

Economic Recovery: Between Relief and Development¹

By

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I. Introduction

Natural disasters are an unfortunate reality in our world. The most recent devastation experienced in the United States, Hurricane Katrina, has displaced hundreds of thousands of people and may cause economic losses over 100 billion dollars by the time all effects are tallied. Relief efforts have begun, with images of rescues, shelters and make-shift morgues filling the media. As relief workers and supplies pour into the area, temporary hospitals and tent-cities will be set up, bus caravans will carry displaced people to safe havens, and the work of reuniting families will begin.

Far more devastating in terms of loss of life, the tsunami of December 26, 2004 was a disaster of enormous proportions. It was remarkable not only in the extent of the loss of life (an estimated 180,000 people died), but in the geographical extent of its impact. The relief response of the international community was swift. Multilateral agencies, national governments and non-governmental organizations raised and began delivering tremendous amounts of support to the desolated areas.

But after the first responders have done their work, after the rescues have taken place, the bodies have been recovered and the wounded treated, comes that period of cleaning up, clearing out and rebuilding. No longer relief, not yet a return to normality, economic recovery is that “process in the middle” which seeks to establish a sustainable path of development in the wake of disaster and the consequent emergency response.

Given the relative frequency with which natural disasters occur somewhere in the world, and the devastating impact that these events have on the lives of those affected, it is somewhat surprising to find that economics does not have a well-developed body of theory regarding the recovery process. Numerous studies of various aspects of the recovery process have been done, and some theoretical structures have been put forward. Yet important pieces are missing. This paper undertakes a survey of the available literature on economic recovery in an effort to highlight that which is known, that which

is debated and that which still must be addressed, with particular focus on the recovery process in developing countries.

The structure of the paper is as follows. Section II of this paper will examine a number of definitions in the literature of “Disaster” and “Recovery,” and discuss the various goals that different participants in the recovery process may have. Clear definitions are needed in order to differentiate these circumstances from a number of other adverse economic conditions that may arise in a particular society’s experience. Clarity over the goals will help us to evaluate the success or failure of different recovery policies.

Section III will look at the context of recovery, since “disasters” happen to people in the course of their normal daily lives. Section IV discusses a number of models used in disaster impact analysis and the recovery process and examines insights from a number of cases. Section V examines recent developments in the literature regarding prevention, mitigation and risk management. Section VI concludes.

II. Definitions

There are many situations that face a society from which it may be said to need to “recover.” An economic recession is followed by an economic recovery. Complex social conflicts such as war (whether civil or international), are followed by a period of economic and social recovery. But the process of economic recovery that I will focus on here will be that which takes place after the occurrence of a natural disaster.

There are a number of concepts that we need to define that will help frame our understanding of the process of economic recovery. The first task in this survey is to examine various definitions found in the literature. These include *natural hazard*, *natural disaster*, *vulnerability*, *risk*, *resilience* and, finally, *recovery*.

Defining economic recovery and its goals are crucial to the process of recovery. These definitions are important because as we will see, different definitions lead to different objectives for the recovery process and different interpretations of "success." In subtle

(and often not so subtle) ways, these definitions shape not only our understanding of the issues of economic recovery, but also our evaluation of the effectiveness of various policies and the extent to which recovery has been achieved in a particular case.

Major disasters can destroy lives and livelihoods. They can wipe out production and distribution systems and rip apart communities. Those affected long to return to the lives that they knew, and define recovery as “getting back to normal.” Yet others see in these disasters opportunities for change². Disasters clear away some of the constraints that have inhibited progress on long-range development goals. Since physical assets and infrastructure must be replaced anyway, there is some argument that the catastrophe can shift a society onto a different path of development that may yield significantly greater results in time.

A *natural hazard* is a potentially destructive meteorological or geophysical phenomenon. Benson and Clay (2004) identify four categories of natural hazards: Rapid-onset hydro-climate hazard (e.g. hurricanes)³; slow-onset hydro-climate hazard (drought); rapid-onset geophysical (earthquake); and slow-onset geophysical (volcanic eruption, erosion)⁴. Although the occurrence of these events is usually thought to be of “natural” origin, it is important for us to note that many slow-onset hazards and some rapid-onset ones are not independent of human activity. The processes of deforestation, desertification through overgrazing and the “reclamation” of swamp land for farming can lead to drought, erosion and flooding.⁵

The occurrence of a natural hazard does not in and of itself constitute a disaster. A typhoon at sea is thought to cause a disaster only when someone gets in its way. A

² As previously undepreciated fixed costs are now suddenly variable costs.

