

Macroeconomic Impacts of Natural Disasters

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Impacts of Disasters

In the event of a natural disaster, humanitarian, economic and ecological impacts and effects may occur (figure 1).

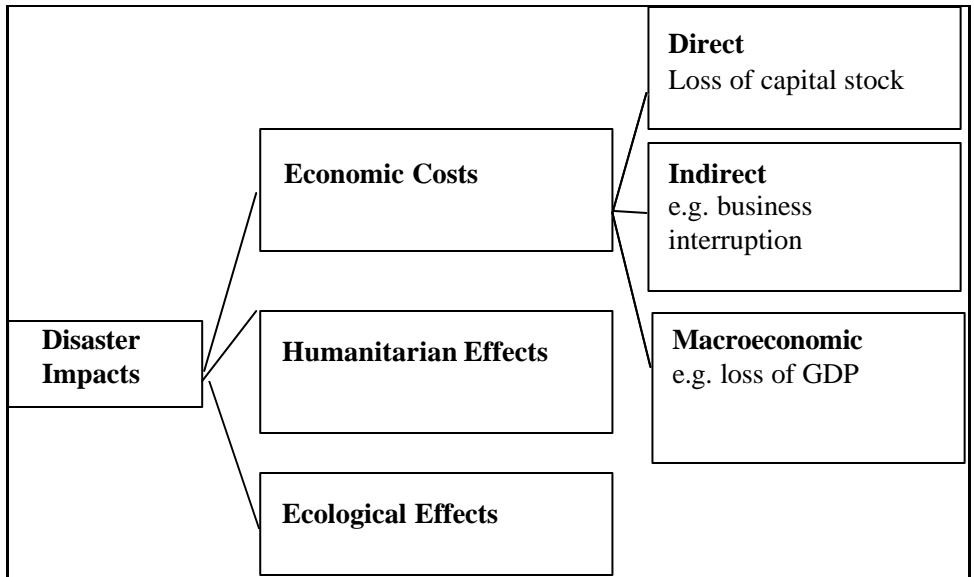


Figure 1: Impacts of natural catastrophes

Source: Mechler 2003

Humanitarian effects include loss of life, affected people and psychological post-disaster effects; *ecological* effects comprise the loss of arable land, forests and damage to ecosystems. *Economic* effects are usually grouped into three categories: direct, indirect, and macroeconomic (also called secondary) effects. These effects fall into stock and flow categories: Direct losses describe the physical impacts on infrastructure (transport, energy and water), buildings, machinery and agricultural assets. They are roughly equal to stock impacts. These can be caused by the disaster itself or by follow-on physical destruction (e.g. through fire). Indirect losses occur as a consequence of these direct stock losses and include production and wage losses due to business interruption. The macroeconomic impacts comprise the aggregate impacts on economic variables like gross domestic product (GDP), consumption and inflation due to the effects of disasters, as well as the reallocation of government resources for relief and reconstruction efforts. Because macroeconomic effects reflect indirect damage as well as relief and restoration efforts, these effects cannot simply be added up without causing duplication (Otero and Marti 1995: 16-18).

This paper discusses the macroeconomic effects that a number of developing countries, subject to substantial natural disaster risk, may experience after disasters. Further, the paper recommends the need to plan the recovery process on a macroeconomic basis. These points are substantiated with examples from recent experience in Honduras and El Salvador.

Typical Effects in a Developing Country

The impacts of natural disasters on society and the environment are substantially greater in less developed countries. This can be explained through a higher degree of vulnerability to disasters in developing countries. Factors that contribute to an increased vulnerability are high poverty and unemployment rates, distributional inequalities, socioeconomic exclusion of the poor from basic services, high population growth, and the lack of strong national and local institutions to respond to natural disasters (Smith 1996: 42-46; ECLAC and IDB 2000: 1; UNISDR 2002: 4ff.; Anderson 2000: 45; Vatsa and Krimgold 2000: 135).

