; and

[82] Burns (2002).
[83] Ellef (1997).
[84] Connecticut Department of Economic and Community Development (1998).
[85] Dan Haar, "State Convenes Economic Board." *Hartford Courant*, February 26, 1997.

[g]overnment, academia, and regional/local organizations in economic development must become full partners within the cluster and work toward common goals."[86]

For the Hartford region, the statewide cluster initiative was relevant because it targeted its two key export industries. After the report was released the Aerospace Components Manufacturers (ACM) and Insurance and Financial Services (IFS) clusters were formalized. ACM began as an alliance of fewer than ten aerospace suppliers, which initially joined to address common workforce issues. In 1999, the group sought funding from the state Department of Economic and Community Development (which administered the cluster program) and formally became the state's aerospace cluster. One interviewee familiar with the cluster told us that it was founded with the mission to counter offshoring trends present since the early 1990s. The cluster's member firms are mainly small to medium-sized. One interviewee told us that lean manufacturing was not widely implemented in 1999 and this has been one issue tackled by the cluster; it does not do the training itself but works with outside consultants in addition to the region's Manufacturing Extension Partnership affiliate, ConnStep. ACM also addresses basic workforce issues by arranging custom training courses for its members. In addition, it provides assistance through consolidated purchasing agreements as well as by providing a roundtable forum to discuss business development. One interviewee told us that "the greatest advantage of ACM is peer-to-peer support."

Evidence from our interviews suggests that the ACM cluster has been the most successful cluster in terms of the support it has brought to its members. The general view expressed by many of our interviewees was that the mission of the clusters was not well defined and that most simply devolved into trade organizations shortly after they were formed. For example, it is unclear how the clusters were supposed to interface with and become "full partners" with government, higher education, and other economic development organizations, as initially envisioned. After Rowland resigned from office in 2004, his successor's administration inherited the program. Although the program continued under that administration, interviewees suggested that the program suffered as a result of the discontinuity in leadership.

The ACM and IFS clusters are part of a dense landscape of economic development organizations operating in the Hartford region. There are two active chambers of commerce in Hartford, though they differ in terms of their geographic scope and services provided. The

[86] Connecticut Department of Economic and Community Development (1998).

MetroHartford Alliance, created in response to the region's late 1980s-early 1990s economic downturn, focuses on traditional economic development activities such as business attraction and retention, talent attraction, entrepreneurship, and marketing. The statewide Connecticut Business and Industry Association lobbies to influence public policies affecting the state's business climate (e.g., tax policy). Since 1983 it has also undertaken workforce development initiatives.

Hartford is also home to multiple organizations that have tried to push the state to new technology frontiers. The Connecticut Center for Advanced Technology helps aerospace suppliers implement both lean production and "hard" technologies that increase productivity. The Connecticut Technology Council, a statewide trade association, facilitates high technology business networks between the state's metropolitan areas and lobbies the state government around issues related to innovation The Beacon Alliance promotes medical device manufacturing in the region and helps aerospace suppliers who are interested in diversifying into medical device manufacturing. None of these organizations was founded in response to an economic shock and none has viewed its role as helping the region's economy avoid, adjust to, or mitigate economic shocks.

Downtown Hartford revitalization became a focus of the Rowland administration, which unveiled its Six Pillars initiative in 1998. The governor cited the weakness of local government and the void left by the Bishops as reasons to give special attention to the city of Hartford.[87] The Six Pillars included "a rejuvenated civic center," "a highly developed waterfront," "a downtown higher education center," "a convention center and sports megaplex," "the demolition or redevelopment of vacant buildings and the creation of downtown housing units," and "an increase in the number of well located and inexpensive parking spaces."[88] The state envisioned spending $350 million with the hope that accompanying federal and private investments would reach $1 billion.[89] It is not clear how Governor Rowland viewed the initiative in terms of region-wide economic impact, but the "suburbs also strongly supported the plans to redevelop Hartford," believing that the city's "dismal national reputation" was an impediment to attracting people to the region.[90]

[87] Bloom (2004).
[88] http://www.ct.gov/governorrowland/cwp/view.asp?A=1331&Q=256160.
[89] http://www.ct.gov/governorrowland/cwp/view.asp?A=1331&Q=256160.
[90] Burns (2002).

Results. The impacts of the Industry Clusters Initiative and the Six Pillars Initiative are not clear, but they appear to have been relatively minor. The efforts of Hartford's many economic development organizations appear to have aided many of the region's firms, especially aerospace manufacturers, but when taken together their efforts do not appear to have been successful in changing the economic trajectory of the region. Consequently, the evolution of Hartford's economy, including its response to economic shocks, has been shaped primarily by broad economic forces. These included declines in defense spending; Pratt & Whitney's loss of market share in commercial aviation; large aerospace assemblers seeking lower cost markets to source parts; the globalization of customers and, in turn, parts of the supply chain; woes in the air travel industry; and increases in productivity that were not offset by increases in business. Structural changes in the insurance industry led to the outsourcing of many jobs to lower cost regions, such as Scranton and metropolitan areas in the Great Plains.

As of the fall of 2010, no public or private organization had undertaken or planned any policy or strategy to restructure the regional economy in response to the Great Recession. Some of our interviewees thought such restructuring was necessary but none thought it possible within the region's existing structure of governments and private organizations. They believed that the region's eventual recovery from the Great Recession would be a continuation of pre-recession trends, including continued high wages and productivity, gradual loss of aerospace manufacturing jobs to productivity growth and relocation abroad, and loss of back-office insurance jobs to other U.S. regions.

Summary

What have we learned about regional resilience to economic shock?

Through our quantitative work, we were able to test some, but not all, of the hypotheses suggested by the literature we cited and reviewed in the first part of our paper. Regional economic structure mattered. Regions that had a higher proportion of their employment in durable goods manufacturing were likely to experience *more downturns* and to be *less shock-resistant* with respect to both employment and GMP. However, they were also more likely to be *resilient* after experiencing a downturn and to take fewer years to become resilient. As we observed, these results make sense in light of the cyclical nature of employment patterns.

