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## **Exploring Regional Economic Resilience**

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Although the literature on regional macroeconomics continues to emphasize the analysis of economic growth, the concept of economic resilience is of increasing interest to policymakers. The terrorist attacks of September 11, 2001, and Hurricane Katrina in 2005 focused attention on the ability of regional economies to respond to human-made and natural disasters (Chernick 2005, Liu and Plyer 2007). The steep losses of U.S. manufacturing jobs since 2000, especially in the Great Lakes Region, have prompted a great deal of concern about how regional economies experiencing those losses can rebound (Wial and Friedhoff 2005, Wial 2007, McGahey and Vey 2008).

Despite the growing importance of the idea of economic resilience, the concept has not been carefully defined or measured. Drawing on implicit definitions used in the limited literature on economic resilience and on more explicit treatments of the concept in the ecological literature, this paper begins by outlining some possible meanings of regional economic resilience. Using these definitions, it then describes in more detail a quantitative and qualitative research methodology that can be used to operationalize the concept and assess the determinants of regional economic resilience.

### **Some Possible Meanings of Regional Economic Resilience**

In their review of the social science literature on resilience, Pendall, Foster, and Cowell (2007) identify four broad themes associated with the concept of resilience: equilibrium, path-dependence, a systems perspective, and a long-term perspective. These themes provide a useful starting point for thinking about what regional economic resilience could mean.

*Equilibrium.* To an economist, perhaps the most natural meaning of regional economic resilience is the ability of a regional economy to maintain a pre-existing state (typically assumed to be an equilibrium state) in the presence of some type of exogenous shock. Although only a few studies explicitly use the term “resilience,” most of the small economic literature that deals with the idea of resilience is concerned with the extent to which a regional or national economy that has experienced an external shock is able to return to its previous level and/or growth rate of output, employment, or population (Blanchard and Katz 1992; Rose and Liao 2005; Briguglio et al. 2006, Feyrer, Sacerdote, and Stern 2007).<sup>1</sup>

A related concept of resilience is the extent to which a regional economy is able to avoid being thrown out of its previous equilibrium state 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 likely to experience a negative demand shock) or withstanding the shock with little or no adverse impact (e.g., by having an economy that is sufficiently diversified that the shock has little macroeconomic effect) (Briguglio et al. 2006). Alternatively, or in addition, it could involve the extent to which the initial impact of a shock is dampened, so that the region does not experience large swings in output or

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<sup>1</sup> 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.

other macroeconomic variables (Duval, Elmeskov, and Vogel 2007); this concept of resilience embodies a preference for regional macroeconomic stability.

*Path-dependence.* The idea of path-dependence, or historical “lock-in,” is based on the assumption that a regional economy has multiple equilibria, not all of which are efficient (in a static and/or dynamic sense). As a result of cumulative decisions made over a long period of time, a regional economy can become “locked into” a level or growth path of economic performance that is suboptimal (Chinitz 1961, Safford 2004). This suggests a concept of regional economic resilience in which resilience is the ability of a regional economy to avoid becoming locked into such a low-level equilibrium or, if in one, to transition quickly to a “better” equilibrium.

*Systems and long-term perspectives.* The previous concepts of regional economic resilience focus on a single measure of economic performance or on one measure at a time. A long-term, systemic perspective, in contrast, would emphasize the structure of relationships among macroeconomic variables that persists over a long period of time and the economic, political, and social institutions that condition this structure. Institutional economists studying the national economy, for example, have used the concept of “social structures of accumulation” (combinations of mutually reinforcing economic, political, and social institutions that persist for long periods of time and create the conditions for long-term economic growth) to explain the long-term (fifty-year or longer) evolution of national macroeconomic performance (Reich 1997). A social structure of accumulation is not static; although it persists for a long time, it evolves in ways that ultimately threaten firms’ profitability and long-term macroeconomic growth. When this occurs, a given social structure of accumulation decays and, after a period of exploration characterized by greater institutional fluidity, is replaced by a new one. Although this perspective has not been applied to regional economic resilience, it could be. The study of resilience would then be the study of the rise, stability, and eventual decay of the institutions that underlie long-term regional economic growth. A regional economy would be resilient to the extent that its social structure of accumulation was stable or to the extent that it was able to make a rapid transition from one social structure of accumulation to another.

### **Operationalizing the Concept of Regional Economic Resilience**

Each of the general concepts of regional economic resilience outlined above can be operationalized in multiple ways. The different concepts can also be combined for operational purposes. In this paper we develop a quantitative operational definition that draws primarily from equilibrium concepts of resilience, although we do not need to assert the existence of equilibria to implement this definition. Later we outline a case study methodology that is capable of shedding light on path-dependence and systemic resilience.