The impacts of disasters on macroeconomic variables in developing and developed countries vary and include:

- For developed countries, no significant macroeconomic impacts are found and the literature focuses generally on direct and indirect impacts and regional economies.

- In developing countries, GDP falls in the year of the event or following year, but rebounds in successive years due to increased investment and capital inflows.
- The public deficit increases as a result of increased spending and decreased tax revenue.
- The trade balance worsens, as exports decrease and the demand for imports increases. Also, trade imbalances increase as imports rise (due to the need for additional goods) and exports fall (losses in goods and productive capital stock).
- Significant longer-term impacts are to be expected depending on the size of the event, economic vulnerability, and the prevailing economic and socio-political conditions.
- The inflow of external aid and capital is decisive for the speed of the economic recovery.

Illustration 1: Honduras, Hurricane Mitch, October 1998

Honduras, following Hurricane Mitch, demonstrates typical after-disaster effects. In October 1998, Hurricane Mitch struck Central America and caused widespread flooding in Honduras. Some 5,700 people were killed and another 620,000 were severely impacted. Sixty percent of the transportation infrastructure was destroyed (PAHO 1999) as well as 70 percent of the banana, coffee, and pineapple crops. Losses in the agricultural sector alone amounted to more than US\$1 billion (CEPAL 1999). According to some estimates, Mitch was an event with a return period of less than once in 100 years. Direct losses amounted to US\$2 billion, approximately 18 percent of total capital stock. Indirect damage was estimated at an additional US\$1.8 billion. Total direct and indirect losses as measured in terms of GDP were in the range of 80 percent. The macroeconomic effects were most visible in 1999 since the disaster struck in 1998 (figure 2).

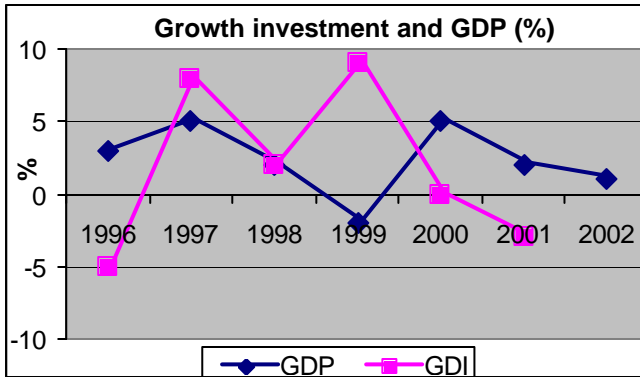
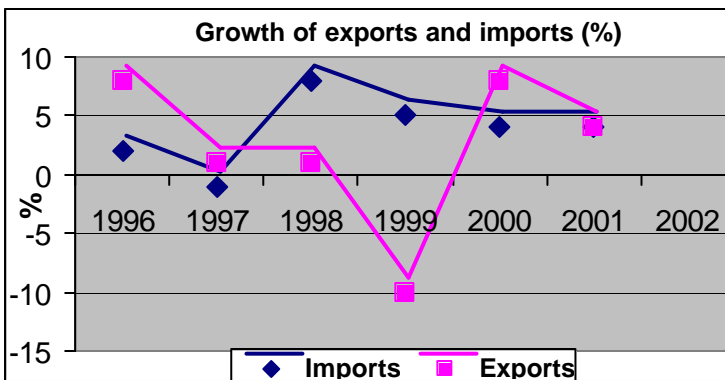


Figure 2: Development of GDP and investment in Honduras 1996-2002
Source: World Bank 2003. (GDP: gross domestic product; GDI: gross domestic investment)

On the one hand, after years of growth, the Honduran economy went into recession in 1999 due to the hurricane’s impacts. On the other hand, substantial reinvestment¹ and reconstruction of capital stock took place in 1999, allowing for a recovery in 2000. The recovery lasted throughout 2001 and 2002, but at diminishing rates. After 1999, investment decreased again. Furthermore, looking at the trade balance, we see a steep decline in exports in 1998 (due to the loss of the banana, coffee, and pineapple crops), though a significant recovery the year later (figure 3). Though GDP and thus income were reduced, the decrease in imports was smaller, probably due to increased consumption and investment needs after the disaster.



