Agenda for today

9:00 – 9:25
• Introduction to DRFIP

9:25 – 10:30
• Block 1: An Introduction to DRFI Analytics & Case Studies

10:30 – 10:45 Coffee Break

10:45 – 12:00
• Block 2: Risk Metrics & Monte Carlo Simulation. A country case study (part 1)

12:00 – 13:00 Lunch

13:00 – 14:30
• Block 2: Risk Metrics & Monte Carlo Simulation. A country case study (part 2)

14:30 – 14:45 Coffee Break

14:45 – 16:00
• Block 3: Study case: risk metrics applied to six Central American’s countries
Training on concepts and terminology for analytics related to disaster risk finance and insurance

Introduction

Olivier Mahul
Global Lead and Program Manager
Disaster Risk Financing & Insurance Program
World Bank
## Disaster Risk Finance within the Disaster Risk Management Framework

<table>
<thead>
<tr>
<th>Pillar</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Risk Identification</td>
<td>Improved identification and understanding of disaster risks through building capacity for assessments and analysis</td>
</tr>
<tr>
<td>2: Risk Reduction</td>
<td>Avoided creation of new risks and reduced risks in society through greater disaster risk consideration in policy and investment</td>
</tr>
<tr>
<td>3: Preparedness</td>
<td>Improved capacity to manage crises through developing forecasting and disaster management capacities</td>
</tr>
<tr>
<td>4: Financial Protection</td>
<td>Increased financial resilience of governments, private sector and households through financial protection strategies</td>
</tr>
<tr>
<td>5: Resilient Recovery</td>
<td>Quicker, more resilient recovery through support for reconstruction planning</td>
</tr>
</tbody>
</table>
Disaster Risk Financing and Insurance Program
A joint program between WBG and GFDRR

DRFIP development objective to increase financial resilience of the countries through minimizing the cost and optimizing the timing of meeting post-disaster funding.
To achieve this objective, DRFIP provides the countries with Analytical & Advisory Services, Financial Services and Convening Services on Disaster Risk Finance.

Governments
- DRF for Rapid Response Financing
- DRF for Budget Protection
- DRF for Resilient Livelihood
- DRF for Agriculture

The Poorest
- Farmers and Herders

Homeowners and SMEs
- DRF for Property Cat Insurance

DRF Analytics for Informed Financial Decision Making

DRF KM and Global Partnerships
DRF Operational Framework

Assess Risks

1. Assess and quantify financial risks related to natural disasters
2. Define and measure contingent liabilities related to natural disasters

Pre-Disaster

Reduce Financial Risk

1. Reduce public contingent liability
2. Integrate risk information into public investments
3. Promote insurance of public assets
4. Promote domestic private catastrophe risk insurance markets

Secure Funding

1. Integrate disaster risk into fiscal risk management and public financial management
2. Improve post-disaster budget response capacity
3. Leverage market-based risk transfer solutions
4. Enhance post-disaster financial assistance

Execute and Monitor Funding

1. Establish effective administrative systems for post-disaster approval, transfer and monitoring of funds

Post-Disaster

International Assistance

- Sovereign Risk Transfer (e.g., Cat Bond/Cat Swap, (re)insurance)
- Insurance of Public Assets
- Contingent Credit Lines
- Post Disaster Credit
- Government Reserves, Contingency Budget / Funds
- Emergency Funding
- Reconstruction

Understanding Risk Forum 2016

DISASTER RISK FINANCING AND INSURANCE PROGRAM (DRFIP)

GFDRR
WORLD BANK GROUP
DRFIP – Operational Engagement Worldwide
DRFIP is active in more than 50 countries

**THE PHILIPPINES**
- DRFIP Strategy, Local Disaster Resilience Insurance Fund, sovereign risk transfer

**COLOMBIA**
- DRFIP Strategy, insurance of public assets and concessions

**MEXICO**
- DRM fund FONDEN, catastrophe bond

**CCRIF**
- Caribbean Catastrophe Risk Insurance Facility

**SERBIA**
- DRFIP strategy
- DRM Fund

**INDIA**
- State DRFIP strategy
- Crop insurance

**MOZAMBIQUE**
- DRM funds
- Crop insurance

**UGANDA**
- Disaster risk finance component for social protection fund

**KENYA**
- Crop and livestock insurance

**MOROCCO**
- Property cat risk insurance program

**MOROCCO**
- Property cat risk insurance program

**VIETNAM**
- DRM Fund, insurance of public assets

**PCRAFI**
- Pacific Catastrophe Risk Assessment and Financing Initiative
Disaster Risk Financing and Insurance Program
Strong partnerships with GFDRR and donor partners

DRF for MIDDLE INCOME COUNTRIES
Support Middle-Income Countries to become proactive risk managers to meet the cost of disasters and climate shocks.

