

School of Economics and Finance

Disasters and the Networked Economy
A Book Summary

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Abstract. This document summarizes the thrust of my monograph book *Disasters and the Networked Economy* (2003, NY: Routledge. 228 pp. ISBN: 978-0-415-66629-9). It is no substitution for the book, but it attempts to make salient the main concepts, explanations and conclusions of it. It does so by first presenting a short general summary and then a summary of the main points of each chapter as well as the main conclusions of the book. It also includes the full list of references used by the book.

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General Summary

Introduction

Quantitative studies normally seek to assess the effects of disasters on the economy, especially over the long term. But there are serious problems with it. Data are poor, techniques are inappropriate for sudden shocks like disasters and not least theoretical interpretation are mostly axiomatic. Strong weaknesses in each of the above stage demand stronger assumptions, so conclusions are necessarily assumption ridden in a compound way, i.e. assumptions on data compound assumptions on technique, which compound assumption of interpretation, which produce assumption-compound results. It is therefore not surprising that the results from such studies are all over the place. From such studies there is little basis for furthering our understanding, let alone designing useful policy. So we propose a more flexible political economy approach, based on societal networks, aimed at addressing a few questions. How important are likely to be long-term and cumulative disaster effects on a networked macro-economy? What are the likely networked reactions of economic participants in the face of disasters? Why should there be a policy balance between the local and the national in the aftermath of disasters? Why should there be a policy balance between endogenous reactions and exogenous responses in the aftermath of disasters? How could an appropriate framework help improve response policy in the context of societal networks? How can public policy tap into endogenous network shifts to speed up and make recovery both more systemically efficient and developmentally efficacious?

Analytical Framework

We propose an analytical framework based upon three concepts: (i) *Societal functionality* is the capacity of a social system to operate in a *viable* way, i.e. a system that can *endogenously* survive (self repair), reproduce (stably expand) and develop (evolve and improve). Direct disaster losses may only make macroeconomic sense if they are assessed in terms of their effects on the workings of the economy as a whole. We show that except in the unlikely case of catastrophes (i.e. when a system stops operating as such), disasters as a rule do not impair societal functionality, which is why effective resilience is always likely to be available, making improbable the existence of significant longer-term negative economic effects. We emphasize that if indirect (flow) effects can be neutralised, then long-term and cumulative disaster effects are highly unlikely to be relevant. (ii) *Economic localization* is the type of economy that is within the affected area, rather than its geographic extent. Then we define a disaster as *localized* if it affects a confined area of economic activity, whether the disaster is geographically widespread or not. We show that most disasters are localized. The more economically confined a disaster the higher the *substitution potential* from unaffected actors for the purpose of recovery. (iii) *Societal network* is a structure made of actors, which are linked by given types of interdependence (basic, beliefs, economic, common interest, antagonistic, etc.). The levels of network integration of society depend on political, economic and cultural variables, which can be analytically characterized as horizontal and vertical relationships. The *economic networking* is part of this, which is the institutional structure and dynamics within which the government and each firm and household belong and act. The economic network can be analytically classified in terms as supra, intra and inter networks.

We show that networked societies with better access to social and economic networks are in better endogenous and exogenous conditions to insulate the national economy, damping down potential indirect effects, and hence long-term negative effects from disasters. That is, they would be in better conditions to gain back and secure stable functionality after disasters. Our aim is to use networks in a contextual political economy way to assess, via the input-output network and the network of business

behaviour under stress, how endogenous (inbuilt) and exogenous reactions and behaviours can be visualized and policy tapped to enhance functionality and therefore recovery from disaster.

General Networked Reactions and Public Policy

Exogenous responses should be in tune with the inbuilt reactions of people and markets, with a view of securing systemic sustainability. Learning about people's behaviours should be a basic trait of public policy, as failing to tap and orientate endogenous reactions in the disaster area may lead to dependency, delaying systemic recovery. In addition, there must be a functional balance between public actions on the national economy and public actions on the local one so as to prevent that directly affected localities be unnecessarily bypassed (or network shifted) by national considerations, rendering them less effective to re-establish their positions after recovery is well under way. So there are two complementary response tensions that public policy should be fully aware of: one is the exogenous and endogenous tension and the other the national and local one. A functional balance has to be struck within and between these two potential failures. In such context we analytically present the cases of cash transfers and in-kind aid, remittances and their infrastructure, shelter provision and migration, insurance and loans, and general systemic public policy and useful societal mechanisms for delivery. The aim was to show the importance of learning about people's reactions in disaster situations for public policy and in passing to show that networks are ubiquitous at all levels of societal action.

The Networked Macroeconomy

We focus on the macroeconomy as a whole, via both an aggregate and a disaggregate outlook, to show the likely networking substitutions induced by direct disaster effects within it. Short and longer functioning macroeconomic effects from disaster impacts can only happen via indirect (flow) effects, while cumulative effects result from a mix of direct and mostly indirect effects. Indirect effects can only cause a long-term effect if they are simultaneously (a) univocal, i.e. they have a unique cause and effect pattern and (b) un-substitutable, i.e. they cannot be substituted by endogenous processes or public policy-induced counteractions. If this was so, any large disaster would lead to a catastrophe, which represents a situation in which insulating and compensating counter-flow become unavailable, so disaster effects escalate without effective opposition, rendering the system unviable. Both requirements are highly unlikely in modern societies, which is why indirect flow effects are normally short-lived and compensated at national macro level.

As an aggregate whole. There are some well-supported assumptions about both direct disaster effects and the economy, e.g. most disasters are localized and most losses are to less productive K stock, endogenous responses and network shifts are paramount, disasters unlock and create investment opportunities, etc. On such bases, it can be shown, via a simple macro model, that the required investment to compensate fully for the potential fall in the growth of GDP from capital stock losses is actually quite modest, however large such losses. With realistic values for its parameters, it can be shown that one unit of disaster capital replacement (via new investment) may have 20 times more positive effect on GDP than the negative effect of one unit loss to a disaster. So in this scenario, an investment of one-twentieth of the capital loss would be enough to keep the GDP growth rate as if there were no disaster, other things being equal. Most countries do fulfil such a requirement within a year.

As a disaggregated networked whole. The result above hides the way in which interacting units react to the capital lost to the disaster, such as governments, foreigners, regions, sectors, firms and households. This is what we then assess via an input-output framework, made of supra-, intra- and inter-networks. (i) Supra-networks operate via official authority and in a good deal via the financial system, which will largely respond to private expectations and government policy preferences. Public policy in interaction with private expectations, associated with direct activities and incentives, can and do characterize possible response consequences. If public and foreign responses act unnecessarily at odds with endogenous response mechanisms, local recovery will likely be systemically negative and wasteful. So the interaction between the government and affected people, between the national interest and the local one, and between endogenous reactions and exogenous responses will greatly shape the systemic quality

and the speed of recovery. So these networks operate from above and go beyond intra- and inter-networks, influencing the behavior, multipliers and stability of the economy, whether purposely or not. (ii) Intra networks operate within and between economic sectors or industries, which are typically input relationships, via market exchange. The actual linkages are however between constituent firms, normally via intermediaries. As is well known, a sector normally cuts across regions, so many firms can be badly affected by a disaster, but the industry or sector can remain unscathed via substitutions, shifts, new entrants and the like, especially within the networked substitution potential of affected countries, making the indirect disaster effect less important or irrelevant at macro national level. This associated with exogenous public and foreign responses may even outweigh the spread of indirect disaster effects on the economy over time. (iii) Inter-networks operate between households and producers through the circular flow of income via market exchange. Most firms produce for both input demand and final demand. The latter are income relationships, which are normally expressed in terms of aggregate demand. The main issue after disasters would then be how to secure compensatory levels of demand and supply. These can come from inventories and idle capacity, savings and remittances, formal and informal loans, government transfers and works, and general foreign and domestic aid. If a disaster shock is considered as transitory, indirect effects effect would only be potential, as affected agents will initially attempt to counteract the shock via households' dis-savings and firms' inventories, if these are available. In addition, exogenous responses via transfers, credits and new response demand are bound to reinforce the counteraction. This would happen in an environment of endogenous network shifting or bypassing of the affected links.

So even if the directly affected agents cannot recover fast or at all, the national macro-economy would insulate them and compensate for the potential flow loss, meaning that negative multipliers are stopped in their tracks, while positive ones may be further stimulated. Hence via endogenous and exogenous responses macro functionality would normally be effective to recover the levels of output in the short to medium term, which is what actually seems to happen.

Two examples. By means of input-output and national account statistics may be possible to anticipate the basic conditions for recovery, especially resorting to two network concepts: the *substitution potential* and the *backward/forward linkages*. By substitution potential, we mean how many times the potential affected flow of output can be substituted by the rest of the economy after a given period, which would measure the level of potential network shifting available. By backward and forward linkages, we mean the pull and push that the affected sectors and regions have on the rest of the economy. If substitution is high, linkages will be less relevant, but if substitution is low, linkages will be all important to assess effects. We illustrate with the cases of the 2004 Indonesia tsunami and the 2010 Chile earthquake. In both cases, the ratios of substitution potential were generally large, and that of backward and forward linkages relatively low for the actually affected sectors. Indonesia and Chile more than substituted their potential flow effects over the first few months, ending up with a higher than expected GDP growth rates a year later. The analysis showed significant network shifts from the affected areas to the rest of the country.

Businesses and Networks

Productive units are the foundation of community networks and livelihoods. They provide employment, skills, goods, services, technology and know-how, and also related societal institutions. Business vulnerability and resilience depend on size, economic sector, goods supply type, diversification, intra business network, hazard insurance, own savings, ownership, disaster experience, political influence and flexible management. But all this also depends on the characteristics of the surrounding community, networks and population behavioural patterns. After disasters have directly affected capital stocks and incomes, there will be affected market participants that are (a) indirectly damaged, which cannot satisfy their needs, given that they lost their regular supply, demand and/or credit flow channels, and (b) directly damaged, which cannot participate in the market, given that they lost their means of participation. Frustrated participants will necessarily take themselves the required initiative to look for alternative markets and early solutions to come out from their predicament, but this can be facilitated and orientated by public policy. It can be shown that if unaffected, but frustrated participants, can be

stimulated and orientated by public policy to shift networks, the investment required to compensate for potential losses of GDP will be even smaller than otherwise it would be (lower than the one-twentieth mentioned above), so that the recovery becomes more efficient and developmentally efficacious. So if after a disaster impact each household and firm are well informed about existing networks of possible markets, and their switching to alternative market in the network is not particularly onerous, then it would be less likely that indirect disaster effects significantly spread over the economy. Although by design or default public policy normally gives some support to the above requirements, this is nonetheless a fertile ground for *ex-ante* and *ex-post* well-designed policy. We then propose that the standard surveys that are carried out after disasters should be complemented with enquiries about networks and networked behaviour of affected businesses and households, which we generally set up in our book Appendix. The information coming from these surveys should greatly support public response policy with a focus on networks and network shifting.

General Conclusions

Given a level of disaster localization, for countries that enjoy a well-developed networking, focused policy incentives might be enough for recovery. Contrariwise, when countries have very underdeveloped network linkages, the role of public policy should be to help put together otherwise isolated activities and households by creating linkages, e.g. via marketing infrastructures, pecuniary incentives, information and the like. In the case of intermediate network development, i.e. too weak to prevent endogenously the spreading of shocks, the affected localities may tend to fragment, so public and foreign policy should primarily aim at reinforcing and develop such initial linkages, physically and/or institutionally. Finally, the main reason why disasters don't have longer, let alone cumulative, effects of note on the economy is because society is a living networked system with permanent functionality and feedbacks associated with inbuilt reactions as well as exogenous responses. After disasters, network shifting and reactions by businesses and people can in addition be systemically stimulated and orientated by public and foreign policy so that the recovery becomes faster, less costly and developmentally useful.

Chapter Summary

Introduction (pp. 1-4)

In a previous work we concluded that, as a rule, natural disasters are a problem of development, but not a problem for development. In the present work, we further support such a conclusion by emphasizing that society is a *living* organism and not an *inert* object. We develop a framework that is set up in terms of societal networking and the economic localization of disasters, showing that societal functionality, defined as the capacity of a system to survive, reproduce and develop, is unlikely to be impaired by natural disasters. This means that institutional resilience and economic resources are, as a rule, always available for recovery.

Society is a living organism made of interrelated parts that generates societally endogenous (inbuilt) reactions to take care of local failures. These inbuilt behaviours operate via local and national networks and often with significant connections to international ones, producing systemic compensatory adaptations and substitutions, circumventions and shifts, migrations and diversification, altering somehow the dynamics and structure of the disaster affected location and country, at least in the short to medium terms

Longer-term disaster effects on the economy are unlikely to happen if indirect (flow) effects can be insulated and counteracted at national macro level, which normally are. In addition, exogenous public and international responses will also be part of the said reactions, making the possibility of systemically harmful macroeconomic effects highly unlikely in the medium term, let alone the long term, and not least making the claim of significant cumulative economic effects little persuasive.

Hence, the main reason why natural disasters don't appear to have longer effects of note on the national economy is because society is a living networked system with permanent functionality and feedbacks, which are associated with inbuilt reactions from horizontal relationships (especially, community and markets) as well as exogenous and endogenized routine responses from vertical linkages (especially public and foreign).

There is then a few questions that this monograph should help answer. How important are likely to be long-term and cumulative disaster effects on a networked macro-economy? What are the likely networked reactions of economic participants in the face of disasters? Why should there be a policy balance between the local and the national in the aftermath of disasters? Why should there be a policy balance between endogenous reactions and exogenous responses in the aftermath of disasters? How could an appropriate framework help improve response policy in the context of societal networks? How can public policy tap on endogenous network shifts to speed up and make recovery both more systemically efficient and developmentally efficacious?

This work unfolds from a critical survey of quantitative studies to the systemic role of business and community networked reactions *vis-à-vis* public response policy, passing through analytical frameworks as well as aggregate and disaggregate theoretical and empirical assessments of potential disaster effects on the economy in real situations.

Chapter I: The Problem with Quantitative Studies (pp. 4-29 plus notes)

Any quantitative study has three necessary components to arrive at conclusions: data, technique and interpretation. The reliability, realism and policy usefulness of conclusions would then depend on the quality of the data, the ability of the technique and the realism of interpretation.

- In the case of disaster studies, which normally attempt to analyse economic effects of disasters, the quality of data is poor, mostly based on EM-DAT and some re-insurance companies. Primary source data comes from countries' own collection, which are then collated by the institutions above. Definitions, focus, accuracy and consistency vary within and across sources and are problematic in themselves. So implicit and explicit smoothing assumptions for tractability are strong as a matter of fact. Techniques are as usual subjected to many well-known insufficiencies, but disasters bring additional ones. So more assumptions are used to make them workable. And the interpretation is founded on theoretical constructs or models, as reality cannot be represented directly, but only interpreted. A model is a logical representation of a subjective interpretation of what we call reality, which at best it comes a little way to arguably explain of, and help policy design for, what is "out there". At worse, it is little else than vested fantasy clad in a logical outfit. This then brings even more assumptions, including axioms (dogmas), from both the interpretation and the forced "tractability" required for mathematical representation or modelling. For disaster analysis, two main quantitative approaches have normally been used:
 - Black-box Techniques (before-after, econometrics and counterfactuals)
 - Simulation Techniques (IO, SAM and CGE)¹
- Conclusions from such approaches are necessarily assumption ridden in a compound way, i.e. the assumptions of each stage compounds the assumptions of the other stages. That is:
 - assumptions on data compound
 - assumptions on technique, which compound
 - assumption of interpretation, which produce
 - assumption-compound results

To Clarify: In the case of black-box techniques, it would be easy to understand that if any of these stages is weak (i.e. requiring stronger smoothing, tractable and interpretative assumption), then the conclusions would necessarily be weak. This is true for any quantitative study, but the problem with those from disasters is that the three stages are significantly weaker. The basic data is pretty unreliable, econometrics (which is the main approach) is badly appropriate to deal with sudden shocks and the interpretation is normally based on axiomatic principles. The latter has often little to do with reality in any case, but even less so in the case of disasters. So it is not surprising that the results from such studies are all over the place. That is, black-box studies conclude that the long-term effects of (the same bundle of) disasters are negative or positive or neutral or simply inconclusive. From such studies there is little basis for furthering our understanding, let alone designing useful policy.