We conceptualize regional economic resilience as the ability of a region (defined roughly as a metropolitan area) to recover successfully from shocks to its economy that either throw it off its growth path or have the potential to throw it off its growth path but do not

actually do so. Regional economies can be thrown off their growth paths through (a) *structural change* resulting from global or domestic competition, from changes in the region's competitive advantage for various products, and/or from changes in consumer demand for products the region produces, or b) other external shocks (a natural disaster, closure of a military base, movement of an important firm out of the area, etc.)

Regions that experience negative economic shocks may exhibit three different kinds of responses. Some of these regions may have returned to or exceeded their previous growth path within a relatively short period of time (definitional concerns dealt with below); these regions might be called *economically resilient*. Some may not have been thrown off their growth path at all; these regions might be called *shock-resistant*. Finally, some regions may have been *unable* to rebound and return to or exceed their previous path; these might be called *non-resilient*. (Note that these definitions imply that non-shock-resistant regions must be either resilient or non-resilient.) All three types of region may have experienced above-average growth, growth at or near the national average, or stagnation or very slow economic growth, before the negative shock hit them.

Note that economic resilience can occur because the region's economy underwent a major change in its industry structure, because it experienced less radical economic changes (e.g., existing firms adopted better technologies or organizational forms or produced new products), or because it just bounced back without restructuring (e.g., because of favorable shifts in the demand for its products). The 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.

Economically resilient and non-resilient regions can be identified using data on aggregate economic performance of regions, while shock-resistant regions can be identified using regional-level data on industry performance or other information on non-industry shocks to regional economies. For the purposes of quantitative analysis current U.S. government metropolitan area definitions can be used to define regions.

*Economic resilience.* In general, economically resilient and non-resilient regions can in principle be identified by examining their economic performance over a period of time. Criteria for a negative economic shock can be defined and pre- and post-shock growth rates and levels of economic performance can be measured. A region whose post-shock growth rate is at least as high as its pre-shock growth rate and that achieves its pre-shock level of economic performance within a specified time period can be considered resilient, while a region that experiences a negative shock and does not meet these criteria can be considered non-resilient.<sup>2</sup> To implement such an approach it is necessary to address measurement issues such as the following.

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<sup>2</sup> Such an approach to identifying and measuring resilience would draw on the general method that Hausmann and colleagues have used to identify growth accelerations at the national level, but would be adapted to measure recovery from shocks rather than long-term accelerations in growth. See Hausmann, Pritchett, and Rodrik (2004).



- What measure(s) of regional economic performance should be used, e.g., gross metropolitan product, employment, earnings, income (and for all of these, total or per worker or per capita), and/or population?
- Should the growth rate for a region be measured in absolute terms, relative to the national average, or relative to the average in the relevant Census region or division (or all of these)? Measuring growth rates in comparison to national or Census regional or divisional averages may make more sense if a choice is necessary, since this controls for national or broad geographic business cycles.
- How far back in time should growth paths be traced? Consistent data on wages, employment, and output available from the economic consulting firm Economy.com, for example, make it possible to go back at least as far as 1980.
- For how many years should growth paths and shock periods be measured? Should the same number of years be used to define pre-shock, shock, and post-shock periods, or should the lengths of these periods be allowed to differ? Should time periods be fixed (e.g., 1980-87, 1987-94, and 1994-2001 as the only periods of analysis for all regions) or rolling (e.g., seven-year overlapping time periods such as 1980-87, 1981-88, 1982-99, etc.)?
- How should growth paths and shocks be measured (e.g., average annual growth or the slope of a regression line through all observations during a time period?)
- How should censoring of the data be treated? (For example,, a recovery from a shock may be in progress but not completed as of the last year for which data are available.)
- How large does a negative deviation have to be (relative to the region's previous performance and/or national average performance) to count as a negative shock?
- How should a region's pre-shock level of economic performance be defined (e.g., peak or average performance during the pre-shock period)?

A continuous variable can be developed to measure regional economic resilience, e.g., number of years (or quarters if the data permit) it takes to return to the previous growth path, percentage of lost employment (or other relevant measure) replaced within a standard period of time, or some other measure that takes into account the relationship between post-shock performance and the size of the shock.

