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The Unlikelihood of an Economic Catastrophe: Localization & Globalization

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Abstract. This paper attempts to show why it is highly unlikely that a disaster can become a catastrophe. We first put forward an economic concept of disaster localization. This shows that a localized disaster is unlikely to affect the macro economy in any significant way and that economic development itself tends to make most disasters localized as an incidental consequence of its endogenous processes. We then show that the effect of current globalization on vulnerability seems to be double-edged. It may increase local vulnerability by disenfranchising communities and adding new sources of economic instability. But it may also speed up the downgrading of vulnerability at the national level by contributing to upgrade localization, further reducing the possibility of a catastrophe. It is therefore, difficult to imagine a realistic scenario in which a disaster could become catastrophic, even less so in developed countries.

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1. Introduction

This paper attempts to show, from an economic viewpoint, why it is highly unlikely that a disaster can become a catastrophe. We start from a number of definitions and conceptualizations, and then approach the issue by putting forward an economic concept of disaster localization. This shows that a localized disaster is unlikely to affect the macro economy in any significant or persistent way and that economic development itself tends to make most disasters localized as an incidental consequence of its endogenous processes. As economic resilience and economic disaster confinement increase, disaster vulnerability is bound to decrease. However, the effect of current globalization on vulnerability seems to be double edged. On the one hand, globalization may increase local vulnerability by disenfranchising communities and adding new sources of economic instability, increasing early disaster effects. But on the other, globalization is likely to speed up the downgrading of vulnerability at the national level by contributing to upgrade localization, further reducing the possibility of a catastrophe.

Catastrophe: for the purpose of this paper, let us define a catastrophe, as an extreme and sudden disaster, the intensity of which affects a social system in such a way that:

- (i) the endogenous (in-built) capacity and the exogenous (policy) options of the system are greatly surpassed, i.e. most economic resources become unavailable (destroyed, damaged, inaccessible or immobilised) and most normal institutions become fragmented and ineffective (failure of normal rules and incapability of governance), so further systemic disintegration and deterioration is unstoppable,
- (ii) assuming that the initial impact was local (in our sense below), the localised failure is so intense that it pervades the whole system in the same way as (i), i.e. the system has no viability within the same institutional arrangements and resources, so
- (iii) external aid (even if available) cannot re-ignite the system, but could at most support its (helpless) victims.

That is to say, the system stops operating as such, requiring a fundamental change, which is a long term and costly endeavour. This can be the case of a harshly defeated country in a war, like Germany after WWI, or the destruction of the institutional cohesiveness of a multi-nationality/ethnic country, like Yugoslavia after the Soviet Union demise (Albala-Bertrand, 2000a) or Iraq after 2003 invasion. But this scenario is unlikely in the case of natural or technological disasters, as explained below.

2. Some Conceptualizations

2.1. Urban Area and Urban Hazard

Urban Area. An urban area or city can be represented as a high concentration of people and artifacts in an articulated set of built-up environment, within a relatively small and confined geographic area, within which and through which societal activities are carried. This articulated set of construction can be described as a collection of service networks and service sources that support societal activities, mostly confined in residential construction and business buildings, like homes, social buildings, public and private offices and factory plants. The main service networks in urbanized areas are transport, utilities and communication. Likewise, service processing and sources come in the shape of power plants, equipment and reservoirs for the supply of electricity, gas, telecommunications and water, which are critical for safety considerations. In addition, the treatment of sewage and rubbish take up urban land

and may be a source of contamination if not properly tackled. Furthermore, all urban activities require machinery and equipment so that institutions and people can carry societal and living functions. These represent the standard categories of the capital stock, i.e. business fixed capital in machinery & equipment, structural capital (plant, infrastructures, overheads, offices and social physical capital) and residential capital (dwellings). Behind all this are people as both workforce and beneficiaries of urban activities. A disaster can directly affect people and the capital stock, affecting indirectly their wider functions, as a consequence of the disarticulation of societal frameworks wrought by the initial direct losses.

Urban Hazard. An urban hazard can become a major disaster if it involves a capital city or large industrial cities. In the discussion below we focus mostly on major disaster impacts, which may be the source of a potential catastrophe, as defined above. We conventionally define a disaster impact as major if the money estimate of direct losses is at least similar to the average GDP growth rate of the affected country, e.g. a 5 percent of GDP. We also consider as major, a disaster that damages a key economic activity, even if the direct losses are not as large. Table 1 below, which is self-explanatory, accounts for the main types of hazards that can affect a country and some useful general characteristic associated with them. Only some of these potential disasters are relevant for urban areas, but the table can be used as a general reference tool. In this paper we only concentrate on sudden types of natural and technological disasters, which may affect cities, unless otherwise is indicated.

