

2. Demarcation of Third World countries and the Vulnerability of Insurance Markets due to Economic Crises

2.1 Problems of Definition and Selection of Third World countries

The spectrum of the countries conventionally called *Third World countries* is broadly defined. That applies to both the definition as well as the conceptual differentiation between these countries.¹¹ As can be appreciated, the Third World is not and cannot be regarded as a homogeneous area, since the countries that form the Third World are neither industrially, socially, culturally nor politically homogenous.¹² Consequently the problems that exist in these countries are variegated, as well as the discussed solutions. In economic terms, the expression *Third World country* comprises nations whose economies are less developed than industrially advanced countries. They are often shown in the same depressing list of characteristics: low productivity, inadequate infrastructure, underexploited available resources and political precariousness.¹³ A generally accepted definition of *Third World country* does not yet exist.

To define this term as precisely as possible, the classification used here is based on the World Bank definition, which distinguishes between two income groups: low-income and middle-income countries. Based on this, countries with a low level of income or, in the official opinion of their governments, less developed economic productivity¹⁴ are *developing countries*.¹⁵ The United Nations (UN) uses another classification: as most seriously affected countries and least

¹¹ Cp. GERATEWOHL, K.: "Entwicklungsländer und Versicherung", in: Farny, D. et al. (eds.): Handwörterbuch der Versicherung (HdV), Vol. 1, Karlsruhe 1988, pp. 141-151., pp. 141ff.

¹² Cp. IRUKWU, J. O.: Reinsurance in the Third World, London 1982, p. 87.

¹³ Ibid., p. 87.

¹⁴ "Economic productivity" is defined as the relation between output of an economic unit and factor inputs which have gone into producing that output. The main source of productivity increases is the use of more and better capital stock. [Cp. PASS, C.; LOWES, B.; DAVIES, L.: "productivity", in: Dictionary of Economics, 2nd edition, Glasgow 1993, pp. 436f.].

¹⁵ Whether most of these countries are actually *developing* is an open question. It all depends on how one defines development. For an excellent discussion cp. TODARO, M. P.: Economic Development in the Third World, 4th edition, New York; London 1989, chapter 3, in particular pp. 62ff.

developed countries.¹⁶ *Countries in transition economies* are countries moving from centrally planned economies to market economies. Several of these countries are sometimes grouped together with developing nations based on their modest level of per capita income.¹⁷ According to this, the area covers parts of Asia, Africa, and Latin America and contains approximately 100 Third World countries.¹⁸

In this paper the expression *Third World country* comprises categories of countries which are partially but not completely synonymous in an economic context, such as *developing country*, *lower-income country*, *newly industrialized country*, *transition country* or *transition economy*. They may be distinguished in other contexts especially according to their economic prosperity.¹⁹

Furthermore, it should not be relevant to determine exactly each separate Third World country. Rather, underdeveloped areas with an appreciably lower level of development are at the focus of our interest. These areas have to deal with economic crises due to the immense disaster-related economic losses and are suitable for further examination in the given context.

2.2 Risk Trends: Occurrence of Natural Disasters

More than 18% of all natural disasters occur in developing countries; 50% to 60% of this area is extremely vulnerable.²⁰ Influenced by natural disasters have

¹⁶ Cp. "Entwicklungsländer" in: GABLER WIRTSCHAFTSLEXIKON, 13th edition on CD-Rom, Wiesbaden 1993.

¹⁷ "Per capita income" is the gross national product (GNP) of a country divided by its population and measures the monetary standard of living in a country's. [Cp. PASS, C.; LOWES, B.; DAVIES, L.: "income per head", in: Dictionary of Economics, 2nd edition, Glasgow 1993, p. 245.].

¹⁸ Cp. KREIMER, A.; ARNOLD, M.: World Bank's Role in Reducing Impacts of Disasters, in: Natural Hazards Review, Vol. 1, No. 1, 2000, pp. 37-42.

¹⁹ A closer description of the problem of a clear definition for *developing countries* can be found in GEMEGAH, A. K.: Möglichkeiten und Grenzen der Versicherungswirtschaft in Entwicklungsländern: Darstellung und Analyse am Beispiel Ghana, doctoral dissertation, Universität Hamburg, Hamburg 1994, pp. 19ff. and KÜHNE, R.: Entwicklungsländer und Versicherungswirtschaft, thesis paper, Universität zu Köln, Köln 1998, pp. 4ff.

²⁰ Data source: MUNICH REINSURANCE COMPANY, GeoRisikoForschung, October 2003.

been 28 developing countries, resulting in over US\$1 billion in direct losses in the last 20 years.^{21,22} The United Nations Development Program (UNDP) reports, that 24 out of 49 of the least developed countries face a high risk of disasters; at least 6 of them have been hit by between 2 to 8 major disasters per year in the last 15 years.²³ "For small countries, losses much less than US\$1 billion can still have significant long-term consequences."²⁴

Economic losses from extreme events continue to increase and severely affect disaster-prone areas. The *World Disaster Report 1999*²⁵ confirmed that more major natural disasters occurred during 1998 than any other year on record.²⁶ Over the past 22 years, developing countries have suffered economic losses of more than US\$122.4 billion from natural disasters; only 3.8 percent were insured.²⁷ These increasing economic damages and losses are attributable to an increasing number of great natural disasters, increasing concentration in hazard-prone regions, and linkages among social factors such as unemployment, poverty and unequal distributions of income. Figure 2 gives an overview of the pattern of great natural disasters in the Third World and the share of economic and insured losses they have caused.

²¹ Cp. MUNICH REINSURANCE COMPANY (ED.): Topics: Annual Review: Natural Catastrophes 2000, Munich 2001, p. 3.