³ Anderson (1990) calls these “sudden-onset” events. In this terminology, a tsunami would be a rapid-onset hydro-geophysical event.

⁴ A volcanic eruption in fact has mixed characteristics. But seismic monitoring technology has improved the ability to forecast an eruption and changed the way that communities prepare in advance for the event.

⁵ There has been speculation that the process of global warming is leading to an increased intensity and frequency of hurricane events and flooding due to rising sea levels, but these are hotly-disputed claims.

number of definitions of *natural disaster* exist in the literature.⁶ Disasters happen to humans as a result of “physical events impacting human settlements” (Freeman 2002). “The word 'disaster' is used to refer to any substantial impoverishment due to an unusual source of stress that takes place within an economic system” (Hirschleifer, 1987)⁷. One definition used for a time at the World Bank described a disaster as “an event which causes government to modify economic priorities and programs substantially” (World Bank, 1988). In terms of magnitude, Anderson (1990) points out that only those events which “exceed the society's coping capacity” are disasters.⁸

A more complete definition is offered by Benson and Clay (1998):

A natural disaster is the occurrence of an abnormal or infrequent hazard that affects vulnerable communities or geographic areas, causing substantial damage, disruption and perhaps casualties and leaving the affected communities unable to function normally. From an economic perspective, a disaster implies some combination of losses, in human, physical and financial capital, and a reduction in economic activity such as income generation, investment, consumption, production and employment in the “real” economy. There may also be severe effects on financial flows such as the revenue and expenditure of public and private bodies.

This definition focuses attention on measurement issues associated with impact analysis in natural disasters. Here the emphasis is on direct losses (lives, productive assets); indirect losses (value of output, etc.); and secondary losses (impacts from changes in the balance of payments and debt loads).

Indeed, a disaster is most often defined in relative terms- when the event affects “a lot” of people and destroys a “significant portion” of the economic assets of a community. That is, definitions of disaster often depend on the size and the initial level of development of the region under consideration. In the analysis of the recovery process, it is important to

⁶ What is more, Hirschleifer (1963) distinguishes between localized disasters, usually of sudden onset, and generalized disasters that result from “complex social phenomena.” A disaster with the geographical impact of the 2004 tsunami shows that this distinction has limitations.

⁷ *Environmental disasters* can occur without reference to human activity, or as the effect of human action on the natural environment. Though important, these disasters are beyond the scope of our study here.

⁸ An implication of this definition is that two events with the same measured loss of life and economic impact may not both be disasters if one community has invested more in “coping capacity.”

bear this in mind. For example, Albala-Bertrand (1993) states that “capital loss is unlikely to have an important effect on growth.” But the effect of a disaster on the national or regional economy, with opportunities for substitution and replacement of lost production, is different from the impact on the area directly affected. Chang (2000) notes that port activity in Kobe, Japan fell permanently after the earthquake there in 1995, but that shipping activity in Busan, South Korea rose correspondingly. The economy of the entire north-east Asian region was impacted less than the city of Kobe.

It is important to emphasize the human impact of disaster events as Ye (2002) does: "Natural disaster is not only a natural phenomenon but also a social event." Economic recovery, then, is part of a larger social process. The serious social, psychological and spiritual impacts of natural disasters are the central issues that the people of the affected area need to recover from. While economic recovery is a critical component, it should be understood as part of the larger problem of restoring peoples' lives and communities. Therefore, I propose to use the following definition: *A natural disaster is the sudden and significant reduction in the capabilities of the people of a community resulting from the occurrence of a natural hazard.* Capabilities here are defined in the sense of Sen (1985), “what [a person] can or cannot do, can or cannot be.”⁹ This definition removes a measure of the emphasis on material loss and asset restoration, and focuses the problem of recovery on returning the affected people to what they could *do* and what they could *be* prior to the onset of the disaster. However, “capabilities” also includes the idea of what a person can or cannot *become*. Thus the problem of recovery will be forward-looking as well as restorative.