In turn, simulation studies, which are by definition not designed to deal with empirical long-term effects, but only theoretical ones, give the game away by imagining a theoretical reality from the beginning so that an initial (disaster) impact on some of their variables can be transmitted, via interaction with other variables and sectors (and/or regions), producing given numerical results for the whole system. These studies are normally founded upon unrealistic extremes, either fully fixed behavioural coefficients (standard Input-Output and Social Accounting Matrix) or fully flexible ones (standard Computable General Equilibrium). So while IO and SAM assume fixed short-term behavioural parameters, CGE assumes an unchanged long-term behaviour. That is, whatever happens with the economic environment,

¹ IO: Input-Output, SAM: Social Accounting Matrix, CGE: Computable General Equilibrium.

the former implies that participants don't adapt, keeping their plans regardless; while the latter implies that participants fully and speedily adapt to any new situation, keeping the same functional and interactive behaviour, as if innovation as well as constraints on information, knowledge, resources, coordination, and let alone societal environmental changes, were unimportant sideshows. A CGE can theoretically be meant only for the very long term, which would make this exercise empirically poor, as it would fail to capture both the sudden nature of most disasters and the very fact that behaviour does change in the long term. Apart from the plethora of strong assumptions coming from interpretation and mathematical tractability rather than realism, both then fail to deal with the effect of sudden shocks on parameters, making the exercise at best interesting, but their results highly misleading. Still, the sectoral/industrial/regional interaction and transmissions that these models attempt to pinpoint are important traits to consider in disaster analysis in a societal system. This is what we preserve in the context of societal networks.

Chapter II: A Political Economy Framework: Functionality, Localization and Networks (pp. 30-55 plus notes)

In later chapters we focus on affected people's and business's endogenous response in connection to both some systemic traits and some *ex-ante* and *ex-post* public and foreign policies. We first focus on the national macroeconomy and society as a whole. Disaster effects should be referred and analysed in the context of macro functionality and development. So societal functionality becomes a key concept.

- Societal Functionality: capacity of a social system to operate in a *viable* way, i.e. a system that can *endogenously* survive (self-repair), reproduce (stably expand) and develop (evolve and improve).

To Clarify: Direct losses of labour, capital stock, consumption and investment goods as well as direct money and income losses, may only make macroeconomic sense, i.e. avoiding the fallacy of composition, if they are assessed in terms of their effects on the workings of the economy as a whole. Otherwise, we will be treading on triviality, i.e. any loss item to a disaster has a long-term *accounting* effect in itself, but if such localized loss does not affect macro-economy functionality, i.e. the economy soon re-establishes its capacity and dynamics, then in this conception it is unlikely to have longer-term macro effects of significance or at all.

- Systemic Functionality, Local/National and Endogenous/Exogenous Tensions: To secure systemic functionality, attention should be focused on a permanent systemic tensions between the local and the national, and between endogenous (inbuilt) and exogenous (mostly *ad hoc*) responses, so that mutual consistent balances between them are sought.

To Clarify: There are two balances that have to be reasonably secured by the public response to disasters. One is the balance between the local level and the national one, and the other is a complementary one between endogenous reactions and exogenous responses. The former should avoid that the national networking insulates itself at the expense of the affected locality, by bypassing and severing local networks with the wider economy beyond what is systemically necessary. The latter, in turn, should avoid that exogenous public and foreign policy suffocates endogenous reactions in a systemically inconsistent way, which may force an unnecessary aid dependency on the directly affected locality.

- Vulnerability, Resilience and Functionality: Vulnerability is associated with the degree of exposure of society's frameworks, social groups and individuals to extreme events. While resilience is associated with the specific processes and items that characterize such exposures and therefore with the mechanisms and policies that can be resorted to recover the affected system.

To Clarify: vulnerability is the risk of potential destruction and damage to a given societal unit from the direct impact of a disaster. So it refers to the state of things as they are just before a disaster strikes. Resilience, in turn, refers to the capacity and ability of such a societal unit, and the ones that can be indirectly affected, to react and recover after such an impact has happened. Both are clearly related, as units that are less vulnerable, because of their quality of resources, can withstand a good deal of the impact and have better and diverse network connections, will normally make them more resilience. We can analytically differentiate between endogenous and exogenous resilience. The former corresponds to the in-built capability of a system to bounce back, given the structure, dynamics and ethos of an affected social and/or economic unit and its societal links with other units within and outside the disaster zone. This type of resilience does not require especial changes to face disasters, but only to extend and deploy its existing protocols and routines. It is part of the standard self-regulatory mechanisms to tackle normal changes in the social and economic environment, which mostly operates from below. In turn, exogenous resilience refers to the abilities and availabilities that can be resorted to bring back the unit to functionality, i.e. survival, continuity and development. This type does require significant changes in objectives and therefore policies, as expectations suddenly change in virtue of sudden ambience changes. This then goes well beyond the standard self-regulatory mechanisms associated with formal

and informal response following the feedbacks from a normal societal environment. It is exogenous because it mostly operates from above and acts via *ad-hoc* changes in ingenuity, policy and decision making.

- Economic Localization: Given that the geographic extent of a disaster does not appear to mean much in the absence of the type of economy that is within the affected area, we then define a disaster as *localized* if it affects a confined area of economic activity.

To Clarify: a geographically widespread disaster can be economically localized (e.g. a drought in a diversified country, such as most South-American countries), or widespread (e.g. a drought in an agriculturally undiversified least developed country, like a Sahelian country). What matters for systemic functionality, and hence for the issue of vulnerability and resilience, is the economic, rather than the geographic, localization of a disaster. Development itself appears to be a process whereby all disasters become more economically localized over time. That is, 'disasters are primarily a problem of development, but essentially not a problem for development' (Albala-Bertrand 1993: 202) Thus, any policy process contributing to a diversified, integrative and sustainable development must incidentally contribute to reducing economic and social vulnerability to disasters, and therefore increasing resilience, as in developed countries. That is, given that development is a process that increases the complexity of a societal setting via all-embracing networks that widen and deepen society's interconnectedness, then societal networking is of paramount importance to analyze functionality and therefore the duration and intensity of disaster effects.

- Localization and Substitution Potential: The more economically confined the direct disaster effects, the more the potential for substitution from unaffected economic units.

To Clarify: Once we know what the geographical spread of the disaster is, it would be possible to assess its economic importance in terms of sectoral, regional and national dimensions, focusing especially on production, exports, domestic demand, capital and employment. These can come from standard national income accounts, hopefully divided into appropriate regions. Assuming that there are appropriate statistics, then it would be useful to count with the importance of the pull and push factor of the affected economic units on the rest of the economy via information on pre-disaster backward and forward linkages. The potential for substitution comes from the existence of available alternative supply/demand sources, from alternative transport infrastructures available, and from how reactive (mostly) private endogenous reactions and (mostly) public exogenous responses are. We can anticipate the importance of potential effects on macro functionality via the calculation of economic substitution potential indexes and other information, at sectoral, regional and national levels, assuming that the emergency is over and fast infrastructure rehabilitation is advanced (i.e. via existing alternative and makeshift infrastructures, which is also part of substitutive activities), which normally happen in the first few weeks.

- Disaster Situation: A disaster situation can be analytically divided into the impact side, the response side and the institutionally interfering effects coming from both.

To Clarify I: A *disaster impact* is normally the result of a physically or societally uncompensated tension between a natural event and a social setting, which translates into death, damage, destruction and the disarticulation of societal frameworks. Given a natural event of given strength, it depends on disaster-proof technology and organization as well as existing socio-political access to it, which mostly respond to endogenous societal processes. Once a disaster impact has occurred, three main types of effects ensue: direct (or stock) effects, indirect (or flow) effects and societal interfering (or institutional) effects. The latter are more clearly associated with the response. Direct effects have an impact on the quality and levels of human populations (injury and deaths) as well as on the quality and levels of physical and animal stocks (damage and destruction). For the economic system, direct effects mostly represent losses to the capital stock and labour. In turn, indirect effects derive from the disarticulations caused by the direct effects, affecting the interrelations between physical structures and between people, which may translate into flow or functionality failures in the economy, public activities, household conditions and the states of health and nutrition. For the economic system, these represent the effect of

the disarticulations of productive units and distributional channels wrought by direct effects, i.e. losses to functioning flows and activity, in terms of foregone production and income, savings and investment, productivity and efficiency, and the like, with consequences such as inflation, unemployment and instability.

To Clarify II: A *disaster response*, on the other hand, is mostly motivated by the disaster impact and can be defined as a wide array of endogenous and exogenous reactions, measures and policies that are aimed at mitigating, counteracting and preventing disaster impacts and effects (i.e. responses on the event, on the impact boundary, on the social system, and on the effects). This then generates three not independent main areas of attention, which makes up the response side of a disaster situation: response mechanisms (exogenous and endogenous types), compensatory response (after a disaster impact) and anticipatory response (before the next potential disaster impact). Given that the above impacts and responses happen in an ongoing system, then there will also be societal side-effects that can come from both the disaster impact effects and the response to them, which are mostly unintended but potentially predictable, i.e. *interfering effects*.

- Societal Networking: Societal Networking is the interconnectedness of interdependent societal units or agents at local, national and international levels. The better and more stable the physical networking (roads, utilities, communications), the more effective the societal (institutional) networking (organized individual, groups and agents).
- Social Network: is a social structure made of nodes or actors or agents (individuals, organizations, groups, countries, etc.), which are linked by given types of interdependence, such as basic relationships (friendship, kinship, sexual, prestige), beliefs links (political, religious, ideological), economic links (trade, finance, production, markets), common interest (clubs, associations, schools, firms, grass-root movements and other types of formal and informal relationships), and of course antagonistic ties (dislike, enmity, competition). Most of these are the result of socialization into norms and beliefs that translate into common and predictable behaviours and as such appear as spontaneous (cultural and religious beliefs, national and regional identity, and general habits and customs). Consciously, networked individuals or agents can call upon nodes of existing or new networks in accordance with their needs, but more often than not, networks facilitate and satisfy needs unconsciously. This brings up the old debate about structure versus agency or objective versus subjective or determinism versus free-will or voluntarism (Marx, Althusser, Hayek, Popper, Giddens, etc.).
- Networked Individuals: Individuals as social agents are creatures and carriers of structures. And as networked beings, they are also modifiers of structures. A single individual may not make much of a difference, however well positioned, but networked individuals, clustered into some identity group, may and often do, especially when social institutions fail to accommodate competing identity groupings, i.e. the breeding ground of complex emergencies.

To Clarify: Given that there is a wealth of precedents in the social sciences for at least the last two centuries, it is surprising that the many contemporary writings on networks pay so little attention to anything that happened before the last couple of decades. This is also one of the main weaknesses of what comes today to be called social network analysis or simply SNA. What is particular to SNA is the empirically detailed mapping of existing social networks, which more often than not only refers to small number of individuals (natural persons) rather than institutional agents, which would represent organizations and societal (common) behaviours. In addition, the mapping of larger numbers of nodes and ties implies to transform a map into a blot, making it less intelligible. An arsenal of social networks, according to the structure of nodes relationships (e.g. complete, star, line, empty, core-periphery) and working concepts (e.g. centrality, clustering, cliques, equivalence, homophily, structural holes) with some measuring methods have been put forward and used to describe empirical networks. Description is the more interesting and useful part of the approach so far. The explanation about how and why social networks form and develop is however poor. This is mostly based on axiomatic applications of game theory and variants to pair wise individuals, operating under instrumental and substantive maximizing rationality. The axiomatic approach, framed on methodological individualism and the maximizing

“rational” agent, runs the risk of becoming rigid, unrealistic and little relevant as a good deal of the disciplines based on it.

We intend to use networks here in a contextual political economy way to assess, via the input-output network and the network of business behaviour under stress, how endogenous and exogenous reactions and behaviours can be visualized and hopefully tapped to enhance functionality and therefore recovery from disaster. So the aim is to analytically contextualize societal network, but not to create descriptive mappings and/or giving axiomatic explanations about them.

- Community and Networks: The levels of integration of communities, within themselves and with the social whole, depend on political, economic and cultural variables. We can analytically characterize social (institutionally networked) individuals by means of three main types of informal and formal institutional linkages with their communities and the wider national (and foreign) whole by means of horizontal and vertical linkages, which give rise to three kinds of relationships: primary, secondary and hierarchical. These can more or less correspond to the concept of social capital and its classification into bonding, bridging and linking capital. That is:
 - *Primary relationships* refers to family, extended family, friends, neighbors, race, ethnic, religious and other kinship or primordial groupings, implying a closer bond and allegiance. These relationships *within* groups of very similar individuals (termed 'homophily' by social network theory) represent a net of *horizontal linkages* that constitute the very base of endogenous disaster reactions (e.g. remittances, victim's hosting, some emergence, and general informal insurance). This is what is sometimes called 'bonding social capital'
 - *Secondary relationships* are especially *between* groupings, linking individuals across groups and cleavages by means of social, political, economic and cultural associations, e.g. formal and informal markets, school interactions, broad political parties, public employees, private workforces, trade unions, consumer's associations and other social political and economic organizations. So basic diversity rather than similarity, pluralism rather than monism, heterogeneity rather than homogeneity are the main features of these relationships, which whether formalized or otherwise, are also part of the societal fabric of *horizontal linkages*. A good deal of endogenous reactions is carried via these relationships, especially via the economic networks provided by the market or associated with it, via formal organizations (e.g. trade unions and employers' associations), but also via naturally-born coping networks, like emergent organizations. This type of inter-relations is sometimes called 'bridging social capital'
 - *Hierarchical relations* refers to state institutions (executive, legislative and judicial offices), private institutions (firms, banks, etc.) and international institutions (UN, World Bank, NGOs, etc.). These are *ranked* relationships and are part of the network of *vertical linkages* between individuals or groupings and formal authority. Most of exogenous response is associated with these hierarchical links. *Ex-post* response without *ex-ante* endogenization is what we call *proper exogenous response*. Then there is also *ex-post* response with *ex-ante* endogenization, i.e. legal institutions, procedures, routines and funds to deal with potential disasters. Vertical *endogenized* responses are therefore less automatic than those related to horizontal linkages, as they require both societal incorporation (socialization) and enforcement, but in time they can become endogenous (e.g. primary education or respect for norms). This type of inter-relations is sometimes called 'linking social capital.'
- The Formal Economic System and its networking can be represented as a structure of stable participants and links, including the government, international institutions, domestic and foreign firms and households. So each firm and each household can be actually linked to, and potentially face, a collection of networks, belonging to domestic and foreign quarters. Productive and income interrelations in an economy can *potentially* and *theoretically* be affected by the physical and/or organizational failure of any single productive unit (e.g. steel-production plant) or any single distribution channel (e.g. industrial motorway) to deliver, affecting indirectly the whole economic circuit and associated non-economic activities. The magnitude and spread of such potential effects

depends simultaneously on the economic importance of the production involved (i.e. how strongly and how many economic units depend on the affected production or supply. These are the *linkages*), the alternative supply sources available (i.e. how many alternative sources, from local, national and foreign suppliers are available, and how easy can they be accessed. This is the *substitution potential*) and infrastructures available (i.e. rehabilitated and/or alternative ones, which are part of the substitution potential). Not least, it also depends on the duration of the hindrance, affecting the range of possible adjustments (i.e. from weathering out the problem to significant structural change). The greater the severity, extent, and duration of effects, other things being equal, the more likely the consequences for the economic circuit as a whole. But then the more localized and better integrated the local system to national societal networks, the more unlikely the spreading of effects towards the macroeconomy as a whole, especially in the medium and long terms.

- Isolation and Insulation: An *isolated*, autarkic, local economy cannot by definition have spreading effects towards the national economy. From the viewpoint of the national macroeconomy, the disaster would be localized and un-intrusive. Contrariwise, if the local economy is integrated to the national economy via mutual demands and supplies of factors, goods and finance, then the disaster can remain local only insofar as the indirect spreading effects can be contained within the disaster zone boundary and/or counteracted outside it. From a national standpoint, the disaster would be localized if the macroeconomy could *insulate* itself from the indirect effects that originate in the disaster zone. For this to happen, the national economy has to compensate with inbuilt economic and other societal reactions, which in addition are likely to be reinforced by exogenous domestic and foreign responses. The basic containment of wider indirect effects would normally occur rapidly via relief and local physical rehabilitation, during which the macroeconomic organism would already be taking care of itself via normal endogenous market and non-market mechanisms.

In Sum: This is like physiological reactions that first insulate a wound, preventing the spread of infection, and then start a healing process that fully re-establish biological functions. Once the macroeconomy has managed to insulate from local failure and therefore functions almost normally, appropriate policies and not least political will are likely to be required to do the same with the affected locality. Nation building and its development implies the integration of otherwise isolated, or autarkic, localities into a common centre of loyalties and high decision making, which necessarily implies a process of political, social and economic enfranchising via institutional and physical networks. Nation building represents societal incorporation, which develops via widening the embrace and sophistication of interconnectedness. This is the original globalization, i.e. all-embracing societal networks within country administrative boundaries. Networked societies with better access to social and economic networks, domestic and foreign, are in better endogenous and exogenous conditions to damp down potential indirect effects and hence long-term effects from disasters. That is, they would be in better conditions to gain back and secure stable functionality after disasters.