DISASTER/HAZARDS (Origin)	MAIN TYPES	IMPACT DURATION sudden or slowly developing**	AREAL EXTENT	INTERFERENCE
			Direct Effects (stock) (extensive or confined)	Institutional Effects
NATURAL				
<i>Geophysical</i>				
	<i>earthquake</i>	sudden	extensive (localised)	small
	<i>hurricane</i>	sudden	confined (path)	small
	<i>volcano</i>	sudden	confined (location)	small
	<i>tsunami</i>	sudden	confined (coastal impact)	small
	<i>drought</i>	slowly developing	widespread	large
	<i>others</i>			
<i>Hydrological</i>				
	<i>flood</i>	sudden	confined (riverbank)	small
	<i>flash flood</i>	sudden	confined (riverbank+relief)	small
	<i>others</i>			
<i>Others</i>				
	<i>Asteroid</i>	sudden	confined (impact***)	small*/huge
	<i>others</i>			
SOCIALLY MADE				
<i>Technological</i>				
Failure, leading to collapse, explosion, conflagration, pollution, contamination and the like	<i>engineering</i>	sudden	confined (construction type)	medium
	<i>chemical</i>	both	both	medium
	<i>biological</i>	both	both	medium
	<i>physicist</i>	both	both	medium
	<i>others</i>			
<i>Political</i>				
Institutional failure, leading to complex humanitarian emergency, societal abnormality, instability and impairment	<i>war</i>	slowly developing	widespread	large
	<i>civil war</i>	slowly developing	widespread	large
	<i>riot</i>	sudden	confined	medium
	<i>terrorism</i>	sudden	confined	medium
	<i>dictatorship</i>	slowly developing	widespread	large
	<i>others</i>			
<i>Economic</i>				
Institutional failure, leading to high unemployment, negative growth, high inflation, unsustainable debt, huge inequality, poverty and instability, resource erosion and degradation.	<i>depression</i>	slowly developing	widespread	large
	<i>stagflation</i>	slowly developing	wiespread	large
	<i>market failure</i>	both	both	medium/large
	<i>policy shock</i>	sudden	both	medium/large
	<i>imposition</i>	sudden	both	medium/large
	<i>others</i>			

(*) Not all these disasters are relevant for urban areas
 (**) "sudden" means from a few seconds to few days. "Slowly developing" means from a few months to years (see Albala-Bertrand, 1993a)
 (***) A huge asteroid may have widespread consequences for climate, society, fauna and flora

Among natural hazards affecting urban areas, the potentially most intense is the earthquake. Along coastal towns there would also be the possibility of earthquake- or volcano -inducing tsunamis. In certain latitudes, there may also be the possibility of hurricanes. In addition, some towns located in certain types of ground relief, like floodplains, may be subject to serious but confined floods, but this would generally be less likely in large cities, let alone the capital city (hurricane Katrina-induced flooding in New Orleans is an exception to note). In general, infrequent but damaging flooding mostly occur in the areas around main riverbanks. Except for volcanoes in very particular locations (e.g. 1995 Monserrat), and the very remote case of asteroids, other natural phenomena would unlikely qualify as a major urban potential disaster, let alone potential catastrophe. Technological hazards, in turn, which can become serious urban disasters, can be classified into the following categories. Engineering disasters, stemming from the failure of buildings, bridges or other construction works like levees (Katrina-induced flooding being again a case to note). Chemical disasters caused by slow pollution and sudden contamination of air, land or water. Biological disasters stemming from virus release or urban deforestation. Nuclear disasters caused from radioactive fallout, radioactive waste or contamination. A good deal of these disasters is associated with the production, containment and use of energy. It is however unlikely that any of this can realistically become a catastrophe, as defined above.

2.2. Disaster and Catastrophe: A Question of Vulnerability

Disaster. A disaster impact is normally the result of a physically or societally uncompensated tension, which translates into death, damage, destruction and the disarticulation of societal frameworks. In the case of natural disasters the uncompensated tension is due to the physical weakness of structures and societal processes that fail to compensate for extreme natural events, like earthquakes, hurricanes, floods and the like. As such, even if the natural event were fully exogenous to society, the physical resistance to geophysical phenomenon would not be. It depends on both disaster-proof technology and sociopolitical access to it, which is mostly an endogenous societal process. This is also the case of technological disasters, but here the inducing phenomenon is also fully endogenous. This is associated with the institutional failure to master the production, containment and use of risky technology. In turn, a socially/politically induced disaster impact, like riots, civil wars, wars and the like (i.e. “complex humanitarian emergencies”) is normally the result of a societal/institutional weakness that fails to accommodate competing identity groups. This is a fully endogenous phenomenon, in-built in social structure and dynamics. We generally exclude the latter, as it has characteristics of its own, which are beyond this presentation (see Albala-Bertrand, 2000a; 2000b)

Vulnerability. We generically define vulnerability as the exposure of both physical and societal frameworks to violent events. The latter refers to the exposure of institutions and organized people to violent or extreme events. The degree of exposure is in turn associated with the risk of failure (or dislocation) of an item (or framework) caused by the impact a potential event of a given magnitude. Society’s physical arrangements are paramount in explaining disaster damage. But these are the result of societal processes that confine people and activities to a physically vulnerable built-up environment and unsafe technology or to societal processes that increasingly weaken the physical environment where people live and work. These societal processes are the result of prevailing institutions, and in turn these institutional arrangements are paramount in explaining resilience and recovery from a disaster impact. This gives rise to two not independent types of vulnerability: physical and societal.

The main processes behind physical vulnerability to both natural and technological hazards are unsafe living quarters (building quality and location) and unsafe economic activities (engineering quality and location of structures and risky processes). In turn the main societal factors behind societal vulnerability, which may increase the proneness and destructiveness of disasters, are entitlement erosion (economic and political possessions, access and rights) and environmental degradation (pollution, deforestation, overcrowding and the like). These four factors are the result of society's processes of production and reproduction, which may differentially affect some individuals and groups as well as increase overall risk in unpredictable ways. Hence, whatever the potential unleashing event (geophysical, technological or political), the proneness of the social/physical system and its increased vulnerability to such events are largely part and parcel of prevailing institutional frameworks and tendencies. It is therefore society itself that, by creating and modifying institutions, may increase or reduce its proneness and vulnerability to geophysical and socially made events (Albala-Bertrand, 1993, 2000a, 2000b).