The extent to which a natural disaster impacts the capabilities of people in the community is a function of their vulnerability, the variability (risk) of occurrence and loss, and the resilience of the community. *Vulnerability* results both from the level and kinds of community capabilities, how narrowly these capabilities are based and their susceptibility

⁹ Extensive (often interminable) lists of capabilities have been drawn up. Sen (1999) points out that these lists are dependent on social context and not necessarily universal. But within a given social context, they can be specified to a level sufficient to make the concept operational. For my purposes here, this is not necessary.

to disruption by various likely hazards. Mechler (undated) observes that “Factors contributing to increased vulnerability comprise widespread poverty, high unemployment, distributional inequalities, high population growth and lack of strong national and local institutions for dealing with disasters.” A community that is more vulnerable has a greater potential to suffer loss.

Risk in this literature often is used to describe the expected loss from a natural disaster. For example, UNAIS (2002) states that, “the level of *risk* in relation to natural disasters in a society is determined by the levels of vulnerability combined with the level of probability and intensity of a natural hazard to occur. Risk reduction refers to activities taken to reduce both vulnerable conditions and, when possible, the source for the hazard (especially addressing drought, floods and landslides).” However, in a more technical financial sense risk also refers to the extent of variability in that expected loss, particularly in reference to insurance.

Resilience is the ability of a community to regain capabilities quickly based on pre-existing structural, social and institutional conditions. Resilience depends on the resources (social and physical) of a community. In the sense of investment, it depends on portfolio diversification- the extent to which individual and community capabilities are broadly based and assured by multiple means. But it also depends on the extent to which that community is integrated into a larger social and economic network that extends beyond the reach of the direct impact of the disaster.

Finally, a number of terms are used in the literature when discussing the process of economic recovery. Often, these terms embody the goals of the recovery process. For example, Quarantelli (undated) surveys a number of these terms:

Reconstruction seems to stress almost exclusively the post-impact rebuilding of the physical structures destroyed or damaged in a disaster. Restoration appears to be a statement about reestablishing prior or pre-impact physical and social patterns... putting back into nearly the original form whatever existed before the disaster. Rehabilitation also seems to also suggest a restoration although more of people than things. Restitution appears to suggest some kind of restoration of the

rightful claims of owners. It implies legal actions to return to a former state of affairs. Finally, the word recovery often seems to imply attempting to and/or bringing the post-disaster situation to some level of acceptability. This may or may not be the same as the pre-impact level.

The terms used are closely related to the goals envisioned for the recovery process. The UN-ISDR (2005) defines recovery as “Decisions and actions taken after a disaster with a view to restoring or improving the pre-disaster living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk.”

In keeping with the focus of my definition of natural disaster on individual and community capabilities, I would propose that *recovery is the restoration of the capabilities of a community lost in a natural disaster*. The community does not need the same assets and structures that existed prior to the disaster (though some capabilities may be provided only through a limited number of means). The process of recovery, thus, considers the past to the extent that it recalls the former capabilities, but looks forward by recognizing that the capabilities of people may be established through a variety of means. A formerly agrarian community may be capable of obtaining sufficient nutrition even though only a small fraction of the workforce remains in the farming sector.

However, the concept of capabilities includes “the power to participate in the social life of the community” (Sen, 1979). Natural disasters often rip apart that social life. Economic, social and political relations are stressed and broken, and people are deprived of that power to participate. Thus the process of recovery of individual and community capabilities must proceed in a manner consistent with the establishment of participatory social life. It cannot ignore the fact that not only were capital assets, specific jobs and houses destroyed, but also a way of life.

The importance of focusing on capabilities as a basis for conceptualizing recovery is clear: it maintains the centrality of the issues of protecting and restoring human dignity rather than on the restoration of buildings or production *per se*. To consider how to

operationalize a definition of recovery in terms of capabilities, we can again turn to Sen (1999, p. 81ff). In the context of discussing much broader issues of policy analysis than just recovery, and after acknowledging that the most fruitful practical course may not be the development of measures of capabilities, he proceeds to describe three approaches which might provide sufficient structure for analysis.¹⁰ It is beyond the scope of the current work to address issues of specifying measures, but it is not beyond comprehension how that might proceed.