¹ GDI: gross domestic investment.

Figure 3: Development of trade balance in Honduras, 1996-2001
Source: World Bank 2003

Financing Drives Recovery

In addition to assessing impacts on the current account and the flow of real goods, it is important to analyze trends in the capital account and the sources that fuelled the recovery. Honduras has a limited ability to finance losses through its own means and traditionally relies upon external aid in economic development and reconstruction after a natural disaster. In 1997, before Hurricane Mitch, foreign aid totaled some 6 percent of GDP. This dependence becomes even more evident when losses are compared to indicators such as tax revenue, domestic savings and credit. To see differences in disaster impacts in developing versus developed countries, it is useful to compare Honduran losses of US\$3.8 due to Hurricane Mitch and California's US\$45 billion losses due to the 1994 Northridge earthquake (figure 4).

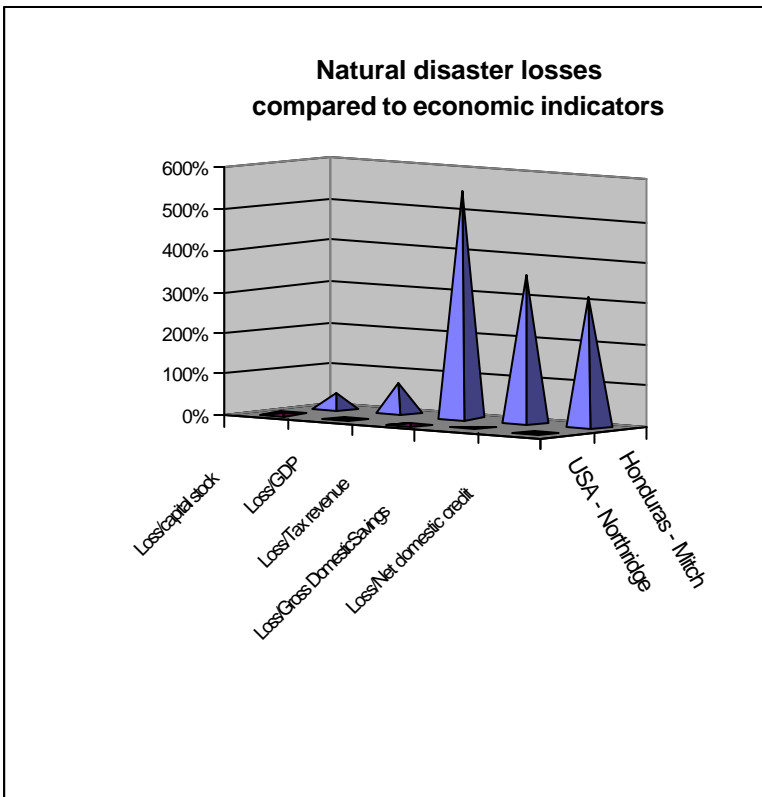


Figure 4: Ability to finance natural disaster losses in Honduras and USA

Source: Mechler 2003.

The comparison shows that severe catastrophic events such as Mitch require Honduras to seek outside help (figure 5).

