A Feasibility Study on the use of Structural Mitigation to reduce the Economic Vulnerability of Caribbean SIDS to Natural Disasters

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CONTENT

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Overview of Master's Thesis

- Title:

Alexander, J. (2007) 'Ex ante Financing Strategies for Disaster Risk Management in Caribbean Economies: The Case of Grenada and Hurricane Ivan'

Overview of Master's Thesis

- **Ex ante** financing vs. **Ex post** Financing Strategies for Disaster Risk Management
- Total Damage Costs (Direct & Indirect)
- Total Cost of Loans (Inclusive of interest payments)
- Total Aid Flows and Grants

FINANCING STRATEGIES FOR DISASTER RISK MANAGEMENT

Ex ante Financing Strategies

1. **Catastrophe Funds**
2. Insurance
3. **Mitigation**
4. Contingent Credit
5. **Catastrophe Bonds**
6. Weather Derivatives
7. Catastrophe Surplus notes
8. Catastrophe Equity puts
9. Catastrophe Swaps
10. Exchange Trade Cat. Opt.

Ex post Financing Strategies

1. Loan Diversion
2. Central Bank Loans
3. Budget Re-allocation
4. Increased Taxation
5. International Aid
6. External Debt

GRENADA AND HURRICANE IVAN

TOTAL DAMAGE AND INDIRECT COSTS	**US$ 952M**
Total Direct Damage to 12 Sectors	812
Total Indirect Damage to 12 Sectors	100
Total Costs of Loans	40
TOTAL AID FLOWS	**US$ 67.35M**
RESOURCE GAP	**US$ 884.65M**

Source: OECS (2004)

THREE EX ANTE FINANCING STRATEGIES

- Three Scenarios examples for Grenada and Hurricane Ivan (September 7, 2004):