III. The Context of Disaster and Recovery

Disasters occur within the context of pre-existing economic, social, political and environmental relations. As devastating as a disaster event may be, the remnants of these relations form the framework for recovery. Quarantelli (undated) observes “Overall, running through our remarks derived from the research literature is the idea that what occurs in the recovery period reflects considerably whatever existed in the pre-impact period of the social system involved.” Within this framework, the nature of the recovery process is affected by the extent of the damage caused by the disaster to physical infrastructure, private and public capital, the labor force and information systems. Economic recovery is also influenced by post-disaster psychological and spiritual conditions of the people affected, as well as the extent of altruism or self-interest exhibited on local, national and international levels.

Changes in the geographical location and concentration of human habitation and enterprise have significantly increased the degree of vulnerability in many parts of the world (Jones, 1992). Economic growth has led to significant increases in the amounts of physical capital at risk, while population growth, rural-urban migration and the growth of “megacities” have increased the number of human lives at risk. Rates of disaster loss have risen dramatically. Worldwide, the average annual rate of asset loss over the period 1992-2001 increased by nearly 7 times from the 1960’s. The rate of loss of life also

¹⁰ Sen describes a “direct approach,” a “supplementary approach,” and an “indirect approach.” He remains realistic here, stating that “the need for pragmatism is quite strong in using the motivation underlying the capabilities perspective for the use of available data for practical evaluation and policy analysis.”

substantially increased, with more than 90% of the disaster deaths during the 1990's occurred in developing countries (Freeman, et.al., 2001).

Pre-existing patterns of poverty and disparate patterns of income distribution significantly influence the impacts of disasters and the subsequent issues in recovery. "Disasters cause poverty. And poverty exacerbates disasters" (UNDP, 1994). Conditions of poverty in a region affect the vulnerability of the people. As Anderson (1990) states "Disaster and poverty are mutually reinforcing. Poverty increases disaster vulnerability." This is true for nations as well as for local communities. For similar population densities and earthquake risk conditions, she notes that Japan's death toll average is 63 compared to Peru's 2,900. The proportionate loss in GDP is estimated to be 20 times higher in developing countries due to a relative inability to quickly replace assets, infrastructure, labor and production in other facilities.

Mathison (2003) points out:

While natural events are indiscriminate, their impact is usually more devastating for poor households because they have fewer options for coping with them. Poor households are also more likely to be located in "danger" zones, for example, below the flood line. This is why natural disasters appear to strike the poor more often – because, in fact, they do.

Given that disaster-prone areas such as flood plains and river banks are less desirable and therefore less expensive, these areas are often disproportionately settled by the poor. To the extent that this is market-based mitigation at work, it has been argued that some risk-return calculation has been performed and the subsequent losses may be "optimal."¹¹ However, in the face of subsistence level income constraints of many of the poor, the optimality of this condition is in doubt. Similarly, resource limitations significantly constrain the quality of shelter that the poor are able to put together. The result of many disasters is a disproportionate loss of life among the poor due to their inability to mitigate. These conditions are described by UNIAS (2002):

¹¹ Yezer (2000) points out that, given mobility, housing prices adjust to incorporate information about disaster risk, declining with increasing levels of disaster risk. Yet in many developing country cases, the assumption of free mobility is questionable.

Poverty and social and economic pressures, such as migration, unemployment, AIDS, illegal land tenure practices, etc., make people more vulnerable by forcing them to live in dangerous locations, often on unsafe land and in unsafe shelters or low-cost dwellings, because there is no other land available at reasonable cost sufficiently close to employment opportunities. Disasters contribute to, and are also exacerbated by, the factors that make people vulnerable –such as unemployment, political instability, poor economic conditions and unequal distribution of wealth, lack of personal security and violation of human rights. Repeated exposure to disasters can lead into a downward spiral of chronic poverty, even though poverty alone is not the only disaster vulnerability.

Berke, Kartez and Wenger (1993) point out that “Recovery policy making is intensely political.” The allocation of limited recovery funds requires that priorities be set and decisions made regarding which parts of the community will be helped first. The effectiveness of recovery policy depends in part on the extent to which there are strong “structural and functional relations among a community's various social units and subsystems,” and strong “structural and functional relations of a community's various social units and subsystems to extra-community systems.” This integration provides a network of relationships which empower a community to draw on resources for recovery.