²² Algeria, Egypt, Mozambique, China, India, Bangladesh, Taiwan, Indonesia, the Philippines, Korea, Afghanistan, Armenia, Georgia, Iran, Mongolia, Thailand, Argentina, Brazil, Chile, Colombia, Cuba, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Venezuela. [Cp. MUNICH REINSURANCE COMPANY (ED.) as cited in FREEMAN, P. K.: Catastrophe Risk: A Model to Evaluate the Decision Process for Developing Countries, doctoral dissertation, Universität Wien, Wien 2000, p. 31.].

²³ Cp. UNITED NATIONS (UN): Disaster Profiles, paper presented at the conference "Least Developed Countries", United Nations Development Program (UNDP), Brussels 14-20 May 2001. Online in internet: URL: <http://www.reliefweb.int/w/rwb.nsf/0/2b808fd2570-1476285256a69006ce8d0?OpenDocument.htm> [Cited 2003-11-08], pp. 2ff.

²⁴ FREEMAN, P. K.: Catastrophe Risk: ..., loc. cit, p. 21.

²⁵ The World Bank: World Disaster Report 1999, Washington D. C. 1999.

²⁶ Kreimer, A.; Arnold, M.: loc. cit., pp. 37.

²⁷ For these data, Munich Re only considers natural disasters with economic losses \geq 1 billion US\$.

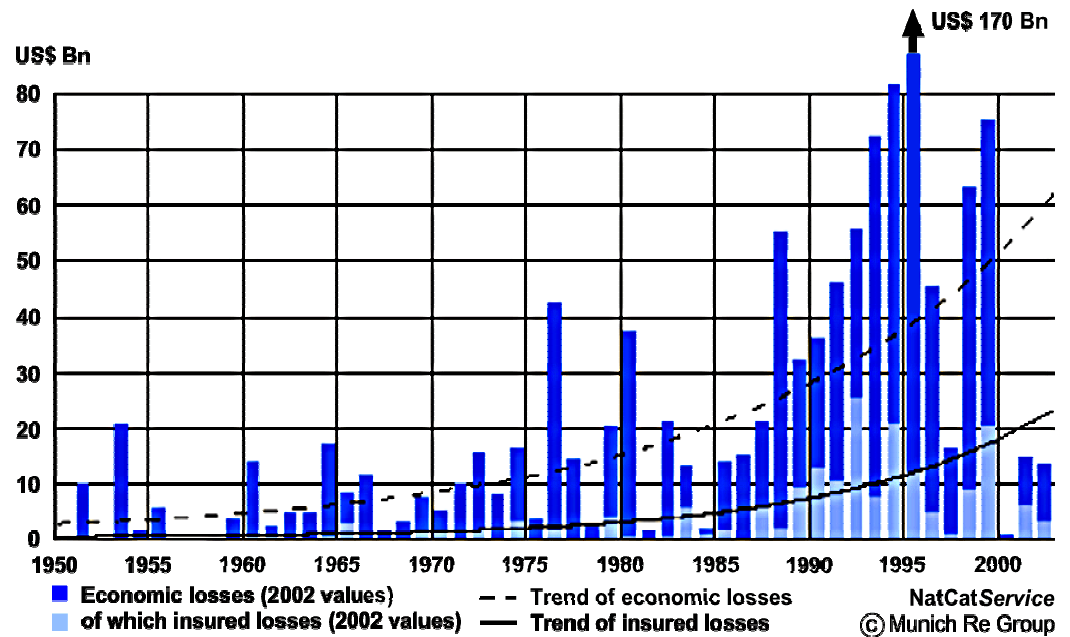


Figure 2: Pattern of Natural Disasters and the Share of Economic and Insured Losses

Source: Munich Reinsurance Company (ed.): Topics: Annual Review: Natural Catastrophes 2000, Munich 2001.

In the year 2003,²⁸ billions of US dollars in economic losses were caused, for example, by floods in Argentina (US\$200 billion), by the storm in India (US\$16 billion) and Cyclone Ami in Fiji (US\$7.8 billion).²⁹ The scale of natural catastrophes has been on the rise since 1970, and catastrophe-related losses still run high. The trend is not expected to abate; the impacts of natural disasters are estimated to increase dramatically over the next 50 years. By some estimates, the global cost of natural disasters is anticipated to top US\$300 billion annually by the year 2050.³⁰

Due to the geography of developing countries, natural disasters and their catastrophe potential dominate on the risk side as opposed to financial market risks which are compared less important for this context. Further, their "[...] lack of infrastructure causes negative impacts on the ability of loss prevention and risk reduction."³¹ The extent of the international contribution is a function of

²⁸ Covering the January 2003 – July 2003 period.

²⁹ Cp. CRED: EM-DAT: loc. cit.

³⁰ Cp. UN: Disaster Profiles ..., loc. cit., p. 3.

³¹ GERATEWOHL, K.: loc. cit., p. 145.

developing countries' limited ability to cope internally with catastrophe risk. For example, "between 1980 and 1998, the World Bank alone approved approximately 200 operations related to natural disasters, amounting to more than US\$14 billion in loans."³² From this follows the necessity for international reinsurance: to spread risks across countries with a view to providing economic relief.

2.3 Economic Environment

2.3.1 *Economic Threat, Vulnerability and Risk*

In the context of disaster-prone Third World countries, it is useful to define certain terms more precisely of disaster. This section will focus on economic vulnerability and the country's social condition: proneness to economic damage from external forces sometimes threatens the very economic viability of Third World countries.³³

The *risk* from natural catastrophes is defined as the possibility of a financial loss due to economic damages. The term *vulnerability* refers to proneness to damage from such external forces. It describes the extent to which human, natural and economic systems are susceptible to, or unable to cope with the adverse affects of natural hazards.³⁴ The most appropriate method to protect against financial losses is the use of insurance, that assumes the risk from economic sectors.³⁵

The vulnerability of an area or a country can be measured by an index, a tool

³² KREIMER, A.; ARNOLD, M.: loc. cit., p. 37. Main Components of these World Bank projects include support for economic recovery, institutional development, reconstruction and rehabilitation. [Ibid., p. 37]. Cp. section 4.3 in this paper.