Industrial concentration also mattered: The greater the number of major export industries in a region, the less susceptible the region is to a downturn and the more shock-resistant it is.

However, human capital played a role as well. Regions that had a higher proportion of working age population with a high school degree or less were likely to experience *more downturns* and to be *less shock-resistant*. However, they were also more likely to be *resilient* after experiencing an employment downturn and to take fewer years to become resilient. The latter finding is surprising, since it is generally assumed that better-educated individuals are more adaptive to economic transformations that require changes in behavior and skill sets. However, if resilience is simply a "bounce-back" of a region due to downturns caused by national economic shocks, there is little need for such adaptive behavior.

Other findings that emerged from our analysis included:

- Labor market flexibility is related to resilience, at least to the extent that right-to-work laws are an indicator of flexibility. Regions in states with right-to-work laws are likely to be more resilient when experiencing a downturn than other regions and also take less time to recover to their prior growth rates.
- The greater the income disparities in a region, the more likely it is to experience an employment downturn and the longer it takes to return to its prior growth rate after the downturn. However, income disparities were positively related to resilience in the face of GMP downturns and to the speed with which resilience occurred.

The quantitative work we report on above provides descriptive results about the frequency of shocks, shock-resistance, and resilience and evidence about what regional characteristics are associated with shock-resistance and resilience. They tell us little, however, about the processes through which regional actors protected their regions from or responded to downturns caused by economic shocks. These processes remain a "black box." To gain insight into these processes, we turn to our case studies.

Over the course of the nearly 30 year period we examined we can characterize Detroit and Cleveland as regions that up until the turn of the century simply rode out downturns without changing their economic structure. During the same period, Charlotte was resilient as the result of an economic transformation in which finance and insurance replaced textiles as the primary

economic drivers of the regional economy. Seattle's regional economy was successfully transformed twice, first from wood product manufacturing to aircraft manufacturing, and then to software. Hartford and Grand Forks, which suffered industry shocks to which they have not been resilient seem to have established new equilibriums at lower levels of employment growth, but Hartford had rapid GMP growth despite its slow employment growth.

Why did these differing experiences play out as they did? Our first conclusion is that in virtually all cases the region's resilience or lack thereof was primarily a product of 1) what was happening to its major export industries both nationally and locally and 2) the behavior of individual firms within the region. The strategic decisions of individual firms and their leaders, as well as decisions by entrepreneurs in the area, were the key actions within the region that affected the region's economy and determined whether or not it proved resilient. Charlotte's transformation to a financial center was largely a result of decisions made by the dynamic leaders of two financial institutions headquartered there. Seattle's transformation to a software-based economy was virtually a historical accident – Bill Gates' decision to move there in the late 1970s and the subsequent birth of Microsoft and other information technology-intensive firms around it (although the region's educated labor force and amenity attractions to educated in-migrants undoubtedly facilitated the growth of this sector). Detroit's economy reflected decisions that the Big Three auto firms made as the auto industry globalized that ultimately reduced their competitiveness and thus the region's economy.

The various shock-induced downturns were often met with public concern and public activity, with the exception of Detroit, where people believed the regional economy would simply recover when the national economy recovered. New organizations and new programs were formed with goals related to diversification, promoting entrepreneurship and innovation, and more intensive area marketing. Cleveland's economic development leaders tried the full panoply of organizations and programs, following recommendations from RAND, McKinsey, and Deloitte in their quest to restructure the region's economy to be more robust. In Detroit, there have been a variety of recent efforts in which foundations have played an important if not the lead role, such as the New Economy Initiative. Charlotte's Chamber of Commerce initiated the "Advantage Carolina" project in 1998. In the wake of a serious recession, Seattle created Enterprise Seattle to recruit new firms to the region. In response to the 1990 recession and the industry shock to the insurance industry, the Greater Hartford Chamber of Commerce created a

regional economic development (business recruitment and retention) agency. However, there has been little or no public or civic response in the Hartford region in terms of organizational creation or restructuring or regional strategy in response to the downturns related to the recessions of 2000 or of 2008.

Organizational creation and restructuring were frequent "responses" to shock. So, in some cases, were increased efforts at collaboration across previously impervious boundaries or network creation among firms in similar sectors or engaged in similar kinds of activities. Many people we interviewed in the Detroit area noted the increased efforts at regional collaboration during the past several years, an activity that was nearly absent prior to the 2000 economic downturn from which the region has not yet recovered. Similarly, the twin shocks of military base closings and the 1997 flood triggered substantial increases in collaboration in the Grand Forks region; as we noted earlier, community leaders saw these shocks as a catalyst, changing how the community interacted and its self-image. In the Hartford region several industry-specific organizations, some supported by the state cluster initiative, were founded during the 1990s and early 2000 to spur development in particular industries, but these were responses to the region's long-term economic stagnation rather than responses to specific shock-induced downturns.

What effect did these explicit efforts to promote economic growth have? First, while policymakers in all of the six regions engaged in traditional economic planning and development activities (marketing and promotion, tax subsidies, job training programs), there is no reason to believe that these activities played a major role in determining whether the region was shock-resistant or resilient to downturns caused by shock. This is not to say that these programs were ineffective or that they were not better in some places than in others; however, virtually no one we interviewed thought that they played a major role in the region's resilience, and we find no reason to quarrel with that assessment.

The effect of other explicit responses is difficult to gauge. Some reflected a reasonable understanding of the region's economic condition and long-term prospects better than did others. To the effect that they reflect community concern, cohesion, and concerted activity they are probably a good thing. But there have been no serious efforts at evaluation, and, indeed, it is difficult to evaluate responses that were multifaceted and would have been expected to take a long time to have an impact. This is particularly true in the presence of other major forces – the

activities of the area's existing firms. Perhaps the strongest evidence of policy impact that we observed was Grand Forks policymakers' pursuit and support of manufacturers, which probably helped lead to an increase in the region's manufacturing specialization. However, even that evidence is only suggestive.