Lack of political influence, lack of economic alternatives, poverty and overall societal disenfranchising may be at the foundation of vulnerability, especially at a local level. A good deal of increased vulnerability and disaster risk can be attributed to the wholesale policy rearrangements demanded and imposed by a socially unconcerned globalization. This is translated into a policy inconsistency, in which institutional rearrangements are imposed with a pace and extent that are significantly faster, deeper and wider than the ability of the most vulnerable people (and their activities) to adapt and accommodate within a minimum of stability. This often puts people and their livelihood in both precarious conditions and a safety vacuum, which could be aggravated by a synchronic downward business cycle (Albala-Bertrand, 2006).

Economic Catastrophe. Given our definition above, for a localized disaster to become an economic catastrophe, three conditions are required.

- (i) Direct (stock) effects have to be widespread, massive or pivotal.
- (ii) Indirect (flow or functioning) effects have to be uncontrollable.
- (iii) Institutional effects have to be so perverse that recovery (economic rehabilitation and reconstruction) becomes unachievable⁽¹⁾. So relief must be the most that external aid, if available, can aspire.

Let us then show why such a scenario, or any in such a direction, is implausible in general, let alone in developed countries.

3. Disaster Localization: A Description from an Economic Viewpoint

In most studies, the use of the word *localization* usually refers to the geographic extent of either the event or the disaster impact itself. Given that this type of extent does not appear to mean much in the absence of the type of economy that is within the affected area, we define a disaster as *localized* if it affects a confined area of economic activity. This implies that a geographically widespread disaster can be economically localized (e.g. a drought in a diversified country), or widespread (e.g. a drought in an agriculturally undiversified least developed country, like a Sahelian country).

TABLE 2: The Issue of Localization*

		ECONOMIC VIEWPOINT	
		<i>LOCALISED</i>	<i>WIDESPREAD</i>
G E O G R A P H I C A L I Z E D	L O C	(11) <i>-Most Disasters</i> e.g. <u>Malawi</u> and <u>Bangladesh</u> (both in later years) and Indonesia	(12) <i>-Some Disasters</i> i.e. Capital city or key industry (e.g. Ecuador 1987 earthquake) e.g. <u>Bangladesh</u> (in earlier years)
	W I D E S P R E A D	(21) <i>-Diversified Economy</i> e.g. drought in Uruguay or hurricane in El Salvador) e.g. <u>Dominica</u> (in later years)	(22) <i>-Undiversified Agricultural Economy</i> e.g. <u>Malawi</u> (in earlier years) and Sahelian countries <i>-Small Islands (with diversification)</i> e.g. <u>Dominica</u> (earlier years) and Monserrat's volcano

*This classification refers only to direct disaster effects (stock effects). Notice also that some countries are underlined when they appear in two different cells at different times. This is to show how similar disasters are likely to become more localized over time, as countries both generally develop and specifically protect against hazards.

Our concept of localization corresponds to the 1st column of the Table 2, i.e. *economic localization*: cells (11) and (21). This also shows that a disaster can be economically localized, whether it is geographically localized or not. Cell (11) shows the most common case, as it is likely that the majority of geographically localized disasters are also economically localized. As examples, we can focus on Bangladesh (especially floods and cyclones) and Malawi (droughts). Since the 1990s these countries underwent geographically localized disasters, which had severe impact in the affected areas, but did not translate into significant losses for the economy as a whole. The initial impacts were short-lived and more than compensated within a year or so. This is also the case of the 2004 tsunami in Indonesia, which would have been localized even without the over-generous aid committed by the rest of the world. Cell (12) shows that some geographically localized disasters can also be economically widespread if they strike a key industry (normally an exporting one, like oil, bananas, etc) or a main industrial/political city (normally the capital city). For example, in 1987, an earthquake in Ecuador damaged the main oil pipe for this export. This is however a rare event, as even when major earthquakes struck a capital city (e.g. Managua 1972, Guatemala City 1976, Mexico City 1985) they do not translate into widespread economic effects, so this is more possibility than necessity. Another possibility would be the cyclone and floods in Bangladesh (then East Pakistan) contributing to the separatist momentum and civil war of independence in early 1970s. The disasters appear to have acted as triggers of a growing institutional conflict with West Pakistan (Albala-Bertrand, 1993). But the above disasters were geographically localized, which in normal times would unlikely create

significant widespread effects on the polity, let alone the macroeconomy, as was indicated in the previous point.

Cell (21) shows that geographically widespread disasters can also be economically localized. This is the case when a geographically widespread disaster strikes a diversified economy, mainly affecting one economic sector, normally the agricultural sector (e.g. droughts in Latin America or even widespread hurricanes in diversified islands like Dominica since the 1980s). It would be unusual that this unleashes important macroeconomic effects, unless the affected sector was pivotal for the rest of the economy, which is unlikely in diversified open economies. Notice also that even when one sector or industry undergoes the brunt of damage from a sudden disaster, like a flood or an earthquake, this sector would unlikely be fully impaired, as disaster impact effects are never homogeneous. Finally, cell (22) represents the case of geographically widespread disasters that also have an economically widespread impact. This normally refers to a geographically widespread disaster that strikes an undiversified agricultural economy (e.g. droughts in Sahelian countries) or a small semi-diversified island (e.g. hurricanes in small Caribbean islands, like St Lucia and Dominica in the late 1970s - fishing, agriculture and tourism might suffer badly). It also includes rare events like the Monserrat's volcano in 1995. The latter would have been widespread however diversified the economy was at the time, as all sectors would have suffered total or partial impairment, which might be expected to cause structural change (Benson & Clay, 2004). Significant structural change in the wake of this disaster would be an indicator of its catastrophic nature. In most cases of widespread disaster, however, the persistence of the macroeconomic effects, whether positive or negative, would be confined to around two to three years after the disaster impact, except in slowly developing disaster like droughts (Albala-Bertrand, 1993; Benson & Clay, 2004). So only cases in cell (22), and to a lesser extent in cell (21), might satisfy the basic conditions required for a disaster to become a catastrophe, as defined above. But even here this is unlikely, as explained later.