³³ Cp. ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN (ECLAC): A Matter of Development: How to Reduce Vulnerability in the Face of Natural Disasters, paper prepared for the workshop "Confronting Natural Disasters: A Matter of Development", New Orleans 25-26 March 2000, p. 5.

³⁴ Cp. CROWARDS, T.: Comparative Vulnerability to Natural Disasters in the Caribbean, Caribbean Development Bank (CDB), Charleston 2000, p. 3.

³⁵ Cp. section 2.3.2 and section 4.4 for further discussion on financial protection and risk-sharing.

that gives information about the economic weakness to the public.³⁶ The index used here covers the following economic components: *Share of Manufacturing and Modern Services in GDP*, *Merchandise Export Concentration*, *Instability of Agricultural Production*, *Instability of Exports of Goods and Services* and *Population Size*. To sum up, three factors of vulnerability are distinguished: hazards as external shocks, exposure values and resilience or capacity to react. The natural hazard index used by Munich Re comprises the components type of disaster (hazard), proneness to disaster (vulnerability), and total value of private and public sectors exposed to disasters.³⁷ This risk index is used for comparing hazard-prone megacities around the world and is shown on map in figure 3.

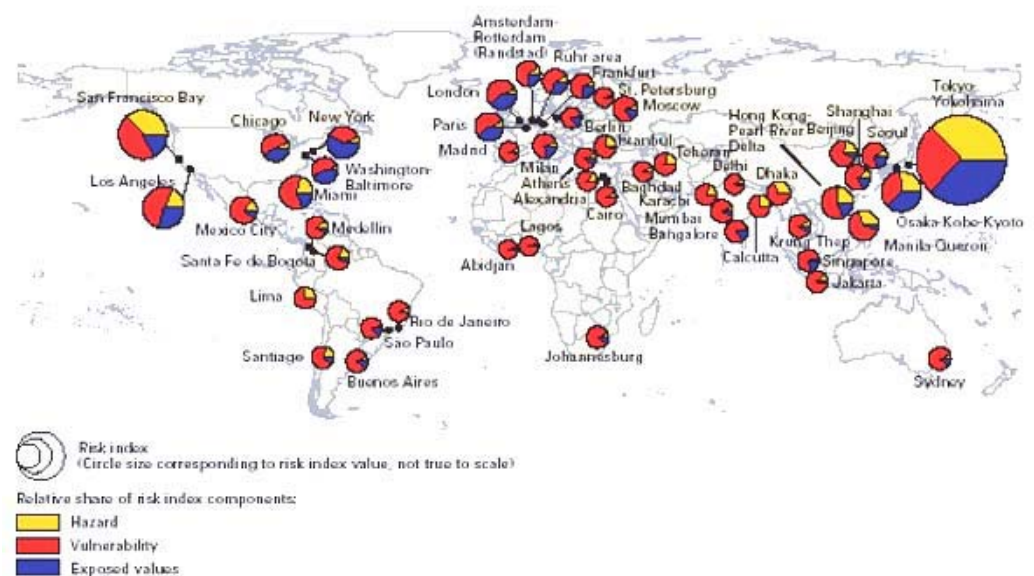


Figure 3: Risk Index

Source: MUNICH REINSURANCE COMPANY (ED.): Topics: Annual Review: Natural Catastrophes 2002, Munich 2003, p. 40.

³⁶ The idea of constructing the index was first formally proposed by Malta in June 26, 1990, during the meeting of Government Experts of Island Developing Countries and Donor Countries and Organizations, held under the auspices of the UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT (UNCTAD). In 2000 the index was developed. [Cp. WITTER, M.; BRIGUGLIO, L.; BHUGLAH, A.: Measuring and Managing the Economic Vulnerability of Small Island Developing States, paper presented at the conference "Vulnerability and Small Island Developing States: Exploring Mechanisms for Partnerships", Jamaica 9-10 May 2002, p. 17.]

³⁷ Cp. MUNICH REINSURANCE COMPANY (ED.): Topics: ..., loc. cit., pp. 40f.

The economy of a country is sensitive to a disaster shock if the development of an economy differs from existing expectations without taking into account the effects of this event. At a macro or sector level this is reflected in the deviation of economic aggregates from trends that were expected without disasters.³⁸ The degree of severity and nature of impact depend on a range of factors, including the size of the economy, its economic structure, and the sectors affected by the disaster.³⁹

The influence of the size of developing countries on the macroeconomic consequences of disasters can be particularly dramatic in the case of smaller states. The risk from catastrophes is likely to impact the whole country at the same time. Looking at the number of events in relation to the land size serves to indicate a proportional impact.⁴⁰ The economic structure of developing countries is generally characterized by a very large primary sector (raw materials, farming) and both a small secondary sector (manufactured goods, construction) and a small services sector (banking, retailing, tourism etc).⁴¹

Resilience is another economic term for the ability and capacity needed to deal with loss exposure in an economy. The speed at which economic activity recovers depends on the composition of all sectors. The re-establishment of the affected regions may require time to restructure and replace lost and damaged

³⁸ Cp. BENSON, C.; CLAY, E.: Developing Countries and the Economic Impacts of Catastrophes, in: KREIMER, A.; ARNOLD, M. (EDS.): *Managing Disaster Risk in Emerging Economies*, The World Bank, Washington D.C. 2000, pp. 11 ff.