  1. Investment in Structural Mitigation;
  2. Catastrophe Fund and
  3. Issuance of a Catastrophe Bond.

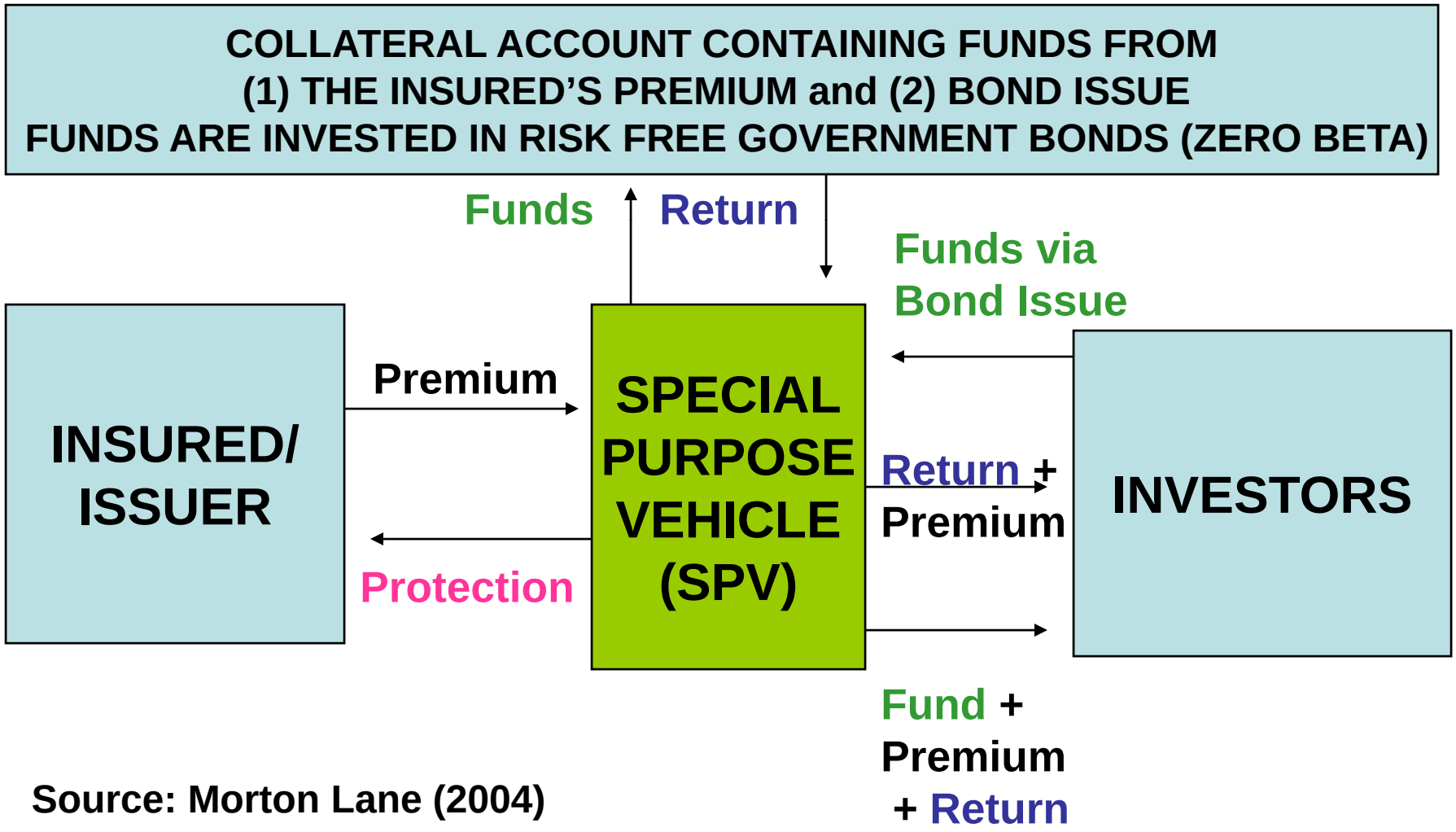
SCENARIO 1: MITIGATION

- U.S. Federal Emergency and Management Authority:

  $1.00 spent on Mitigation saves $2.00 in recovery and response.

Annual Expenditure on Mitigation (since 1990)	US$ 1M
Total Expenditure on Mitigation (1990-2004)	US$ 13M
Total Savings	US$ 26M
New Resource Gap	US$ 859M
Actual Resource Gap	US$ 885M

CATASTROPHE BOND STRUCTURE



Source: Morton Lane (2004)

SCENARIO 2: CATASTROPHE BOND

CATASTROPHE BOND

Insured/Issuer: Government of Grenada

Special Purpose Vehicle: Swiss Re

Issue Date: January 1st, 2001

Maturity Date: December 31st, 2006

Initial Payment: US$200M

Coupon: 3 month LIBOR + 6.75%

Coverage type: Parametric

Peril: Category 3 Hurricane

Rating: BB+ (Standard and Poors)

Premium: RANGE US$5m TO US$16m

Risk Assessment Firm: NOAA

CATASTROPHE BOND PRICING

Assumption: There exists a 1 in 100 years probability that a Category 3 Hurricane will strike. (All bond issues to date were based on this fact.)

Rule of thumb:

Premiums range from 2.5 to 8 times expected annual loss. *(Guy Carpenter, 2005)*

Maximum Coverage= US$200m

Annual Expected Loss= US$200m/100yrs.

= US$2m

Issuer/Insured Premium Range= US$5m to US$16m

CATASTROPHE BOND ANALYSIS

BEST CASE SCENARIO	WORST CASE SCENARIO
Total Premium= US$15m	Total Premium= US$24m
Funds Available=US$200m	Funds Available=US$200m
New Resource Gap= US$685m	New Resource Gap= US$685m
Initial Resource Gap= US$885m	Initial Resource Gap= US$885m

SCENARIO 3: CATASTROPHE FUND

CATASTROPHE FUND

National Reconstruction Levy is expected to raise EC$10.5m or US$4m in Revenues. (*Grenada's 2006 Budget Speech*)

Assume: The Government of Grenada had a Nation Reconstruction Levy that raised US$1m annually since 1990 then the total value of the fund as at 2004 would have been US$18.88m (If it was invested at 6% in a financial institution)

CONCLUSIONS

- Investment in Structural Mitigation, Catastrophe Bonds and Catastrophe Funds could be very appropriate ex ante financing strategies for disaster risk reduction in the Caribbean.

- The ***Disaster Syndrome*** ought to be removed from the minds of all citizens in the Caribbean.