Our focus to this point has been on *responses*. Do policymakers in some regions engage in *precautionary planning* that make it less likely for their economies to experience shock-induced downturns or more resilient in the face of downturns?? We found little evidence of this kind of advance planning. Indeed, in many cases the *response* to shock-induced downturns included expressions of regret at not having taken such precautionary action. A frequent question was why a region – Detroit is a particularly good example – had failed to diversify its export base to avoid the problems associated with concentration in one sector. But this begs the question in two senses. First, as some of the people in Detroit observed, the dependence on the auto industry had brought them prosperity for nearly a century. They may be paying for that now, but a century is a pretty good run for a regional economy. Second, even had they wanted to diversify, what could or should they have done? Expressing the desirability of diversification is not the same as actually doing it; what are the leverage points in the regional economy that could have been manipulated to bring about diversification?[91]

Grand Forks is particularly interesting in that our interviewees stressed how resilient the area was and how successful its recovery was from the industry shock and flood of 1996-97. Yet our data show that the region was non-resilient to that shock and, indeed, seems to have established a new equilibrium at an employment growth rate considerably lower than its previous one. And, indeed, perhaps the evaluation of the Grand Forks community is at least as relevant as the picture presented by our data. Regional economic resilience inevitably has a subjective component, and the perception of regional economic resilience that our definition incorporates need not reflect the perceptions of leaders in every region. The Grand Forks region has continued to grow and prosper and those whom we interviewed said that the community seems happy with the results. In 1995, the year prior to the onset of the regional downturn wages per worker in Grand Forks amounted to $24,414 in 2005 dollars; in 2007 wages per worker had

[91] The six case study regions had quite varied trends. Detroit, which had the second highest index of concentration in 1980 actually increased its degree of concentration by 2000, as did Cleveland, which had the lowest concentration index in 1980. The two regions with the most rapid job growth over that time period, Charlotte and Seattle, both had greater industrial diversity in 2000 than they had in 1980, but so did Hartford, one of the regions with the slowest job growth.

increased by 17.7 percent to $28,726, also in 2005 dollars. However, this increase was considerably less than the 24 percent increase in wages per worker nationally during the same period.

Hartford presents a different scenario. Employment in the region was actually nearly 30,000 jobs less in 2007 than it was in 1988. Yet wages per worker in 2005 dollars had increased by 35.9 percent from $39,019 per worker in 1988 to $53,030 in 2007. It appears that the Hartford region has shed a large number of low-income workers, including many back office workers in the insurance industry, and has retained or added high wage workers to its economy. Hartford was the only one of the six case study regions where income inequality (as measured by the ratio of the income of the household at the 80th percentile of the income distribution to that of the household at the 20th percentile) actually increased (from 3.74 in 1980 to 4.13 in 2000).

Conclusion

This chapter has several lessons for regional economic development policymakers. First, they should understand the ways in which their regions are vulnerable to downturns or likely to have trouble recovering from them. Detroit, for example, is especially vulnerable to employment and GMP shocks because of its dependence on durable goods manufacturing, large population of less educated workers, undiversified export base, high degree of income inequality, and less flexible labor market, but the first three of these characteristics also make it quick to recover from employment shocks and its high degree of inequality makes it quick to recover from GMP shocks.

Because it takes a long time to change the regional characteristics that affect resilience-related outcomes, policies and strategies that are put in place after a region has experienced an economic shock are likely to be of little value, as our case studies suggest. Thus, to the extent that they can, policymakers should undertake precautionary planning to make regions less vulnerable to downturns or more likely to rebound from them. Unfortunately our research has very little to say about what kind of precautionary planning works to increase shock-resistance or resilience to shock. We found no evidence of such effective precautionary and preventive planning. However, our research *has* provided predictive ability of the likelihood or different kinds of regions being adversely affected by different kinds of shocks as well as the length of

time it takes them to recover. This suggests that regional leaders have the ability, if they wish to utilize it, to plan for the adverse effects shock-induced downturns will have on their residents and governments and to put in place efforts to cope with them, even if they are unable to prevent them.

However, our findings suggest that some of the regions that could most benefit from such planning may be ones in which regional actors are least equipped to carry it out effectively. In metropolitan areas with long histories of specialization in durable manufacturing and with large shares of less educated workers in their population (such as Detroit and Cleveland), residents and businesses may come to believe that their regional economies will always bounce back from shocks even when those shocks are due more to fundamental, long-term changes in the regional economy (such as the decline of the auto industry) than to the ordinary ups and downs of the business cycle. In such regions, economic development policymakers may either perceive no need to plan for restructuring of the regional economy (as in Detroit) or carry out plans that are not sufficient to cope with the challenges of restructuring (as in Cleveland).

In addition to industrial and demographic characteristics, the social organization of business in a region can impede planning to mitigate shocks. In regions such as Detroit where a few large firms from the same industry or related industries dominate the economy and civic life, other public and private actors may be unable to plan or carry out plans on a regional basis, simply because they never needed to do so in the past. (Workers, for example, may not believe that shocks to the dominant firms could be permanent because those shocks had never been permanent in the past. Suppliers may lack the design and marketing capacities they would need to compete for other business because the dominant firms had always provided them with ready markets. Local business and economic development groups may lack the capacity to respond because other businesses and nonprofit organizations have neither the experience in bringing together the necessary resources nor the ability to cooperate to do so. Local governments may also lack such experience and ability.[92] Regional leaders in post-2007 Charlotte, long dominated by a few large banks as Detroit was by automakers, may or may not suffer the same inability to plan in the face of the current shock to their region's dominant industry. At the opposite extreme, regions such as Hartford have such fragmented business communities and local public

[92] See Atkins and others (2011).

sectors, with so little communication or coordination among them, that there is simply no organization capable of planning to mitigate economic shocks.

In addition to precautionary planning, which may be difficult or impossible in some regions, what else can regional economic development policymakers do to improve the economic resilience of their regions? As our Cleveland case suggests, policymakers' efforts to improve existing industries and grow new ones may at least cushion the blow of an economic shock. They may also lay the foundation for an eventual return to more robust economic growth.