³⁹ According to TWIGG the *type* of hazard (e.g. earthquake, flooding or hurricane) is also relevant for economic vulnerability. Because economic activity is sensitive to many influences, including other sources of shock, it is difficult to isolate precisely the impacts of a specific disaster or disasters. [Cp. TWIGG, J.: *Development at Risk? Natural Disasters and the Third World*, International Decade for Natural Disaster Reduction (IDNDR), Oxford 1998]. This aspect should be disregarded in this thesis. GUIN; SAXENA give a detailed overview of long-term losses caused by specific natural hazards.[GUIN, J.; SAXENA, V.: *Extreme Losses from Natural Disasters: Earthquakes, Tropical Cyclones and Extratropical Cyclones*, Boston 2000. Online in internet: URL: http://www.air-worldwide.com/_public-NewsData/000208-/Extreme_Losses.pdf [Cited 2003-11-08].

⁴⁰ Cp. CROWARDS, T.: *Comparative Vulnerability to Natural Disasters in the Caribbean*, Caribbean Development Bank (CDB), Charleston 2000, p. 7f.

⁴¹ Cp. Pass, C.; Lowes, B.; Davies, C.: "Third World country" in *Dictionary of Economics*, 2nd ed., Glasgow 1993.

capital.⁴² The best way to reduce vulnerability is to increase the capacity of countries to manage the shocks due to the disasters they face.⁴³

2.3.2 Situation and Economic Rank of Insurance Markets for Natural Disasters

The defining feature of complete insurance markets is that potentially large-scale risks are eliminated completely. In the quest for complete markets and economic independence, insurance and reinsurance markets are characterized as an indispensable instrument in Third World countries.⁴⁴ Insurance markets are part of the financial system⁴⁵ of a country and as completion, (re-)insurance markets should ensure that risk is balanced between sectors and thus they are relevant for the risk transfer.⁴⁶ In connection with this, the safeguard should minimize potentially severe disturbances to the unstable economy caused by external shocks.⁴⁷ To adequately cover these risks, the capacity of the international markets and consequently the cooperation of the international reinsurance industry is needed.⁴⁸

In most of the developing countries, functioning capital markets do not exist. The economic vulnerability to natural disasters is exacerbated in developing countries by weak insurance markets which are ill-equipped to cover

⁴² These are *secondary effects* which are described in section 3.2.

⁴³ GILBERT, R.; KREIMER, A.: Learning from the World Bank's Experience of Natural Disaster Related Assistance, The World Bank, Washington D.C. 1999, pp. 5ff.

⁴⁴ Cp. IRUKWU, J. O.: loc. cit., pp. 89 ff.

⁴⁵ A financial system is a network of financial institutions that cover the banking or manufacturing sector, (...) commodity markets as well as the service industry. [Cp. PASS, C.; LOWES, B.; DAVIES L.: "financial system", in: Dictionary of Economics, 2nd edition, Glasgow 1992, p. 195.].

⁴⁶ For further discussion on incomplete markets cp. SCHLESINGER, H.; DOHERTY N. A.: Incomplete Markets for Insurance: An Overview, in: DIONNE G.; HARRINGTON S. E. (EDS.) Foundations of Insurance Economics: Readings in Economic and Finance, Boston et al. 1992, pp. 134ff.

⁴⁷ The importance of additional external aid of multilateral institutions in context of disaster management is elucidated in section 4.3.

⁴⁸ Cp. GERATEWOHL, K.: loc. cit., pp. 146f.

catastrophic risk.⁴⁹ The incapacity to spread risk internally, whether for political or economic reasons, is a major component in the inability of countries to respond to external shocks, including natural disasters.⁵⁰

It will be seen that the shifting of risk, the very essence of insurance, occurs in many forms in the economic system, but always with some limits. In Third World countries, risk markets are neither widespread, nor do they work effectively. Understanding the restrictions on insurability of risk enables a better understanding of why the economic system in general is so limited in its risk-bearing ability.⁵¹

Despite the general financial and economic problems, as well as the structural obstacles in Third World countries,⁵² the development and growth of an efficient insurance scheme have been restrained by the static financial system.^{53,54} In recent years, there has been growing demand for catastrophe protection by all market participants.⁵⁵ While the insurance sector of many developing countries has been growing, the world share has shown no measurable increase due to their small size.⁵⁶

⁴⁹ Cp. ANDERSEN, T. J.; MASCI, P.: Economic Exposures to Natural Disasters Public Policy and Alternative Risk Management Approaches, in: Infrastructure and Financial Markets Review (IFM), Vol. 7, No. 4, 2001, p. 6.

⁵⁰ Cp. FREEMAN, P. K.: Catastrophe Risk: ..., loc. cit., pp. 11ff.

⁵¹ For further information cp. GUILLAUMONT, P.: On the Economic Vulnerability of Low Income Countries, Auvergne 1999, p. 8.

⁵² Structural obstacles could be fluctuating prices or dependence on negative economic development.

⁵³ A "static system" describes an economy in a long-term equilibrium under stable environmental conditions (constant population, no technical progress, unchanged consumption behavior). The rate of change of all variables approaches zero over time. [Cp. "statische Wirtschaft", in: GABLER WIRTSCHAFTSLEXIKON, 13th edition on CD-Rom, Wiesbaden 1993.].

⁵⁴ Cp. GERATEWOHL, K.: loc. cit., p. 145.

⁵⁵ Cp. SWISS REINSURANCE COMPANY (ED.): Emerging markets: the insurance industry in the face of globalisation, sigma No. 4/2000, Zurich 2000, p. 3.

⁵⁶ Cp. UNCTAD: Review of Developments in the Insurance Market: Alternatives for Insurance of Catastrophes, Environmental Impairments and Large Risks in Developing Countries, Study by the UNCTAD secretariat, UN, UNCTAD/TD/B/CN.4/32/, Washington D.C. 1994, p. 6.

