Towards a Theory of Economic Recovery from Disasters

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Economic recovery refers to the process by which businesses and local economies return to conditions of stability following a disaster. Its importance and complexity are being increasingly recognized in disaster risk reduction research and practice. This paper provides an overview of current research on economic recovery and suggests a research agenda to address key gaps in knowledge. Empirical studies have provided a number of robust findings on the disaster recovery of businesses and local economies, with particular insights into short- and long-term recovery patterns, influential factors in recovery, and disparities in recovery across types of businesses and economies. Modeling studies have undertaken formal analyses of economic impacts of disasters in which recovery is usually addressed through the incorporation of resilience actions and investments in repair and reconstruction. Core variables for assessing and understanding economic recovery are identified from the literature, and approaches for measuring or estimating them are discussed. The paper concludes with important gaps in the development of a robust theory of economic recovery. Systematic data collection is needed to establish patterns and variations on how well and how quickly local economies recover from disasters. Research is urgently needed on the effectiveness of resilience approaches, decisions, and policies for recovery at both the business and local economy levels. Detailed, testable theoretical frameworks will be important for advancing understanding and developing sound recovery plans and policies. It will be especially important to consider the relationship between economic recovery and recovery of the built environment and sociopolitical fabric of communities in developing a comprehensive theory of disaster recovery.

Keywords: Disaster recovery, economics, resilience, business, modeling
Overview

Economic recovery, as considered in this paper, refers to the process by which businesses and local economies return to conditions of stability following a disaster. Economic recovery differs in two main ways from the term “economic impact”, which is more commonly associated with disasters: (1) impact refers to the consequences of a disaster, while recovery refers to the process of overcoming them; and (2) economic impact is typically measured in dollars, while economic recovery is also often measured in time (as in “years to recover”). Recovery has traditionally been taken to mean a return to pre-disaster conditions; however, there is growing recognition by researchers and practitioners that economies often do not return to pre-disaster states, but may stabilize at a different, “new normal” state. Recovery and resilience are closely related terms: resilience is demonstrated by actions that facilitate rapid, effective post-disaster recovery.

Broadly speaking, it is important for a theory of disaster recovery to encompass several categories of questions regarding economic recovery, including issues of definition, recovery patterns and generalizations, recovery differentials, factors that influence recovery, the relationship between economic and other dimensions of recovery, and, ultimately, factors and decisions that can facilitate economic recovery. These questions have been addressed to differing degrees in the literature to date. This review focuses on two main strands of the literature: empirical studies and modeling approaches. It emphasizes the literature from the U.S. and other advanced economies. At the scale of individual businesses, most insights have derived from surveys and other empirical research, while at the urban and regional economy level, most findings have been gained from modeling studies. This review identifies key research findings, core variables, and important knowledge gaps. It argues that while research has produced numerous insights into economic recovery, there remains a need to synthesize this knowledge into a generalized, multi-scale, integrative, and testable theory of disaster recovery.

Key Findings

Findings from Empirical Studies

The empirical literature to date provides a number of key insights on the economic recovery of businesses and communities. The list of findings below is not intended to be exhaustive; rather, it highlights some of the more robust findings from recent disasters that a theory of disaster recovery should be able to explain.

- Businesses and local economies are generally resilient to disasters. Most businesses recover (Webb et al. 2000; National Research Council 2006; Lam et al. 2009).
While the degree of property damage to a business is one factor in explaining recovery, it is often not the most important one (Tierney 1997; Alesch and Holly 1998; Webb et al. 2000; Alesch et al. 2001; Chang and Falit-Baiamonte 2002; Lam et al. 2009).

Some types of businesses, sectors, and local economies tend to have greater difficulty recovering from disasters than others. These include:
- **Small businesses.** These often occupy more physically vulnerable structures, have less access to insurance and other means of finance, lack redundancy in facility location, and have limited if any capacity for pre-disaster mitigation and preparedness (Kroll et al. 1991; Dahlhamer and Tierney 1998; Webb et al. 2000, 2002; Chang 2010).
- **Locally-oriented businesses,** especially in retail and some service sectors (Kroll et al. 1991; Dahlhamer 1998; Alesch et al. 2001; Chang and Falit-Baiamonte 2002). Customers of these businesses have themselves suffered losses in the disaster.
- **Financially marginal businesses** (see below) and economies struggling before the disaster (Dahlhamer 1998; Webb et al. 2002; Alesch et al. 2001; Alesch et al. 2009).