*Shock-resistance.* One way to identify shock-resistant regions is to use a similar method but instead of defining a shock as a negative deviation in regional aggregate economic performance (e.g., total employment relative to national average), we would identify a shock as a negative deviation in the performance of one or more of a region's largest (3, 4, 5?) export-base industries (perhaps at the 3 digit NAICS level) and determine whether that industry or those industries in aggregate declined by more than some amount over some period of time. A shock-resistant region would then be one that experienced such a negative industry shock but that did not experience a decline in aggregate economic performance. Implementing this definition raises measurement issues similar to those outlined above. (For example, it would be necessary to decide whether decline should be in employment, earnings or gross metropolitan product per sector.) It would also be necessary to define and be able to identify export-base industries and decide what to do about import-substitution industries.

It would then be possible to develop a measure of shock-resistance for regions that experienced negative industry shocks. For example, such a measure could be based on the aggregate post-shock growth rate relative to the size of the industry shock or the aggregate growth rate of non-shock industries relative to the size of the industry shock.

Some regional economic shocks may not show up in either the aggregate economic data or the data on leading export industries. A natural disaster such as a hurricane or earthquake could be such a shock, as would a plant closure that did not affect the overall performance of a region's leading export industries. Such a shock would have to be identified using information other than quantitative data (e.g., reports in the news media) but in other respects it would be possible to characterize the regional response to the shock using the above categories. Military base closures could be identified by tracking military employment in a region, which is available in the Economy.com data.

Employing the techniques set forth above, it is possible to identify those regions that have been economically resilient, non-resilient, or shock-resistant and rank the regions according to their degree of resilience or shock-resistance. Regions can be cross-classified in each category according to whether their pre-shock growth rates were high, low, or average relative to that of the nation as a whole. They can also be cross-classified according to the kinds of shocks that they experienced (e.g., losses of manufacturing or mining jobs, military base closings, natural disasters).

### **Understanding and Accounting for Regional Economic Resilience**

The critical question is why some regions are economically resilient or shock-resistant while others are not. Empirical research and literature on regional economic resilience is rather sparse. Blanchard and Katz (1992) examine state-level responses to negative aggregate regional shocks during the mid- to late 20<sup>th</sup> century; they find that after experiencing such a shock, a state typically returned relatively quickly to its previous growth rate but not to its previous growth path. Feyrer, Sacerdote, and Stern (2007) examine county- and metropolitan-level responses to the 1977-84 wave of job losses in automobile and steel production. They find that places experiencing this shock regained their pre-shock employment levels within five years after the end of the shock but experienced very little growth subsequently. Both studies, therefore, find that regional economies were generally not economically resilient in the sense in which we have defined that term. However, Feyrer and colleagues find that places with warm climates and those located near large metropolitan areas had the most successful post-shock recoveries.

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 by developing new goods or services for export from the region (Markusen 1985). A second strand examines the unresolved question whether industrial specialization or industrial diversification better promotes growth

(Glaeser et al. 1992; Henderson, Kuncaro, and Turner 1995; Harrison, Kelley, and Gant 1996; Henderson 2003). A third line of research suggests that human capital is a major driver of growth (Glaeser and Saiz 2004; Glaeser, Scheinkman, and Shleifer 1995; Gottlieb and Fogarty 2003; Simon 1998). 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 (Flynn 1984, Harrison 1984). 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 (Chinitz 1961, Safford 2004, Christopherson and Clark 2007). All these potential determinants of regional growth, as well as others that may be derivable from the ecological and other social science literatures, are candidate determinants of resilience.

To understand and explain regional economic resilience and to take into account possible path-dependence and longer-term institutional concepts of resilience it is necessary to make use of both large N quantitative analysis and intensive case studies employing both quantitative and qualitative methods.

- Large N quantitative analysis.** As there are no widely accepted theories of regional recovery from shock, a theory must be constructed on the basis of the available literature. This theory can then be used to create an empirical model that explains resilience as a function of pre-shock or other exogenous regional characteristics. The model should also contain variables controlling for initial year employment by industry and demographic characteristics and could also include type of shock: cyclical, structural, or exogenous. The dependent variable could either be a continuous measure of resilience (as explained above) or a dichotomous (resilient/non-resilient) variable. (The latter would require a logit or discriminant analysis.) A similar approach can be used to explain shock-resistance. Alternatively, it may be possible to estimate a multinomial logit model with three categories, resilient, non-resilient, and shock-resistant. Yet another option would be to put all resilient and shock-resistant regions in one category and explain what determines whether a region is either in that category or non-resilient.
- **Case studies.** Case studies make possible a much thicker and context-specific understanding of regional economic resilience, non-resilience, and shock-resistance, taking into account the effects of public policy, firm strategy, and institutional structure, history, and culture. They would also be sensitive to identifying common strategies across the case study regions and could support informed judgments on strategies that were more likely and less likely to be effective.
    - *Case study selection* can begin by modeling the expected regional reaction to economic shock, using one of the approaches outlined above. Those regions that are outliers, i.e., regions that recovered considerably more successfully or less successfully than the average region, are the ones from