We can also see in Table 2 that some disaster-prone countries, which were located in cells (12) and (22) in early years, reappear in cell (11) or (21) in later years, i.e. the countries undergo more localized disasters from similar natural events over time. For example, Malawi moves from (22) to (11), while Dominica does from (22) to (21) and Bangladesh from (12) to (21). This is an indication that for disaster-prone countries, as a rule, development can be conceived as a process that transforms all types of disaster into economically localized ones, i.e. towards cells (11) and (21). This appears to have been the case of the three countries mentioned above (Benson & Clay, 2004). This is then also an indication that development and reduced macroeconomic vulnerability to disasters might go hand in hand. This process would be reinforced and sped up by disaster policies that explicitly seek such an outcome, but such policies are more likely to come up in the aftermath of large natural disasters than in normal times. In what follows the term "disaster zone" is used for any stock affected by the initial impact, whether this is located within a given geographic area or not.

4. An Explanation of the Social/Economic Nature of Disaster Localization

4.1. Isolation and Insulation

An isolated, autarkic, local economy cannot by definition have spreading effects towards the national economy. If it happened to be affected by a disaster, however large its direct or stock effects, the indirect effects would be contained within its boundaries, which may make the total local effects more intense. Without outside aid and endogenous macro integrative

reactions, the recovery would likely be more trying, as it would have to be met with resources and reactions within the local economy alone. From the viewpoint of the (national) macroeconomy, the disaster would be localized and unintrusive. 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 (economic or geographic) zone boundary. 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 create compensations via in-built economic and other societal reactions, which in addition are likely to be reinforced by exogenous domestic and foreign responses. This would initially insulate the disaster, and later help recover the disaster zone itself. 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.

4.2. Disaster Escalation

Analytically, a sudden disaster impact can only escalate into a larger disaster via indirect effects. That is, the damage caused on capital stocks and people by a direct impact is bound to impair functioning processes and flows (production, distribution, exchange, and the like). But if these are systemically counteracted at local level or compensated at national level, then the macroeconomy would unlikely be affected, and therefore a potential escalation into a larger disaster, let alone a catastrophe, would not be realized.

We expect that a more developed country will be more economically diversified and more internally and externally articulated. This will make both its inter-industrial and income linkages more all embracing and dynamic, less dependent on given domestic sources, and not least its people will more likely be institutionally integrated to a more responsive center of allegiance or state. This means that a disaster might have the possibility of spreading via linkages to the wider economy, through indirect or flow effects, which would not happen from an autarkic location. But at the same time the inter-linked system is likely to generate market endogenous reactions via buffer stocks, substitutions and new supply/demand opportunities that would dampen down negative effects. In addition, other in-built or institutional mechanisms, plus the standard exogenous ones, would respond in the same direction (Albala-Bertrand, 1993). That is why, in this conception, both indirect effects and long-term effects from localized disasters are likely to be unimportant for the macroeconomy. In diversified economies they would be rapidly compensated and outweighed, even in the disaster zone itself. So the *direct* disaster stock loss, which is associated with residential, infrastructure, social, business and inventory capital, plus current production and labor, might represent almost all of the total loss. In sudden, localized, disasters this is unlikely to have major effects on the macroeconomy even in the short term, especially after relief and rehabilitation are well under way, as shown below (Ibid.). In addition, globalization via trade integration, financial development and speedy communications is bound to support and foster the general requirements for enhanced localization and resilience, despite its current shortcomings. That is, any spreading of a disaster, let alone one approaching a catastrophe, is highly unlikely in such a scenario.

4.3. A Macroeconomic Argument

In the above general context, even if the capital stock lost to the disaster were not completely replaced, it would be unlikely that the economy be affected in the short and medium terms, let alone in the long term. This can be shown by means of a macroeconomic argument. Setting aside the normally large overestimation of disaster losses, the argument can be based on well-supported facts about both localized disasters and developing economies. About the former, first, capital losses to disaster are not homogeneous and normally lopsided towards the less productive capital; second, most losses are to the capital stock rather than to income, and third, reconstruction investment is likely to be of better quality than that of the capital lost. About developing economies, it is first well known that the growth of output does not depend on the contribution of the capital stock alone, but also on labor, technology and other societal requirements. Second, it is accepted that new investment opportunities are more likely to be taken up when their risks are low, especially when private investment is publicly supported and protected. Third, it is also accepted that public investment in infrastructure normally complements or “crowds in” private investment (Albala & Mamatzakis, 2004; Aschauer, 1988; Taylor, 1983). Furthermore, developing countries exhibit large levels of unused or underused productive factors, in terms of idle capacity, underemployed labor and other resources, which may be one of the reasons why inflation is either not significant or very short-lived after localized disasters. Idle capacity is mostly due to narrow domestic markets and single primary exports, lack of domestic credits and savings, lack foreign exchange and expertise, and not least lack of information about investment opportunities and know-how (Thirlwall, 2003). Some of these constraints are normally weakened, if not lifted, by the disaster response (Albala-Bertrand, 2004/1993).