On the other hand, class, race and gender distinctions (both within the community and in relationship to people outside the disaster-affected area) are likely to negatively impact the course of economic recovery (Blaikie, et.al., 1994). To the extent that these conditions limit participation in the recovery process and access to recovery programs, the programs enacted may serve to exacerbate these conditions. In the case of gender relations, women are often more vulnerable to disaster because of the structure of power and decision-making in the community. Additionally, given the indiscriminate nature of mortality in natural disasters, the empowerment of women in recovery is particularly relevant. In many disasters, the loss of significant numbers of income-earning, power-possessing male family members leaves these women particularly at risk.

Pre-existing conditions of education and human capital formation will influence the alternatives available in recovery. Horwich (2000) contends that it is human capital rather than physical capital that is the “dominant economic resource.” It is clear that the

resilience of a community will be built up by the strengthening of its educational and training systems. Further, to the extent that the skills developed are transferable between employment opportunities, the base for establishing individual and community capabilities is broadened.

Turning now from the social to the economic conditions existing prior to a disaster, our understanding of the course of recovery requires us to consider the structure of production; the state of the community's economic infrastructure; the structure of demand; financial institutional structures and access to finance capital; and macroeconomic policy.

The sectoral structure of a growing economy changes over time. Benson and Clay (2004) point out that some sectors are more vulnerable to certain types of natural hazards than others. For instance, the agricultural sector is more at risk from hydro-climatic hazards while geophysical hazards (e.g. earthquakes) can have far greater impacts on the built environment than on agriculture. Jones (1992) notes that "Services are highly dependent on transportation and communication." Thus the greater the proportion of an economy that is in Services, the greater the vulnerability of the economy to disaster from a natural hazard that can disrupt transportation and communication. As development progresses and the proportions of output shifts from agriculture to manufacturing to services, vulnerabilities change.

The extent to which regional economies are diversified and national economies are geographically dispersed also influences the recovery process. An area that has high concentrations of particular industries will face particular issues in recovery that a more diversified area will not. Small island economies are necessarily more vulnerable, with a greater proportion of GDP at risk from a single event while being less able to draw on unaffected national resources.

The growth of infrastructure increases vulnerability while increasing the capacity to engage in complex economic exchange and providing for greater community capabilities.

UNIAS (2002) states that:

“Current trends towards a globalized society have made societies much more dependent on services and infrastructure “life lines”, in both urban and rural areas, including transportation, water, electric, gas, drainage, storage facilities and communication networks. A failure of these services due to natural or other disasters can have considerable consequences even for people in areas not directly affected. The concentration of political, economic and other resources and assets in one urban area can have national, regional or even international repercussions (p7).

This is more an issue of urbanization and regional and national economic integration than of “globalization” *per se*, but it is nonetheless a real issue of increasing vulnerability. Additionally, the pre-disaster healthcare delivery system will form the framework for relief efforts, but also will be called upon to provide a somewhat different mix of services throughout the recovery process.

The structure of demand changes following a disaster. In the recovery period, demand increases for housing, infrastructure restoration and capital goods, while typically moderating for consumption goods.¹² Hirschleifer (1987) observes that recovery and resiliency depend in part on “elasticity... the short-run ability to utilize (or re-organize) excess capacity to the most immediate needs (e.g. crowding remaining transportation systems, reducing the level of [health] care while expanding the extent to which basic care can be given), and substitutability [the ability to utilize goods to fulfill alternative needs] in the aftermath.”

Financial institutions play a significant role in the process of economic recovery. The extent to which these institutions’ loan portfolios were at risk in the disaster, their subsequent need for recapitalization and the ability of the monetary authority to provide finance capital all influence both the speed and depth of recovery. The pre-existing structure of those institutions, their lending policies and their capacity to handle a broad array of demands will affect the allocation of financial capital to the various competing needs for funds.

¹² The restoration of demand for household replacement goods depends on the level of unaffected wealth and the income generation conditions in the recovery period.

Additionally, the extent to which financial institutions grant access to various potential borrowers will significantly shape the distributional effects of the disaster. In particular, the poor, now with even fewer assets, will have particular difficulties obtaining finance capital. The poor are also less likely to have access to networks of assistance for the rebuilding of microenterprises and other lost physical capital. While microfinance institutions (MFI) have gained in popularity over the last 30 years, their role following a disaster is limited by their small size and their own institutional vulnerability to both default and liquidity risks. Indeed, Mathison (2003), Miamidian, et. al. (2005) and Pantoja (2002) all are primarily concerned with helping MFI deal with their existing loan clients and protecting the sustainability of their own organizations.