Appendix

Table A1. Employment Shocks by Type and Their Effects on Regions

Shock Type and Effect				Of Those That Resulted in Downturns		
Type of Shock	Did not Result in Downturn (Region was Shock-Resistant)	Resulted in Downturn	Total	Region was Resilient to Downturn	Region was Non-Resilient to Downturn	Average Length to Recovery for Resilient Regions
National Economic Shock	221 (33%)	440 (67%)	661 (100%)	*245(56%)*	*195 (44%)*	2.8 years
Alone	183(45%)	223 (55%)	406 (100%)	*122 (55%)*	*101 (45%)*	2.8 years
with Local Industry Shock	9(11%)	73(89%)	82(100%)	44 (60%)	29 (40%)	3.0 years
with National Industry Shock	29(17%)	144(83%)	173(100%)	79 (55%)	65 (45%)	2.6 years
Local Industry Shock	383 (58%)	280 (42%)	663 (100%)	*204 (73%)*	*76 (27%)*	2.9 years
Alone	374(64%)	207 (36%)	581(100%)	*160 (77%)*	*47 (23%)*	2.8 years
with National Economic Shock	9(11%)	73 (89%)	82(100%)	44 (60%)	29 (40%)	3.0 years
National Industry Shock	135 (33%)	272 (67%)	407 (100%)	181 (67%)	91 (33%)	2.9 years
Alone	106(45%)	128(55%)	234(100%)	102 (80%)	26 (20%)	3.1 years
with National Economic Shock	29(17%)	144(83%)	173(100%)	79 (55%)	65 (45%)	2.6 years
Total Shocks (Not Double-Counting)	701 (47%)	775 (53%)	1476 (100%)	507 (65%)	268 (35%)	2.9 years

Source: Authors' analysis.

Table A2. GMP Shocks by Type and Their Effects on Regions

Shock Type and Effect				**Of Those That Resulted in Downturns**		
Type of Shock	Did not Result in Downturn (Region was Shock-Resistant)	Resulted in Downturn	Total	Region was Resilient to Downturn	Region was Non-Resilient to Downturn	Average Length to Recovery for Resilient Regions
National Economic Shock	233 (55%)	188 (45%)	421 (100%)	*148 (79%)*	*40 (21%)*	2.3 years
Alone	178 (74%)	62 (26%)	240 (100%)	*45 (73%)*	*17(27%)*	2.3 years
with Local Industry Shock	24 (32%)	50 (68%)	74 (100%)	42 (84%)	8 (16%)	2.0 years
with National Industry Shock	31 (29%)	76 (71%)	107 (100%)	61 (80%)	15 (20%)	2.5 years
Local Industry Shock	414 (58%)	297 (42%)	711 (100%)	*258 (87%)*	*39 (13%)*	2.4 years
Alone	390 (61%)	247 (39%)	637 (100%)	*216 (87%)*	*31 (13%)*	2.4 years
with National Economic Shock	24 (32%)	50 (68%)	74 (100%)	42 (84%)	8 (16%)	2.0 years
National Industry Shock	184 (42%)	258 (58%)	442 (100%)	226 (88%)	32 (12%)	2.4 years
Alone	153 (46%)	182 (54%)	335 (100%)	165 (91%)	17 (9%)	2.4 years
with National Economic Shock	31 (29%)	76 (71%)	107 (100%)	61 (80%)	15 (20%)	2.5 years
Total Shocks (Not Double-Counting)	776 (56%)	617 (44%)	1393 (100%)	529 (86%)	88 (14%)	2.4 years

Source: Authors' analysis.

Model 1: Explaining the occurrence of regional economic downturns. We employ a hazard model, a model in which the dependent variable measures the duration of time that an entity spends in a steady state before experiencing a particular event.[93] A hazard model estimates when the event is likely to occur and the independent variables in the model measure the effect of each on the probability that it will occur in a given year. The event of interest in this case is a regional economic downturn, defined as a decline of at least two percentage points in the prior eight-year average annual growth rate. Model 1 thus estimates how much time occurs until a metropolitan area experiences a downturn. This is equivalent to asking what conditions contribute to an area suffering a downturn in a given year.

The unit of analysis is a regional economy-year (i.e., each of the 361 metropolitan areas in each of the 30 years is a separate observation).[94] Since the model seeks to answer the question, how much time occurs until a metropolitan area experiences a downturn, we used only those observations when a metropolitan area was not already in a downturn and thus was capable of suffering from a new one.

Model results are presented in Tables A3 (for employment) and A4 (for GMP). Positive coefficients on a variable indicate an increase in the risk of a metropolitan area experiencing a downturn, given that one has not already occurred.[95] Negative coefficients indicate a decrease in the risk of a downturn occurring. The results can also be discussed in terms of hazard ratios, which allow for easier substantive interpretation. A hazard ratio of 1 suggest that a one-unit increase in a variable does not change the risk of experiencing the event in question, given that it hasn't already occurred. A hazard ratio of 2 suggests that a one unit increase in a variable doubles the risk of experiencing the event, given that it hasn't already occurred. Variables that

[93] Specifically, we use the Cox proportional hazards model. The Cox model is different from parametric models in that it leaves the hazard rate unparameterized; that is, it makes no a priori assumptions about the shape of the hazard. The hazard rate represents the risk of experiencing an event, given that the entity in question hasn't experienced it yet. Box-Steffensmeier and Jones (2004) have argued that in most settings the Cox model is preferable to parametric alternatives due to its less strict assumptions about the data-generating process.

[94] We apply the conditional gap time correction to the standard Cox model as recommended by Box-Steffensmeier and Zorn for sequential repeated events, using the Efron method to account for coterminous event occurrences or "ties." The model stratifies by the order in which the event (in this case, a downturn) occurs and uses robust variance estimates. See Box-Steffensmeier and Zorn (2002). Standard errors are clustered by metropolitan area.

[95] In the case that a metro experienced a downturn previously, then this can be taken to mean that a downturn has yet to occur in the years *since* a previous downturn. In other words, after a downturn occurs and is resolved, the area can once again experience another downturn

are expressed as a percentage have been standardized so that their values fall between 0 and 100 (rather than 0 and 1.0), allowing for more meaningful interpretation of the hazard ratios.