In the context of a disaster situation, which includes the impact, the response and derived societal interference, an economy would normally generate *endogenous* reactions from within and from outside the disaster area. For example, market reactions that follow opportunities, either by filling profitable gaps left by the disaster losses or by complementing new (disaster) public investment, or both. There will also be economic counteractions via the use of buffer stocks, like savings and inventories plus fast imported inputs, to partly make up for the initial losses to both final and intermediate goods. Buffer stocks in a disaster aftermath will contribute to contain both negative multiplying effects on the economic machinery and the spreading effects from the disaster zone to the rest of the country (Albala-Bertrand, 1993). The more diversified and openly integrated and economy was, the more important would these reactions be. In other words, the disaster itself endogenously creates domestic and foreign economic incentives and reactions, which are reinforced by public, private and foreign exogenous responses. New concessional foreign exchange could even relax a foreign-exchange constraint if this was present before the disaster, as can be shown via a two-gap model (Taylor, 2004; 1994), increasing investment and hence growth. The stimuli from disaster-induced incentives may also unlock and create economic opportunities, inducing a reconstruction investment multiplier larger than the disaster loss multiplier, making the recovery less costly to undertake and more rapidly to succeed than otherwise it would have been. But the main argument about localization would actually hold even if there were no multiplying effect from the disaster response, when the multiplier was equal to unity (Albala-Bertrand, 2006).

4.4. A Model for a Localized Disaster

With this framework in mind, an economic model to assess the output effects of a localized disaster can be articulated as follows (see Albala-Bertrand, 2004/1993). The basic relationship is that a unit of capital loss will always have a lower impact on future output than one unit of capital replaced via new investment. That is, on this count, the negative effect of the disaster impact is always smaller than the positive effect of the disaster response. This is because the value of the productivity of capital is always smaller than the value of the investment multiplier, even if the latter were equal to unity, as shown below.

Impact effect. The output that can be produced with a given stock of capital normally represents only a fraction of the value of the capital stock, normally around 40 percent of it (i.e. the ratio total output-to-total capital, or average productivity of capital, is around 0.4). That is, 2.5 units of average capital would normally produce around one unit of average output. But first given that disasters affect more the less productive capital types, like residential and infrastructure capital, then the average productivity foregone to the disaster will be lower than normal, say half of it. That is, five units of capital loss would represent one unit of foregone output. And second given that the less productive capital is the more affected within any capital type, say half of it again, then 10 units of average capital loss would represent around 1 unit of average foregone output (i.e. the output-to-capital ratio would actually be only equal to 0.1). Hence, 10 units of capital lost to a disaster would only represent about one unit of future output loss. Or conversely one unit of capital loss would represent a one-tenth loss of future output. If we also allow for noncapital contributions, then the impact of capital losses on future output will be even smaller, but to make our point we can stick to the moderate capital-output ratio above.

Response effect. In turn, one unit of reconstruction investment will represent at least one unit of future income, and significantly more via the multiplier. This is because investment represents both additions to the capital stock and direct income, so while investment is replacing the disaster loss to the capital stock, it is also increasing the aggregate demand and therefore income directly. Furthermore, one unit of expenditure on autonomous investment would normally represent more than one unit of new income over the year, as this expenditure will undergo several market rounds over the year, which is what we call the multiplier. This of course requires the existence of underemployed resources, which is a normal feature of most countries, especially developing ones. It also requires the lifting of some domestic and foreign constraints via increased information and coordination as well as public support and foreign exchange availability, which are normal disaster response features (ibid.). So if we conservatively assume a multiplier equal to two, then the replacement of one unit of capital loss would represent about two units of new income. If we also allow for the fact that the capital replacement is normally of better quality than that of the loss, the positive effect would be greater, but for the purpose of our general argument we can ignore this fact.

Total effect. Taking both the impact and response together, then a unit of reconstruction investment would have 20 times more impact on income and output than one unit of capital loss. That is, one unit of capital loss would represent a one-tenth loss of output, while one unit of capital replacement would represent 2 units of new output. In other words, to recover the possible negative effect of disaster loss on future output, reconstruction investment can be only one-twentieth of total capital loss, in the first aftermath year. That is, if capital loss represented 10 percent of GDP, then the required ratio of investment to GDP would have to be only 0.5 percentage points more than otherwise it would have been. As this investment

ratio is normally around 15 percent of GDP, the post-disaster ratio would require being around 15.5 percent of GDP, which is not an onerous additional effort. Most countries do fulfill such a requirement within a year or so. It can also be shown that, after the first post-disaster year, the required investment ratio can be even more moderate than in the first year to keep GDP unaffected, as if there was no disaster.

An application of this model to seven large disasters in Latin America (Albala-Bertrand, 2004/1993) appears to confirm the patterns above. For example, the large Guatemalan earthquake in 1976, which reported a loss-to-GDP ratio of 17 percent, required a total expenditure ratio (including both investment expenditure and other expenditure) of 1.2 percentage points more than otherwise it would have been, in the first post-disaster year, and significantly less afterwards. In all the cases in this study, the required investment ratio was generally fulfilled, making potential growth losses more than compensated either in the year of the disaster or within the first two post-disaster years. That is, even in the worse cases, the negative disaster effects on the economy were short-lived and more than compensated afterwards.

That is why only rarely has a localized disaster a negative impact on GDP even in the first accounting year. If anything, because of the new disaster-associated opportunities, related directly to reconstruction or otherwise, and the unlocking of potentials due to public expenditure, domestic finance and foreign exchange, it is likely that there will be a significant acceleration of growth. This will normally be confined to the first two or three post-disaster years, especially but not only in the case of earthquake disasters (Albala-Bertrand; 1993 Charveriat, 2000)⁽²⁾. Lastly, and not less important, this is partly the reason why it is unconvincing that a localized disaster impact can have important indirect, let alone longer-term, effects on the economy. And it is also partly the reason why the assertions about the existence of harmful cumulative disaster effects on the economy are little convincing⁽³⁾.