Chapter III: Networked Reactions and Public Policy (pp.56-76 plus notes)

We assume that the aim of any disaster response, beyond purely short-term relief requirements, is to re-establish damaged macro functionality and help recover lost local livelihoods in a sustainable manner. The question is how to make exogenous public response *systemically* compatible with endogenous reactions, so as to increase the effectiveness and efficiency of the recovery, in relation to both societal functionality and long-term development. This takes us back the two dynamic tensions, mentioned in the previous chapter, which require balance after a disaster:

- Tension between National and Local Responses: This is part of the normal development process, which by means of socially wide network integration brings societal change at a higher stadium of economic and social functionality to more and more localities of a country, i.e. internal globalization. After disasters have destroyed and/or damage the capital stock and income directly, there will then be frustrated participants on the supply and demand sides, whether within or outside the geographic and/or economic disaster zone. This creates a tension between the national and the local in terms of local reactions and national response priorities.

To Clarify: Public activity should aim at a twofold systemic balance. On the one hand, it should seek to prevent the national macro-economy from undergoing unnecessary negative indirect effects that may translate into losses of functionality and therefore future GDP; and on the other, it should prevent that directly affected localities be unnecessarily bypassed by national macro considerations, rendering them less effective to re-establish their positions after recovery is well under way. So there must be a functional balance between actions on the national economy and actions on the local one so as to secure systemic consistency.

- Tension between Endogenous and Exogenous responses: There is a tension between endogenous reactions and exogenous (mostly policy) responses. The former should be properly channelled by public policy, while public policy should not systematically bypass it.

To Clarify: International and public disaster responses can become both more effective by harnessing useful endogenous (inbuilt) mechanisms, and less harmful by avoiding trampling with and/or suffocating them. In other words, supra networks have to be consistent with existing and/or potential subordinated networks, i.e. intra and inter economic networks plus other societal ones. Exogenous responses are meant to be a complement to inbuilt reactions. So there must be a balance with a view of making exogenous public response *systemically* compatible with endogenous reactions, so as to increase the effectiveness and efficiency of the recovery in relation to both societal functionality and long-term development. Failing to tap private endogenous initiatives and activities in the disaster area may lead to unnecessary dependency from subsidies, let alone handouts, delaying the incorporation of disaster affected people and activities into the regular economic system. But failing to tap endogenous initiatives of unscathed activities and people, in and outside the disaster area, may delay and increase the cost of recovery at national and local levels. A balance has to be struck between these two potential failures.

- Given the experience of communities and firms in the face of disasters, there are a number of response mechanisms that should be evaluated in terms of its systemic consistency with institutional networks, especially via the market, for longer-term sustainability and development, i.e. for systemic functionality. All main responses should be analyzed in term of their market availability and their impact on development. We illustrate the issue with:
 - Emergency support: cash, vouchers, in-kind aid
 - Remittances: infrastructure and mechanisms
 - Refugees: shelter provision, camps, migration
 - Recovery funding: insurance, subsidies and loans

- There are also institutional networks and mechanism through which systemic public policy can be more efficiently channelled. For example:
 - Trade unions and employer's organizations
 - Mobiles phones network and access
 - The armed forces and religious institutions

In Sum: Exogenous responses should be in tune with the inbuilt reactions of people and markets, with a view of securing systemic sustainability, i.e. functionality. It is then important to learn about people's reactions in disaster situations for the purpose of public policy. This may allow tapping existing networks or creating new ones, as they are ubiquitous at all levels of societal action. An appropriate policy support and enhancement of community networked reactions can reduce the local-national tension, and secure the effectiveness and efficiency of recovery both in itself and in terms of general development.

Chapter IV: The Networked Macro-Economy and Disasters (pp.77-105 plus notes)

Societal reactivity via domestic and foreign linkages in a diversified economic environment is paramount to explain why naturally induced disasters might not have the all-embracing negative economic effects that are so commonly portrayed in the mass media and other sources, let alone become a catastrophe. A disaster can however be devastating for the directly affected locality, but national societal response mechanisms are likely to be always available. In other words, natural disasters are unlikely to affect the capability of a societal system to be viable, as disaster do occur in the context of a networked economy and society. So the networked macro-economy should represent the first focus to assess economic effects from disaster impacts.

- Effects on Functionality: Short and longer functioning macroeconomic effects from disaster impacts can only happen via indirect (flow) effects, while cumulative effects result from a mix of direct and mostly indirect effects. Indirect effects can only cause a long-term effect if they are simultaneously: (a) univocal, i.e. they have a unique cause and effect pattern and (b) un-substitutable, i.e. they cannot be substituted by endogenous processes or public policy-induced counteractions.
- Disaster Escalation and Catastrophe: To emphasize, long-term and indeed cumulative disaster effects can only happen via indirect (or flow) effects. This means that the issue of counter-flows at macro and local levels is of paramount importance. A catastrophe represents a situation in which insulating and compensating counter-flow become unavailable, so disaster effects escalate towards it without effective interruption, which is a rare case.

To clarify I: Catastrophe is an extreme and sudden disaster whose intensity affects a social system as follows.

- (i) The endogenous (inbuilt) capacity and the exogenous (policy) options of the system are greatly surpassed, i.e. most economic resources become unavailable and most normal institutions become fragmented and ineffective, so further systemic disintegration and deterioration is unstoppable. In economic terms: direct (stock) effects are economically widespread, massive or pivotal.
- (ii) If failure is localized, then it is so intense that it pervades the whole system in the same way as in the previous point, i.e. the system has no viability within the same institutional arrangements and resources. In economic terms: indirect (flow) effects are uncontainable.
- (iii) External aid, domestic or foreign, even if available, cannot re-ignite the system, but only support its now helpless victims. Institutional effects are so perverse that functional recovery, via economic rehabilitation and reconstruction, becomes unachievable. That is to say, the system stops operating as such, requiring a fundamental change, which is a long-term and costly endeavour.

To Clarify II: As a consequence, the economic system is rendered unviable and victim relief must be the most that external aid can achieve, as in some complex emergencies. This is more likely in the aftermath of wars or massive failure of institutional cohesiveness (e.g. Germany after WW I or the breakup of Yugoslavia), but highly unlikely in the case of sudden disasters, except and arguably in the case of the volcanic-induced disaster of Monserrat in 1995. In other words, a catastrophe, as defined above, might only happen if a disaster renders economy and society into either inert objects or fully disorganized social entities, which are unlikely propositions, especially in the context of localized disasters. So societal functionality is unlikely to be impaired, except and arguably in the very short term. Given this, to assess the economic effects of a disaster on GDP both an aggregate model and a disaggregate argument can be entertained.

- An Aggregate Macroeconomic Model: There are some well-supported assumptions about both direct disaster effects and the economy, especially in the case of developing countries, e.g. most disasters are localized and most losses are to less productive K stock, endogenous responses and network shifts are forthcoming, disasters unlock and create investment opportunities, etc. Within the dynamic societal framework sketched above, to assess disaster effects on the economic, an

economic model can be formulated by paying attention to the impact effect on GDP growth, the response effect on GDP growth, and the investment required to keep GDP growth as if there were no disaster. The model shows that the latter is very modest, which is normally achieved within a year from the impact.

To Clarify: Let's go step by step, from impact and response effects to total net effects and required investment, without the maths. (i) Impact Effect: the output that can be produced with a given stock of capital, i.e. capital productivity, normally represents only a fraction of the value of the capital stock, usually around 40 percent of it. So the potentially theoretical reduction in output from capital losses would only be a fraction of such losses. Incorporating well-supported assumptions, such productivity would be significantly smaller than say 40 percent. (ii) Response effect: investment has a dual role in the economy, on the supply side, it represents additions to the capital stock and, on the demand side, it represents direct income. So reconstruction investment while replacing the losses to the capital stock, it also increases the aggregate demand and therefore income directly. One unit of reconstruction investment will directly represent one unit of income, but indirectly significantly more via the multiplier after one year. (iii) Total effect: taking the impact and response together, given some realistic values to parameters, then a unit of reconstruction investment could have 20 times more impact on output than one unit of capital loss. So to know how much new investment would be required to compensate for the potential loss of output from the disaster loss to capital, we simply calculate the required reconstruction investment that would keep the economy as if there were no disaster, all other things being equal. It can be shown that however large the direct disaster impact, the addition to the normal investment ratio (i.e. investment to GDP) would be quite modest, e.g. for a large disaster with a loss ratio of 10 percent (i.e. direct losses to GDP), an additional half a percent more than otherwise it would have been would be enough. Empirically, we have been shown elsewhere that most disaster-affected countries do fulfil such an investment requirement within a year or so.

- A Disaggregated Macroeconomic Argument: The above model does not let appreciate how network interactions between and within economic sectors, whether in the disaster area or outside it, can help explain the outcome above. So it is necessary to analyze the workings of the economy towards this end in a more disaggregated manner. It would simply useless, if not impossible, to analyze a fully disaggregates economy via its networked makeup, which is one of the reasons why standard network analysis focus on small groups of participants, making the analysis confined and partial, and normally extricated from the whole where they belong. In a real economy, the number of participants (nodes) and relationships (links) would be huge, and the strength and stability of such interconnections would be mostly unknown. So meaningful analysis at that detailed level is simply out of the question. For an explicit network analysis, an input-output framework of already grouped units (industries, sectors and/or regions) is the only possible route at macro level, keeping always in mind that within each grouped analytical unit there are large networks of seemingly alike participants or nodes. The input-output framework is then a network of networks, which explicitly via matrix presentation and algebra takes care of (i) what unit is linked with which other unit, (ii) how strong is such direct connection and (iii) how strong is the pull/push of a particular unit on all the other units, directly and indirectly, via backward and forward linkages. This should take care of the importance of both the affected units in the national economy, disaggregated according to economic sector, industry or region, and the networking options or substitution potential (SP) of both the directly and indirectly affected participants.

To Clarify Input-Output Networks: For the analysis of networking and localization we then use the input-output accounting (but only partly as a model) in a loose way to account for general interconnectedness, its strength and influence, as it was just before the disaster impact, which allow us to focus on the areas where endogenous reactions and exogenous responses, and therefore resilience, have to be forthcoming to counterbalance for potential indirect (flow) effects. To this purpose, we call *supra-networks* the encompassing interconnectedness of the government institutional apparatus with intra and inter networks, which mostly depend on comprehensive policy derived from both short-term expectations and policy and longer-term development aims. We call *intra-networks* the interconnectedness between producers and *inter-networks* the interconnectedness between producers

and households. These three network levels are interconnected, but analytically we can focus on each of them in turn.

(i) Supra-Networks: refer to vertical open-loop economic policy decisions of government and international institutions *vis-à-vis* economic agents (firms and households), depending on expectations and policy preferences. These networks operate in a good deal via the financial system. This open loop is due to the fact that income withdrawals from the economic circuit (i.e. savings, taxes, imports, debt servicing and the like) and income injections or reintroductions (i.e. investment, subsidies, loans, exports, and the like) are both separated in logic and time. So these links are hierarchical and supra national, which represent vertical relationships or the so-called linking capital. These operate above and go beyond intra- and inter-networks, influencing the behaviour, multipliers and stability of the economy, whether purposely or not.

➤ *Transmission Effects*: Private expectations and public policy associated with incentives or otherwise are paramount to characterize possible response consequences. First, if the disaster shock is considered as permanent, the agents' behaviour would reinforce the downturn (e.g. no compensatory behaviour, capital flights, outmigration, bankruptcy and the like). Second, if the shock is considered as transitory, agents will keep prevailing policies, compensating recessive factors and make the downturn shorter-lived. Third, if agents expect public and foreign aid, then agents' behaviour may either reinforce the positive upturn or delay recovery as external aid to the disaster zone is awaited. In addition, if public and foreign responses act unnecessarily at odd with endogenous response mechanisms, by bypassing them or unnecessarily superimposing on them, then local recovery will likely be systemically negative and wasteful. So the interaction between the government and affected people, between the national interest and the local one, and between endogenous reactions and exogenous responses will greatly shape the systemic quality and the speed with which the economy would recover.

(ii) Intra-Networks: Intra-networks refer to the economic linkages within and between economic sectors or industries, which are typically input relationships, normally via market exchange intermediation. The actual linkages are however between constituent firms or producers, whether within or between sectors or industries. As is well known, a sector or industry normally cut across regions, e.g. tourist firms and resorts can be scattered all over a country, agriculture production can come from many areas of a country, textile firms can be located in many regions, and so on. This is an extremely important consideration in the case of disasters, as many firms can be badly affected by a disaster, but the industry or sector can remain unscathed via substitutions, shifts, new entrants and the like, especially within the substitution potential of affected countries, making the indirect disaster effect less important or irrelevant at macro national level.

➤ *Transmission Effects and Their Economic Context*: indirect effects and counter effects of impacts and responses are bound to occur via main economic transmission routes, via input-output networks from market and nonmarket reactions. In this context, to assess which sectors or regions can potentially have higher national spreading effects, measures of pre-disaster backward and forward linkages as well as their potential for substitution would be a useful and qualified starting point to anticipate effects and design public response. Economic compensations initially happen endogenously, within the same structure or otherwise, according to expectations about the failure induced by the disaster, and later this compounds with the exogenous response. Endogenously, the use of both buffer stocks, network shifting and other substitutions and incentives (idle capacity, imports, price changes, etc.) will come a good way to counteract spreading effects over the national economy, which associated with exogenous public and foreign responses may fully counterbalance, and even outweigh, the spread of indirect disaster effects over time. This may lead to technical change, diversification, output type change and compositional change, especially when the economic environment has undergone significant changes itself, whether the initial setback was short-lived or not.

➤ *Heterogeneity of Producers*: Producers are not homogeneous, so firms or units of different size and productivities are bound to coexist with each other. Larger units would as a rule have many

more possibilities than smaller ones to withstand both direct and indirect disaster effects, as they may have a better quality of fixed assets and location as well as more subsidiaries and diversification, i.e. less vulnerability to direct effects and less exposure to them. Larger units are also likely to have higher profits and solvency, higher liquidity and inventories, higher client power and market access, better business connections and higher political influence, i.e. both less vulnerability to indirect effects and more resilience to counter them. As a corollary, the smaller the unit, the higher its economic vulnerability, even in the absence of disasters. In other words, pre-disaster economic and political vulnerability and resilience greatly explains disaster vulnerability and resilience in the aftermath.

(iii) Inter-Networks: refer to economic linkages between households (as income earners and consumers) and producers (as suppliers of final goods and services) through the circular flow of income via market exchange. As is known, most firms, apart from producing for intermediate input demand, also produce for the final demand. These are income relationships, which are normally expressed in terms of aggregate demand, i.e. consumption, investment, government expenditure, export and imports. Imports imply that households can buy directly or indirectly from foreign producers, so other things being equal, imports compete with domestic production of final goods. The main issue after disasters would then be how to secure compensatory levels of demand and supply. These can come from inventories, savings, remittances, formal loan, informal loans, government transfers and works, and general foreign and domestic aid.

- *Transmission Effects*: Let us assume that price adjustments are sticky and slower than quantity adjustments to clear markets, which is normally the case,. On this scenario, let first assume that agents hold elastic expectations, i.e. an exogenous demand fluctuation is considered as permanent by market participants, which is rarely the case in disasters. A standard income multiplier would then work as follows. Any autonomous variation of expenditure will be instantaneously met by an equivalent variation in production to absorb it. In general, if the variation is positive, this will be met out of idle capacity and new employment, from the pool of the unemployed or underemployed, and if it is negative by cutting down capacity usage and employment. So the multiplier will amplify the initial demand loss, via several market exchange rounds, by some factor over time, e.g. one unit of demand lost to the disaster could become, say, two units of potential loss over time. This is an indirect flow effect. Alternatively, under the assumption of inelastic expectations, i.e. an exogenous demand variation is considered as transitory by agents, which is the normal case in sudden disasters, then the multiplier will look quite different. The multiplying effect is only potential, as it is a flow that could be counteracted by the wider economy, including the initial losers, which is more likely in the case of sudden disasters. Economic agents will attempt to counteract the shock via households' dis-savings and firms' inventories, if these are available. In addition, exogenous responses via transfers, credits and new response demand are bound to reinforce the counteraction. This happens in an environment of endogenous network shifting and bypassing of the affected links. So even if the directly affected agents cannot recover fast or at all, the national macro-economy would insulate them and compensate for, or even outweigh, the potential flow loss, meaning that negative multipliers are stopped in their tracks, while positive ones may be further stimulated.