- Government Education activities and fiscal incentives can help to reduce the ***Resources Gaps*** caused by disasters and the ***Disaster Syndrome.***

CURRENT RESEARCH

- Title:

Alexander, J. (2008) 'A Feasibility Study on the use of Structural Mitigation to reduce the Economic Vulnerability of Caribbean SIDS to Natural Disasters'

RATIONALE

- To highlight the feasibility of structural mitigation as a **major tool** for reducing the Economic Vulnerability of Caribbean SIDS; and

- To **reduce** the rising costs and total number of person affected by disasters.

OBJECTIVES

- Review the Literature on Economic Vulnerability and specifically, Structural Mitigation;
- To illustrate the Feasibility/Costs and Benefits of Structural Mitigation; and
- To inform policy makers and Governments about incentives to induce economic actors to engage in structural mitigation.

DISASTER MITIGATION AND VULNERABILITY NEXUS

- Van Howell (2006) states that:

  '…increased economic vulnerability requires that natural disaster mitigation strategies be at the heart of planning/development of new and existing construction.'

- Rose (2004) acknowledges that *'mitigation can reduce vulnerability to natural disasters.'*

STUCTURAL MITIGATION

- Structural activities, done prior to a disaster, to reduce the devastating impacts caused to human life and infrastructure. (Freeman et al. 2003)

- Godschalk et al. (1999) structural mitigation includes the strengthening of buildings and infrastructure exposed to hazards by a variety of means (building codes, engineering design and construction practice)

ECONOMIC VULNERABILITY

- **McEntire (2001) :**

  Failure to purchase Insurance;

  Limited resources for disaster prevention, planning and management.

- **Hemming and Petrie (2000):**

  Economic vulnerability = Fiscal vulnerability

  (inability of a government to achieve any of the three main macro-fiscal objectives of fiscal policy at the aggregate, sectoral and program levels)

ECONOMIC VULNERABILITY

- **Briguglio (2002) :**

Economic openness

Export concentration

Import dependence

Peripherality

FEASIBILITY OF STRUCTURAL MITIGATION

- **BENEFITS OF MITIGATION STRATEGIES:**

1. Minimal property damage
2. Minimal inventory damage
3. Minimal loss of working days/productive time
4. Low emergency response costs
5. Reduction in the incidence of injuries
6. Reduced loss of life.
7. Increase sense of company strength
8. Reduced potential of low employee morale
9. Increased property value
10. Lower insurance premiums (if deductibles are increased)
11. Reduced potential of low employee morale

FEASIBILITY OF STRUCTURAL MITIGATION

- **COST OF MITIGATION STRATEGIES:**

1. Complete destruction
2. Complete loss
3. Extended Shutdown
4. High emergency response costs
5. Initial construction cost
6. Maintenance cost (net present value of)7.
7. Environmental Damage (in the case of flood mitigation that involves floodwalls, levees and modifying river channels.)
8. Loss of wetlands (in the case of flood mitigation that involves floodwalls, levees and modifying river channels.)
9. Loss of animal habitat (in the case of flood mitigation that involves floodwalls, levees and modifying river channels.)

FEASIBILITY STUDIES

- Hurricane Ivan (Grenada);
- St. Mark Secondary School (Grenada)
- Deepwater Port (Dominica)
- Manley Library (Jamaica)
- Grand Palazzo Hotel (St. Thomas)

FEASIBILITY STUDIES

- Houses (US)
- Des Moines Water Works (U.S.)
- Olive View Medical Centre (U.S.)

CONCLUSIONS

- Structural Mitigation is not an option for Caribbean SIDS;
- The Benefits of Structural Mitigation outweigh the Cost, making it very appropriate;
- Investments in Structural Mitigation in the pre-disaster period signal a more prudent use of resources in for financing natural disasters;
- Recommend tax breaks to middle income households; tax holidays and reduced corporation taxes for businesses to engage in Structural Mitigation works.

WAY FORWARD

COMPREHENSIVE STUDY ON

“FEASIBLE STRUCTURAL MITIGATION MEASURES FOR CARIBBEAN SIDS”

- Identification of specific structural mitigation measures (i.e. local labour and local materials) for the poor in Caribbean SIDS;
- Economic Appraisal of these measures; and
- Analysis of the attitudes of the poor, other individuals and firms to structural mitigation measures in Caribbean SIDS.

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THE END

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