

Disaster risk from a macroeconomic perspective: A metric for fiscal vulnerability evaluation

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IDB Disaster Risk Management Indicators Program

- Set of four indicators of disaster risk and disaster risk management.
- Evaluates and monitors risk and measures risk management performance at the country and local level.
- Policy and development planning tool for decision makers to effectively manage disaster risk.
- Assists in financial planning for disasters.
- Assist in defining appropriate prevention and mitigation measures; locate investments in safe areas.

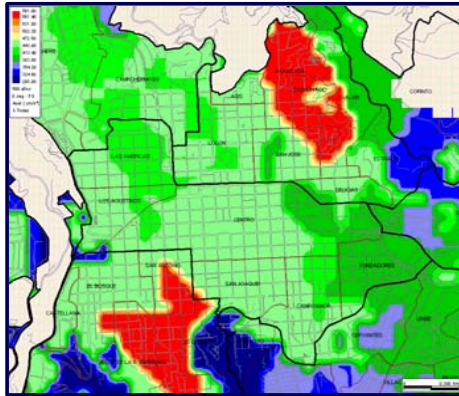
Indicators System of Disaster Risk and Risk Management IDB – UNC/IDEA

- DDI : Disaster Deficit Index
- LDI : Local Disaster Index
- PVI : Prevalent Vulnerability Index
- RMI : Risk Management Index

Disaster Deficit Index - DDI

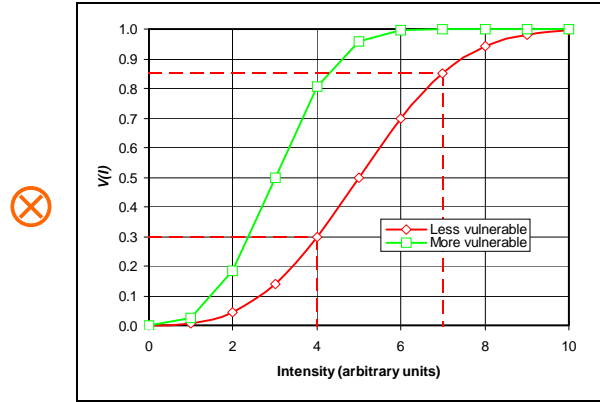
- Represents risk from a macroeconomic and financial perspective in case of possible catastrophic events. This requires an estimation of the critical impact during a given exposure time and the financial ability to cope such situation.

Hazard



Expected Intensity for the MCE

Vulnerability



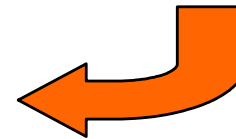
Damage functions for exposed goods

Risk



Potential damages x Economic value

$$DDI = \frac{MCE\ loss}{Economic\ Resilience}$$



Description	Indicators
Insurance and reinsurance payments	F_1^P
Reserve funds for disasters	F_2^P
Aid and donations	F_3^P
New taxes	F_4^P
Budgetary reallocations	F_5^P
External credit	F_6^P
Internal credit	F_7^P

Disaster Deficit Index - DDI

$$DDI = \frac{MCE \text{ loss}}{Economic \text{ Resilience}}$$

$$DDI = \frac{L_R^P}{R_E^P} \left\{ \begin{array}{l} L_R^P = \varphi L_R \\ L_R = EV(I_R F_S) K \\ R_E^P = \sum_{i=1}^n F_i^P \end{array} \right.$$

ΣF_i^P : Possible Internal and External Funds

- F_1^P , insurance and reinsurance payments,
- F_2^P , availability in funds for disasters
- F_3^P , aids and donations,
- F_4^P , possibility of new taxes,
- F_5^P , margin of budgetary reallocations,
- F_6^P , potential external credit,
- F_7^P , potential internal credit.

Disaster Deficit Index '