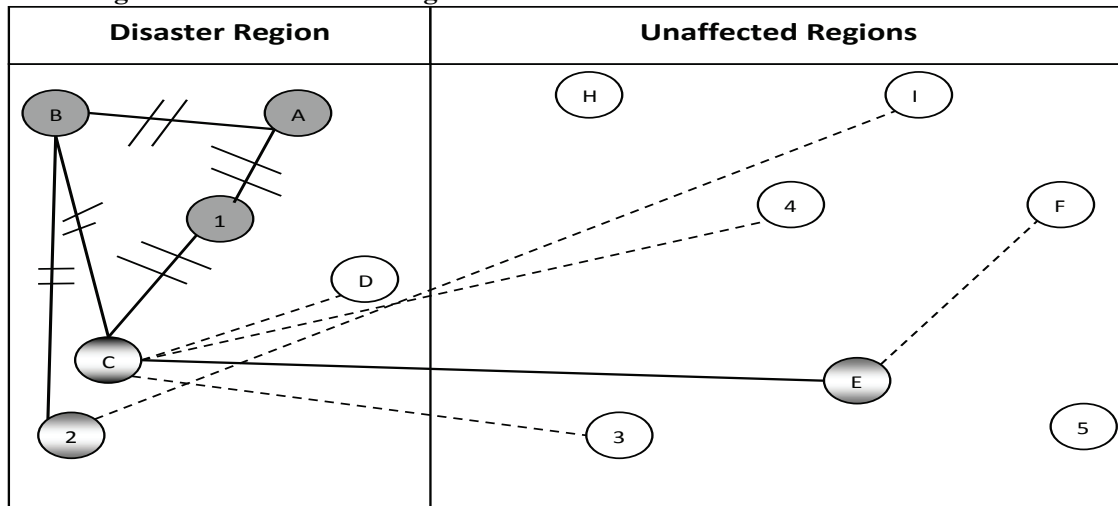
In Sum: It would normally be possible for unaffected units to make up for the loss by using idle capacity (if capital were affected), buffer stocks (if production and income were affected), from new supply entrants (if production or capital were affected), and foreign trade (if production were affected), which will normally be complemented by public and foreign responses. Under these conditions, if we assume that communications between regions are acceptable (i.e. disruptions are short-lived), transport costs do not vary significantly, and information about both new business opportunities and macro coordination is fairly adequate, then the excess demand for goods in short supply does not need to bring changes in relative prices, let alone inflation, except transitorily. Hence via endogenous and exogenous responses macro functionality would normally be effective to recover the levels of output in the short to medium term. Empirically, as a rule, disaster induced-inflation pressures are normally short lived.

Chapter V: Regional Disaggregation and Two Examples (pp.106-125 plus notes)

- IO and IRIO Tables: Sectoral networks are normally spread over the territory a country, and given that most disasters, apart from being economically localized, are geographically localized, then regionally disaggregated tables, called inter-regional input-output tables (or IRIO tables) could be of great use. These are however less available than standard input-output tables (or IO tables), and similar to the latter also carry timing problems. In addition, the regional disaggregation that encompasses a disaster zone may be too large to be of use without further qualification and information. So IO and IRIO tables, may be too aggregate to analyse a localized disaster without complementary statistics, but can still be a good starting point to consider network shifting.

To Clarify: The diagram below helps to visualize how the indirect disaster effect on businesses can prompt their linking with unaffected firms and consumers, whether within or outside the disaster region, assuming compatible goods, i.e. what we been calling *network shifting*. Although it is presented in terms of regions, it can be equally set up in terms of sectors or industries.

Inter-Regional Network Switching



- *Description*: We use capital letters for firms and numbers for consumers. Fully shaded circles mean that the firms or consumers have been directly affected. Partially shaded ones mean that firms or consumers have been indirectly affected. Circles without shades mean that they are unaffected by the disaster. Heavy lines with two crossed bars mean then the link has been totally severed by the disaster. Dotted lines mean the available options open for indirectly affected firms or consumers. Finally, unlinked circles simply mean that they are unaffected, but not useful options for indirectly affected firms or consumers. The diagram shows that firms A and B, and consumer 1 are all out of functions. Because of this, firms C and E and consumer 2 are indirectly affected, as their standard links with the former have been cut off by the disaster. Their available options are as follows: firm C can replace firm B by linking with firm D of the same region and with consumers 3 and 4 of the unaffected region. In turn consumer 2 can now replace firm B with firm I of the unaffected region. Finally, Firm E is second-degree (indirectly) affected by the potential failure of firm C, which is first-degree (indirectly) affected. It can then link up with firm F, if need be. They can also link with domestic importers or foreign firms.

To Clarify: The above shows that if (a) alternatives links are available, (b) the information about them is prompt and (c) the link is possible without excessive additional cost, then most of the initial potential indirect effects can be substituted, compensating the macroeconomy for the functionality failure of the directly affected economic units and, therefore, stopping indirect flow effects from spreading. This of course assumes that these alternatives exist and that there will be coexistence of affected and unaffected economic units of similar sectors, both in the disaster region and in the country. Imports, of course, can

also be an alternative link up, if need be, which are not shown in the diagram above. Alternative network links are normally available in the case of localized disasters, especially in countries with some economic diversification and marketing structures.

- What We Want to Measure: By means of mainly IO, IRIO and National Accounts. We look to produce quantitative measures to help us assess the economic importance of direct effects, the potential for negative indirect (flow) effect, and the potential to substitute such flows, i.e. a substitution potential indicator. That is, we seek to produce the following ratios and measures:
 - (a) The most affected region in the country's economy
 - (b) The most affected regional economic sectors in the national sectors
 - (c) The most affected regional economic sectors in the region's economy
 - (d) The sectoral proportion that was affected in the most affected regional sectors
 - (e) From (d), the *substitution potential* (SP) at sectoral, regional and national levels
 - (f) Backward and forward, interregional and inter-sectoral, linkages

Two Cases: Indonesia 2004 and Chile 2010: Apart from National Accounts, Indonesia has IRIO and IO tables around the time of the earthquake-induced tsunami that affected the Indian Ocean, while Chile has only IO tables just before its very strong earthquake.

I. Indonesia: Indonesia is a large archipelagic country, made of large islands like Sumatra and Java as well as scattered small ones over its territory. It has a population of some 220 million inhabitants and enjoys a lower-middle GDP *per capita* of around US\$3,500 (in ppp). Agriculture share in GDP is around 20 per cent, with a rural population of around 50 per cent. Its exports-to-GDP ratio is around 45 per cent, while agricultural share in exports represents around 10 per cent, and both fuels and manufacturing take some half of it, in about equal shares. It also counts with a medium-level Human Development Index (HDI) of around 0.61, falling to around 0.50 when adjusted for inequalities (UNDP, 2011). In addition, it exhibits a Gini coefficient of inequality of around 0.38, which is on the low level and has some 18 per cent of people under the international poverty line (i.e. less than US\$1.25 a day in ppp), which is on the medium level (World Bank, 2011).

The 2004 earthquake-induced tsunami in the Indian Ocean affected mostly the Northern-West coast of Sumatra, the Aceh province, especially the northern tip of Sumatra, Banda Aceh, Aceh Barat and Aceh Besar, causing a large number of casualties, some 2.3 per cent of the province's population (around 160,000 death or missing), and many times more displaced people, the poor and women being disproportionately represented. Most of the physical losses were for housing and infrastructures, while productive sectors suffered only secondary damage, except for agriculture and fishery, which are mostly associated with the poorest sections of the affected region. Oil and gas production and exports were already in decline, but were not badly affected. Given that these are the main economic activities of the region, with little linkages towards the whole country, there was never a serious economic analysis that claimed that the tsunami was going to affect Indonesia's macroeconomy in any significant way, to the point that most international organizations, like the IMF, kept the growth rate for 2005 slightly lower, which actually improved. If anything, the overgenerous aid committed for emergency and reconstruction of the affected areas, especially Aceh, may have rapidly compensated for any possible spread effect and in passing contributed positively, even if secondarily, to GDP.

- *National macroeconomic effects*: These were therefore meant to be unimportant from the outset, even without reference to international aid. The disaster was very geographically localized, affecting only a very confined area of economic activity in very heterogeneous ways. The low impact on main economic sectors made the disaster economically localized too. In addition, the main sectors (oil and gas production, oil refinery and oil manufacturing) are mostly semi-enclave exporting sectors with little indirect impact on the rest of the economy, so were not bound to transmit negative effects in a significant way, eliciting less response demands on endogenous and exogenous macro counteractions to keep the national macroeconomy at previous levels. In addition, Sumatra's main industrial centre, Medan, was not directly affected at all. This city has a good deal

of trade interaction with Aceh province, so some indirect effects were to be expected. There were some important inflationary pressures in Banda Aceh after the 2004 tsunami disaster, but not equally so for Indonesia as a whole. This was short term and back to trend level within a year. Construction material, as expected, and some food and textiles were the most affected by excess demand and inflation in the region. This may be an indication of inappropriate short-term national response policy, which despite the overgenerous foreign aid, may have over-insulated the national macroeconomy at the expense of Aceh, i.e. partly bypassing the disaster area.

- *Statistics and Indicators:* Flow variables only indirectly represent capital losses. Notice that the statistics are about flow (e.g. GDP) rather than stock variables (e.g. capital), which make them less useful than otherwise it would be, as it is the stock losses at sectoral and regional levels that can primarily produce indirect (flow effects). Still, in terms of flows variables the story above is as follows: (i) most linkages are within Sumatra, this region having only secondary links with other regions, (ii) the most affected sectors were agriculture and fishery, which although important sectorally, they are secondary for the national economy, (iii) The Aceh province represents 11 percent of Sumatra's gross regional output and 2.3 percent of national final output. Most of this percentage is minerals and refineries, which were not badly affected by the disaster, (iv) the Aceh economy was not equally affected by the disaster, (v) there then was significant substitution potential available to keep functionality stable, as seen in the table below:

V.2 Localization Ratios (LR) and Substitution Potential (SP)

Ratios (%)				
	Aceh/Inds	Aceh/Smt	Smt/Inds	Aceh/Aceh
Sct/Fn	0.5	2.2	2.3	20
Sct/Sct	7.3	20	36	
Fn/Fn	2.3	11	21	

SP (times)				
	Inds/Aceh	Smt/Aceh	Inds/Smt	Aceh/Aceh
Fn/Sct	200	45	43	5
Sct/Sct	14	5	3	
Fn/Fn	43	9	5	

Fn: Final Output

Smt: Sumatra

Sct: Agriculture and Fishery together

Inds: Indonesia

SP: Substitution Potential

- So given that the capital stock loss in Aceh was not total, then the above substitution potential values are likely to be significantly larger. Notice also that the figures above are all yearly ones, but a good deal of the actually affected sectors and firms were back into business from a few weeks to a few months after the disaster, which compounds the positive substitution potential with actual recovery, making the flow effects even less significant.
- Recall that there are two types of potential substitution: via sectoral and via general network shift or network bypassing. That is, one is a network shift that happens when unscathed firms of a given sector take over the production of affected firms of the same sector, and another network shift happens when potential losses of GDP from the affected area are counteracted with increases of GDP in other areas, whether including the affected sectors or not. A typical case of the latter is the productive activity of rehabilitation and re-construction of affected infrastructures and housing.
- The analysis shows, at the macro level, significant network shifts from the affected areas to the rest of the country, as Aceh's economy showed declines or modest growth, especially in non-construction productive sectors, while the country showed strong growth as a whole. This is an indication of localised network bypassing, i.e. frustrated normal demands from the disaster area, and supplies to this area, that bypassed Aceh, which may have been even more pronounced in the absence of the high levels of aid funding. All this also shows that economic functionality was never under peril.

II. Chile: Chile is a high-middle income country with some 17 million population. It is a very long and narrow country, located in the southernmost west-coast (Pacific Ocean) of South America. According to GDP per capita, Chile is classified as an upper-middle income country (around US\$ 16,000 in ppp), which made it into the OECD club a few years ago. It has relatively low levels of poverty with around 14 per cent of population under a poverty line (measured by a minimum basket of basic goods), but it has very high inequality levels (Gini: 0.52), which makes it the eighteenth worst in the world and, after taxes and transfers, the worst by far among OECD countries.

On 27 February 2010, just before the new presidential mandate transmission, a strong earthquake (Richter degree 8.8) affected Chile, especially in its south-centre territory. This happened in a context of economic slowdown (2008) and recession (2009), coming from the Great Recession, which was still to be overcome. To top that, a salmon virus affected seriously its aquaculture, salmon being the second most important export. And in addition, in early 2010, a new government came into office, replacing a coalition that had been governing for 20 years, which was bound to produce early administrative disruptions and maladjustments. The earthquake epicentre was under the seabed not far from the coast, which originated a tsunami that struck some of the Chilean coastline. The first waves from the tsunami hit about 34 minutes after the earthquake, but others came several hours later, damaging some properties and businesses and killing some 200 hundred people. Most of these due to a botched and incompetent managing of early warning, especially for the waves that came later. In all, around 500 people died, some 40 percent of it from the tsunami. Chile did not ask for international aid.

- *National Macroeconomic Effects*: At the end of 2010, ten months after the disaster, the country was growing stronger and creating more employment than expected before the disaster. However, a number of sectors in the disaster zone either grew by a lower rate or had not quite recovered their immediate pre-disaster levels. The region of Valparaiso (Region V), the second most important in Chile, which was just outside the disaster zone, grew at an unprecedented GDP growth rate, 7.5 per cent as compared to 5.2 per cent for the country as a whole. This shows massive demand and supply shifts from the directly affected regions to this important, but only peripherally affected, region, which stimulated other sectors and industries, especially manufacturing, mining, transport & communications, and commerce, restaurants and hotels. This is what we have called network bypassing or network shifting from a disaster that frustrates otherwise stable network patterns of economic activity. Most of it is normally an endogenous reaction of firms and consumers seeking to satisfy demands and supplies that are constrained and frustrated by the disaster, but also responds to the additional aggregate demand created by the needs of emergency, rehabilitation and early reconstruction. On the other hand, the directly affected regions and especially some firms in it may find difficult to regain the economic position that was lost to Valparaiso.
- *Statistics and Indicators*: The same as with Indonesia, we don't have statistics about the capital losses of affected sectors, so we have to use flow variables only. The most affected area were three regions (O'Higgins, Maule and Bío-Bío), with over 3.5 million population, representing some 20 per cent of country total. Other regions were only peripherally affected with generally minor effects. These three most affected regions represented some 16 per cent of the country's GDP, 22 per cent of total employment, 41 per cent of total non-mining primary sector employment and 14.3 per cent of mining employment. The GDP share of the regions' main sectors were manufacturing (3.4 per cent), personal services (1.9 per cent), agriculture and fishing (1.6 per cent), construction (1.3 per cent) and transport and communications (1.1 per cent). It can also be seen that the share of regional sectors in the respective sectors varies from 50 per cent in agriculture, cattle and silviculture to 9 per cent in mining, and a range of important shares in between, especially for manufacturing and utilities. It can also be seen that both backward and forward linkages for non-mining primary sectors and also for utilities were above average, and around average for manufacturing and transport & communications, meaning that the former had some over-average push and pull strength on the rest of the economy, although they represented only a small fraction of the national GDP. In addition, the affected region contributed with 19 per cent of total exports. The destruction however was not

regionally total even in the most affected sectors, so there was substitution potential (SP) within the regions and at national level.

V.2 Characteristics of Most Affected Subsectors (%)

Sectors	National SP (times)			Manufacturing SP (times)		Sectoral Linkages	
	GO/SGO	F/SF	X/SX	MGO/SMGO	MF/SMF	BW	FW
1 Aquaculture	203	n.a	n.a	na	na	1.7	1.8
2 Extractive Fishing	331	1345	1212	na	na	0.5	1.3
3 Fishmeal and Oil	360	380	94	72	68	1.5	1.1
4 Fish and Shelfish Products	92	62	20	18	11	1.7	0.1
5 Wood Production	200	223	70	40	40	1.3	0.7
6 Wood Goods	265	263	93	53	47	1.3	0.6
7 Cellulose Production	95	79	26	19	14	0.9	0.5
8 Fuel Production	57	95	79	11	17	0.2	1.2
9 Basic Chemicals	106	115	36	21	21	0.8	0.7
10 Rubber Goods	837	1125	381	167	202	0.5	1.0
11 Plastic Goods	159	270	226	32	48	0.6	1.0
12 Glass and Glass Goods	700	1947	1136	139	349	0.6	1.1
13 Basic Iron and Steel	148	541	108	30	97	0.8	1.4
National Averages	111	111	111	45	45	0.8	0.9

SP: Substitution potential **SF: Sectoral F** **SMGO: Sectoral MGO** **BW: Backward Lingage**
GO: Gross Output **X: Exports** **MF: F for M** **FW: Forward Linkage**
SGO: Sectoral Gross Output **SX: Sectoral X** **SMF: Sectotal MF**
F: Final Demand Output **M: Manufacturing** **MGO: GO for M**

- The data above is not about the proportion in which the sectors were actually affected, but only about the sectors were firms were affected. This means that the substitution potential was actually significantly larger and the linkage effects lower than portrayed in the table. In addition, most of what was affected was relatively short-lived. Backward and forward sectoral linkages were of medium strength. From the viewpoint of substitution potential (SP), it seems that the damage was unlikely to produce flow losses of significance, which were likely to be compensated over the year, as most of it had the potential for substitution from unaffected areas and regions, apart from imports, as it actually happened. The lack of inter-regional input-output tables for Chile prevented us from knowing how the affected regions interact with the rest of the country via both intermediate inputs and final demands, which would have been useful complementary information for functionality assessment. All this also shows that economic functionality was never under peril.