3. The Macroeconomic Impacts of Natural Disasters at the Aggregate Level

3.1 Preliminary Remarks

The macroeconomic impacts of natural disasters are an important issue for the economic development of Third World countries. Sudden, unexpected events affect national and international financial systems. Natural disasters can and do have severe negative short-run economic impacts; economic activity is consequently heavily influenced by the effects of extreme events. They also appear to have adverse long-term consequences regarding economic growth, development and poverty. The macroeconomic impacts of natural disasters in Third World countries will be discussed in this section.

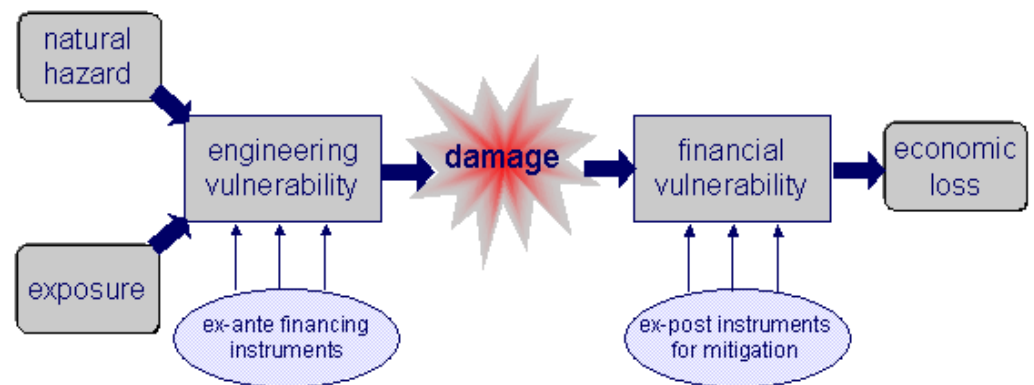


Figure 4: From Natural Hazards to Economic Loss

Source: Own chart

3.2 Direct, Indirect and Secondary Effects

Generally, the economic costs of natural disasters encompass direct, indirect and secondary effects.⁵⁷ The direct and indirect damage caused worldwide by disasters has increased over the last 30 years, from about US\$8 billion in the 1970s to US\$16 billion in the 1980s and peaking at US\$18 billion in the 90s.⁵⁸

⁵⁷ Cp. KREIMER, A.; ARNOLD, M.: loc. cit., p. 37.

⁵⁸ Cp. ANDERSEN, T. J.; MASCI, P.: loc. cit., p. 6.

Direct economic costs are split approximately evenly between developed and developing countries, but low-income countries are especially sensitive.⁵⁹

3.2.1 *Direct Effects*

Hazards cause *direct damage and costs* that represent the value of damage to and losses on fixed assets and capital or the physical impact on inventory.⁶⁰ They tend to occur immediately during or after the disaster. In economic terms, these losses can be equated to stock losses. Direct damage can be expected to exceed 1% of GDP in developing countries.⁶¹ This influences nearly one seventh of the economic capacity of a third world country, yet that varies depending on the economic development. The costs include, for example, total or partial collapse of housing, buildings or destroyed infrastructure. Over the last decade, direct losses from natural hazards in the developing world averaged US\$35 billion annually.⁶² Calculating them is difficult, especially in poor countries where assets are not registered.⁶³

3.2.2 *Indirect Effects*

From direct costs follow *indirect damages and costs*.⁶⁴ This include losses⁶⁵ of potential production due to interrupted and lost production capacity, disruptions in the flow of goods and services as well as reduced income and increased expenses. Indirect damages are perceived after the event and continue to occur

⁵⁹ Cp. ERMOLIEV, Y. ET AL.: *Catastrophic Risk Management and Economic Growth*, IIASA, Laxenburg 2000, p. 1.

⁶⁰ Cp. KREIMER, A.; ARNOLD, M.: loc. cit., p. 37.

⁶¹ Cp. SWISS REINSURANCE COMPANY (ED.): *Natural catastrophes and man-made disasters in 2000: fewer insured losses despite huge floods*, sigma No. 2/2001, Zurich 2001, p. 9.

⁶² Cp. BARHAM, C.: *Global Change and Catastrophe Risk Management: Earthquake Risks in Europe*, paper presented at the conference "New Directions in Disaster Management", The World Bank, Washington D.C. 6-9 July 2000, p. 2.

⁶³ Cp. AUFFRET, P.: *Catastrophe Insurance Market in the Caribbean Region: Market Failures and Recommendations for Public Sector Interventions*, The World Bank, Washington D.C. 2003, p. 17.

⁶⁴ Cp. MECHLER, R.: *Natural Disaster Risk Management and Financing Disaster Losses in Developing Countries*, doctoral dissertation, Universität Fridericana zu Karlsruhe, Karlsruhe 2003, pp. 24 ff.

⁶⁵ Losses are distinguished in economic losses and insured losses. With a glance on figure 2, the share of insured losses is notably low. Cp. also section 2.3.2.

for a time period that can last from weeks to months until reconstruction is completed and the entire production capacity has been restored. The reconditioning can take several years and can be substantial.⁶⁶ Direct and indirect losses from selected natural catastrophes are shown in appendix I. The losses are measured by loss of output and earnings.

3.2.3 *Secondary Effects*

Further on, macroeconomic impacts include the consequential effects of reallocation of investment resources, causing an aggregate impact on the economy plus response, stocks and flows. These are *secondary effects*.⁶⁷ Many follow-up economic costs based largely on direct physical impacts or losses of fixed capital and inventory are underestimated. MURLIDHARAN; SHAH refer in their analysis explicitly to variable impacts due to different disasters since they have varying direct and consequently indirect and secondary effects.⁶⁸ Some indirect and secondary effects on economic activity - such as changes in fiscal policies, long-term consequences of the reallocation of investment resources, or the losses in human capital - go unrecorded.