Table A3. Likelihood of metropolitan area experiencing an employment downturn in a given year (Model 1)

Variable	**Cox Regression: Conditional Gap Time Model**			
-	**Coefficient**	**Standard Error**	**Hazard Ratio**	**Standard Error**
Percent of population with high school education or less	0.048***	0.008	1.049***	0.008
Lagged employment	0.000	0.000	1.000	0.000
Wages Per Worker	0.002	0.012	1.002	0.012
Percent of employment in Durable manufacturing	0.028***	0.008	1.028***	0.008
Percent of employment in Non-Durable manufacturing	0.013	0.013	1.013	0.013
Percent of employment in Health Care and Social Assistance	-0.083***	0.027	0.921***	0.025
Percent of employment in Tourism-Related Industries	-0.015	0.013	0.985	0.013
Number of major export industries	-0.076***	0.023	0.927***	0.022
Herfindahl index	0.028*	0.015	1.028*	0.015
Eight-Year Growth Rate	0.211***	0.033	1.235***	0.041
National Economic Downturn Shock	1.027***	0.078	2.791***	0.219
Local Industry Shock Alone	1.227***	0.107	3.410***	0.363
National Industry Shock Alone	1.538***	0.135	4.655***	0.631
National Econ. Downturn Shock and Local Ind. Shock	1.220***	0.136	3.386***	0.462
National Econ. Downturn Shock and National Ind. Shock	1.506***	0.091	4.509***	0.411
Northeast	-0.791***	0.212	0.453***	0.096
Midwest	-0.091	0.169	0.913	0.154
South	-0.867***	0.163	0.420***	0.068
MSA age	0.003**	0.001	1.003**	0.001
Percent of population in principal city	-0.002	0.003	0.998	0.003
Number of research universities (2010)	0.002	0.079	1.002	0.079
Right-to-work law	0.148	0.127	1.159	0.147
Percent of population Non-Hispanic Black	-0.000	0.006	1.000	0.006
Percent of population Hispanic	-0.011***	0.004	0.989***	0.004
Income Ratio 80-20	0.274**	0.111	1.315**	0.146
Chi^2	*887.13*			
$Prob > Chi^2$	*0.0000*			
N	*6518*			

*** p < 0.01, ** p < 0.05, * p < 0.1
Source: Authors' analysis.

Table A4. Likelihood of metropolitan area experiencing a GMP downturn in a given year (Model 1)

Variable	**Cox Regression: Conditional Gap Time Model**			
	Coefficients	**Standard Error**	**Hazard Ratio**	**Standard Error**
Percent of population with high school education or less	0.054***	0.009	1.056***	0.010
Lagged GMP	-0.000	0.000	1.000	0.000
Wages per Worker	0.021*	0.012	1.022	0.012
Percent of employment in Durable manufacturing	0.024**	0.010	1.024***	0.010
Percent of employment in Non-Durable manufacturing	-0.001	0.014	0.999	0.014
Percent of employment in Health Care and Social Assistance	-0.039*	0.023	0.961*	0.022
Percent of employment in Tourism-Related Industries	-0.004	0.012	0.996	0.012
Number of major export industries	-0.083***	0.022	0.920***	0.020
Herfindahl index	0.010	0.019	1.010	0.019
Eight-Year Growth Rate	0.186***	0.031	1.205***	0.037
National Economic Downturn Shock	0.071	0.121	1.073	0.13
Local Industry Shock Alone	0.773***	0.093	2.167***	0.202
National Industry Shock Alone	1.067***	0.104	2.906***	0.302
National Econ. Downturn Shock and Local Ind. Shock	0.848***	0.155	2.334***	0.362
National Econ. Downturn Shock and National Ind. Shock	0.962***	0.126	2.618***	0.330
Northeast	-0.080	0.248	0.923	0.229
Midwest	-0.025	0.195	0.976	0.190
South	-0.136	0.194	0.873	0.170
MSA age	-0.001	0.001	0.999	0.001
Percent of population in principal city	0.007**	0.003	1.007**	0.003
Number of research universities (2010)	0.135	0.083	1.144	0.095
Right-to-work law	-0.268**	0.133	0.765**	0.101
Percent of population Non-Hispanic Black	0.012	0.008	1.012	0.008
Percent of population Hispanic	-0.019***	0.006	0.981***	0.006
Income Ratio 80-20	-0.059	0.104	0.942	0.098
Chi^2	*378.30*			
$Prob > Chi^2$	*0.0000*			
N	*5025*			

*** p < 0.01, ** p < 0.05, * p < 0.1
Source: Authors' analysis of Moody's Economy.com data.

Model 2: Explaining Shock Resistance. Model 2 is a logistic regression that examines what makes regions "shock-resistant." This model differs conceptually from model 1 because it considers only instances in which a region has experienced some sort of identifiable shock, while model 1 includes all metropolitan areas in all years, regardless of whether a shock has occurred in a metropolitan area. Each observation represents a year in which a region suffered from at

least one type of shock. As with the previous model, we exclude those observations where a region was already in a downturn and thus could not be adversely affected by further shocks. We exclude national economic downturn shocks from the model. Thus, the results for the other types of shocks should be interpreted as the probability of a type of shock causing a downturn *relative to* the probability of a national economic shock causing a downturn.

We employ logistic regression to explore those factors that contributed to a region's shock resistance. To make for easier substantive interpretation, we calculate discrete effects for each variable, which can be interpreted as the increase in the probability of an event occurring produced by a one unit increase in the independent variable (from half a unit below its mean value to half a unit above), holding all other variables at their mean values. If the variable in question is a dummy variable, then the discrete effect represents the effect of the dummy changing from 0 to 1, holding all other variables at their mean values. Model results are shown in Tables A5 (for employment) and A6 (for GMP). Standard errors are robust and clustered by metropolitan area.