In Sum: For both countries, the ratios of substitution potential were generally large, and that of backward and forward linkages, relatively low for the actually affected sectors. Not surprisingly, Indonesia and Chile more than substituted their potential flow effects over the first few months, ending up with a higher than expected GDP growth rates a year later. Not surprisingly too both cases did not suffer important functionality losses and were growing strongly only a few months after the disaster. This good result was also due to exogenous domestic and foreign responses, but the role of endogenous market and non-market responses cannot and should not be underestimated.

Chapter VI: Systemic Consistency, Business and Network Shifting

(pp. 126-156 plus Appendix)

In this chapter we deal with businesses and their networks under disaster endurance and attempt to answer some questions. Why should public policy tap and orientate network shifting behavior? What should a desirable network context be to secure effective systemic recovery after disasters?

- Systemic Consistency Criteria: as introduced earlier, there are two balances to consider in the wake of disasters; that between the local and the national and that between exogenous and endogenous responses. So two main criteria should be resorted to secure a systemic consistent response.
 - *Value Criterion*: any exogenous public and/or foreign response action that helps facilitate, enhance, support or create useful endogenous reactions is to be promoted. As a corollary, any exogenous action that bypass, frustrates, suffocates or destroys useful endogenous mechanisms, if it is not to be resisted, it should be modified so that it can be systemically absorbed, minimizing negative side effects.
 - *Boundary Criterion*: an endogenous reaction is economically useful if it feeds and is part of local and national societal networks, especially associated with markets and public development activities. Some endogenous reactions are not systemically useful, but a necessary palliative. Other endogenous reactions are simply anti-systemic and counterproductive, e.g. panic, looting, speculation, fragmentation, free riding on public aid, and so on. Some palliative reactions do have a bearing on the speed of recovery and can also be enhanced by public response and policy, especially in terms of pre-disaster measures, e.g. warning systems and trained reactions, first-aid information and training, emergency locations and network information, etc.
- Response Inconsistencies: From the above criteria, we may classify two types of public response inconsistencies: (a) *direct inconsistency*, if it leads to unnecessary local dependency, by suffocating local markets via inappropriate aid (e.g. Malawi 1992) or imposing an exogenous administration that takes over local management and decisions (e.g. Aceh 2005); and (b) *indirect inconsistency*, if it leads to the national economy unnecessarily bypassing the affected locality, leading to the rundown of local viability.
 - As a rule, if a year after a disaster, the national GDP does not fall, but local GDP does, then this might be an indication of the national bypassing the affected locality.

To Clarify: For example, the Hyogo Framework sought to make disaster response more effective by establishing some operational priorities, which amount to give disaster response priority to local and national institutions by endogenizing assessment, monitoring and early warning, while creating a culture of safety and resilience as well as securing preparedness for an effective response. Instead, the sound and well-funded reports about the response to the 2004 Asian tsunami showed (i) significant and wasteful lack of coordination between the myriad of disaster agencies themselves and between them and domestic institutions, (ii) a bypassing and disregard for local and national capabilities, (iii) an often inappropriate type of in-kind aid in both consumer and capital goods, (iv) a lack of accountability and transparency in response funding and use, (v) an inadequate risk analysis about affected people's own reactions and behaviours, (vi) an insufficient if not misleading information about reconstruction plans and general activities, which failed to incorporate local input and understanding to such purpose, and so on.

- Business and Networks: Productive units, as private businesses or otherwise, are the very foundation of community networks and livelihoods, as they provide gainful employment and in-house training, consumer goods and necessary services, introduction of technology and know-how, and not least a number of related societal institutions and networks like trade unions, social clubs,

sport clubs and the like. But they normally receive scant attention from disasters studies. These businesses operate in the context of market and public networks. A firm or productive unit will normally have intra-links (between firms) and inter-links (with final consumers) and will operate in an environment of economic conditions, government policy and business/government expectations (supra-links). A disaster can affect a productive unit directly via stock losses on business capital and labour. But it can also affect this unit via flow effects derived from intermediate inputs availability, utility services disruption and of course the demand for its output. There then will be a range of potential direct and indirect business losses, as shown in table below:

Range of Business Disaster Effects

DIRECT EFFECT ON	INDIRECT EFFECT
Capital Labour Management	Output/Sales quantity Output/Sales quality Network Switching
Infrastructures: Transport Utilities	Network Disconnection Service flows Network Switching
Population Housing	Customer Base Network Switching
General Physical and Societal Disruption	Community Environment Business Environment Network Switching

- All the points affecting demand and personal incomes are related to firms via loss of labour, productivity and ambience changes. Changes in consumption composition, away from non-essential expenditure, and disconnection or loss of standard markets and suppliers are the incentive for demand shift and network switching. Therefore, fully unscathed firms, whether within or outside the disaster zone, would be the route for network shifts and disaster zone bypassing.
- The demand can then be under a number of not necessarily independent effects:
 - (a) Income effect via loss of employment
 - (b) Substitution effect on demand towards essential goods and services
 - (c) Saving-debt effect from loss of housing and migration
 - (d) Switching effect from losses of standard markets and suppliers
- **To Emphasize:** After disasters have destroyed and/or damage capital and income directly, there will be suppliers that cannot supply, as they lost their customers; demanders that cannot demand, as they lost their suppliers; and producers that cannot produce, as they lost their input providers. That is, (i) there will be indirectly affected market participants that cannot satisfy their needs, as they lost their regular supply, demand and/or credit flow channels, and (ii) there will be directly affected participants that cannot participate in the market anymore, as they lost their means of participation, i.e. capital, labour and/or income. Frustrated participants normally take themselves the initiative to look for alternative markets and early solutions to come out from their predicament, but this can be facilitated and orientated by public policy.
- Business vulnerability and resilience depend on many factors, such as size, economic sector, type of good supply, diversification, intra business network, hazard insurance, own savings, ownership, disaster experience, political influence and flexible management. But it also

depends on the characteristics of the surrounding community and networks as well as population behavioural patterns, e.g. migration.

- General Network Bypassing: When local businesses are impaired or impeded to produce and supply largely non-affected demands, then given competitive market practices, non-affected businesses are likely to do so, taking advantage of the situation. And consumers and firms that need such goods are also likely to look for alternative sources, stimulating and complementing a network demand-supply shift, which mutually reinforces each other. In this case, the directly affected firms are then likely to be bypassed at least in the short term, e.g. the Kobe port after the 1995 Japan earthquake in 1995, or Ground Zero business after the 2001 Twin Tower attack in New York, or New Orleans businesses after the 2005 Hurricane Katrina, or the bypassing of directly affected regions after the 2010 Chile earthquake, and so on.
- How Firms Fail: First, structural precautions to protect premises and capital are necessary to reduce losses to life and property, but not sufficient to help businesses survive. The latter is related to how businesses are related to each other and their customer base, i.e. business and consumer networks, including non-economic community networks. Second, most business don't appear to fail immediately after the event. That is, the weakest firms are likely to fail right away, but for most of the others the survival and recovery will be a long trying struggle. That is, most losses do not to occur right after the disaster, but during the recovery phase via business interruptions, fall in demand for their output and loss of business value, which will affect their capacity to access credit. Third, the pre-disaster conditions of the firm and the new economic climate will have a strong bearing in their capacity to survive.
 - In addition, the managerial ability of firms is another important factor for recovery. Normally, business owners are greatly unprepared to face an abrupt change in business environment. So they may struggle for months, under the impression that the disaster is just a fluctuation and that things are going to get back as they were, before given up. But in each disaster area it seems that on average, even in the short term, businesses do recover.
 - It also known that a good deal of businesses, especially in developing countries, is mostly dependent on local markets with normally stable customer patterns. So these are likely to be more vulnerable and less resilient if their surroundings are affected by a disaster, even if they themselves are not badly affected directly.
- What We Would Like to Know about Businesses: We need more focused information about business networks, normal network shifting, and network bypassing of both firms and households under stress. Standard surveys about destruction and needs should be re-structured and extended to include questions about key traits of networks, especially related to business behaviour. But to carry such studies would necessarily imply follow up surveys of disaster affected firms over a longer term, which would require appropriate funding and not least commitment, which is more likely to be secured with the cooperation of international organizations. The surveys should enquire about the above traits directly, first, at national levels and, then, be comparably collated at international levels. This effort would be policy useful and bound to help efficient recovery in a faster and less expensive way, helping in passing the development of networks and therefore development itself. The book appendix sketches generally such surveys requirements.
- New Income Flows and Network Shifting: New income flows are a different kind of income injection, as compared with income detracted from standard projects toward disaster recovery ones. First, statically, they do add to income and hopefully demand, which dynamically may create a stimulus for the local and national economy that was not present before the disaster event. So they do at least help compensate the macroeconomy for the potential indirect losses. Second, fresh flows in association with post-disaster network shifting may more than compensate the macroeconomy.

To Clarify. Policy Induced Network Bypassing: In the aggregate model of Chapter IV, the effects of normal network shifting after disasters were implicit. But, there will always be a variable degree of potential network shifting that is not exercised endogenously because of lack of information, lack of access, lack of funding, lack of other incentives, and the like. So there will always be an available degree of potential network shifts, associated with the substitution potential (SP) of the situation, which could be stimulated by appropriate public policy. If this is so, then the compensatory replacement investment (mentioned in the model of chapter IV) can be even smaller to achieve the same result, i.e. to keep GDP growth as if there were no disaster. That is, if say 10 percent of the total directly and indirectly affected businesses is policy induced to shift networks, other things being equal, then the effect of reconstruction investment would be 10 per cent stronger than without such shifts, and therefore the required reconstruction investment to keep the economy as if there were no disaster would be around 90 per cent of that without such shifts. Or alternatively, the same reconstruction investment will speed up economic recovery.

- Implications: The first implication of the above is that a country with better, or post-disaster-created, information about possible market pairing (i.e. alternative networking), let alone public funding and policy to stimulate network shifts, will have a higher degree of bypassing by initially frustrated market participants than otherwise it would be. The second implication is that in countries with poor business networks, an important role for the state after disasters is to create networks and information so as to facilitate such demand and supply shifts following disasters. Frustrated customers (for final and intermediate input) will look for suppliers and supplies in alternative markets, while frustrated suppliers will look for customers in alternative markets. The two may coincide in a good extent, making the exercise more efficient and prompt. The government can play a useful role as facilitator and matchmaker, as kind of broker for information, as well as provide infrastructure, organization and funding for the purpose.
 - The only case in which this may not be justified is if the disaster zone, especially its business base, can be brought back to effective functionality fast enough, without creating anti-systemic dependencies. If that is not available and bypassing is not encouraged, then the zone risks start living of hand-outs, discouraging proper business and in passing local economic and social development. In addition, this may also prevent the dynamics of the more-than-compensatory network shifting vis-à-vis fresh income flows. So in most real cases, a balance has to be struck between preventing the rundown of the disaster zone by market desertion and encouraging national income recovery. Or at least securing some kind of market redress once the in-zone business recovery is well under way.
- To Summarize: if a firm loses their customers and is fully bypassed, then other things being equal macroeconomic income will be the same as before the disaster. All that has happened is a redistribution of income/output generation. In addition, if the negatively affected firm can manage to bring back the same customer base after reconstruction, then the macroeconomic income can be larger than before the disaster on account of reconstruction expenditure, assuming that this is done with fresh income flows. So in virtue of network shifting via demand and supply linking jumps, the macroeconomy will not be negatively affected and can be positively affected, when riding on fresh reconstruction recovery income flows. In addition, response investment multipliers might be stronger than investment multipliers from both detracted projects and from the direct stock loss to a disaster, making the positive effects of reconstruction investment and network shifting stronger on output and general GDP. This implies that although flow interruptions can be heavy in the disaster zone, and more particularly for the directly affected private and public productive firms, the macroeconomy would unlikely endure significant fluctuations after disasters. The avoidance of serious discontinuities, by keeping the economic flows with little hindrance, is tantamount to a system with healthy endogeneity. In other words, this is a system in which functionality is not heavily affected, so societal resilience, both endogenous and exogenous, will help bring the system back to normality.

- A Desirable Network Context after Disasters: If disasters don't appear to have a negative effect on macroeconomic functionality, what could the specific reasons for such a result be? A desirable systemic context for indirect effects not to have negative consequences would then be if:
 - (a) each household and firm face a wide network of possible markets for both their demands and supplies (domestic and foreign),
 - (b) each household and firm are reasonably informed about such network by the market and society themselves, but especially as part of the public response,
 - (c) household's and firm's switching to any alternative market in the network is not particularly onerous, which again can be due to development, but especially to public support, and
 - (d) some credit and/or cash support as well as remittances are readily available and properly channelled, which is again an important role for the public sector, then it would be less likely that indirect disaster effects can significantly spread over the economy.

If in addition, public sector information and facilitation for new investment opportunities associated with reconstruction are prompt and expedite, including owner-based reconstruction, then there will be little support for the existence of important indirect effects in the medium term, let alone in the longer term. Foreign response can support all these conditions with funding, information and technical advice, which may speed up the outweighing of indirect effects, let alone their counteraction. Although by design or default public policy normally gives some support to the above requirements, this is nonetheless a fertile ground for *ex-ante* and *ex-post* well-designed policy.

In Sum: The networked characteristics of the country and their affected businesses, communities and people will greatly determine the duration and depth of disaster effects. As a general rule, the higher the economic localization (i.e. the more economically confined the direct effects), the less developed the networking required to achieve a given level of resilience (systemic capacity to counteract the indirect effects of a disaster), and therefore to secure stable societal functionality. In addition, if public policy can help network shifts, then for each level of localization, there will be a more effective networking activity. In other words, for each level of networking, public policy will make the disaster more localized and therefore economic and social recovery more expedite and less costly.

Conclusions (pp.157-166)

1. Standard Disaster Studies: it is highly unlikely that quantitative methods will settle the issues about the importance of negative indirect effects on the economy in the medium to long run, let alone the issue of cumulative effects. They carry inbuilt insufficiencies for dealing with natural disasters, which are associated with data quality, technique ability and theoretical interpretation. These characteristics produce strong assumption-compound conclusions of dubious and/or misleading understanding and policy use.
2. General Framework: given that disasters represent discontinuities and fast substitutions in a networked societal environment, then an argumentation founded in a political economy framework may help advance knowledge and policy with more propriety. Within it, well-focused quantitative studies may make more sense. We set up such a framework by means of the concepts of *economic localization*, *substitution potential*, *societal functionality*, *network shifting*, *local/national tension*, *endogenous/exogenous responses tension*, and the necessary distinctions between *catastrophe and disaster* as well as *isolation and insulation* so as to develop and analyze a *disaster situation* on the basis of *societal networks*.
3. General Societal Context: as a general conclusion from our argumentation, we suggest that natural disaster effects, contrary to socially (or “man-”) made ones, are as a rule exogenous to the institutional workings of a system, which is the main reason why long-term, or for that matter cumulative, effects are unlikely to happen. That is, in the overwhelming majority of natural disasters *societal functionality* is not impaired, whether they are *economically localized* or otherwise, except and arguably in the very short term. In the aftermath of disasters, while local reactions to local damage are normally forthcoming, society as an institutional interacting whole tends to insulate against the spread of local failures, compensating indirect and hence longer term effects. This may cause unnecessary local disenfranchising, which is what we call the *local/national tension*, while the exogenous responses may unnecessarily suffocate endogenous reactions, which is what we call the *endogenous/exogenous tension*. A difficult balance should be sought by public policy after disasters.
4. Analytical Argumentations: by means of argumentations based upon both an aggregate macro model and a dis-aggregate input-output framework, we showed how economic networking can help explain why institutional functionality is likely to render indirect (flow) effects unimportant for the economy as a whole. We also emphasize that in the absence of significant negative indirect effects, longer term disaster effects for economy and society as a whole are highly unlikely to exist. We differentiated interrelationships into “supra-networks”, “intra-networks” and “inter-networks”, indicating that all of them interact with each other in an institutional or political economy context. We showed here how *endogenous responses* via buffer stocks, prices and network shifting can prevent negative disaster flow effects to spread over the economy, which associated with standard *exogenous (public and foreign) responses* may render unwarranted the claim that indirect effects are important for the economy in the medium and the longer term, but also often in the short term. This emphasizes the importance of approaching response policy in the context of networks.
5. Required Statistics: as regards our argumentation based on input–output networks, we called attention to the need to count with regional and sectoral statistics to anticipate the importance of the economic effects of large disasters via the concepts of *economic localization* and *substitution potential*. We analyzed two cases of large disasters where some statistics were available for the task: the 2004 Indonesia tsunami and the 2010 Chile earthquake. We showed that it could have been anticipated, as it was from some sources, that it was highly unlikely that the disasters were to cause national negative economic effects of importance, especially in the medium, let alone the long, term. In our two examples, we showed that Indonesia and Chile more than substituted their potential negative flow effects over the first few months, ending up with a higher than expected GDP growth rate a year later. There were no important functionality losses, and both countries were growing strongly only a few months after the disaster. A good

deal of this good result was due to exogenous responses, but the central role of endogenous market and non-market responses cannot be underestimated.