$$IDD' = \frac{\textit{Average Annual Loss}}{\textit{Capital Expenditure}}$$

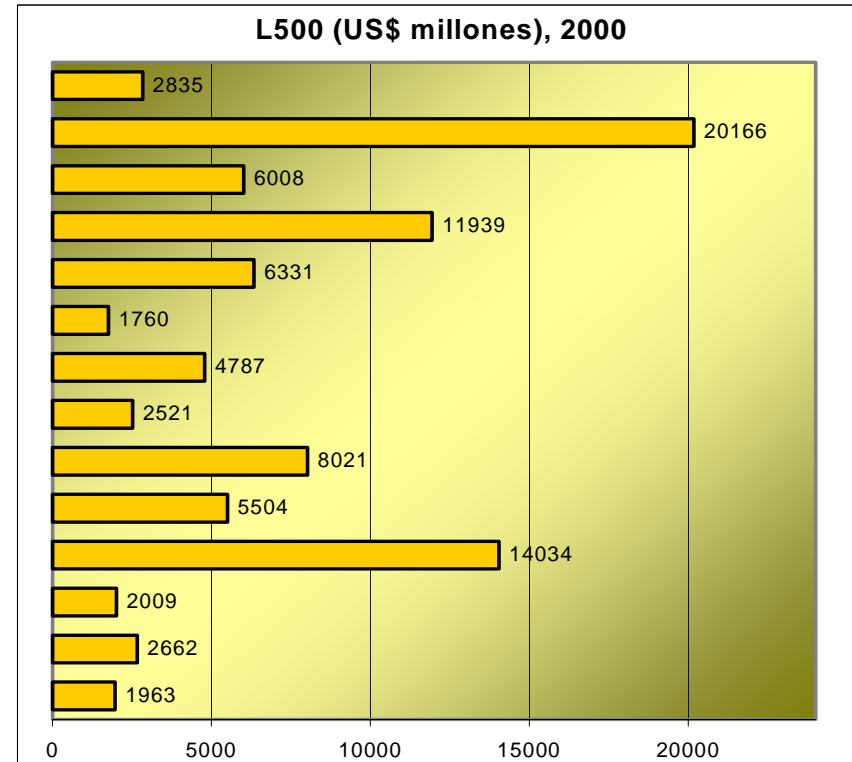
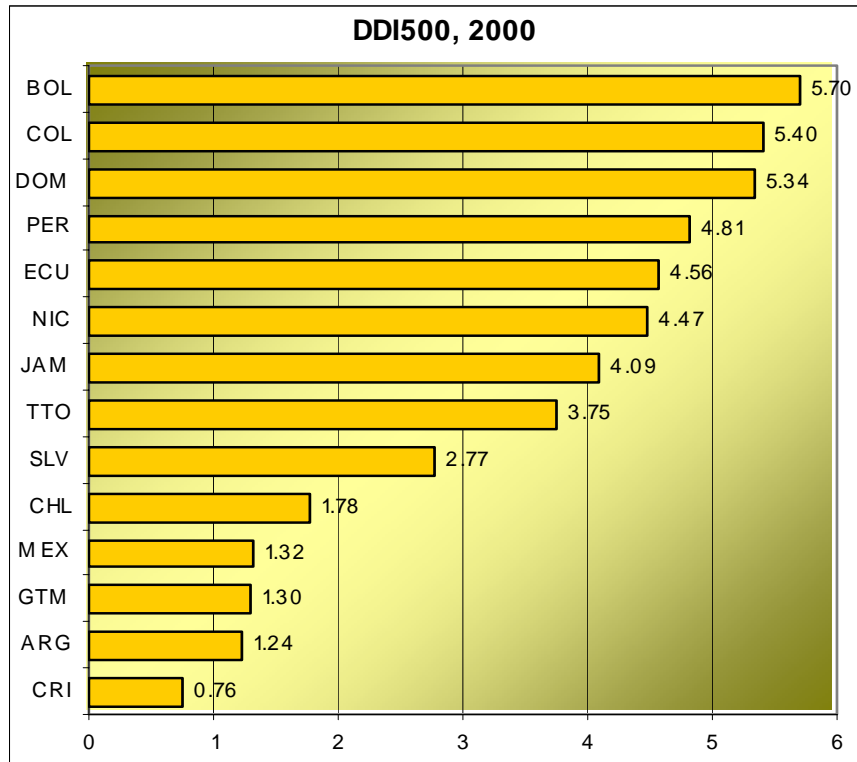
$$IDD' = \frac{L_y^P}{E_C^P}$$

... the portion of the investment which could be comprise the annual payment for future disasters.