Table A5. Did Shock Result in an Employment Downturn? (Model 2, Logit)

Variable	Coefficient	Standard Error	Discrete Effect
Percent of population with high school education or less	0.040***	0.009	0.010
Lagged total employment	0.000	0.000	0.000
Wages Per Worker	0.076***	0.019	0.019
Percent of employment in Durable Manufacturing	0.034***	0.012	0.008
Percent of employment in Non-Durable Manufacturing	0.027*	0.015	0.007
Percent of employment in Health Care and Social Assistance	0.005	0.026	0.001
Percent of employment in Tourism-Related Industries	-0.032	0.023	-0.008
Number of major export industries	-0.094***	0.033	-0.023
Herfindahl Index	0.028	0.018	0.007
Eight-Year Growth Rate	0.755***	0.079	0.185
Local Industry Shock Alone	-0.379**	0.169	-0.094
National Industry Shock Alone	-0.041	0.203	-0.010
National Econ. Downturn Shock and Local Ind. Shock	2.328***	0.410	0.400
National Econ. Downturn Shock and National Ind. Shock	1.540***	0.250	0.322
Northeast	0.208	0.359	0.051
Midwest	0.430*	0.259	0.105
South	-0.483*	0.276	-0.119
MSA age	0.004*	0.002	0.001
Percent of population in principal city	-0.008*	0.004	-0.002
Number of research universities (2010)	0.072	0.157	0.018
Right-to-work law	0.084	0.169	0.021
Percent of population Non-Hispanic Black	0.026***	0.007	0.007
Percent of population Hispanic	0.004	0.006	0.001
Income Ratio 80-20	0.140	0.145	0.035
Chi2	328.87		
Prob > Chi2	0.00		
Pseudo R2	0.27		
N	1,476		

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' analysis.

Table A6. Did Shock Result in a GMP Downturn? (Model 2, Logit)

Variable	Coefficient	Standard Error	Discrete Effect
Percent of population with high school education or less	0.037***	0.011	0.009
Lagged GMP	-0.000	0.000	0.000
Wages Per Worker	0.110***	0.022	0.027
Percent of employment in Durable Manufacturing	0.015	0.015	0.004
Percent of employment in Non-Durable Manufacturing	-0.019	0.019	-0.004
Percent of employment in Health Care and Social Assistance	0.001	0.025	0.000
Percent of employment in Tourism-Related Industries	-0.032	0.021	-0.008
Number of major export industries	-0.044	0.031	0.011
Herfindahl Index	0.021	0.028	0.005
Eight-Year Growth Rate	0.436***	0.053	0.107
Local Industry Shock Alone	0.784***	0.198	0.191
National Industry Shock Alone	1.365***	0.205	0.328
National Econ. Downturn Shock and Local Ind. Shock	2.314***	0.342	0.470
National Econ. Downturn Shock and National Ind. Shock	1.870***	0.278	0.413
Northeast	0.090	0.306	0.022
Midwest	0.307	0.263	0.076
South	0.204	0.253	0.050
MSA age	-0.002	0.002	0.000
Percent of population in principal city	0.010**	0.004	0.002
Number of research universities (2010)	-0.012	0.175	0.003
Right-to-work law	-0.204	0.178	-0.050
Percent of population Non-Hispanic Black	-0.002	0.008	0.001
Percent of population Hispanic	-0.010	0.007	-0.002
Income Ratio 80-20	0.262**	0.130	0.064
Chi^2	206.46		
$Prob > Chi^2$	0.00		
$Pseudo\ R^2$	0.16		
N	1393		

*** p < 0.01, ** p < 0.05, * p < 0.1
Source: Authors' analysis.

Model 3: Explaining regional responses to economic shocks. Model 3 is a logistic regression that examines the regional characteristics that influence whether a metropolitan area economy that experienced an economic downturn was resilient. This model treats each of the downturns that metropolitan areas experience as separate observations and looks at the factors that contribute to whether or not a metropolitan area is resilient to a particular downturn. Model

results are presented in Tables A7 (for employment) and A8 (for GMP). As with the previous model, standard errors are robust and clustered by metropolitan area.

Table A7. Was Metropolitan Area Resilient to Employment Downturn? (Model 3, Logit)

Variable	**Coefficient**	**Standard Error**	**Discrete Effect**
Percent of population with high school education or less	0.076***	0.011	0.016
Lagged total employment	-0.000	0.000	0.000
Wages Per Worker	-0.034*	0.020	-0.007
Percent of employment in Durable manufacturing	0.032**	0.016	0.007
Percent of employment in Non-Durable manufacturing	-0.032	0.020	-0.006
Percent of employment in Health Care and Social Assistance	-0.083*	0.043	-0.017
Percent of employment in Tourism-Related Industries	0.039**	0.018	0.008
Number of major export industries	-0.022	0.043	-0.005
Herfindahl index	0.053	0.044	0.011
Pre-downturn growth rate	-0.384***	0.054	-0.080
Number of Years in Downturns	-0.132	0.126	-0.028
National Economic Downturn Shock	0.039	0.220	0.008
Local Industry Shock Alone	0.043	0.248	0.009
National Industry Shock Alone	0.098	0.289	0.020
National Econ. Downturn Shock and Local Ind. Shock	-0.719**	0.331	-0.165
National Econ. Downturn Shock and National Ind. Shock	-0.591**	0.252	-0.133
Northeast	-1.301***	0.374	-0.305
Midwest	-0.885***	0.283	-0.197
South	-0.684**	0.316	-0.145
MSA age	-0.001	0.002	0.000
Percent of population in principal city	0.003	0.006	0.001
Number of research universities (2010)	0.048	0.142	0.001
Right-to-work law	0.398*	0.214	0.083
Percent of population Non-Hispanic Black	0.007	0.012	0.001
Percent of population Hispanic	0.007	0.007	0.001
Income Ratio 80-20	-0.349**	0.152	-0.073
Chi^2	*206.41*		
$Prob > Chi^2$	*0.00*		
$Pseudo\ R^2$	*0.20*		
N	*1076*		

*** p < 0.01, ** p < 0.05, * p < 0.1
Source: Authors' analysis.

Table A8. Was Metropolitan Area Resilient to Downturn? (Model 3, Logit)