Restoration of lifeline infrastructure services is important in business recovery; infrastructure concerns can be a significant barrier to businesses re-opening (Webb et al. 2000, 2002; Lam et al. 2009).

Neighborhood effects can be important. Businesses in highly damaged neighborhoods often have difficulty in recovery, even if they experienced little direct damage themselves, because of loss of customers (Webb et al. 2000; Chang and Falit-Baiamonte 2002). Locally-oriented retail businesses reliant on foot traffic are especially vulnerable.

The business continuity industry is rapidly growing and filling an important niche in terms of services previously not available or only provided by government (Rose and Szelazek 2011).

The economic stimulus of reconstruction can be significant, particularly in the short run (Dacy and Kunreuther 1969; Chang 2010). Construction and other sectors involved in rebuilding often experience notable short-term gains.

Pre-disaster trends (e.g., of economic growth or decline) are often accelerated, exacerbated, or intensified in recovery (NRC 2006; Chang 2000; Dahlhamer 1998; NRC 2006; Alesch et al. 2009; Chang 2010).

Business failures precipitated by a disaster can occur long after the disaster event (Alesch et al. 2001; Webb et al. 2002; Lam et al. 2009).

Early work (Wright et al. 1979; Friesema et al. 1979) found little statistical evidence of long-term economic effects of disasters. More recent studies, however, suggest that these findings may have been oversimplified and overly optimistic (see discussion in NRC 2006). Catastrophic events (those in which damage is extraordinarily severe)
can cause long-term, structural change in local economies. The “new normal” may differ from the pre-disaster economy in such ways as types of businesses, sectoral composition, spatial distribution, and economic strength and competitiveness (Alesch et al. 2009; Lam et al. 2009; Chang 2010).

Findings from Models

Most of the formal analyses of disaster recovery have been undertaken with models developed to estimate economy-wide losses, or consequences. These are typically multi-sector models emphasizing the interdependency of the entire economy and the role of “indirect effects”—input-output (I-O) and computable general equilibrium (CGE) analysis (Rose 2004). Recently, efforts have been made to incorporate resilience into these models to show how an efficient allocation of resources can mute business interruption (BI) and hasten recovery (Rose and Liao 2005; Rose et al. 2010). Recovery is usually addressed with these models in two ways: 1) resilience actions and 2) investment in repair and reconstruction. Findings include:

- Multiplier or general equilibrium effects can be even larger than the direct business interruption effects for metropolitan areas or entire states because interdependencies increase with the size of the economy (Rose et al. 1997; Cochrane 2004).
- Key sectors, such as lifelines and petroleum refining, have been identified that can bottleneck an economy and whose resumption to normal levels is a key first step to recovery (West and Lenze 1994; Rose et al. 1997; Barker and Santos 2001).
- Some model analyses and real world examples, such as Los Angeles after the Northridge Earthquake, have yielded some ironic outcomes—that recovery leads to the economy being better off than before. This is misleading in two ways. First, it can only happen if there is an outside infusion of capital from insurance payments or government and philanthropic assistance. Second, the recovery effort is most assuredly a drain on the national economy. In fact, Cochrane (2004) has pointed out it is a mirage even for the region because any stimulus from people dipping into their savings will necessitate replenishment of bank accounts for several years, thereby stunting the consumption spending stream in years to come.
- Resilience has been found to have a profound effect on recovery. Rose et al. (2009) found that business interruption was lowered by more than 70% for firms that were able to relocate quickly after 9/11. Rose et al. (2007, 2011) have shown that several low-cost resilience tactics could reduce the losses from short-term water and power service disruptions by as much as 90% (e.g., conservation, input substitution, storage, and production recapture).
- Not all price increases represent gouging, as some increases are a signal of increased scarcity of remaining resources. Rationing requires an administrative bureaucracy, and while likely to maintain political stability and promote equity, incurs the extra
administrative cost and also leads to lower efficiency in terms of general resource allocation (Rose and Benavides 1999; Rose and Liao 2005).