which case study regions should be selected.. This approach reduces the influence of researchers' biases on case selection. Given this starting point it is useful to attempt to include among the case studies a mix of economically resilient, non-resilient, and shock-resistant regions and regions with varying pre-shock growth rates.

- *Quantitative analysis for each case study* can begin with a comparison of location quotients at various stages in the period covered to determine how each region's economy was changing relative to the national economy. A shift-share analysis for each region determines how the area's economy could have been expected to grow had each of the industrial sectors in the region's economy grown at the same rate as that sector grew in the nation as a whole and, by extension, whether the area had a competitive advantage in that sector as indicated by whether employment in the sector grew by more or less than could have been expected given the national trends. Finally, a cluster analysis of each region's industry at the three-digit NAICS level makes it possible to examine the cluster drivers of the economy at the beginning of the period and how they have changed by the end of the period. It is also desirable to examine growth in employment by size of firm and the extent to which each region has been able to generate new small firms.
- *Qualitative case study analysis* includes examining documents and conducting a series of interviews to determine what explains regional response to economic shocks beyond the structural factors included in our original model. For the purpose of case studies, regions may be defined more broadly or more narrowly than the official metropolitan areas that were used for the quantitative analyses; it is desirable to be flexible about the precise geographic scope of the regions in which interviews are to be conducted, letting the perceptions of interviewees guide the researchers' choices.

There are three major potential explanations of resilience (by no means mutually exclusive) that are worthy of consideration in the case study phase of the research.

- Governance responses, in particular, public policy actions that were taken at the local, regional, or state level; public-private collaborative efforts; private sector efforts organized on a public level (e.g., a CEO organization creating and implementing a strategic vision for the region, a chamber of commerce charged with operating the region's economic development program, a foundation lead effort to creative a regional strategic vision).
- Industry or firm responses by firms or industries in the region, including strategic responses by individual firms to improve their

- Institutional characteristics that condition, constrain, or promote effective action to respond to economic shocks, including institutional structure, institutional history, and institutional culture, such as the extent to which entrepreneurship is valued, whether labor-management relations are collaborative or antagonistic, etc.

Case study interviews should be conducted with a wide variety of individuals, both participants and informed observers. These may include past and present public officials at the local and regional levels, members of important organizations concerned with the economy and economic change (chambers of commerce, growth organizations, labor union leaders and coalitions), researchers at local institutions (or elsewhere) who have studied the regional economy, business and financial journalists, key members of important firms in the region and of sectoral organizations of firms, etc. Appendix 1 lists the kinds of questions that could be asked of interviewees. Appendix 2 provides an initial list of the types of individuals and institutional representatives who might usefully be interviewed.

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## Appendix 1

### Questions for Regional Economic Resilience Case Studies

#### Case Studies

- Questions to be answered:
  - Overall: What explains the performance of the regional economy in terms of its ability to recapture its growth path after having been thrown off its previous path.
  - What was its previous growth path and what were its economic drivers?
  - What threw the region's economy off its previous growth path?
    - National business cycle
    - Erosion of competitive advantage
    - Decline in global demand for product(s) it produced
    - Exogenous shock
  - How did the region's economy respond to the shock? To what extent did it "rebound," to what extent did it "reload" through market restructuring (i.e., change its economic base, what kinds of jobs did it gain, what kind did it lose (both by sector and by earnings – were they high wage jobs or low wage jobs), etc.?
- We want to understand three things that may have shaped regional responses to loss of jobs. (1) deliberate policy/strategy on the part of governments, individual firms, business groups, etc.; (2) institutional structure, history and culture, which both shape policy/strategy and mediate its impact on economic outcomes; and (3) exogenous factors. The first two, and especially the second, co-evolve with local economic structure.
  - Policy/strategy
    - Was the region (or local governments within the region or the state) able to engage in policy making or strategic action that moved the region towards recovery?
      - If so, how did it do so?
    - Specifically: Did the region (or local governments within the region or the state) adopt any explicit strategy/policy either
      - Economic or industrial development strategies by the public sector, public-private collaboratives, or private sector organizations (e.g., Chamber of Commerce)?
      - Did individual firms or sectors adopt explicit strategies to improve their performance?
    - What were these strategies/policies (see below)?
      - Policy/strategy objectives and design
      - Institutional mechanism through which policies were designed and implemented.
    - What were the objectives of the various policies/strategies – i.e., why was the policy adopted, what was it expected to accomplish?
    - What was the effect of the various policies/strategies? Were they effective (did they accomplish their objectives)?