Variable	Coefficient	Standard Error	Discrete Effect
Percent of population with high school education or less	-0.007	0.019	0.000
Lagged GMP	0.000	0.000	0.000
Wages Per Worker	0.045	0.030	0.003
Percent of employment in Durable manufacturing	0.015	0.028	-0.001
Percent of employment in Non-Durable manufacturing	-0.016	0.033	-0.001
Percent of employment in Health Care and Social Assistance	-0.116*	0.060	-0.009
Percent of employment in Tourism-Related Industries	0.017	0.030	0.001
Number of major export industries	0.018	0.048	0.001
Herfindahl index	0.003	0.044	0.000
Pre-downturn growth rate	-0.726***	0.082	-0.055
Number of Years in Downturns	-0.500**	0.195	-0.038
National Economic Downturn Shock	-0.664*	0.361	-0.063
Local Industry Shock Alone	-0.367	0.310	-0.030
National Industry Shock Alone	-0.095	0.357	-0.007
National Econ. Downturn Shock and Local Ind. Shock	-0.668	0.518	-0.064
National Econ. Downturn Shock and National Ind. Shock	-0.181	0.389	-0.014
Northeast	-0.838*	0.476	-0.083
Midwest	0.421	0.466	0.029
South	0.118	0.451	0.009
MSA age	-0.008**	0.003	0.000
Percent of population in principal city	0.004	0.008	0.000
Number of research universities (2010)	-0.267	0.210	-0.020
Right-to-work law	0.703**	0.337	0.051
Percent of population Non-Hispanic Black	-0.041**	0.017	-0.003
Percent of population Hispanic	0.012	0.014	0.001
Income Ratio 80-20	0.519**	0.243	0.039
Chi^2	*192.02*		
Prob > Chi^2	*0.00*		
Pseudo R^2	*0.28*		
N	*952*		

*** p < 0.01, ** p < 0.05, * p < 0.1
Source: Authors' analysis.

Model 4: Explaining Length of Time to Resilience. Model 4, a hazard model in the form of model 1, explains what determines *how long* it takes after a downturn occurs for a region to become resilient. This model is limited to those observations when metropolitan areas are already in a downturn and excludes years when a metropolitan area is in a growth period.[96] The results are presented in Tables A9 (for employment) and A10 (for GMP). By exploiting the full

[96] We censor those observations in which a metro area is deemed non-resilient to a downturn; that is, the full amount of time it takes for these regions to recover from the downturn, if they do recover, is considered to be unobserved in the data.

time-series/cross-sectional nature of the data, the hazard model includes more observations than does the logit model used for model 3. Thus, more variables attain statistical significance.

Table A9. Does Metropolitan Area Recover from an Employment Downturn in a Given Year? (Model 4)

Variable	Cox Regression: Conditional Gap Time Model			
	Coefficient	Standard Error	Hazard Ratio	Standard Error
Percent of population with high school education or less	0.031***	0.009	1.032***	0.010
Lagged employment	-0.000*	0.000	1.000*	0.000
Wages Per Worker	-0.062***	0.017	0.939***	0.016
Percent of employment in Durable manufacturing	0.027***	0.010	1.028***	0.010
Percent of employment in Non-Durable manufacturing	-0.003	0.012	0.997	0.012
Percent of employment in Health Care and Social Assistance	-0.092***	0.028	0.912***	0.025
Percent of employment in Tourism-Related Industries	0.043***	0.012	1.044***	0.012
Number of major export industries	-0.013	0.026	0.987	0.025
Herfindahl index	-0.003	0.024	0.997	0.024
Pre-downturn growth rate	-0.408***	0.041	0.665***	0.027
Number of Years in Downturns	-0.777***	0.077	0.460***	0.035
National Economic Downturn Shock	0.350**	0.166	1.419**	0.236
Local Industry Shock Alone	0.294*	0.169	1.341*	0.227
National Industry Shock Alone	0.162	0.185	1.176	0.218
National Econ. Downturn Shock and Local Ind. Shock	0.349*	0.192	1.418*	0.272
National Econ. Downturn Shock and National Ind. Shock	0.463***	0.168	1.590***	0.267
Northeast	-0.715***	0.242	0.489***	0.118
Midwest	-0.751***	0.201	0.472***	0.095
South	-0.399*	0.210	0.671*	0.141
MSA age	0.002	0.001	1.002	0.001
Percent of population in principal city	0.001	0.004	1.001	0.004
Number of research universities (2010)	0.204**	0.094	1.226**	0.115
Right-to-Work Law	0.292**	0.132	1.339**	0.177
Percent of population Non-Hispanic Black	0.005	0.008	1.005	0.008
Percent of population Hispanic	0.007	0.006	1.007	0.006
Income Ratio 80-20	-0.323***	0.121	0.724***	0.087
Chi^2	*503.75*			
$Prob > Chi^2$	*0.00*			
N	*5018*			

*** p < 0.01, ** p < 0.05, * p < 0.1
Source: Authors' analysis.

Table A10. Does Metropolitan Area Recover from a GMP Downturn in a Given Year? (Model 4)

Variable	**Cox Regression: Conditional Gap Time Model**			
	Coefficient	**Standard Error**	**Hazard Ratio**	**Standard Error**
Percent of population with high school education or less	0.008	0.011	1.008	0.011
Lagged GMP	-0.000	0.000	1.000	0.000
Wages per Worker	-0.028	0.020	0.972	0.019
Percent of employment in Durable manufacturing	0.000	0.011	1.000	0.011
Percent of employment in Non-Durable manufacturing	-0.023	0.016	0.977	0.016
Percent of employment in Health Care and Social Assistance	-0.081***	0.027	0.922***	0.025
Percent of employment in Tourism-Related Industries	-0.014	0.022	0.986	0.021
Number of major export industries	0.005	0.024	1.005	0.024
Herfindahl index	-0.006	0.027	0.994	0.026
Pre-downturn growth rate	-0.380***	0.033	0.684***	0.022
Number of Years in Downturns	-1.439***	0.101	0.237***	0.024
National Economic Downturn Shock	0.266	0.222	1.304	0.290
Local Industry Shock Alone	-0.070	0.170	0.933	0.159
National Industry Shock Alone	0.051	0.172	1.052	0.181
National Econ. Downturn Shock and Local Ind. Shock	0.018	0.193	1.018	0.197
National Econ. Downturn Shock and National Ind. Shock	0.213	0.174	1.238	0.216
Northeast	-0.616**	0.258	0.540**	0.139
Midwest	0.011	0.200	1.011	0.203
South	-0.232	0.227	0.793	0.180
MSA age	-0.000	0.001	1.000	0.001
Percent of population in principal city	0.006	0.003	1.006	0.003
Number of research universities (2010)	-0.002	0.116	0.999	0.116
Right-to-Work Law	0.419***	0.158	1.521***	0.240
Percent of population Non-Hispanic Black	-0.022***	0.007	0.978***	0.007
Percent of population Hispanic	-0.002	0.005	0.998	0.005
Income Ratio 80-20	0.424***	0.103	1.528***	0.158
Chi^2	*708.02*			
$Prob > Chi^2$	*0.00*			
N	*3508*			