Summary: Core Variables (or Parameters) of a Theory of Recovery

Table 1 summarizes some of the core variables that have been suggested in the literature. (For conceptual frameworks that relate some of these variables in an explanatory model of business and/or regional economic recovery, see Alesch et al. 2001; Chang and Falit-Biamonte 2002; Cochrane 2004; Rose 2009).

<table>
<thead>
<tr>
<th>Variable Category</th>
<th>For Businesses</th>
<th>For Economies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent (i.e., recovery)</td>
<td>Business survival/recovery Business interruption</td>
<td>Employment Unemployment Output Income Income distribution Number of businesses</td>
</tr>
<tr>
<td>Independent</td>
<td>Direct damage to business Infrastructure disruption Speed of business reopening Disaster impact on customers Disaster impact on competitors Industry competition Market access Product necessity Pre-disaster financial condition Entrepreneurial actions Mitigation/preparedness Access to recovery resources Type of recovery resources Resilience (inventories, unused capacity, system redundancy)</td>
<td>Direct damage to infrastructure Core economic sectors Economic diversity Pre-disaster growth/decline Inflow of insurance payments Inflow of disaster assistance Distribution of disaster assistance Market signals Excess capacity Population dislocation</td>
</tr>
<tr>
<td>Correlate</td>
<td>Business size Sector Tenure (rent/own)</td>
<td>Size of the economy Resource base Social structure Location Climate/Weather</td>
</tr>
</tbody>
</table>

(1) May be impediments or facilitators to recovery.
(2) Classified as an independent variable, rather than a measure of recovery, because reopening does not ensure long-term business survival and recovery.
(3) Variables that are empirically correlated with independent variables but that are not themselves explanatory factors.
Measurement or Estimation of Core Variables

Of the core variables suggested in Table 1, many can be readily measured quantitatively. Statistical time series data are generally available for localities in the U.S. for such variables as number of businesses, employment, wages, etc. Few studies have used such data for assessing economic recovery from disasters (e.g., Ewing et al. 2003), and they have arguably been underexploited as a data source for comparative analysis. Chang (2010) identifies issues and suggests guidelines for using statistical data to analyze disaster recovery, particularly from the standpoint of systematically developing datasets of multiple disasters to derive generalized patterns and insights. For example, recovery can and has been variously defined with reference to pre-disaster, “without”-disaster, or restabilized reference levels of economic activity. For discussions of conceptual and methodological issues related to measuring economic losses or damages, see Cochrane (2004) and Rose (2004).

Other variables in Table 1 can be readily measured in tailored data collection instruments such as surveys. Financial marginality, for example, can be inferred from questions that ask about the financial health of a business prior to the disaster, even if these are Yes/No, scale, or Likert type questions. Such variables have typically been operationalized in binary or categorical form in statistical models (e.g., Alesch et al. 2001; Webb et al. 2002) and recovery simulation models (Miles and Chang 2006, 2008). Survey data have also been used to infer parameters of regional economic models, such as resilience responses to water outages (Rose and Liao 2005).

Key Unanswered Questions and Further Research Needs

As suggested in Table 1 above, empirical studies on business recovery have provided a stronger basis for a theory of economic recovery than the literature on recovery of local economies. While many questions remain to be addressed, in our opinion, several represent important gaps in developing a robust theory of economic recovery:

1. **To what degree, and how well, do local economies recover?** There is a need for systematic gathering of data on economic recovery of disaster-affected communities. Getting beyond case studies is essential in order to establish patterns and identify disparities. Similarly, modeling studies that explore a range of disaster scenarios can be used to inform policy-makers about how economic recovery might transpire under various conditions.

2. **Why is economic recovery faster in some disasters than others?** Some potential factors to be investigated include the magnitude of the hazard impact relative to the economy, characteristics of the physical damage, attributes of the local economy (e.g., size, diversity, growth trend), and recovery policies implemented.
3. **What is the role of resilience in disaster recovery? How important are inherent and adaptive capacities?** There is a need to measure the effectiveness and the cost-effectiveness of best practice resilience tactics (Sheffi 2005; Rose 2007). Better understanding is needed on how resilience of businesses and economies can be enhanced prior to a disaster.