Therefore, reactivity via domestic and foreign linkages in a diversified economic environment is paramount to explain why disasters might not have the dramatic negative economic effects that are so commonly portrayed in the mass media and other sources. That is, market behavior and information, economic diversification and integration, public institutions and expenditure, and domestic and foreign interactions will all endogenously and exogenously help counteract, if not outweigh, actual and potential disaster effects. These processes are likely to be enhanced by globalization, which would make the possibility of disaster escalation, let alone national catastrophe, highly unlikely. Notice however that even in the absence of exogenous response, especially associated with foreign aid, most of this compensation would happen anyway, as society (and the economy) is not an inert thing but a living organism. 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 an unlikely proposition, especially in the context of localized disasters.

5. Globalization and Localization

Globalization does appear to help the general process of localization by endogenously enhancing economic diversity and synergy via all-embracing domestic and foreign economic networking. These enhanced interlinkages are bound to increase the resilience of an open national economy, making it more able to insulate from general local failures. But current globalization policies appear also as contributing to increase local vulnerability, especially in the case of natural disasters, by disenfranchising local communities, business and individuals

at a faster pace than their ability to adapt at least in the short and medium terms. So lower macroeconomic vulnerability is perfectly compatible with higher social (local) vulnerability, especially that of those directly affected by a disaster.

Globalization. Globalization is a societal process that widens and deepens the mutual interactions between the institutions and people of each country and the rest of the world. In particular, economic globalization refers to the institutions associated with the flows of traded goods and services, financial and direct capital, migrant labor and tourism, and economic information and ideas, within a global arena of cultural institutions and traits. This process has accelerated, as the means of transport and information has cheapened, while global administrative and communication structures have become more flexible and expedite. The most vocal advocates of economic globalization, normally associated with the so-called “Washington Consensus”, claim that as more countries join their preferred and currently dominant policy package, economic and social benefits for everybody will come over time. The detractors normally agree that higher levels of global integration could be economically and socially beneficial, but have serious doubts about the soundness of the economic policies that are currently pursued for this purpose. Their misgivings are mostly due to the fact that a rapid, unregulated and socially unaccommodating transition to higher stages of globalization have often produced deleterious consequences for the economy in general and for the most vulnerable people in particular. In addition, the transition length towards the expected equitable benefits of a higher stage of globalization remains so far undefined (see *Oxford Review of Economic Policy* 2004, Vol.20, No.1)⁽⁴⁾.

There are increasing problems associated with the deepening and enhancing of economic globalization via the currently dominant policies, which have been widely studied in the real world. First, there appears to be normally a short/medium term increase of vulnerability, especially of the poorest sections of society, increasing poverty and inequality. The latter appears as unchecked even in countries that the “Washington Consensus” would consider as prime example of success, like Chile, which has ended up with the 9th worse income distribution in the world (HDR, 2004; Pizarro et al, 1996). Second, there has also been a good deal of economic instability and economic destruction, associated with unregulated financial flows and free-trade integration. Free unregulated capital flows have rendered economies even more unstable and less policy independent than before, which have also carried serious political instability and social victimization, like in Argentina 2001 (Frenkel, 2003; Damill, Frenkel & Maurizio, 2003; Weller, 2001; Weisbrot & Baker, 2001). In turn, free-trade integration has created serious transition cost associated with the fast, uncoordinated and inequitable domestic structural change that seems required to fit into the global economy (Grabel, 2002; Rudra, 2002; Eichengreen, 2001). Furthermore, restrictions on international labor mobility (i.e. a way to weather out unemployment) appear as an uneasy countertrend to globalization. Lastly, there appears to be a clear asymmetry in the compliance with current globalization precepts between the developed and developing countries, in favor of the former (Guadagni & Kaufmann, 2004) In fact, no serious economist would argue about the existence of such actual problems, but about their interpretation and solutions, and not least about their socially acceptable time-length persistence. Therefore, at least in the medium term, these processes are likely to render significant numbers of people more differentially at risk and hence more vulnerable than before. This may have not unimportant consequences for the globalization project as a whole, but it also shows that current globalization, in its purist “Washington Consensus” guise, may have significant ideological overtones (Stiglitz, 2002; Weiss, 2002; Wade, 1996). There are however proposals for other ways of inserting into the global economy, which seemingly do not require enduring the worse social and economic

costs of this enterprise (Stiglitz, 2006; Chang & Grabel, 2004; Stiglitz, 2002; Nayyard, 2002, Mansoob, 2002; World Bank, 2001; Wade, 1990).

On this score, globalization may act as a double-edged process. On the one hand, it enhances the social and economic networking within the domestic economy, and between this and the global economy, which is likely to increase resilience by both endogenously helping the confinement of disaster effects (i.e. increasing localization) and helping make endogenous and exogenous responses more prompt and diverse. On the other hand, the current policy package has been shown to cause severe domestic local victimization by upsetting the social and economic networks of traditional communities, which often act as an informal insurance against disasters. If the new social and economic re-articulation (to global demands) were fast and little painful this would not be much of a problem, but it actually seems to exhibit an undefined persistence, so sounder policies are required (Stiglitz & Charlton, 2005). There might then be the requirement of international concerted efforts to improve the soundness and safety of globalization policies as an aim in itself, so that the masses of vulnerable people and activities get a better deal than currently, especially in the face of natural hazards.

5.1. Some Positive Contributions

As regards the event itself, there is little that globalization can do directly, as it would mostly depend on highly sophisticated technology to alter the strength of earthquakes, hurricanes, floods and volcanoes at source, which is hardly available (Kunreuther & Rose, Vol. I, Part V, 2004). But it could help by contributing to the setting up of early warning systems and disseminating information and know how. In turn, regarding the strength of the physical built-up environment, the main mechanisms to reduce the disaster impact vulnerability are regulations of buildings and structures, like construction codes, land use licenses, and regulations about land location and the handling of risky technology. Globalization, via dissemination of information about best practices, may contribute positively to a better understanding of design and use of structures as well as their monitoring and legal enforcing. In addition, insurance can also play a role at this juncture, by disciplining construction and land use, as conditions to qualify for insurance cover. The requirement to introduce disaster-risk factors in both cost-benefit analysis and private investment projects, as a condition for international and domestic loans, can also work towards this aim (Mechler, 2003). But its effective implementation depends more on the type of society than on globalization itself. So the role of the state, as a necessary complement or substitute for private markets, should not be overlooked.