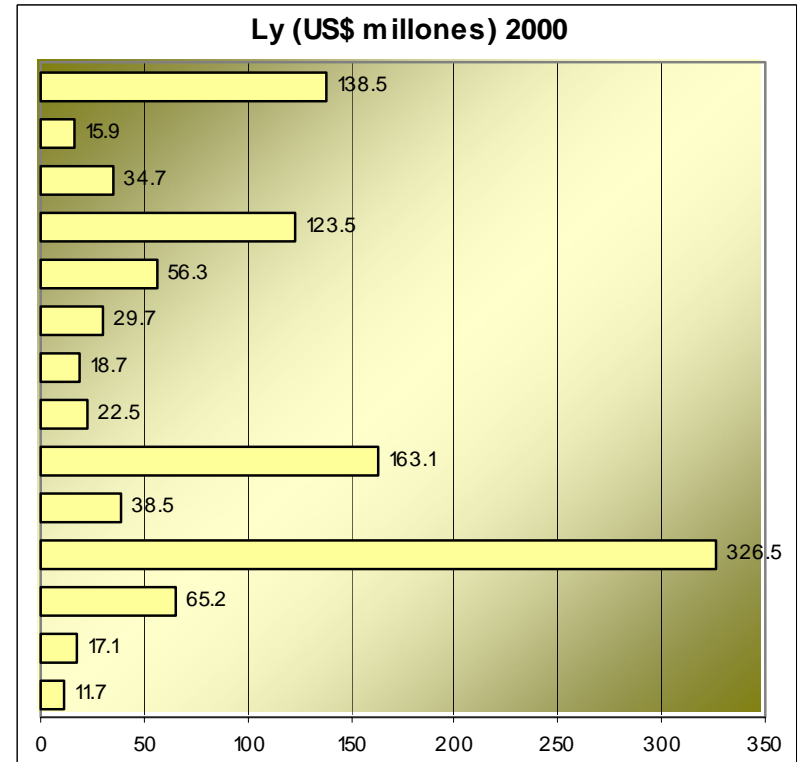
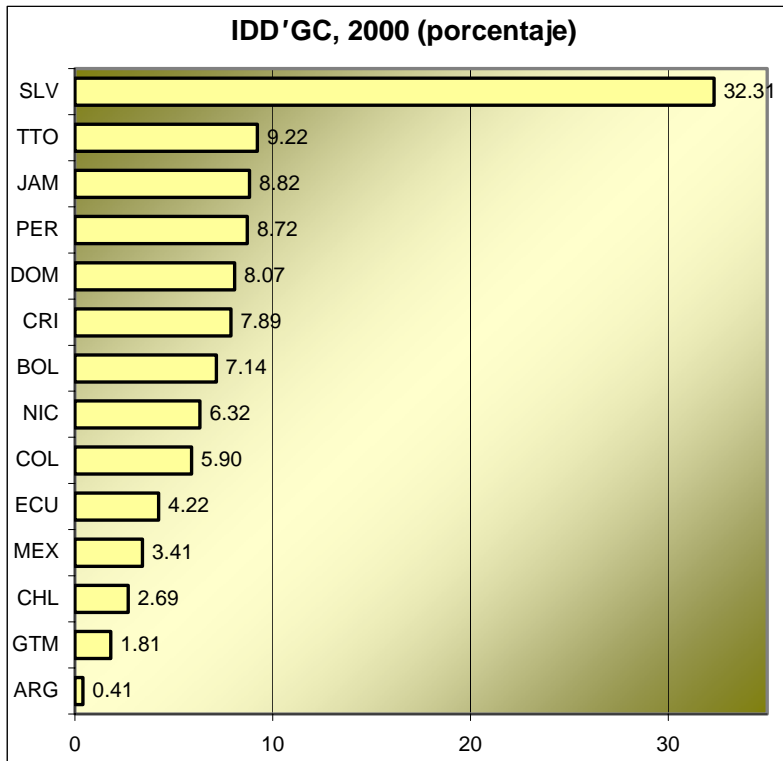
Meaning and possible actions...

- DDI > 1.0 means economic incapacity to cope extreme disasters. As greater DDI, greater gap. If constrictions for additional debt exist, this situation implies impossibility to recover.
- Economic, financial and planning analysts can evaluate the budget problem and the need to take into account these figures in the financial planning.
- It is evident the need to invest in the physical vulnerability reduction to reduce the potential losses. Property insurance, reserve funds strengthening and the need to negotiate contingency credits are supported to improve resilience.

Results for Latin-American and Caribbean Countries



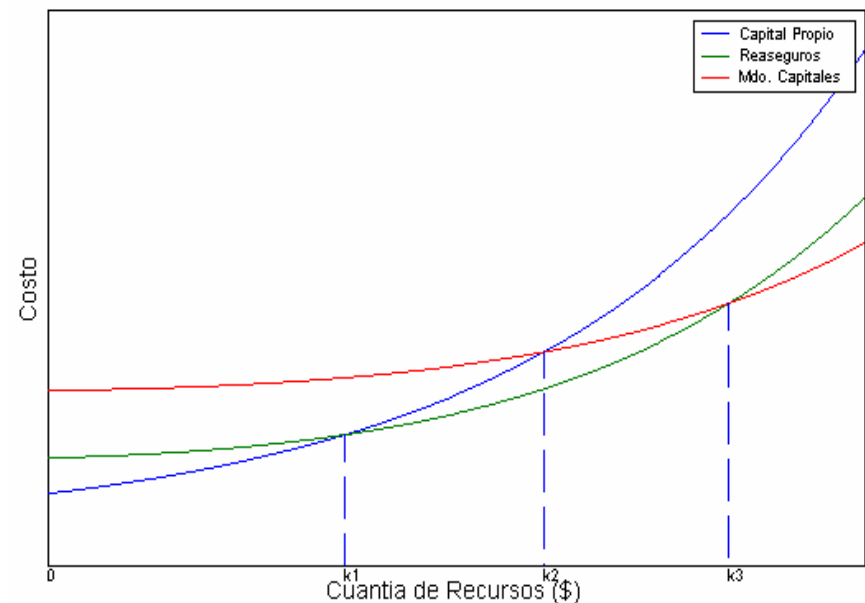
Results for Latin-American and Caribbean Countries



Evaluation of Alternatives

- Reserve funds, insurance and reinsurance and capital market

INSURANCE / REINSURANCE
CAT BONDS
CONTINGENT SURPLUS NOTES
SECURITIES
HEDGES
CAT SWAPS
CLIMATE DERIVATIVES
CONTINGENCY LOANDS



Conclusions

- The Disaster Deficit Index provides a simple way of measuring a country's fiscal exposure or vulnerability and the implicit contingency liabilities for the sovereign states in case of extreme disasters.
- This allows national decision makers to measure the budgetary implications of hazard extreme events and highlight the importance of including this type of information in financial and budgetary processes.

Thank you!