- To what extent did they account for the region's performance and, in particular, its deviation from its expected performance predicted by our model (e.g., even if successful, were they extensive enough or powerful enough to have made much of a difference)?
    - At the end, we'd like to say "those that applied X policy were more likely to have succeeded in replacing employment than not."
  - Institutional Structure, History, and Culture
    - What is the economic history of the region? How has it adapted to economic shocks or transitions in the past?
    - How do state, city, or regional laws and institutions affect the region's response to having been thrown from its previous growth path?
    - What are the informal institutions and taken-for-granted assumptions that organize economic and political actors' responses to economic change? What kinds of policies and strategies do these institutions and assumptions make likely or difficult? Are these institutions and assumptions widely shared among different kinds of actors (e.g., firms, economic developers, unions, public officials)? Are they related to past economic structure? E.g., consider innovation, entrepreneurship, competition, cooperation, etc.
    - Have the area's firms historically been exposed to competition or have they been protected?
    - Has the area been dominated in the past by one or a small number of large firms, and, if so, how has that affected new business formation and financing, workers' and managers' willingness to work for other firms, and the number, types, and competencies of local suppliers?
    - Through what kinds of institutional/organizational structure have recovery efforts been organized?
      - Regional strategies through a regional agency
      - Individual jurisdiction development agencies
      - Individual firm or firm consortium(a)
      - Public-private collaboration
        - City level
        - Regional level
      - Private sector led efforts (e.g., Chamber of Commerce or CEO organization as major development agency.
      - Efforts through sectoral or cluster constructed firm organization (s)
      - University or nonprofit-led efforts
      - No obvious institutional leadership
- Exogenous

- Examples
    - Katrina
    - NAFTA
    - Base closing
  
- Types of policies/strategies
  - Identify and write up briefly in advance if possible.
  - Did local governments, business groups, public-private partnerships, or other actors within the region or the state engage in any of the following policies/strategies) designed to increase economic activity and employment in the region?
    - Economic Development
      - Types of strategies
        - Subsidies for recruiting individual firms
        - Infrastructure development
        - Human capital strategies
          - Improvements in the formal K-12 education system
          - Community colleges
          - Workforce development/training/retraining (post-secondary)
        - Marketing/promotion
          - Of region as a location for economic activity
          - Of region's products (export promotion)
        - Image enhancement
        - Venture capital provision
        - Technology investment
        - Sectoral Based economic development strategies, e.g.,
          - Bio-tech
          - Tourism, conferences, etc.
          - Sports
          - Eds/meds
          - Transportation/distribution,
        - Industry diversification strategies
        - Technical Assistance to existing firms (retention strategies)
        - Small business incubation
        - University-based development
        - Amenities as a means of attracting high-skilled labor and firms with needs for such labor
  - Did important private firms or sectors in the region adopt new strategies such as:
    - Increased R&D
    - Product diversification
    - New product development (product innovation)

- Changes in the organization of production (e.g., relationship of internal production units to each other, changes in relationship to suppliers, outsourcing, etc.)
- Technological changes (process innovation)
- Factor changes (e.g., changes in the ratio of capital to labor)

## **Appendix 2**

### **Potential Interviewees for Case Studies**

Economic development organizations (public sector/public-private organizations and Chamber of Commerce) at jurisdictional and regional levels

Chamber of Commerce and other local business group officials, even if not directly doing economic development work

Public officials (mayors, county executives, city and county legislators, state-level officials concerned with economic development in the region)

Council of Governments and regional planning and development agencies

Business firms, including appropriate representatives of major firms that have reduced employment, large and small firms that have gained employment (including hospitals and universities if relevant), and appropriate representatives of firms in other growing sectors.

Business sectoral organizations such as advanced manufacturing networks, etc.

Community colleges

Venture capitalists

Manufacturing Extension Partnership centers

Business journalists

Researchers (academic and think tank) knowledgeable about regional economy

Labor union officials (central labor council or major locals)

Workforce development officials (e.g., local WIB director)