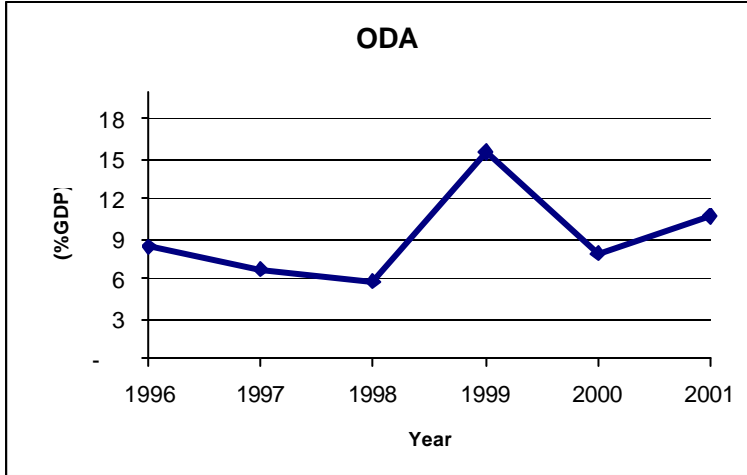


Figure 5: External financing Honduras after Hurricane Mitch
Source: World Bank 2003

After Mitch, total aid (official development assistance (ODA))² rose sharply from 6 percent of GDP in 1998 to 16 percent in 1999. In absolute terms, ODA rose from US\$303 million to US\$842 million. This large inflow of free or concessional financing contributed significantly to the recovery process.

A crucial question that arises in such post-disaster cases is what happens when there is an insufficient inflow of external financing. In a recent study, the International Institute for Applied Systems Analysis (IIASA) analyzed the economic impacts of disasters and the driving forces of recovery in developing countries. Probabilistic catastrophic shocks were then inserted into these macroeconomic projections (Freeman et al. 2002). In a case study involving (post-Mitch) Honduras, potential effects were assessed. In figure 6, the line with the squares presents original GDP projections with steady GDP growth. The other line shows projections when the impacts of a natural disaster are factored in and no additional external financing is available. In such an extreme case, GDP in Honduras would likely stagnate and then decrease. Of course, a scenario without any external financing is

² ODA comprises grants or loans with a grant element of at least 25 percent given to developing countries.

unlikely and represents a worst-case scenario. Financing is usually made available for disaster-affected countries. In reality, GDP will mostly likely develop somewhere between the baseline and the worst case scenario.

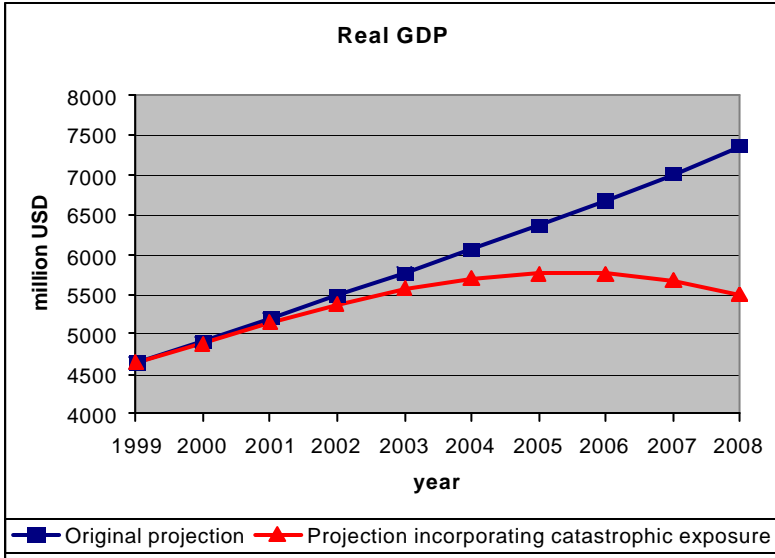


Figure 6: Simulated growth path of real GDP with and without catastrophe exposure in Honduras

Source: Freeman et al. 2002

Macroeconomic Management Issues after Disasters

There are a number of countries like Honduras that could face post-disaster financing difficulties and need access to additional external funds. A crucial issue includes finding financial resources with reasonable loan conditions. The case of El Salvador highlights this issue.