Table 1 summarizes the potential effects of natural disasters:

	Primary effects	Secondary effects
Physical effects	<ul style="list-style-type: none"> • Ground deformation and loss of ground quality • Collapse of structural damage to buildings and infrastructure • Non-structural damage loss of ground quality to buildings and infrastructure 	<ul style="list-style-type: none"> • Progressive deterioration of damaged buildings and infrastructure which are not repaired

⁶⁶ According to the macroeconomic model by ALBALA-BERTRAND, "(...) indirect disaster losses are probably insignificant for the economy as a whole." [ALBALA-BERTRAND, J. M.: Political Economy of Large Natural Disasters With Special Reference to Developing Countries, Oxford 1993, p. 203.].

⁶⁷ Cp. MECHLER, R.: Natural Disaster Risk ..., loc. cit., p. 10.

⁶⁸ Cp. MURLIDHARAN, T. L.; SHAH, H. C.: ..., loc. cit., p.2.

Economic effects	<ul style="list-style-type: none"> • Interruption of business due to damage to buildings and infrastructure • Loss of productive workforce through fatalities, injuries and relief efforts • Capital costs of response and relief 	<ul style="list-style-type: none"> • Losses born by insurance industry weakening the insurance market and increasing premiums • Loss of market and trade opportunities through short-term business interruption • Loss of confidence by investors, withdrawal of investment • Capital costs of repair
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Table 1: Potential Direct, Indirect and Secondary Effects of Natural Hazards

Source: Own compilation based on MECHLER, R.: Natural Disaster Risk: ..., loc. cit., pp. 11f.

3.3 Defining Key Variations in the Economic Impact of Catastrophic Events: Key Variables

We can measure the impact of natural disasters by observing changes in economic variables associated with the occurrence of natural disasters. The chosen variables for further analysis in this paper are GDP growth, investment and savings, external debt and inflation. The key variables of economic impacts from catastrophic events are briefly defined below.⁶⁹

- *Gross domestic product (GDP)* measures the total output of goods and services for final use occurring within the domestic territory of a given country, regardless of the allocation to domestic and foreign claims. Gross domestic product rate is the change of the GDP between two successive years, measured in percent. Growth rates are computed from time series expressed in constant local prices. Long-term average growth rates are calculated using the least-squares method.
- *Gross national savings* are gross domestic savings plus net income and net current private transfers from abroad. *Gross domestic investment* consists of

⁶⁹ The definitions are according to the World Bank classification to avoid bias, since much of the data was also obtained from the World Bank. Other organizations may have other definitions. Online in internet: URL: <http://www.worldbank.org/depweb/english-/modules-/glossary.html> [Cited 2003-07-26].

outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales. The indicator is presented as the percentage share of GDP in national currency at current purchaser prices.

- Long-term *external debt* is defined as debt that has an original or extended maturity of more than one year and that is owed to nonresidents and repayable in foreign currency, goods, or services. Long-term debt has three components: *public debt*, which is an external obligation of a public debtor, including the national government, a political subdivision (or an agency of either), and autonomous public bodies; *publicly guaranteed debt*, which is an external obligation of a private debtor that is guaranteed for repayment by a public entity; and *private non-guaranteed debt*, which is an external obligation of a private debtor that is not guaranteed for repayment by a public entity.
- *Inflation* is an increase in the general level of prices in an economy that is sustained over a period of time. Inflation is considered to be undesirable because of its adverse effects on income distribution, lending and borrowing, speculation, and international trade competitiveness.

3.4 The Nature of Economic Crises After Disasters

3.4.1 Effects on Short-Term Macroeconomic Consequences

Direct destruction that occurs during or immediately after a disaster can have serious short-term impacts on the economy and is measured by changes in the GDP.⁷⁰ The short-term effects are expected to take place in the year of the disaster, as well as a short time after the disaster has happened.

For reconstruction of the damaged infrastructure - which increases the growth rate of gross fixed capital formation - GDP growth can be expected to be

⁷⁰ Cp. CHARVÉRIAT, C.: loc. cit., p. 15.

transitory due to the overall public and private investment efforts.⁷¹

Short-term fiscal imbalances caused by the need for budget reallocations to make immediate repairs after a disaster are an additional example of temporary effects. Natural disasters directly reduce the amount of physical capital in an economy, too. This could disrupt productivity and trigger a loss of capital assets, which in turn decreases output. Consequently, natural hazards have an immediate negative impact on production, culminating in a negative short-term impact on GDP growth.⁷²

Inflationary processes can be also regarded. The immediate effects on prices of market changes are complicated by the monetary effects of reconstruction, even when it is carried out with donated resources or external finance.

One more effect can be noticed concerning influences on the balance of payments. Natural disasters affect government external borrowing or future levels of debt servicing. As short-term disparity due to mostly primary effects lead to increased indebtedness, additional cost emerges which alter the debt profile and reduce the ability to obtain access to new loans or commit the investment resources that in other circumstances could increase productive capacity. A manifold increase in the current account deficit can be noticed along with falling exports and concomitantly rising imports to deal with emerging needs.

In all, any worsening of the balance-of-payments position could also exert pressure on the exchange rate, state of public finances and level of indebtedness – and thus on international competitiveness. These effects are expected to take place in the year of the disaster, too, as well as during the two to three years following the event and sometimes for even longer. The time distance of the impact varies depending on the month of occurrence of the disaster.⁷³

⁷¹ Cp. CHARVÉRIAT, C.: loc. cit., p. 15.

⁷² Ibid., p. 15.

⁷³ Ibid., p. 15.