6. Exogenous-Endogenous Consistency: inbuilt reactions from businesses and communities are of paramount importance. The failure of exogenous responses, whether domestic or foreign, to tap into them is bound to lead not only to short-term wastage and a catalogue of unnecessary insufficiencies, as shown in the case of the 2004 Asian tsunami, but also to long-term wasted opportunities for securing a recovery in terms of systemic consistency, functionality and hence development. We express the need that exogenous responses be in tune with the endogenous reactions of people and markets, with a view of securing a systemically consistent recovery. In such a context, we analytically presented the cases of cash transfers and in-kind aid, remittances and its infrastructure, shelter provision and migration, insurance and loans, and general systemic public policy. The aim was to show the importance of learning about people's reactions in disaster situations for public policy, and in passing to show that networks and endogenous reactions are ubiquitous at all levels of societal action.
7. Public Policy on Networks: after a disaster impact, there will be disaster unscathed market participants that cannot satisfy their needs, as they lost their regular sources, and there will also be directly affected participants that can no longer participate in the market, as they lost their means of participation. An important role for *ex-ante* and *ex-post* public response will be to facilitate the contact between frustrated economic participants and new or existing economic networks as well as speeding up the recovery of directly affected participants to prevent their market disenfranchising (via incentives and disincentives associated with information, administrative links, specific funding and the like). We showed that in the presence of networks, if public policy can stimulate, speed up and orientate the network shifting of affected economic participants, then recovery would be faster and more developmentally efficient, as the additional investment over normal investment-to-GDP, which is required to keep the economy as if there were no disaster, is likely to be even smaller than it would otherwise be.
8. Enhanced Surveys: standard surveys that are carried out after disasters, by especially the government to assess damage and needs, normally focus more on infrastructures and housing than on businesses. The latter have normally been studied for developed countries, but more in terms of isolated units than in terms of their networked existence and interdependencies with other firms, customers, the government and the community where they belong. We propose that standard surveys should be complemented with enquiries about networks and networked behaviour of affected businesses. This should be done with a common methodology, which we generally set up in our book Appendix. This implies an important role for international organizations, which should also usefully collate such surveys.
9. General Conclusion: given a level of disaster localization, for countries that enjoy a well-developed networking, focused policy incentives might be enough for recovery. Contrariwise, when countries have very underdeveloped network linkages, the role of public policy should be to help put together otherwise isolated activities and households by creating linkages, e.g. via marketing infrastructures, pecuniary incentives, information and the like. In the case of intermediate network development, i.e. too weak to prevent endogenously the spreading of shocks, the affected localities may tend to fragment, so public and foreign policy should primarily aim at reinforcing such initial linkages, physically and/or institutionally.
10. Living Networked System: The main reason why disasters don't have longer, let alone cumulative, effects of note on the economy is because society is a living networked system with permanent functionality and feedbacks associated with inbuilt reactions from horizontal relationships as well as exogenous and endogenized routine responses from vertical linkages. After disasters, network shifting and reactions, by businesses and people, can in addition be systemically stimulated by public and foreign policy so that the recovery becomes faster, less costly and developmentally useful.

Book References (pp.178-191)

- Ackerman, F. (2005) 'Priceless Benefits, Costly Mistakes: What's Wrong With Cost-Benefit Analysis?' *Post-Autistic Economics Review, Issue No.25*, pp.2-7.
- Adams, L. and R. Winahyu (2006) *Learning from Cash-based Responses to the Tsunami — Case Studies*, London: Overseas Development Institute (ODI).
- Akita, T., Kurniawan P.A. and Miyata, S. (2011) 'Structural Changes and Regional Income Inequality in Indonesia: A Bidimensional Decomposition Analysis', *Asian Economic Journal*, Vol. 25, No. 1, pp. 55-77.
- Alarcon, J., Heemst, J., Keuning, S., Ruijter, W. and Vos, R. (1990) *The Social Accounting Framework for Development*, Aldershot, UK: Avebury.
- Albala-Bertrand, J.M. & Mamatzakis, E.C. (2004) 'The Impact of Infrastructures on the Productivity of the Chilean Economy', *Review of Development Economics*, Vol. 8, Issue 2, pp. 266-78.
- Albala-Bertrand, J.M. (1999) 'Industrial interdependence change in Chile: 1960-1990. A comparison with Taiwan and South Korea', *International Review of Applied Economics*, vol. 13, No. 2, pp.161-92
- Albala-Bertrand, J.M. (2000a) 'Complex Emergencies versus Natural Disasters. An Analytical Comparison of Causes and Effects', *Oxford Development Studies*, 2, pp.187-204.
- Albala-Bertrand, J.M. (2000b) 'Responses to Complex Humanitarian Emergencies and Natural Disasters. An Analytical Comparison', *Third World Quarterly*, 2, pp. 215-27.
- Albala-Bertrand, J.M. (2004/1993) 'Natural disaster situations and growth: a macroeconomic model for sudden disaster impacts', Selected for Critical Writings in Economics in H. Kunreuther & A. Rose, (eds), (2004) *The economics of natural hazards* (Volume II, pp. 453-70), Cheltenham: Elgar.
- Albala-Bertrand, J.M. (2006) 'Globalization and localization: an economic approach', in R. Dynes, H, Rodriguez & E. Quaranteli, R. Dynes, *Handbook of Disaster Research*, New York: Springer. pp.147-67.
- Albala-Bertrand, J.M. (2006b) 'Changes in Chile's production structure, 1986-1996: Output and industrial interdependence', *Cepal Review* 88, pp. 159-72.
- Albala-Bertrand, J.M. (2010) 'A Contribution to Estimate a Benchmark Capital Stock', *International Review of Applied Economics*, Vol. 24, No.6, pp.633-64.
- Albala-Bertrand, J.M.(1993) *The Political Economy of Large Natural Disasters*, Oxford: Clarendon Press.
- Albala-Bertrand, J.M., (2007) 'Relative Capital Shortage and Potential Output Constraint: a Gap Approach', *International Review of Applied Economics*, Vol. 21, No.2, pp.321-52.
- Aldrich, D. (2011) 'The Externalities of Strong Social Capital: Post-Tsunami Recovery in Southeast India', *Journal of Civil Society*, Vol. 7, No. 1, pp. 81–9.
- Alesch, D. J., Holly, J.N. Mittler, E. and Nagy, N. (2001) 'Organizations at Risk: What Happens when Small Businesses and Not-for-Profits Encounter Natural Disasters', *First Year Technical Report of the Small Organizations, Natural Hazards Project*, Center for Organizational Studies, University of Wisconsin. Green Bay. Fairfax, VA: Public Entity Risk Institute.
- Alesch, D.J. (2005) 'Complex Urban Systems And Extreme Events: Toward A Theory of Disaster Recovery', Peri Public Entity Risk Institute, University of Wisconsin-Green Bay, USA.
- Alesch, D.J., and Holly, J.N. (1997) 'Small business failure, survival, and recovery: Lessons from the January 1994 Northridge earthquake' In *Proceedings of the NEHRP Conference and Workshop on Research on the Northridge, California Earthquake of January 17, 1994* (pp. 48–55), Richmond, CA: California Universities for Research in Earthquake Engineering.
- Alexander, R (2006) 'Tsunami: Build Back Better: Mantra Aside, an Aid gone Wrong Story? A Livelihood Sector Review', *Bangalore: Development Consultancy Group*, <http://www.ideasint.org/Documents/Tsunami%20Aid.pdf>.
- ALNAP (2008) 'Responding to Earthquakes: Learning From Earthquake Relief and recovery Operations', www.proventionconsortium.org www.alnap.org.
- ALNAP (various years) *ALNAP Lesson Papers*, <http://www.alnap.org/resources.aspx>.
- Alvarez, R. and López, A.R. (2008) 'Trade Liberalization and Industry Dynamics: A Difference in Difference Approach', *Central Bank of Chile, Working Paper No.470*.
- Anderson, C.W., Santos, J. and Haimes, Y.Y. (2007) 'A Risk-based Input-Output Methodology for Measuring the Effects of the August 2003 Northeast Blackout', *Economic Systems Research*, Vol. 19, No. 2, pp. 183–204.
- Arias, D. & Covarrubias, K. (2006). 'Agricultural Insurance in Mesoamerica: An Opportunity for Deepening Rural Financial Markets', IDB, February.
- Aschauer, David A. (1989) 'Is Public Expenditure Productive?', *Journal of Monetary Economics* 23, pp. 177-200.
- Aswany, A.A. (2011) '*On the State of Egypt: What Caused the Revolution*', Edinburgh: Canongate Books.

- Baez, J. E., and I. V. Santos, I.V. (2007) 'Children's Vulnerability to Weather Shocks: A Natural Disaster as a Natural Experiment', Mimeo, Syracuse University.
- Bailey, S. (2008) 'Cash Transfers for Disaster Risk Reduction in Niger: A Feasibility Study', *Humanitarian Policy Group*, Overseas Development Institute.
- Banco Central (2012) *Cuentas Nacionales 2008-2011*, Santiago: Banco Central de Chile.
- Bank Dunia/The World Bank (2007) 'Aceh Economic Update', November, Jakarta: Bank Dunia.
- Barton, A. (1970) *Communities in Disaster. A Sociological Analysis of Collective Stress Situations*, Garden City, Mich.: Anchor Doubleday.
- Beggs, J., Haines, V. and Hurlbert, J. (1996) 'Situational Contingencies Surrounding the Receipt of Informal Support', *Social Forces*, 75(1), pp.201-22.
- Below, R., Vos, F. and Guha-Sapir, D (2010) 'Moving Towards Harmonization of Disaster Data: A Study of Six Countries', *CRED Working Paper No. 272*.
- Benson, C. and Clay, E. (1998) 'The Impact of Drought on Sub-Saharan African Economies', *World Bank Technical Paper No. 401*.
- Benson, C. and Clay, E. (2004) 'Understanding the Economic and Financial Impacts of Natural Disasters Disaster Risk', *World Bank Management Disaster Series No.4*.
- Bergmann, B. (2007) 'Needed. A New Empiricism. Economist', *Voice* (4)2.
- Berke, P. R. and Beatley, T. (1997) *After the Hurricane: Linking Recovery to Sustainable Development in the Caribbean*. Baltimore, Maryland: The Johns Hopkins University Press.
- Binder, A. and Witte, J.M. (2007) *Business Engagement in Humanitarian Relief: Key Trends and Policy Implications*, *Humanitarian Policy Group (HPG) Background Paper*, London: Overseas Development Institute.
- Blanco, E. A., Fengler, W. Ihsan, A. (2008) 'The impact of the Tsunami and the Reconstruction Effort on Aceh's Economy', *World Bank*, Draft.
- Bottomore, T.B. and Nisbet, R.A. (1979) *A history of sociological analysis*, New York: Heinemann Press.
- Briguglio, L. (2004) 'Economic Vulnerability and Resilience: Concepts and Measurements', Malta: Commonwealth Secretariat and the University of Malta, University Gozo Centre.
- Browne, M. J. and Hoyt, R. E. (2000) 'The Demand for Flood Insurance: Empirical Evidence', *Journal of Risk and Uncertainty*, Vol. 20, No. 3, pp. 291-306.
- Bruneau, M., Chang, S.E., Eguchi, R., Lee, G., O'Rourke, T., Reinhorn, A., Shinozuka, M., Tierney, K., Wallace, W. and von Winterfelt, D. (2003) 'A Framework to Quantitatively Assess and Enhance Seismic Resilience of Communities', *Earthquake Spectra*, 19, pp. 733-52.
- Bulmer-Thomas, V. (1982) *Input-Output Analysis in Developing Countries*, New York: John Wiley.
- Burton, I., Kates, R.W. and White, G.F. (1978) *The Environment as Hazard*, Oxford: Oxford University Press.
- Carter, M. R. (2007) 'Poverty traps and natural disasters in Ethiopia and Honduras', *World Development* 35, No.5, pp. 835-56.
- Cassidy, J. (2009) *How Markets Fall. The Logic of Economic Calamities*. London: Allen Lane.
- Causton, A. and G. Saunders (2006) 'Response to Shelter Needs in Post-Earthquake Pakistan: A Self-Help Approach', *Humanitarian Exchange*.
- Cavallo, E., and Noy, I. (2010) 'The Economics of Natural Disasters: A Survey2', *IDB Working Paper 124*. Washington, DC, United States: Inter-American Development Bank.
- Cavallo, E., Galiani, S., Noy, I. and Pantano, J. (2010) 'Catastrophic Natural Disasters and Economic Growth', Washington: Inter-American Development Bank.
- CEPAL (2000) 'Informe De La Reunión de Expertos Sobre Remesas en México: Propuestas Para Su Optimización', LC/MEX/L.452 (SEM.115/2).
- Chang H.J. and Grabel I. (2004) *Reclaiming Development*, London: Zed Books.
- Chang, H.J. (2002) *Kicking Away the Ladder – Development Strategy in Historical Perspective*, London: Anthem Press.
- Chang, S.E. (2001) 'Structural change in urban economies: Recovery and long-term impacts in the 1995 Kobe Earthquake', *The Kokumin Keizai Zasshi Journal of Economics and Business Administration*, 183, pp. 47-66.
- Charvériat, C. (2000) 'Natural Disasters in Latin America and the Caribbean: An Overview of Risk', *Inter-American Development Bank, Working Paper 434*.
- Chu, K. (2007) 'Smaller Business Struggle to Recover From Katrina', *USA Today* http://www.usatoday.com/money/smallbusiness/2007-08-28-katrina-finances_N.htm.
- Ciaschini, M. (ed.) (1988) *Input-Output Analysis: Current Developments*, London: Chapman and Hall.
- Clay, E., Bohn, L., Blanco de Armas, E., Kabambe, S. and Tchale, H. (2003) 'Malawi and Southern Africa: Climatic Variability and Economic Performance', *World Bank Disaster Management Facility, Working Paper Series*, No.7.

- Cohen, A.J. and Harcourt, G.C. (2003) 'Whatever Happened to the Cambridge Capital Theory Controversies?', *Journal of Economic Perspectives*, Vol. 17, No. 1, pp.199-214.
- CORFO (2011) 'Programas de Reconstrucción', Gobierno de Chile, Ministerio de Economía.
- Cosgrave, J (2007) *Synthesis Report: Expanded Summary. Joint evaluation of the international response to the Indian Ocean tsunami*. London: Tsunami Evaluation Coalition (TEC).
- Crowe, A. (2012) *Disasters 2.0: The Application of Social Media Systems for Modern Emergency Management*, Boca Raton: CRC Press.
- Cuaresma, J.C. (2009) 'Natural Disasters and Human Capital Accumulation' World Bank, GFFDRR, *Policy Research Working Paper* 4862.
- Cuaresma, J.C., Hlouskova, J., and Obersteiner, M. (2008) 'Natural disasters as creative destruction?: evidence from developing countries', *Economic Inquiry*, 46 (2), pp. 214-26.
- Cuny, F.C. (1983) *Disaster and Development*, Oxford: Oxford University Press.
- Dabashi, H. (2012) *The Arab Spring. The End of Postcolonialism*, London: Zedbooks.
- Davis, I. (1978) *Shelter After Disasters*, Oxford: Oxford Polytechnic Press.
- Dawkins, R. (ed) (2008). *The Oxford Book of Modern Science Writing*, Oxford: Oxford University Press.
- De Mel, S., McKenzie, D. and Woodruff, C. (2008) 'Enterprise Recovery Following Natural Disasters', University of Peradeniya, World Bank, and University of California, San Diego.
- Dervis, K., Melo, J. and Robinson, S. (1985) *General Equilibrium Models for Development Policy*, Cambridge: Cambridge University Press.
- Deshingkar, P. and Aheeyar, M.M.M. (2006) 'Remittances in Crisis: Sri Lanka after the Tsunami', *HPG Background Paper*. London: Overseas Development Institute.
- Di John, J. (2008) 'Conceptualising the Causes and Consequences of Failed States: A Critical Review of the Literature', *SOAS Working Paper* No. 25.
- Donaghy, K.P., Nazmiye Balta-Ozkan, N. and Hewings, G. (2007) 'Modeling Unexpected Events in Temporally Disaggregated Econometric Input-Output Models of Regional Economies', *Economic Systems Research*, Vol. 19, No. 2, 125-45.
- Donovan, C., McGlinchy, M., Staatz, J. and Tschirley, D. (2005) 'Desk Review: Emergency Needs Assessment and the Impact of Food Aid on Local Markets', *World Food Programme*, Emergency Needs Assessment Branch.
- Dornbusch, R., Fischer, S. and Startz, R. (2008) *Macroeconomics*, International Edition, 10th Edition, Boston: Macgraw-Hill.
- Dutt, A.K. (1990) *Growth, Distribution and Uneven Development*, Cambridge: Cambridge University Press.
- Dynes, R.R. (1970) *Organized behavior in disaster*, Lexington, MA: Heath Lexington Books.
- Earthquake Emergency Recovery Project (2006) *Livelihood Support Cash Grant: Operational Manual*, Washington DC: World Bank.
- ECLAC (2003) *Handbook for Estimating the Socio-economic and Environmental Effects of Disasters*, Chile: CEPAL.
- ECLAC (2010) *Terremoto en Chile. Una Primera Mirada al 10 de Marzo de 2010*, Santiago: Naciones Unidas, CEPAL.
- ECLAC (2010) *The Chilean Earthquake of 27 February 2010. An Overview*, Santiago: United Nations Publication, CEPAL
- Ellerman, D. (2003) 'Policy Research on Migration and Development' *World Bank Policy Research Working Paper* 3117.
- EM-DAT website: <http://www.emdat.be/source-entry>
- Eurostat (2008) *Eurostat Manual of Supply, Use and Input-Output Tables*, Luxembourg: Office for Official Publications of the European Communities.
- Fagen, P. (2006) 'Remittances in Crises: A Haiti Case Study', *HPG Background Paper*. London: Overseas Development Institute.
- Ferguson, R. (2006) 'Insurance Solutions for Emerging Markets', paper prepared for London Economic Forum, December 2006.
- Ferreira, J., Dias, J. and Lopes, J.C. (2007) 'Complexity as interdependence in input-output systems', *Environment and Planning*, Vol. 39, pp. 1770-82.
- Ferris, E. (2008) 'Natural Disaster- and Conflict-Induced Displacement: Similarities, Differences and Inter-Connections', http://www.brookings.edu/speeches/2008/0327_displacement_ferris.aspx?emc=lm&m=214900&l=31&v=658612.
- Fideus, M. & Widyasanti, A.D. (2010) 'Indonesian Interprovincial Trade: What can be Revealed from a Gravity Modeling?', www.unescap.org/tid/artnet/mtg/gravity10_weds3.pdf
- Fine, B. (2008) 'Social Capital in Wonderland: The World Bank behind the Looking Glass', *Progress in Development Studies*, vol.8, no.3, pp.261-9.