Illustration 2: El Salvador, Earthquakes in 2001

In January and February 2001, El Salvador was struck by two strong earthquakes and thousands of aftershocks. Total direct losses were calculated at US\$1.9 billion, of which US\$1.5 billion were caused in January and US\$0.4 billion in February. In terms of GDP, the combined loss was about 14 percent. Following the events, a financing gap was acknowledged. An International Monetary Fund-World Bank post-disaster joint assessment recommended additional borrowing of US\$1.2 billion from 2001 to 2005. Finding appropriate resources was crucial since:

From the standpoint of macroeconomic policy, the key question is how much and how rapidly can the government afford to borrow to finance the reconstruction costs, while keeping fiscal policy on a sustainable path. (IMF and World Bank 2001).

Two main financing options and scenarios were analyzed:

- Scenario A1: borrowing from 2001 to 2005 (spread over 5 years so as not to exceed the economy’s absorptive capacity) from multilateral development institutions at LIBOR³ (here assumed at 6 percent) plus 150 basis points resulting in a 7.5 percent interest rate, a maturity of 20 years and grace period of five years.
- Scenario B2: borrowing of same amount over same time period in capital markets at LIBOR +280 basis points, resulting in an 8.8 percent interest rate, a maturity of seven years and no grace period.

The implications of these two options on major macroeconomic variables were also analyzed. Impacts on the fiscal deficit were assumed to be the same: a rise to 5 percent of GDP in 2001 and stabilization at about 1.5 percent (a value targeted in the baseline assessment) in 2005. However, looking at public debt and debt service payments, important differences occurred in the two scenarios (figure 7).

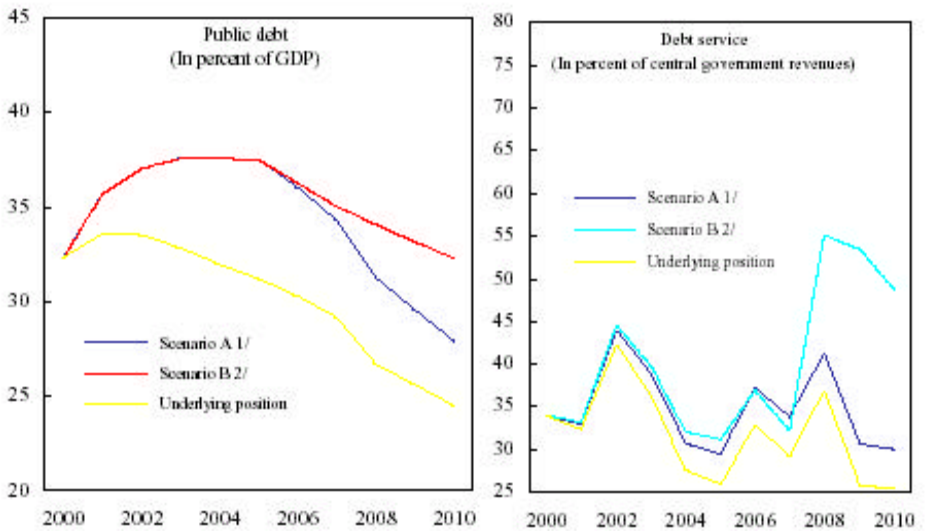


Figure 7: Implications for public debt and debt service payments
Source: IMF/WB

³ London interbank exchange rate: standard international interest rate for borrowing in capital markets.

In scenario A1, public debt first rises considerably, then falls sharply after 2005. In case B2, debt reduction is slower. For debt service payments, even more significant differences emerged: in scenario A1, debt service payments do not consume significantly larger amounts of government revenues than the base case. In case B2, debt service payments rise sharply in 2008 due to the efforts necessary to retire bonds issued from 2001 to 2003. Fifty-five percent of government revenues would be reached. This compares to a maximum value of 41 percent in scenario A1, with smoother borrowing due to longer maturities and a grace period of five years. Debt service payments reach 37 percent in the base case. The assessment concluded that it would be “inadvisable to borrow on market terms,” thus option B2 would be undesirable if international aid was available.