To sum up it can be said that impact of disasters on deficit financing caused by disasters can be seen as loss in terms of GDP.⁷⁴ ALBALA-BERTRAND shows that the amount of investment effort needed to compensate the negative impact of the disaster does not automatically have to be relatively high because of the large multiplier effect associated with the increase in investment for reconstruction of the affected area.⁷⁵

3.4.2 Effects of Economic Contraction under Special Consideration of Long-Term Macroeconomic Consequences

Earlier in this paper we described various short-term macroeconomic impacts. "For small countries, losses even much less than US\$1 billion can have significant long-term consequences"⁷⁶ and make up a considerable percentage of GDP. The focus lies now exclusively on long-term direct, indirect and secondary effects on the economy of a third-world country. According to FREEMAN,⁷⁷ long-term development impacts of catastrophes depend on how direct losses lead to indirect and secondary costs depending on the country's economic capacity to absorb losses. Others have explored the long-term impact of disasters by modeling economic growth as a function of the rate of growth of the capital stock and then considering the implications of disaster-related capital losses.⁷⁸

"The vulnerability of a country depends mainly on the degree of diversification of the economy and its macroeconomic performance before the disaster hits."⁷⁹

⁷⁴ According to ALBALA-BERTRAND, the financial short-term impacts of disasters on the counter-balance do not necessarily have to be massive because of the large multiplier effect associated with the increase in investment for the reconstruction. [Cp. ALBALA-BERTRAND, J. M.: Natural Disaster Situations and Growth: A Macroeconomic Model for Sudden Disaster Impacts, in: World Development, Vol. 21, No. 1, 1993, pp. 417ff. and ALBALA-BERTRAND, J. M.: Political Economy of Large Natural Disasters With Special Reference to Developing Countries, Oxford 1993, pp. 86 ff.].

⁷⁵ Cp. ALBALA-BERTRAND, J. M.: Natural disaster situations ..., loc. cit., pp. 417ff.

⁷⁶ FREEMAN, P. K.: Catastrophe Risk: ..., loc. cit., p. 21.

⁷⁷ Ibid., p. 4.

⁷⁸ E. g. MACKELLAR, L.; FREEMAN, P. K.; ERMOLIEVA, T.: Estimating Natural Catastrophic Risk Exposure and the Benefits of Risk Transfer in Developing Countries, IIASA, Laxenburg 1999.

⁷⁹ CHARVÉRIAT, C.: loc. cit, p. 21.

FREEMAN; MECHLER show in their analysis how the existing differences between revenues and expenditures (the "finance gap") of a low-income country behave in a post-disaster situation.⁸⁰ The sudden occurrence of destruction of private assets, as well as public assets such as economic and social infrastructure, reduces the amount of physical capital in an economy.⁸¹ Long-term replacement is necessary, at least until reconstruction is completed. The intensity, form and planning of financing of reconstruction efforts are essential in determining the long-term growth effect of the disaster. Also, losses of environmental assets and services with measurable economic consequences have a long-term impact on the economy. The unexpected financial strain results in extraordinary fiscal imbalances.

Long-term consequences of indirect and secondary damages are triggered by the reallocation of capital recourses. Natural catastrophes cause property damage which will be removed by rebuilding services. For reconstruction of the destroyed area, internal and external investments are completed, which results an change of capital allocation.

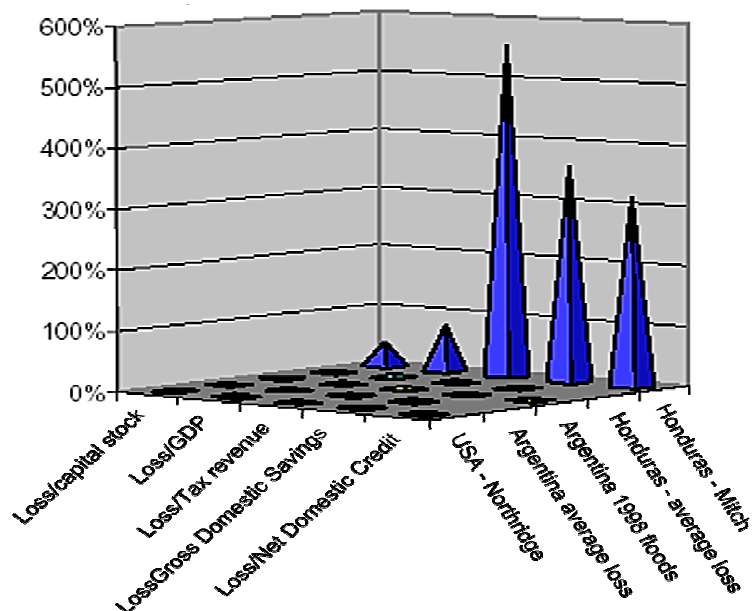


Figure 5: Natural Disaster Losses compared to Economic Indicators

Source: MECHLER, R.: Natural Disaster Risk ..., loc. lit., p. 43

⁸⁰ FREEMAN, P. K.; MECHLER, R.: Public Sector Risk Management in Mexico for Natural Disaster Losses, Workshop "Innovations in Managing Catastrophic Risks: How Can They Help The Poor?", Washington D.C. 8-10 January 2001.

The renewed composition of the capital stock of an economy, as well as the non-replacement of other assets destroyed by a catastrophe, cause a permanent loss of potential output.⁸² Under extremely simplified assumptions, the GDP is reduced by the shock to the capital stock, which is the available pool of savings and (in a closed economy) investment.⁸³ Thus, net capital formation in the years following a catastrophic loss will be lower than it would have been in the non-catastrophe case.⁸⁴ Natural catastrophes have consequently impact on the growth on the developing economy due to immediate changes in the capital stock.⁸⁵

Also related to the capital account, the impact of disasters on foreign direct investment (FDI) also have a long-term effect on the economy. The literature suggests that the cost of market access through exports, the quality of infrastructure, government incentives, political risk, per capita income, the degree of industrialization and the size of domestic markets are all important in attracting FDI.⁸⁶ Export-orientated economies are also more successful in attracting FDI, as discussed above. There is little evidence reported in the literature that natural hazards and related risk have influenced FDI decisions directly, although there is some anecdotal evidence that this may occur.⁸⁷

3.5 Practical Experience: The Case of Hurricane Mitch in Honduras (October 1998)

3.5.1 Economic Situation in the Country Before Hurricane Mitch hits

Honduras is one of the least developed in Latin America. For heavily indebted

⁸¹ Cp. CHARVÉRIAT, C.: loc. cit., p. 22.