- Fine, B. (2010) *Theories of Social Capital. Researchers Behaving Badly*, London: Pluto Press.
- Finlan, A. (2004) *The Collapse of Yugoslavia 1991-1999*, London: Osprey Publishing.
- Flint, M. and Goyder, H. (2006) *Funding the Tsunami Response*, London: Tsunami Evaluation Committee.
- Fomby, T., Ikeda, Y. and Loayza, N. (2009) 'The Growth Aftermath of Natural Disasters.' *Policy Research Working Paper 5002*, Washington D.C.: World Bank.
- Fraccastoro, K.A. (2008) 'Entrepreneurial Recovery From Natural Disaster: A Consideration of Influential Factors', *Journal of Business & Economics Research*, Vol.6, No.12.
- Stewart, F. (ed.) (2008) *Horizontal Inequalities and Conflict: Understanding Group Violence in Multiethnic Societies*. Basingstoke: Palgrave Macmillan.
- Freeman, P.K., Martin, L. A., Mechler, R. and Warner K. (2002) 'Catastrophe and Development: Integrating Natural Catastrophes into Developing Planning', *Disaster Risk Management Working Papers Series 4*. Washington DC: World Bank.
- Fukuyama, F. (2002) Social Capital and Development: The Coming Agenda. *SAIS Review*, vol. XXII, No 8.
- Galleguillos Jara, J.P. (2010) 'Informe de la Comisión Especial Investigadora del Estado de la Institucionalidad en Relación a Su Capacidad de Respuesta Frente a Desastres Naturales.', Septiembre, Comisión de la Cámara de Diputados de Chile.
- Geipel, R. (1982) *Disaster and Reconstruction*, London: Allen & Unwin.
- Giarini, O. (ed.) (1984) *The Geneva Papers on Risk and Insurance*, Geneva: The Geneva Association.
- Giddens, A. (2006) *Sociology*, 5th Edition, Cambridge: Polity Press.
- Girard, C., and Peacock, W. (1997) 'Ethnicity and segregation: Post-hurricane relocation', In W. Peacock, B. Morrow, and H. Gladwin (eds) *Hurricane Andrew: Ethnicity, gender, and the sociology of disaster*, New York: Routledge; pp. 191–205.
- Gobierno de Chile (2010) '*Plan de Reconstrucción. Terremoto y Maremoto del 27 de Febrero de 2010*', Santiago: Gobierno.
- Goldsmith, E. and Hilyard, N. (1984) 'The Social and Environmental Effects of Large Dams', Wadebridge Ecological Centre, Wadebridge, Cornwall.
- Gordon, P., Richardson H.W., and Davis, B. (1997) 'Transport-related Impacts of the Northridge Earthquake', *Journal of Transportation and Statistics*, 1, pp. 21–36.
- Government of Pakistan (2006) 'Pakistan: Government Distributed Rs45 Billion in Quake-Hit Areas So Far', Islamabad: Government Publication.
- Goyal, S. (2007) *Connections*, New Jersey: Princeton University Press.
- Greenaway, D., Leybourne, S.J., Reed, G.V. and Whalley, J. (1993) *Applied General Equilibrium Modelling: Applications, Limitations and Future Development*. London: HMSO.
- Guha-Sapir, D and Below, R. (2002) *The Quality And Accuracy of Disaster Data. A Comparative Analyses of Three Global Data Sets*, WHO, Centre for Research on the Epidemiology of Disasters, University of Louvain, School of Medicine, Brussels, Belgium.
- Hammond, L. (2008) 'Strategies of Invisibilization: How Ethiopia's Resettlement Programme Hides the Poorest of the Poor', *Journal of Refugee Studies* 21(4), pp.517-36.
- Hanneman, R. A. and Riddle. M. (2005) '*Introduction to Social Network Methods*', Riverside, CA: University of California, Riverside (published in digital form at <http://faculty.ucr.edu/~hanneman/>).
- Harcourt, G.C. (1972) *Some Cambridge Controversies in the Theory of Capital*, Cambridge: Cambridge University Press.
- Hare, A.P. and Hare, J.R. (1997) *J. L. Moreno*. London: Sage Publications.
- Harvey, P. (2007) *Cash-Based Responses in Emergencies*, London: ODI, HPG Report 24.
- Harvey, P. and Lind, J. (2005) *Dependency and Humanitarian Relief: A Critical Analysis*, London: ODI, HPG Report 19.
- Hausman, D.M. (1992) *The Inexact and Separate Science of Economics*, Cambridge: Cambridge University Press.
- Heger, M., A. Julca, and O. Paddison (2008) 'Analysing the Impact of Natural Hazards in Small Economies: The Caribbean Case', UNU/WIDER Research Paper 25.
- Hendry, F.D. (2000) *Econometrics: Alchemy or Science?*, Oxford: Oxford University Press.
- Hernández-Coss, R. and Bun, C.E. (2007) 'The UK–Nigeria Remittance Corridor Challenges of Embracing Formal Transfer Systems in a Dual Financial Environment', Washington D.C.: World Bank.
- Hirschleifer, j. (1987) *Economic Behaviour in Adversity*, Chicago: University of Chicago Press.
- Hoskins, A. (2006) 'Markets and Emergency Needs Assessments: Cairo Workshop', World Food Programme: Emergency Needs Assessment Branch.
- Hobsbawm, E. (1997) *On History*, New York: The New Press.
- Hochrainer, S. (2009) 'Assessing the Macroeconomic Impacts of Natural Disasters – Are there Any?', *World Bank Policy Research Working Paper 4968*. Washington, DC: The World Bank.

- Hofmann, C.-A. (2005) *Cash Transfer Programmes in Afghanistan: A Review of Current Policy and Practice*, London: ODI HPG.
- Horwich, G. (2000) 'Economic Lessons of the Kobe Earthquake', *Economic Development and Cultural Change*, Vol. 48, No. 3, pp. 521-42.
- IMF (2005) 'Preliminary Assessment of the Macroeconomic Impact of The Tsunami Disaster on Affected Countries, and of Associated Financing Needs', Prepared by the IMF in Cooperation with the World Bank, February, 4. Washington: IMF.
- IMF (2008) *World Economic Outlook*, Washington D.C.: IMF.
- INACER (various years) *Indicador de Actividad Regional*, Santiago: Instituto Nacional de Estadísticas.
- Indonesia Relief (2005) '7 Trucks of Expired Tsunami Food Aid Destroyed', *Tsunami Relief News*, Banda Aceh: Indonesia Relief, <http://www.indonesia-relief.org/mod2d7b-2.html>.
- INE (various years) *Análisis de Coyuntura*, Santiago: Instituto Nacional de Estadísticas.
- INE (various years) *Informe Económico Regional*, Santiago: Instituto Nacional de Estadísticas.
- Ingram, J.C., Franco, G., Rumbaitis-del Rio, C. and Khazai, B. (2006) 'Post-Disaster Recovery Dilemmas: Challenges in Balancing Short-Term and Long-Term Needs for Vulnerability Reduction', *Environmental Science and Policy*, No. 9, pp. 607-13
- Jackson, M.O. (2008) *Social and Economic Networks*, New Jersey: Princeton University Press.
- Jacobsen, K. (2005) *The Economic Life of Refugees* Bloomfield, CT: Kumarian Press.
- Jaramillo, C. (2007) 'Natural Disasters and Growth: Evidence Using A Wide Panel of Countries', CEDE, Document Cede 2007-14.
- Keen, S. (2012) *Debunking Economics. The Naked Emperor Dethroned?* 2nd Edition, London: Zed Book.
- Keipi, K. and Tyson, J. (2002) Planning and Financial Protection to Survive Disasters, *IDB Sustainable Development Department Technical Papers Series*.
- Kendra, M.J. and Wachtendorf, T. (2006) 'Community Innovation and Disasters', In R. Dynes, H. Rodriguez and E. Quaranteli, R. Dynes, *Handbook of Disaster Research*, New York: Springer. pp. 316-34.
- Kennedy, P. (2008) *A guide to Econometrics*, 6th Edition, Oxford: Blackwell Publishing.
- Khan, F. (2006) 'The Response to the Earthquake in Pakistan: The View from the Federal Relief Commission', *Humanitarian Exchange*, No. 34.
- Kilduff, M and Tsai, W. (2003) *Social Networks and Organizations*, London: Sage Publications.
- Kirman, A. (2011) *Complex Economics: Individual and Collective Rationality*, The Graz Schumpeter Lectures, London: Routledge.
- Kirman, A. (1992) Whom or What Does the Representative Individual Represent? *The Journal of Economic Perspectives*, 6 (2), pp. 117-36.
- Kirman, (2010) 'The Economic Crisis Is A Crisis For Economic Theory', *CESifo Economic Studies*, 56 (4), pp. 498-535.
- Kregel, J.A. (1976) *Theory of Capital*, London: The MacMillan Press.
- Krugman, P. (2008) *The Return of Depression Economics and the Crisis of 2008*, London: Penguin.
- Kunreuther, H. & Rose, A., (eds) (2004) *The Economics of Natural Hazards*, Cheltenham: Elgar.
- Kunreuther, H. (1996) 'Mitigating Disaster Losses Through Insurance', *Journal of Risk and Uncertainty*, 12, pp. 171-87.
- Kunreuther, H. and M. Pauly, (2004) 'Neglecting Disaster: Why Don't People Insure Against Large Losses?', *Journal of Risk and Uncertainty*, 28, pp. 5-21.
- Kuznets, S. (1955) 'Economic Growth and Income Inequality', *American Economic Review* 45/1.
- Lateef, N. V. (1982) *Crisis in the Sahel: A Case Study in Development Cooperation*, Boulder, Col.: Westview Press.
- Leontief, W.W. (1953) *Studies in the Structure of the American Economy*, New York: Oxford University Press.
- Levi-Strauss, C. (1963) *Structural Anthropology*, New York: Basic Books.
- Ligon, E., Thomas, J.P. and Worrall, T. (2002) 'Informal Insurance Arrangements with Limited Commitment: Theory and Evidence from Village Economies', *The Review of Economic Studies*, 69(1), pp.209-44.
- Loayza, N., Olaberria E., Rigolini, J. and Christiansen, L. (2009) 'Natural Disasters and Growth. Going Beyond the Averages', *World Bank Policy Research Working Paper* 4980.
- Lukes, S. (ed.) (1982) *Durkheim: The Rules of Sociological Method*, New York: The Free Press.
- Marx, K. (1976) *Capital. A Critique of Political Economy*, London: Pelican.
- McClelland, J.S. (1996) *A History of Western Political Thought*, London: Routledge.
- Miamidian, E., Arnold, M., Burritt, K. and Jacquand, M. (2005) 'Surviving Disasters and Supporting Recovery: A Guidebook for Microfinance Institutions', World Bank, *Disaster Risk Management Working Paper Series* No. 10.
- Miles, S.B., and Chang, S.E. (2003) *Urban Disaster Recovery A Framework and Simulation Model*, Multidisciplinary Center for Earthquake Engineering Research, Technical Report No. MCEER-03-0005, Buffalo, NY.

- Mileti, D. (1999) *Disasters by Design A Reassessment of Natural Hazards in the United States*, Washington, DC: Joseph Henry Press.
- Miller, D.L. and Paulson, A. (2007) 'Risk taking and the quality of informal insurance: gambling and remittances in Thailand', *Working Paper Series*, WP-07-01, Federal Reserve Bank of Chicago.
- Minski, H. (2010) *Stabilizing an Unstable Economy*, New York: McGraw-Hill.
- Mitra-Khan, B. H. (2008) 'Debunking the Myths of Computable General Equilibrium Models', New York: Schwartz Center for Economic Policy Analysis, New School for Social Research.
- Morris, S. S. and Wodon, Q.(2003) 'The Allocation of Natural Disaster Relief Funds: Hurricane Mitch in Honduras', *World Development* Vol. 31, No. 7, pp. 1279–89.
- Murlidharan, T.L. and Shah, H.C. (2003) 'Economic Consequences of Catastrophes Triggered by Natural Hazards', *Blume*, Report: 143.
- Nafziger, E.W., Stewart, F. and Väyrynen, R (eds) (2000) *War, Hunger, and Displacement: Volumes 1 and 2*, Oxford: OUP.
- Nafziger, W. and Auvinen, Y. (2002) 'Economic Development, Inequality, War, and State Violence', *World Development* 30: 2.
- Nakagawa, Y. and Shaw, R. (2004a) Social Capital And Disaster Recovery: A Comparative Case Study Of Kobe And Gujarat Earthquake. *13th World Conference on Earthquake Engineering, Vancouver, B.C., Canada, Paper No. 771*.
- Nakagawa, Y. and Shaw, R. (2004b) Social capital: A missing link to disaster recovery, *International Journal of Mass Emergencies and Disasters*, 22(1), pp. 5–34.
- Noy, I. (2009) 'The Macroeconomic Consequences of Disaster', *Journal of Development Economics*, 88(2), pp. 221-31.
- Okuyama, Y. (2009) 'Critical Review of Methodologies on Disaster Impact Estimation, background paper for Assessment on the Economics of Disaster Risk Reduction', The Global Facility for Disaster Reduction and Recovery (GFDRR), World Bank.
- Okuyama, Y., Hewings, G.J.D. and Sonis, M. (2004) 'Measuring Economic Impacts of Disasters: Interregional Input-Output Analysis Using Sequential Interindustry Model', in: Y. Okuyama and S.E. Chang (eds) *Modeling Spatial and Economic Impacts of Disasters*, New York: Springer, pp. 77-101.
- Okuyama, Y., Ed, (2007) 'Special Issue: Economic Modelling for Disaster Impact', *Economic Systems Research*, Vol. 19, No. 2.
- Oosterhaven, J. and Stelder, D. (2007) 'Regional and Interregional IO Analysis', The Netherlands: Department of Economics and Econometrics, Faculty of Economics and Business, University of Groningen.
- Otman, W. and Kalbefrg, E. (2007) *The Libyan Economy*, New York: Springer.
- Oxfam (2005) 'A Place to Stay, A Place to Live. Challenges In Providing Shelter in India, Indonesia And Sri Lanka, After The Tsunami', *Oxfam Briefing Note*, December.
- Oxfam (2006) 'The Tsunami Two Years On: Land Rights in Aceh', *Oxfam Briefing Note*, November.
- Özerdem, A. and Jacoby, T. (2006) *Disaster Management and Civil Society: Earthquake Relief in Japan, Turkey and India*, New Delhi: I.B.Tauris.
- Pantoja, E. (2002) 'Microfinance and Disaster Risk Management. Experiences and Lessons Learned', World Bank: ProVention Consortium.
- Peacock, W. G., Dash, N. and Zhang, Y. (2006) Shelter and housing recovery following disaster, in *The Handbook of Disaster Research*, edited by H. Rodriguez, E. L. Quarantelli, and R. Dynes. New York: Springer, pp. 258-74.
- Perrings, C. (2001) 'Resilience and Sustainability', in Henk Folmer, H. Landis Gabel, Shelby Gerking, and Adam Rose (eds) *Frontiers of Environmental Economics*, Cheltenham, U.K.: Edward Elgar, 319–41.
- Perry, M. (1999) *Small Firms and Network Economies*, London: Routledge.
- Prince, S.H. (1920) 'Catastrophe and Social Change', *Studies in History, Economics and Public Law*, Vol. 1, No.94.
- Putnam, R. (2000) *Bowling Alone: The Collapse and Revival of American Community*, New York: Simon & Schuster.
- Putnam, R.D., Leonardi, R. and Nanetti, R.Y. (1993) *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton, USA: Princeton University Press.
- Pyrenne, E. (1958) *A History of Europe From the End of the Roman World in the West to the Beginnings of the Western States* New York: Doubleday.
- Quarantelli, E. L. (ed.) (1978) *Disaster Theory and Research*, London: SAGE.
- Raa, T.T. (2005) *The Economics of Input-Output Analysis*, Cambridge: Cambridge University Press.
- Raddatz, C. (2009) 'The Wrath of God. Macroeconomic Costs of Natural Disasters'. The World Bank, Development Research Group, *Macroeconomics and Growth Team, Policy Research Working Paper* 5039.