In another study on financing natural disaster risks in Latin America (Freeman, et al. 2003), IIASA used a methodology to calculate the amount of post-disaster financing required to fund reconstruction and relief as well as any financing gap that occurred. The methodology calculates funds available from domestic resources such as tax revenues, savings and aid and the ability to borrow within sustainable limits. For a number of countries in Latin America and the Caribbean, the methodology was applied. Figure 8 shows the financing gaps expected for events with a recurrence period of 100 years (or an annual probability of 1 percent).

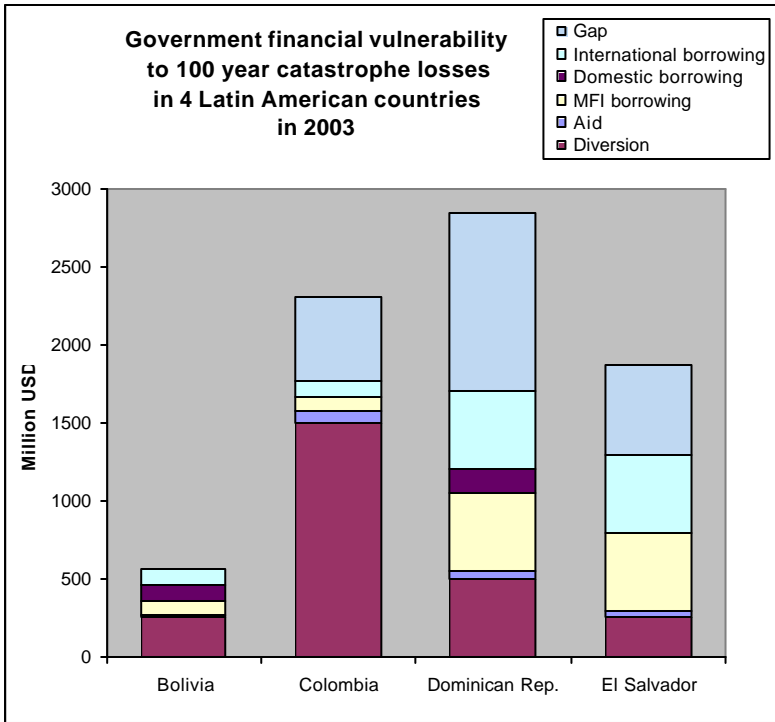


Figure 8: Financing gaps in a number of Latin American countries

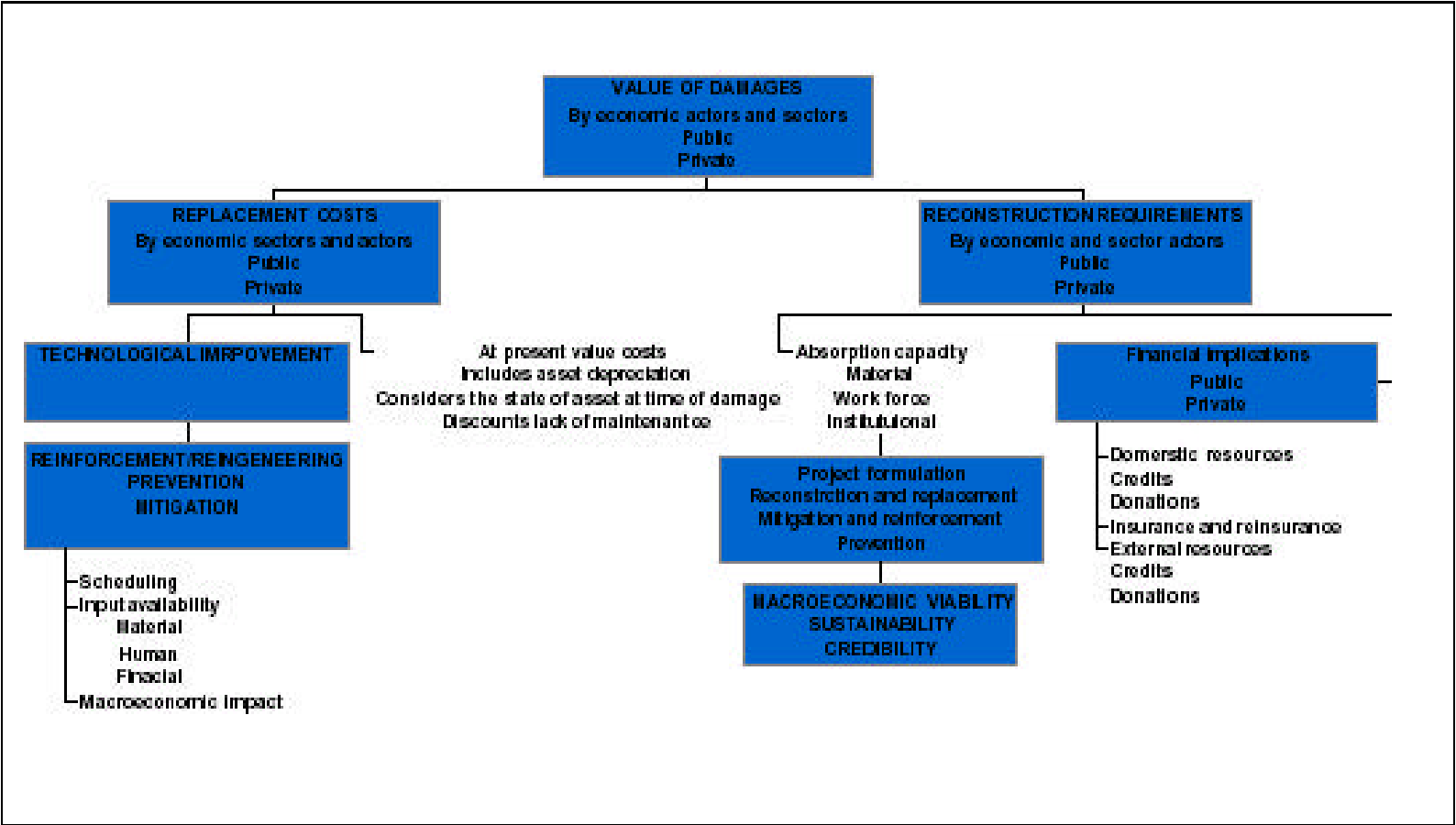
Based on this analysis, in addition to El Salvador, neither Colombia nor the Dominican Republic would be able to finance losses without additional external help. Bolivia, the poorest of these four countries, in terms of GDP, would not have financing difficulties due the fact that natural disaster risk and potential losses are small.

Conclusions

Natural disasters cause human suffering and immediate destruction. Disasters also have macroeconomic impacts on GDP growth, balance of trade, the public deficit and indebtedness. A number of developing countries will reach the limit of their ability to finance such unexpected shocks due to low domestic savings, a small tax base and a limited ability to borrow at favorable conditions. Governments, in the absence of risk financing options undertaken before a disaster has struck, will have to access external capital to fund post-disaster obligations that include providing relief to the poor and those in need, rebuilding infrastructure and rehabilitating the economy. For

these reasons, it is crucial that governments plan ahead, as debt and debt service payments may have significant long-term impacts upon the economy. As shown in figure 9, the Economic Commission for Latin America and the Caribbean (2003: 72) notes that it is necessary to estimate reconstruction requirements and resources as well as check the macroeconomic viability of accessing financial resources.

In conclusion, it is essential to mobilize domestic and foreign resources and balance relief and reconstruction with prudent macroeconomic management (inflation, reserves, deficit and indebtedness). Prudent macroeconomic management is necessary for a quick and consolidated recovery process. This underscores the need for advance planning to address the risks a country may face in the future.



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