⁸² Cp. MACKELLAR, L.; FREEMAN, P. K.; ERMOLIEVA, T.: loc. cit., p. 3.

⁸³ Cp. explanations in footnote 53.

⁸⁴ Cp. MACKELLAR, L.; FREEMAN, P. K.; ERMOLIEVA, T.: loc. cit., p. 4.

⁸⁵ ALBALA-BERTRAND has a different opinion. He states that the process of replacement of lost fixed capital can be expected to raise its quality, and therefore increases productivity of the gross fixed capital formation. [Cp. ALBALA-BERTRAND, J. M.: *Political Economy ...*, loc. cit., pp. 70ff.]

⁸⁶ Cp. SHATZ; VENABLES; SINGH as cited in LEVY-LIVERMORE, A.: *Economic Analyses of Financial Crises*, Aldershot 1995, pp. 13 ff.

⁸⁷ Explained in detail in BENSON, C.; CLAY, E.: *Dominica: Natural Disasters and Economic Development in a Small Island State*, The World Bank, Washington D.C. 2001, pp. 9ff.

developing countries, the prosperity depends on external public borrowing from multilateral and bilateral lenders to continuing infrastructure investment. The government of Honduras forecasted an annual GDP growth rate of 5.3% for 1998/99.⁸⁸ Other government goals included containment of the rate of inflation, the rebuilding of reserves and a reduced budget deficit of GDP. Honduras is the third poorest country in Central America with per capita income of US\$700 in 1997. The country owed US\$4.4 billion in 1998, representing an estimated 93% share compared with GDP scales and US\$725 per head.

According to an analysis by Swiss Reinsurance and the International Institute of Applied Systems Analysis (IIASA), Honduras is prone to disasters with main risks in storm, flood and landslide; earthquake risk is identified as moderate. The estimated loss potentials are shown in table 2 as follows:⁸⁹

	50-year loss	100-year loss	500-year loss
Main risk: Storm, Flood, Landslide	US\$7.0 bn (5%) of capital stock lost	US\$1.6 bn (12%) of capital stock lost	US\$4.0 bn (31%) of capital stock lost
Moderate risk: Earthquake	US\$0.1 bn (0.8%) of capital stock lost	US\$0.2 bn (1.4%) of capital stock lost	US\$0.6 bn (4%) of capital stock lost

Table 2: Estimated Loss Potentials in Honduras

Source: Swiss Reinsurance Company; IIASA

3.5.2 Economic Effects After the Disaster

The effect on the macroeconomic situation of Hurricane Mitch in October 1998 was devastating. Preliminary estimates of damage and replacement costs prepared by the UNITED NATIONS DEVELOPMENT PROGRAM (UNDP) and the ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN (ECLAC) suggest total direct damage to Honduras caused by Hurricane Mitch was US\$2.2 billion; this is equivalent to 18% of the capital stock. Indirect damages were

⁸⁸ INTERNATIONAL MONETARY FUND (IMF): Honduras: Initiative for Highly Indebted Poor Countries: preliminary draft, Washington, D.C. 1999, p. 2.

⁸⁹ Appendix VI shows the corresponding maps for illustrating the vulnerability of Honduras.

calculated at another US\$1.5 billion, the replacements costs at US\$5 billion.⁹⁰ The World Bank has organized post disaster reconstruction projects for more than 56 countries since 1980, and has loaned more than US\$14 billion. Honduras is one of these countries and has borrowed US\$7.5 billion after Hurricane Mitch.⁹¹ Following the 1998 hurricane, a series of adjustments were made to annual economic forecasts for the year.

In all, total direct and indirect effects are estimated at US\$3.7 billion, equivalent to 74% of Honduras' 1997 GDP. Replacement costs are calculated at US\$5 billion,⁹² Honduras' total GDP in 1998.

The WORLD BANK estimated an increase in inflation to 10.5% and GDP growth in the year after Mitch to be negative, at -1.9%. Long-term activities like production and consumption were also interrupted. In the case of Honduras, remittances significantly increased after Hurricane Mitch by 50.3% in 1999.⁹³ The US government provided US\$563.2 million worth of emergency assistance.

Hurricane Mitch's impacts will last for a long time. The ECONOMIST INTELLIGENCE UNIT (EIU) forecasts that the impact of Hurricane Mitch on economic activity in Honduras caused GDP contraction in 1998 of as much as 6%. Hurricane Mitch threw Honduras back 30-50 years in development terms with losses of up to 70% of its infrastructure following Mitch. In the next years it is likely that natural disasters will be the most significant external shock to affect Honduras in the following 20-25 years.⁹⁴

⁹⁰ Cp. ECLAC as cited in MECHLER, R.: Natural Disaster Risk ..., loc. cit., pp. 158ff.

⁹¹ Cp. FREEMAN, P. K.: Catastrophe Risk:..., loc. lit., p. 22.

⁹² Cp. ECLAC: A Preliminary Assessment of Damages Caused by Hurricane Mitch, Washington D. C. 1998.

⁹³ Cp. ECONOMIST INTELLIGENCE UNIT (EIU): Country Report for Honduras. First quarter 2000, London 2000, p. 41.

⁹⁴ Ibid., p. 43.