*** p < 0.01, ** p < 0.05, * p < 0.1
Source: Authors' analysis.

Tables A11 and A12 present summary statistics for the data used in the employment and GMP models, respectively.

Table A11. Summary Statistics - Employment (1978-2007)

Variable	Source	Mean	Min	Max
Percent of population with high school education or less	Census /DataFerrett/GeoLytics	58	22	83
Lagged employment (Thousands of Jobs)	Economy.com	271	5	8532
Wages per Worker (Thousands of 2005 $)	Economy.com/Own Calculations	31	18	87
Percent of employment in the following categories:				
- Durable manufacturing (NAICS 33)	Economy.com/Own Calculations	9	0	43
- Non-Durable (31, 32)	Economy.com/Own Calculations	6	0	38
- Health Care and Social Assistance (62)	Economy.com/Own Calculations	9	1	36
- Tourism-Related Industries (Arts, Entertainment, Recreation, Accommodation, and Food-Services) (71-72)	Economy.com/Own Calculations	9	3	41
Number of major export industries	Economy.com/Own Calculations	5	0	15
Herfindahl index	Economy.com/Own Calculations	5	2	42
Eight-Year growth rate	Economy.com/Own Calculations	0.02	-0.06	0.15
Number of Years in Secondary Downturns	Economy.com/Own Calculations	0.29	0	4
National Economic Downturn Shock	Economy.com/Own Calculations	0.06	0	1
Local Industry Shock Alone	Economy.com/Own Calculations	0.09	0	1
National Industry Shock Alone	Economy.com/Own Calculations	0.03	0	1
National Econ. Downturn Shock and Local Ind. Shock	Economy.com/Own Calculations	0.01	0	1
National Econ. Downturn Shock and National Ind. Shock	Economy.com/Own Calculations	0.02	0	1
Northeast	Census	0.12	0	1
Midwest	Census	0.25	0	1
South	Census	0.41	0	1
West	Census	0.22	0	1
MSA age (Numbers of years since principal city passed 50,000 in population in a decennial census)	Historical Census Data	52	0	210
Percent of population in principal city	Census /DataFerrett/GeoLytics	44	10	100
Number of research institutions (Universities classified by the Carnegie Foundation as involved in either high or very high research activity)	Carnegie Foundation	0.51	0	13
Right-to-work state	National Right to Work Legal Defense Foundation	0.43	0	1
Percent of population Non-Hispanic Black	Census /DataFerrett/GeoLytics	10	0	48
Percent of population Hispanic	Census /DataFerrett/GeoLytics	7	0	94
Income Ratio 80-20	Census /DataFerrett/GeoLytics	4.17	2.94	7.95

Note: Statistics are for fully pooled data. Models will exclude certain observations.
Source: Authors' analysis.

Table A12. Summary Statistics - GMP (1986-2007)

Variable	Source	Mean	Min	Max
Percent of population with high school education or less	Census /DataFerrett/GeoLytics	52	22	76
Lagged GMP (Millions)	Economy.com	23	0.5	1110
Wages per Worker (Thousands of 2005 $)	Economy.com/Own Calculations	32	20	87
Percent of employment in the following categories:				
- Durable manufacturing (NAICS 33)	Economy.com/Own Calculations	8	0	41
- Non-Durable manufacturing (31, 32)	Economy.com/Own Calculations	6	0	38
- Health Care and Social Assistance (62)	Economy.com/Own Calculations	10	2	36
- Tourism-Related Industries (Arts, Entertainment, Recreation, Accommodation, and Food-Services) (71-72)	Economy.com/Own Calculations	9	3	41
Number of major export industries	Economy.com/Own Calculations	6	0	16
Herfindahl index	Economy.com/Own Calculations	5	2	38
Eight-Year growth rate	Economy.com/Own Calculations	0.03	-0.11	0.12
Number of Years in Secondary Downturns	Economy.com/Own Calculations	0.22	0	3
National Economic Downturn Shock	Economy.com/Own Calculations	0.05	0	1
Local Industry Shock Alone	Economy.com/Own Calculations	0.14	0	1
National Industry Shock Alone	Economy.com/Own Calculations	0.06	0	1
National Econ. Downturn Shock and Local Ind. Shock	Economy.com/Own Calculations	0.02	0	1
National Econ. Downturn Shock and National Ind. Shock	Economy.com/Own Calculations	0.02	0	1
Northeast	Census	0.12	0	1
Midwest	Census	0.25	0	1
South	Census	0.41	0	1
West	Census	0.22	0	1
MSA age (Numbers of years since principal city passed 50,000 in population in a decennial census)	Historical Census Data	52	0	210
Percent of population in principal city	Economy.com/Own Calculations	43	10	100
Number of research institutions (Universities classified by the Carnegie Foundation as involved in either high or very high research activity)	Carnegie Foundation	0.5	0	13
Right-to-work state	National Right to Work Legal Defense Foundation	0.44	0	1
Percent of population Non-Hispanic Black	Economy.com/Own Calculations	10	0	48
Percent of population Hispanic	Economy.com/Own Calculations	8	0	94
Income Ratio 80-20	Economy.com/Own Calculations	4.18	2.98	7.95

Note: Statistics are for fully pooled data. Models will exclude certain observations.
Source: Authors' analysis.

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