- Raschky, P.A. (2008) 'Institutions and the Losses from Natural Disasters', *Natural Hazards and Earth System Sciences*, 8, pp. 627-34.
- Rasmussen, T.N. (2004) 'Macroeconomic implications of natural disasters in the Caribbean', *IMF Working Paper* No. 224.
- Ratha, D. (2005) 'Workers Remittances: An Important and Stable Source of External Development Finance', in S. M. Maimbo and D.Ratha (eds), *Remittances: Development Impact and Future Prospects*. Washington DC: World Bank.
- Ratha, D., Mohapatra, S. & Xu, Z. (2008) 'Outlook For Remittance Flows 2008-10: Growth Expected to Moderate Significantly, But Flows to Remain Resilient', *Migration and Development Brief* 8, World Bank, Washington DC. November.
- Resosudarmo, B.P. and Nurdianto, D.A. (2007) *Fundamentals of an Input-Output Analysis with an Application to the 2005 Indonesian Inter-Regional Input-Output Table*, Indonesia: CSIRO.
- Rodriguez, H., Quarantelli, E., and Dynes, R.R. (2006) *Handbook of Disaster Research*, New York: Springer.
- Rose, A. & Liao, S. (2005) 'Modeling Regional Economic Resilience to Disaster: A Computable General Equilibrium Analysis of Water Service Disruptions', *Journal of Regional Science*, Vol.45, No. 1, pp. 75-112
- Rowley, K. (2008) 'The Role of Community Rebuilding Plan in the Hurricane Recovery', GulfGov Reports, Rockefeller Institute of Government, Retrieved from http://www.rockinst.org/disaster_recovery/
- Rubin, C., and Barbee, D. (1985) 'Disaster Recovery and Hazard Mitigation: Bridging the Intergovernmental Gap'. In Emergency Management: A Challenge for Public Administration, *Public Administration Review*, 45, pp. 57-63
- Russell, B. (1991) *History of Western Philosophy* London: Routledge.
- Saleh, N. (2010) *An Anatomy of the Financial Crisis. Blowing Tumbleweed*, London: Anthem Press.
- Santos, I. (2008) 'How do households manage the effects of natural disasters? Empirical evidence from central America'. Bruegel, Draft.
- Savage K. and A. Suleri (2006) *Remittances in Crises: A Case Study from Pakistan* London: ODI, HPG Background Paper.
- Savage, K. and Harvey, P. (eds) (2007) *Remittances during crises. Implications for humanitarian Response*. London ODI: HPG Report 25.
- Savage, K. Umar, E. (2006) *Independent Evaluation of Oxfam GB Malawi's Cash-Transfer Programme*, London ODI: HPG Report 22.
- Save the Children (2005) *Rapid Livelihoods Assessment Report: The Impact of the Earthquake on Livelihoods in Muzaffarabad & Bagh Districts Azad Jammu & Kashmir Pakistan*. Save the Children.
- Save the Children USA (2006) 'Update on Housing Reconstruction in Aceh, Indonesia', Save the Children.
- Sawyer, M. (1995) 'New Keynesian Macroeconomics: A Critique of its Contribution', University of Leeds, School of Business and Economic Studies, *Discussion Paper Series* E95/12.
- Scanlon, T.J. (1988) 'Winners and Losers: Some Thoughts About The Political Economy of Disasters', *International Journal of Mass Emergencies and Disasters*, Vol.6, No.1, pp.47-63.
- Scanlon, T.J. (2007) 'A Perspective on North American Natural Disasters', In J.P. Stoltman, J. Lidstone, and L.M. Dechano (eds) *International Perspectives On Natural Disasters: Occurrence, Mitigation, And Consequences*, The Netherlands: Kluwer Academic Publications. pp. 323-40.
- Schubert, B. (2006) 'A Capital Based Income Generation Scheme for Tsunami Affected Households in Trincomalee District, Sri Lanka', *Overseas Development Institute: Feasibility Study for Save the Children*.
- Schwarze, R. and Wagner, G. (2007) 'The Political Economy of Natural Disaster Insurance : Lessons from the Failure of a Proposed Compulsory Insurance Scheme in Germany', *European Environment* 17, 6, 403-15.
- Serafini, A. (2001) *The Epic History Of Biology*, London: Perseus Books Group.
- Serra, N and Stiglitz, J.E. (eds) (2008) *The Washington Consensus Reconsidered*, Oxford: Oxford University Press.
- Shaikh, A. (2007) *Globalization and the Myths of Free Trade: History, Theory and Empirical Evidence*, New York: Routledge.
- Shoven, J.B. and Whalley, J., (1992) *Applying General Equilibrium*, Cambridge, UK: Cambridge University Press.
- Silber, L. and Little, A. (1996) *The Death of Yugoslavia*, London: Penguin.
- Silva Malig, M. (2011) Seremi de Economia. Region de Valparaiso, Hemeroteca, <http://www.mauriciosilvamalig.cl/>.
- Simmel, G. (1971) *On Individuality and Social Forms*, Chicago: University of Chicago Press.
- Skidmore, M. and Toya, H. (2002) Do natural disasters promote long-run growth?, *Economic Inquiry*, 40 (4), pp. 664-87.

- Skoufias, E. (2003) 'Economic Crises and Natural Disasters: Coping Strategies and Policy Implications', *World Development* 31(7) pp.1087-102.
- Slater, R. and M. Mphahlele (2008) 'Cash Transfers, Gender and Generational Relations: Evidence from a Pilot Project in Lesotho', London ODI, HPG.
- Smith, S.K. and McCarty, C. (1996) 'Demographic Effects of Environmental Disasters: A Case Study of Hurricane Andrew', *Demography*, 33, pp. 265-75.
- Smith, S.K. (1996) 'Demography of Disaster: Population Estimates after Hurricane Andrew', *Population Research and Policy Review*, 15, pp. 459-47.
- SOFOFA (2010) 'Evolucion de los Principales Sectores Industriales Post Terremoto', Septiembre, Minuta, Departamento de Estudios.
- SOFOFA (2012) *Informe Estadístico Mensual, Junio*, Santiago: SOFOFA.
- Solimano, A. (2003) 'Remittances by Emigrants: Issues and Evidence', *Santiago: CEPAL, Serie Macroeconomía del Desarrollo*, No.26.
- Sorokin, P.A. (1942) *Man and Society in Calamity*, New York: Dutton.
- Srinivasan, K. (2006) 'The State and Civil Society in Disaster Response Post-Tsunami Experiences in Tamil Nadu', *Journal of Social Work in Disability and Rehabilitation*, 2006, Vol. 5, Nos.3/4, pp. 57-80.
- Stark, O. (1993) *The Migration of Labor*, Cambridge, MA: Blackwell.
- Stelder, T.M., Oosterhaven, J and Eding G.J. (2000) *Interregional Input-Output Software. IRIOS 1.0 Manual*, The Netherlands: University of Groningen.
- Stiglitz, J.E. (2002) *Globalisation and its Discontents*, London: Allen Lane-The Penguin.
- Stiglitz, J.E. (2006) *Making Globalization Work*, London: Blackwell.
- Stiglitz, J.E. (2010) *Freefall. Free Markets and the Sinking of the Global Economy*, London: Allen Lane-The Penguin Group.
- Stoltman, J.P., Lidstone, J. and Dechano, L.M. (eds) (2007) *International Perspectives On Natural Disasters: Occurrence, Mitigation, And Consequences*, The Netherlands: Kluwer Academic Publications.
- Szreter, S. and Woolcock, M. (2004) 'Health By Association? Social Capital, Social Theory, and the Political Economy of Public Health', *International Journal of Epidemiology*, 33(4), pp. 650–67.
- Tata Institute of Social Sciences (2005) *The State and Civil Society in Disaster Response: An Analysis of Tamil Nadu Tsunami Experience*, Mumbai: Tata Institute.
- Tata Institute of Social Sciences (2007) *Case Study Follow-ups 2 Years after the Tsunami*, Mumbai: Tata Institute.
- Taylor, L. (1983) *Structuralist Macroeconomics*, New York, Basic Books.
- Taylor, L. (1994) 'Gap Models', *Journal of Development Economics*, Vol. 45, pp.17-34.
- Taylor, L. (2004) *Reconstructing Macroeconomics. Structuralist Proposals and Critiques of the Mainstream*, Cambridge, Mass., Harvard University Press.
- Taylor, L. (2011) 'CGE Applications in Development Economics', *SCEPA Working Paper* 2011-1.
- Taylor, L., and Arnim, R. (2006) *Modelling the Impact of Trade Liberalisation: A Critique of Computable General Equilibrium Models*, Oxford UK: Oxfam International.
- Taylor, L. (ed.) (1990) *Socially Relevant Policy Analysis: Structuralist Computable General Equilibrium Models for the Developing World*, Cambridge, Mass.: MIT Press.
- TEC (2006) *Tsunami Evaluation Coalition: Consolidated Lessons and Recommendations from the TEC Synthesis Report and TEC Thematic Evaluations*, London: Tsunami Evaluation Committee.
- TEC(2007) *Tsunami Evaluation Coalition: Consolidated Lessons and Recommendations from the TEC Synthesis Report and TEC Thematic Evaluations*, London: Tsunami Evaluation Committee.
- Telford, J. and Cosgrave J. (2006) *Joint Evaluation of the international response to the Indian Ocean tsunami: Synthesis Report*, London: Tsunami Evaluation Coalition (TEC).
- Theil, H. (1971) *Principles of Econometrics*, New York: John Wiley.
- Thirlwall, A.P. (2011) *Economics of Development (Ninth Edition)*, New York: Palgrave MacMillan.
- Thissen, M. (1998) 'A Classification of Empirical CGE Modelling', University of Groningen, *SOM Research Report* 99C01.
- Thomas, J. (1992) *Informal Economic Activity*, London: LSE.
- Tierney, K.J. (1997) 'Business Impacts Of The Northridge Earthquake', *Journal of Contingencies and Crisis Management*, Vol. 5, No. 2, pp. 87-97.
- Tierney, K.J. (2006) 'Businesses and Disasters: Vulnerability, Impacts, and Recovery', In Rodriguez, H., Quarantelli, E. & Dynes, R (eds) *Handbook of Disaster Research*, New York: Springer, pp. 275-96.
- Tierney, K.J., Nigg, J.M. and Dahlhamer, J.M. (1996) 'The impact of the 1993 Midwest Floods: Business vulnerability and disruption in Des Moines', In R.T. Sylves and W.L. Waugh, Jr. (eds), *Disaster management in the U.S. and Canada: The politics, policymaking, administration and analysis of emergency management*, Springfield, IL: Charles C Thomas. pp. 214–33.
- Todaro, M. (2003) *Economic Development in the Third World* (8th Edition), London: Longman.

- Todaro, M.P. and Smith, C.S. (2006) *Economic Development* (Ninth Edition), London: Pearson Education.
- Townsend, R. (1994) 'Risk and Insurance in Village India', *Econometrica* 62, pp. 539-92.
- Tschoegl, L., Below, R. and Guha-Sapir, D. (2006) 'An Analytical Review of Selected Data Sets on Natural Disasters and Impacts', Bangkok: UNDP/CRED (Workshop on Improving Compilation of Reliable Data on Disaster Occurrence and Impact).
- UK Remittance Working Group/DfID (2005) 'UK Remittance Market', www.dfid.gov.uk/pubs/files/uk-remittances-report.pdf.
- UNDP (2011) *Human Development Report*, New York: UNDP.
- Varshney, A. (2001) 'Ethnic conflict and civil society: India and beyond', *World Politics*, 53(3), pp. 362-98.
- Vaserstein, L.N. (2003) *Introduction to Linear Programming*, New Jersey: Prentice Hall.
- Vigdor, Jacob (2008) 'The Economic Aftermath of Hurricane Katrina', *Journal of Economic Perspectives*, 22, pp. 135-38.
- Walras, L. (2003) *Elements of Pure Economics*, London: Routledge.
- Warhurst, A. (2006a) 'Disaster Prevention: A Role for Business? Provention Consortium, World Bank.
- Warhurst, A. (2006b) 'Logistics Companies and Asian Tsunami Relief', *Ethical Corporation Magazine*.
- Wasserman, S. and Faust, K. (2009) *Social Network Analysis*, Cambridge: Cambridge University Press.
- Webb, G.R., Tierney, K.J., and Dahlhamer, J.M. (2000) 'Businesses and Disasters: Empirical Patterns and Unanswered Questions', *Natural Hazards Review*, 1, 83-90.
- Webb, G.R., Tierney, K.J., and Dahlhamer, J.M. (2002) 'Predicting long-term business recovery from disaster: A comparison of the Loma Prieta Earthquake and Hurricane Andrew', *Environmental Hazards*, 4, 45-58.
- Werker, E. (2007) 'Refugee Camp Economies', *Journal of Refugee Studies* 20 (3), pp. 461-80.
- Wetterberg, A. (2004) *Crisis, Social Ties, and Household Welfare: Testing Social Capital Theory with Evidence from Indonesia*, Washington, DC: World Bank.
- WFP (2006) *Overview of the SENAC Project: Strengthening Emergency Needs Assessment Capacity*, Rome: World Food Program.
- WFP-ODI (2005) *The effects of food aid on household migration patterns and implications for emergency food security assessments*. London: ODI.
- White, G.F. (ed.) (1974) *Natural Hazards: Local, National, Global*, Oxford: Oxford University Press.
- Wooldridge, J.M. (2010) *Econometrics Analysis of Cross Section and Panel Data* (2nd Edition), Cambridge, Mass: MIT Press.
- World Bank (2000) 'What is Social Capital?' from www.worldbank.org/poverty.
- World Bank (2001) 'Honduras: Poverty Diagnostic 2000', *Report No. 20531-HO*, Washington, DC: World Bank.
- World Bank (2002) *Migrants Capital for Small-Scale Infrastructure and Small Enterprise Development in Mexico*, Washington DC: World Bank.
- World Bank (2006) *Global Economic Prospects. Economic Implications of Remittances and Migration*, Washington DC: World Bank.
- World Bank (2007) *Aceh Public Expenditure Analysis, Spending for Reconstruction and Poverty Reduction*, Washington DC: World Bank.
- World Bank (2009) *Aceh Growth Diagnostic*, Washington DC: World Bank.
- World Bank (2010) *Natural Hazards, Un-Natural Disasters. The Economics of Effective Prevention*, Washington DC: World Bank and the UN.
- World Bank (2011, 2012) *World Bank Development Report*, Washington DC: World Bank.
- World Conference on Disaster Reduction (2005) 'Hyogo Framework for Action 2005-2015: International Strategy for Disaster Reduction. Building the Resilience of Nations and Communities to Disasters', Kobe: www.unisdr.org/wcdr.
- Xiao, Yu and Nilawar, U (2012) 'Winners and Losers: Analyzing Spatial Economic Demand Shift after Disasters', *Disasters*. Forthcoming.
- Yamano, N., Kajitani, Y., and Shumuta, Y. (2007) 'Modeling the Regional Economic Loss of Natural Disasters: The Search for Economic Hotspots', *Economic Systems Research*, 19 (2), pp. 163-81.
- Zerbe, R.O. and Bellas, A.S. (2006) *A Primer for Cost-Benefit Analysis*, Cheltenham: Edward Elgar.
- Zhang, Y., Lindell, M.K. and Prater, C.S. (2009) 'Vulnerability of Community Businesses to Environmental Disasters', *Disasters*, Vol. 33, Issue 1, pp.38-57.

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