4. **How is economic recovery linked with the recovery of households, institutions, and other aspects of holistic community recovery?** Current knowledge is patchy, and permits only rudimentary development of simulation models of community recovery (e.g., Miles and Chang 2006, 2008). The roles of agents other than local businesses – notably, governments, non-governmental organizations, the informal sector of the economy, and agents outside the disaster area – should also be considered.

5. **What types of decisions and policies are most effective in facilitating business and local economic recovery?** For example, empirical evidence on the use of insurance, loans, and other financial sources has been surprisingly mixed (Alesch et al. 2001; Webb et al. 2002). Another key policy issue concerns the timing of recovery resources; in particular, the tension between delaying activities to enable post-disaster planning (including incorporation of mitigation in recovery activities) and accelerating reconstruction to allow businesses to reopen quickly. Insights are also needed on what types of recovery strategies are effective for economies that were already declining prior to the disaster.

6. **What is the best relative mix of private, government and non-profit sector roles?** Studies of this issue would examine how the various major sector groups can work effectively with a minimum of overlap and conflict. It would also identify complementary policies and partnerships (Wein and Rose 2011). For example, the influence of the increasing privatization of disaster recovery activities should be considered.

In our opinion, these knowledge gaps suggest the following broad research priorities for developing a theory of economic recovery from disasters:

- Developing systematic databases of economic recovery in actual disasters, using comparable data collection and measurement protocols (see Peacock et al. 2008). Similarly, it is important to develop systematic databases of key variables that may explain recovery patterns and differences.
- Developing detailed theoretical frameworks of the processes of business and local economic recovery. It is important that these frameworks be capable of being operationalized into measurable variables, so that they can be empirically tested. It is further important that these frameworks address the multi-scale relationships between recovery of individual businesses, the local economy, and the broader economic environments in which they are located. Moreover, these frameworks must include...
essential aspects of recovery in other domains, such as the built environment, social, and institutional recovery. For example, there is a need to evaluate the extent to which government involvement represents an unnecessary duplication of effort or detracts from the efficient workings of markets, and to identify conditions under which markets fail to perform well (e.g., externalities, public goods, attainment of equitable outcomes).

- Developing an understanding of how economic recovery is influenced by the magnitude of the disaster. This includes examination of special features of catastrophes, including the potential of major disasters to erode or overwhelm economic resilience, and the need for extreme measures at high levels, such as actions by the Federal Reserve as in the aftermath of 9/11 (Rose et al. 2009).

- Developing sound assessments of actions, decisions, and policies that can foster recovery in a range of disaster contexts. For example, resilience tactics by businesses should be studied for their effectiveness and cost-effectiveness. Remedies for market failure, both government involvement and market strengthening, should be systematically analyzed. Public-private partnerships should be studied. Policy analysis should include examination of equitable approaches to addressing situations in which full recovery is impossible or imprudent, or where massive relocations are warranted.

**Relationship with Other Dimensions of Recovery**

Economic recovery is only part of the broader community recovery effort, though a crucial aspect. Economic recovery provides basic necessities of life, jobs to sustain the economy in terms of income and tax revenues, and reinstatement of wealth through the return of property values.

At the same time, economic recovery is not likely to be forthcoming as effectively, or at all, unless the physical and sociopolitical fabric is repaired:

- Civil order must be restored.
- Infrastructure must be repaired.
- Capital markets must be accessible.
- Workers must be available and labor markets functioning.
- Government services need to be available.
- Spiritual/ethical values, either religious or secular, must be intact.

Recovery also presents great opportunities for mitigation and resilience capacity-building for future events:

- Lessons must be learned to avoid repeating mistakes.
• Where appropriate, short-run adaptive behavior should be sustained for the long-run.
• Mitigation should be built into reconstruction since it is less expensive than retrofitting.

These and other issues related to the relationship between economic recovery and overall, holistic recovery of a community after disaster are the subject of other papers in this workshop.

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References