Endogenous (in-built) and exogenous (policy decision) channels of response might get strengthened by globalization. Foreign trade benefits a country by delinking the domestic structure of production from that of demand and *vice versa*. This diversifies the sources and markets of inputs and outputs. This is bound to increase the localization of a disaster, as the output and capital losses as well as the ensuing demand losses in the disaster zone can now be more easily made up with alternative domestic and foreign markets⁽⁵⁾. This may not only reduce even more effectively the potential for widespread effects on the macroeconomy, but also change the structure of supplies and demands towards more stable markets. This may promptly shelter and compensate the macroeconomy from unwanted indirect flow effects, but it may also put out of business a number of affected economic activities in the disaster zone. So while the disaster becomes even more economically localized than before, it might also worsen the plight of affected communities by passing them over. But if the macroeconomy is not affected, then it should be more expedite and less onerous for the affected country to

counter the effects in the disaster zone, but that would depend more on the domestic power structures than on globalization. Notice that a wide and fast opening to international trade is likely to have also a number of serious problems for developing countries ⁽⁶⁾.

Emergency relief and emergency rehabilitation are likely to be enhanced by globalization via macro insulation, local integration, buffer reactions and general exogenous resources. Once the emergency response has contained the spread and the deepening of indirect effects, the basis for start reversing the direct effects would be feasible. This would come in the shape of physical reconstruction plans, which is partly an exogenous type of activity, but financing from insurance, market reactions and other in-built systems would also be involved. These responses do require public involvement out of public finance via contingency funds, new grants and subsidies, tax and bills write-offs, and the like. But it would also require foreign aid and credits, including material, technical and labor assistance. This can complement in-built financial mechanisms that transfer risk and that increase the available funding for reconstruction, i.e. financial anticipatory mechanisms either as a specific disaster aim or as an incidental by-product of financial deepening. This takes us to the second main plank of globalization, the development of domestic financial markets and its integration to a global financial market, in terms of bank loans, portfolio investment and foreign direct investment. These are meant to increase greatly in coverage and depth, via the development and creation of financial instruments and products. Setting aside the serious problem of domestic (lack of) regulation of foreign financial flows, as indicated above, a more developed financial market would include some mechanisms to fund, spread, transfer and reduce risk and vulnerability. Instruments like disaster insurance and reinsurance, catastrophe bonds and weather derivatives, hedge funds and disaster credit, reserve funds and remittances, are all part of the current need to establish a financial architecture aimed at disaster vulnerability reduction (Andersen, 2002; Keipel & Tison, 2002; Doherty, 2000; Kunreuther, 1996)⁽⁷⁾.

6. Conclusions

Disasters may impose large residential, infrastructure and agricultural losses as well as large death tolls and injuries within the disaster zone, but it is highly likely that these losses and problems will be economically localized. Economically localized losses of capital and activities, death tolls and injuries are unlikely to affect significantly the macroeconomy in the short term, let alone in the longer term. In such a context it is highly unlikely that a disaster can turn into catastrophe. In addition, given that a macroeconomy would unlikely be affected by an economically localized disaster, communities and activities directly affected should be the main target of response policies, rather than the unwarranted belief that the economy as a whole would be impaired.

The positive features of current globalization seem to contribute to further enhance localization. It can also provide new opportunities for both improving physical prevention and diversifying risk, which would depend not only on domestic society and its ruling regime, but also on globalization policies and their social concern. But its negative features may increase direct local victimization via the impairment of local endogenous mechanisms of response by perverse effects associated with international trade and capital flows. In addition, if globalization induces the synchronization of the economic cycle across countries, then remittances and foreign aid may strongly suffer in a downturn.

Development itself appears to be a process whereby all disasters become more economically localized. That is, “disasters are primarily a problem *of* development, but essentially not a

problem *for* development” (Albala-Bertrand, 1993, p. 202). Thus, any policy process contributing to a diversified, integrative and sustainable development must incidentally contribute to reducing economic and social vulnerability to disasters, as in developed countries. It is therefore difficult to imagine a realistic scenario in which a disaster could become catastrophic, even less so in developed countries⁽⁸⁾.