Macroeconomic conditions preceding a disaster event can significantly impact the process of recovery (Benson and Clay, 2004). Employment conditions and capacity utilization rates determine the level of excess capacity that may be able to be used in the recovery process. The extent to which growth in the economy has been built on the exploitation of factor complementarities will affect vulnerability and cause significant “multiplier effects.” Pre-existing inflation and high relative interest rates will both limit the flexibility of the monetary authority in dealing with recovery.

Prior fiscal policy (including tax policy) can limit the extent to which these tools can be used in order to stimulate investment and economic activity. Further, in a disaster of significant size, tax revenues may fall significantly, limiting the government’s ability to finance recovery and increasing the overall debt load of the country. Trade deficits and exchange rate depreciation can create an environment in which external sourcing of physical capital is more costly and international financial capital flows may be adversely affected, particularly in the short-run, by increased perceived risk.

IV. Models for Impact Analysis and Recovery

Extensive research has been done, both analytical and case-based, assessing the impact of natural disasters. While this analysis provides information needed for the recovery process, it is perhaps a testament to the complexity of the problem to note that there are relatively few examples of direct modeling of the recovery process itself. Since “economic impact is determined by a complex and changing combination of factors” (Benson and Clay, 2004), complete mathematical models will be difficult to construct and validate. Indeed, such modeling will likely be more fruitful when undertaken as a systems / structure exercise. In this section I present a survey of a number of impact analysis models and models from regional economics that may apply to recovery analysis.

The UN Economic Commission for Latin America and the Caribbean (2003) presents a Handbook for a comprehensive, detailed approach to assessing the impacts of natural disasters.

The ultimate goal of the assessment methodology presented herein is to measure in monetary terms the impact of disasters on the society, economy and environment of the affected country or region.... Application of this methodology provides affected countries or regions with the means to determine the value of lost assets and define reconstruction requirements.

The issues included in the assessment are housing, health and education; infrastructure; economic sectors, including tourism; employment; environmental impacts; macroeconomic effects and the impact of disaster on women. And while the measurement of impacts in monetary terms may tend to focus attention toward the recovery of assets and incomes, yet this comprehensive approach is most notable.

Anderson (1990) notes that in the case of impact analysis in developing countries care must be taken to deal with the effect of the disaster on the non-formal sector which often represents a significant portion of total economic activity. This is particularly important because losses in this sector disproportionately affect the poor.

A full survey of literature regarding the psychological effects of disasters is beyond the scope of this study. However, psychological conditions in a community clearly impact the recovery process and full psychological functioning must be seen as an essential capability needing to be restored. On the individual level, World Bank (2005) observes from their experience, "At the outset providing survivors with income earning opportunities tied to physical work often seems to help as much as grief counseling."

On a community level, "a fundamental element in successful development is the existence of a strong sense of efficacy, i.e. the ability to affect and manage outcomes" (Anderson, 1990). The fact that disasters strip away the community's capability to affect and manage outcomes is an important point. Recovery must not only be thought of as a process of asset rebuilding. The community's participation in the process itself is crucial. It is crucial not only to gain "buy-in" to recovery projects, or to give the community a sense of "ownership." Participation in the recovery process is a crucial part of building that "strong sense of efficacy" that is the basis for the capability for full and effective participation in the social life of the community and for further development.

An associated issue arises here. The importance of managing information and expectations in times of natural disasters cannot be understated. Quarantelli (undated) asserts that "assessment of recovery is not just a matter of what actually occurs, but also prior experiences that affect perceptions of the process." Invariably the expectations of the community affected by the disaster regarding the speed of recovery are quite unrealistic since communities often do not have the information or experience upon which to base those expectations¹³. Providing opportunities for communication regarding both the duration and the goals of recovery is important for the community to be able to form reasonable expectations and to be able to participate in the process.

The macroeconomic impacts of disaster are informally discussed by Freeman, et. al. (2003). Following a disaster there is usually a reduction in the tax base at the same time as expenditures rise, leading to increased national borrowing (or monetization). Domestic

¹³ The same can be said of expectations regarding relief assistance.

and export production is redirected toward recovery. Along with increases in the importation of capital goods, there is a deterioration in the trade balance. Short-run capital flight at a time of increased borrowing will put pressure on both interest rates and the exchange rate. Together these factors will increase domestic inflationary pressures.