Notes

- (1) 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. 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). In turn, indirect effects derive from the disarticulations caused by the direct effects, affecting the interrelations between physical structures and between people, which translate into flow or functioning failures in the economy, public activities, household conditions and the states of health and nutrition. For example, for the economic system, direct effects represent losses to the capital stock and labor, whereas indirect effects represent losses to functioning flows, in terms of foregone production and income, savings and investment, productivity and efficiency, and the like. In addition, there are some societal interfering effects from the impact and the response, which are bound to have some variable degree of intromission in normal society and economy, making the prevailing resources undergo some rationalization and redirection, affecting institutional patterns. In the case of natural disasters, this is mostly an incidental and short-lived effect of a disaster situation. For socially made disasters, like complex emergencies or technological hazards, the institutional effect is more all embracing, as the triggering event, the proneness and vulnerability to breakdowns are themselves both institutionally based and due to institutional failure. Societal interference can be expressed in short-term changes in private savings and stocks, in shifting of supply and demand sources, in shifting of investment opportunities and credit sources, in public and trade deficits, in changes in inflation and relative prices, in changes in capital flows and remittances. But it can also be seen in terms of institutional changes, translating into fragmentation and politicization, technological changes and migration, corruption and speculation, and in the stimulation of less common long-term changes in economic and political structures (see Albala-Bertrand, 1993).
- (2) It would not be difficult to entertain the notion that, by virtue of development itself, if disasters with the same geophysical characteristics were to strike the same countries in the same places, the loss of life would be significantly smaller, because of better design and better people's reaction to disaster. In turn, the losses of capital stock, in money terms, would likely be higher, if anything because urban property in large cities has both become significantly more expensive and more concentrated via vertical construction. But the GDP effects would be significantly smaller than then, as functioning flows would likely be less affected by virtue of higher localization, and therefore less macroeconomic vulnerability. This is what normally happens in developed countries in the face of disasters.
- (3) As indirect, long-term and cumulative effects of disasters are intractable to direct observation, then most disaster "experts" and observers, like relief operators and journalists, but also academics and international staff, normally get away with uncheckable and unfalsifiable statements. These assertions then feed back and are repeated by everybody else as a buzzword. Many of these sources may actually have vested interests in keeping the fiction about the importance of these effects, as shown in Albala-Bertrand (1993). A term like "merchants of apocalypse" would not be inappropriate to refer to them. In turn, some studies via abstract modeling also attempt to establish their importance. The latter are interesting but normally fail in their realism. For example, a study by Freeman et al (2002), for some regions prone to floods and other

localized disasters in some Latin American countries, heavily relies upon fixed coefficients, an actuarial concept of losses and an inert conception of society. Fixed coefficient would normally be a problem for any projection beyond three to five years, but more so in the case of a serious upheaval coming from disaster. The actuarial concept might be useful for isolated items, but certainly not for social processes. And associated with the latter, the inert approach to society is simply untenable. Society, including the economy, is not a collection of inert items or a static cake, which can be wind up as a toy or cut to size, but a living organism that generates societally endogenous reactions. These are bound to produce adaptations, substitutions, economic shifts, migration, diversification, and other in-built societal traits, altering somehow the dynamics and structure of the affected location and country (see Albala-Bertrand, 1993).

- (4) The “Washington Consensus” represents a package of neoliberal policies agreed mainly by US officials, the IMF and the World Bank in the mid-1980s, in connection to the required stabilization and structural adjustment of the countries affected by the 1980s debt crisis (Stiglitz, 1998). This became later the policy package behind the dominant model of current globalization. Its main components are free foreign trade, specialization via (static) comparative advantages, liberalization of capital flows, the “flexibilization” of the labor market, balanced budgets and privatization, a minimal and subsidiary role for the state, and the deregulation of most if not all price signals (Williamson, 1990; Fischer, 2003). The main alternative, and more successful, model of globalization seems to be the Asian Model, followed by Taiwan and South Korea, based upon the economic experience of Japan after World War II. Here the state has an important role to play, as free markets are not considered as self-adjusting towards the best socioeconomic outcome for industrial policy, employment, growth rates, technological sophistication, income distribution and poverty. These Asian countries observe the best levels on all these counts among most countries, let alone developing countries (Chang, 1996; Chang & Grabel 2004).
- (5) A qualification seems necessary here, as for undiversified developing economies, especially agricultural monoproducers and exporters, globalization policies are no panacea, as it condemns countries to such production for longer than necessary. That is, free-trade agreements prevent countries from protecting infant industries and developing industrial policy *a la* Taiwan and South Korea, i.e. the two most successful developing countries since World War II.
- (6) The downsides of unfettered international trade are manifold. Firstly, there will be an initial destruction of indigenous uncompetitive firms and a probably long lasting confinement to the production of primary products (Weiss, 2002), increasing general vulnerability and disaster vulnerability in passing. This is the consequence of the elimination of tariff and other trade protections, which is demanded by the WTO for foreign trade agreements (FTAs), not always readily observed by OECD countries. Secondly, it may also make the economy more vulnerable to international fluctuations, again weakening domestic response in the event of disaster. And third it may also stifle domestic technological sophistication and the economic efficiency of domestic intermediate inputs, which may in the long run make an economy less flexible to adapt to sudden changes. So the positive aspects of free trade have to be balanced against the negative ones when analyzing it, let alone when designing policy for the real world and current generations (Chang & Grabel, 2004; Andersen, 2003; Stiglitz, 2002; Albala-Bertrand, 2006; 1999; Chang, 1996).

- (7) The impact of a natural or technological disaster might be at least partly absorbed via improved access to this set of instruments and via better information about risk *vis-à-vis* materials and design. But for as long as the collateral requirements were not readily available, loans and other forms of financial protection might not reach the people who need it most in the wake of disaster. Insurance premiums might be an unaffordable cost for precisely the people and activities more likely to be directly affected by a disaster impact. Still, the easier availability of these products for firms and employers might reduce the livelihood vulnerability of employees, even if the latter cannot afford insurance of their own. But, even if the domestic and international financial market for insurance were easily available, voluntary insurance and other risk-transfer instruments, are as a norm poorly demanded (Kunreuther, 1997; Albala-Bertrand, 1993; Giarini, 1984; Cochrane, 1975; Dacy & Kunreuther, 1969). All this requires government intervention at all levels for effective reactions to potential and actual impact effects (Godschack et al 1998; Albala-Bertrand, 1993; Dreze & Sen, 1990/91; Miletto & Sorensen, 1988).
- (8) The rather sensationalist title of Workshop III of the conference, i.e. “Escalation from Disaster to Catastrophe”, seems catchy, but misleading, as in European countries the possibility of catastrophe from natural or technological disasters may be closer to fiction than fact. A more down-to-earth title would have been “Understanding and Tackling Indirect Disaster Effects”.

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