In terms of structured mathematical models, Yezer (2000) discusses two analytical modeling approaches to disaster analysis drawn from regional economics: regional econometric models and inter-industry (input-output) models. He suggests that feasible modifications could make such models useful for recovery analysis. These models also allow for simulations to be run on a variety of recovery policy proposals. However, the data requirements for these models make implementation difficult, particularly in developing country environments or in the context of rapid structural change.

A very basic approach is taken by Okuyama (2003), who uses a Solow-Swan growth model to discuss capital stock evolution through the recovery period. Given a temporary increase in the saving rate (and the corresponding decrease in consumption), recovery accelerates. This example includes modeling the disaster as an exogenous shock with exogenous response. A full CGE model is used by Narayan (2003) to study the effects of cyclones on small island economies, using Fiji as a case.

Case studies offer another perspective on the process of recovery. Benson and Clay (2004) use three cases to discuss various aspects of disaster impacts. Small island nations can be particularly vulnerable since a significant portion of the entire economy is affected simultaneously, as in the case of Dominica. Their case of Bangladesh focuses on the impact of natural disasters on public finance. And they study Malawi and southern Africa to illustrate the impact of climatic variability on economic performance. Other instructive cases include general economic impacts (Horwich, 2000) and transportation effects (Chang, 2000) in Kobe, Japan; housing reconstruction in Mexico City (Kreimer and Echeverria, (undated)); and examples of the necessity for an integrated perspective on development, prevention, relief, recovery and mitigation from Honduras (Telford, et.al (2004)) and from China (Ye (2002)).

V. Risk Management, Prevention and Mitigation

Over the last 15 years, significant work has been done in the areas of risk management and development planning, with an emphasis on disaster mitigation. While the timing of major disasters is inherently unpredictable, their occurrence is not always unforeseen. Cyclones, earthquakes and floods are often recurrent phenomena that need to be incorporated into investment and development decisions. In terms of cost-benefit analysis, projects need to take into account expected losses from disaster and build in mitigation and prevention as a key component from the start. The optimality of investment requires it. Further, the ability to respond to future events will depend significantly on steps taken now to manage the risk of those future disasters.

There is general agreement at this point that recovery planning should embody mitigation and prevention planning in an effort to reduce vulnerability. “Reconstruction projects should always include mitigation measures to reduce the chances a repeat natural disaster. By themselves, reconstruction efforts are not enough.” (Gilbert and Kreimer (1999)). “Reconstruction of damaged infrastructure is imperative, but insufficient by itself. It is equally important to identify local vulnerabilities and determine how to reduce them in ways that lead to durable solutions. The sustainability of infrastructure reconstructed after disaster is always in doubt when long-term measures to address disaster mitigation are absent” (World Bank (2005)). There is some doubt, however, about being able to convince policy makers that the expenditure on such efforts is justified¹⁴.

To strengthen the case, Mechler (undated) discusses the use of cost-benefit analysis for evaluating and managing disaster risk. Both mitigation measures and insurance can be used. In treating the problem of expected loss in the analysis, he points out that while most large developed countries can act as risk-neutral decision makers, smaller

¹⁴ Rather pragmatically, World Bank (2005) goes on to declare that “reaching agreement on the mitigation measures with the government within the first three months is very important because it gets much harder to get politicians to focus on disaster once the memory of the emergency recedes.”

developing countries should be more risk-averse since they have higher (proportional) economic vulnerability, a few large (and geographically proximate) infrastructure assets and economic centers. While insurance markets are typically underdeveloped in many lower-income countries, international capital markets have developed new products, including catastrophe and weather bonds, options, swaps and other derivatives (Freeman, et.al. (2003)).

The argument for risk management and preparedness goes beyond the context of recovery into the very center of development planning. As Anderson (1990) bluntly states, “The basic argument for integrating disaster awareness into development planning is that it is wasteful not to do so.... Disasters shorten the economic life of development investments.... Investment dollars are lost when a project is financed which is later wiped out by a (predictable) typhoon, earthquake or mudslide.” Then of course there is the issue of the impact on human lives.

Some prevention and mitigation efforts have the character of public goods (e.g. flood control projects), while other measures are more directly private¹⁵. Horwich (2000) notes that the type and amount of mitigation undertaken will change over the course of development. “Early in economic development, most disaster initiatives are public goods and will be undertaken, if at all, by government or charitable organizations. But eventually, at some income threshold, the private interest in protecting life and property from rare but catastrophic events materializes. At that point there emerge emergency and risk management departments in commercial and other enterprises, private disaster consultants, and disaster property insurance, including self-insurance through private saving.”

The poor, on the other hand, are typically less well equipped to privately mitigate and prevent losses. They have fewer housing and locational choices. They face much tighter budget constraints and thus remain more vulnerable. Because of this, Berke, et al. (1993)

¹⁵ Building codes increase private costs, but have certain public goods characteristics, (e.g. proper construction and spacing of buildings can prevent the spread of fire to neighboring properties). Thus there is incentive to free-ride.

highlight the need for the "achievement of equity, mitigation and sustainable development, particularly through local participation in redevelopment planning and institutional cooperation."

VI. Conclusion

We can draw a number of conclusions from this survey. First, definitions of disaster and recovery set the conceptual framework for the recovery process and are therefore an important part of the process. In particular, definitions of recovery (including my own) generally embody objectives for the recovery process. A definition focused on the "direct, indirect and secondary losses" from disaster will lead to a process oriented to the replacement of lost assets and restarting production. A definition centered on individual and community capabilities leads to more human-centered recovery process.

Second, disaster is not the first event in the recovery process. Earlier patterns of development created the vulnerabilities that the natural hazard event collided with. After the disaster, those pre-existing social and economic conditions significantly influence recovery. Similarly, the recovery process will influence subsequent social conditions, including future patterns of production, income distribution, power relations and capabilities.

Recovery objectives are not the same for all participants in the process. The problem of post-disaster optimization requires the specification of a measure to optimize (an "objective function"). There may be conflict between recovery planners who look to the future of the community and victims who "just want to get back to the way things were." Recovery is about people, not things. Therefore optimal recovery may not lead to an "efficient solution," since efficiency is not the only component of the objective function. Assets should be replaced "optimally," in a way that which generates the highest "returns" in the future. But people's future welfare is also impacted by the amount of change that they must endure (and their social tolerance for change). If "normalcy" is highly valued in the impacted society, the social value of replacing assets with older, less productive yet familiar technology may be deemed "optimal."

Impact analysis in recovery attempts to measure the loss and indicate priorities for recovery, and is an area of the literature that has made significant strides. But these analyses generally lack models of recovery. Such models would include dynamic and interactive effects that would give understanding and guidance to the sequencing of recovery. In the literature, this guidance comes primarily through the experience detailed in case studies. The development of such recovery models is an issue for further research.

Participation by the community in recovery is itself an important part of recovery. If the issue was merely asset replacement, an external organization could provide what would essentially be an insurance reimbursement and the community will have recovered. But natural disasters destroy not only productive capabilities but social capabilities as well. The recovery of those capabilities is essential, including that “sense of efficacy” that forms the basis for empowered future development.

Undertaking the process of recovery from disaster without incorporating steps toward managing the community’s future vulnerability is a recipe for disaster. Indeed, current development projects should incorporate mitigation planning. Yet doing the cost-benefit analysis to determine appropriate levels of investment mitigation requires at least implicit estimates of the probability of the occurrence of the natural hazard. Recent experience of a disaster tends to increase that estimate, whether that revision is appropriate or not¹⁶. Care must be exercised to appropriately carry out this analysis in the midst of recovery.

A study of this kind can at best skim the surface of a topic as complex as economic recovery from natural disaster. Indeed, there are a number of issues in recovery even not touched by this survey. These issues include the role of external aid in recovery, the impact of gifts-in-kind on the restoration of local production and distribution, and many others. Certainly there is room for a great deal of additional research.

¹⁶ Indeed the occurrence of a large earthquake may reduce the probability of another large earthquake while increasing the probability of smaller events due to the geophysical processes at work.

How will we know that recovery is over and development has resumed? Perhaps one indication that the process of recovery is nearing completion is when the disaster is no longer the organizing principle or the primary referent in how a community thinks of itself. The community finally will have recovered when its members are again capable of living lives of dignity and respect at least at the level they were prior to the event, though by no means will that be the end of the community's development of their capabilities.

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