Dr. H. S. H. K. M. S. N. S. T. U. K. A. I. D. G. F. D. R.
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

DRF for AFRICA
Support African countries to manage the financial impact from disasters as part of building their overall resilience to climate and disaster shocks.

DRF for RESILIENT LIVELIHOODS
Support governments to integrate social protection schemes in their DRF strategy to offer rapid and timely assistance to vulnerable households affected by shocks.

DRF for MIDDLE INCOME COUNTRIES
DRF for AFRICA

DRF for GLOBAL POLICY, KNOWLEDGE & TRAINING
Leverage the WBGs convening power to invest in policy advice and knowledge management to support policy reforms and financial instruments.

DRF for SMALL ISLAND STATES
Support SIDS to strengthen their financial resilience as part of the broader disaster risk management and climate change adaptation agenda.

DRF for ASIA
Support Asian countries to manage the financial impact from disasters as part of building their overall resilience to climate and disaster shocks.

DRF for AGRICULTURE
Support countries to implement sustainable, cost-effective public-private partnerships in agricultural insurance as part of broader agricultural risk.

DRF for AFRICA

DRF for AFRICA

DRF for GLOBAL POLICY, KNOWLEDGE & TRAINING

DRF for ASIA

DRF for AGRICULTURE

DRF for SMALL ISLAND STATES

DRF for ASIA

DRF for AGRICULTURE

DRF for SMALL ISLAND STATES

DRF for ASIA

DRF for AGRICULTURE
DRF Analytics – Closing the Gap

Actuarial analysis bridges the gap between risk data and evidence based decision making.

- DRF analytics help analyze and evaluate risk and capacitate decision makers to better manage and prioritize risk.
- DRF analytics have supported WB client dialogue on financial resilience; but need to move to a structured approach for analytics.
Training on concepts and terminology for analytics related to disaster risk finance and insurance

Block 1: An Introduction to DRFI Analytics & Case Studies

José Ángel Villalobos, Barry Maher and Darío Bacchini
Block 1: An Introduction to DRFI Analytics & Case Studies

Agenda

9:25 – 9:40
• Introduction to DRFI Analytics

9:40 – 10:30
• Three Case Studies
Disaster Risk Financing Analytics
Objective of DRFI Analytics

To help governments and other users of Disaster Risk Finance information

• **Understand** their financial risk related to natural disasters;
• Employ efficient **financial/actuarial analysis** in the development of DRF strategies;
• Improved **financial capacity** to meet financial needs immediately following natural disasters; and
• Increased capacity to **monitor and evaluate** DRF strategies.
Users of Analytics

• The DRFIP analytics function applies expertise in actuarial and probabilistic catastrophe risk modelling, and economic analysis to increase capacity of stakeholders to take informed decisions on DRF based on sound financial analysis. Users include:

  • Client governments
  • Donors
  • Regulatory Bodies
  • Insurance Companies
Process for analytics development
Actuarial Control Cycle

- Develop DRF strategy
- Crop subsidies
- Cost of scalability mechanism
- Design risk transfer solution

Specify the problem

- Assess assumptions
- Update input data
- Adjust tool

Develop solution

- Design model
- Inputs:
  - Loss Distn
  - Parameters
  - Eco. Assumptions
  - Target pop.
- Outputs:
  - Historical payouts
  - Indicative pricing
  - Cost of DRM strategy
  - CBA

Monitor progress
Process for analytics development
Interdisciplinary approach is critical
Process for analytics development
Interdisciplinary approach is critical

- **Hazard** – how peril could affect region and/or economic sector
  - Earthquakes (Seismologists, engineers, etc.); Drought (Meteorologists, Agronomists, etc.); Flood (Meteorologists, Engineers, Agronomists, etc.)

- **Exposure** – what are the key assets
  - Crowd sourced / street mapped / insurance industry / government asset data

- **Vulnerability**
  - Engineers (buildings), Agronomists (crops), Economists (economy)

- **Result**: Obtain “Loss Distributions” or “Impact Assessment”
DRFIP analytics delivered to date

<table>
<thead>
<tr>
<th>Disaster Risk Finance Analytics for:</th>
<th>Analytics Tool/Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sovereign</td>
<td>Cost Benefit Analysis</td>
</tr>
<tr>
<td>Sovereign</td>
<td>Risk Transfer Pool Analytics</td>
</tr>
<tr>
<td>Sovereign</td>
<td>Insurance Decision Making Tool</td>
</tr>
<tr>
<td>Sovereign</td>
<td>CAT in a Box Tool</td>
</tr>
<tr>
<td>Sovereign</td>
<td>Ad-hoc analytics</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Agricultural Insurance Fiscal Costing and Product Design Tool</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Agricultural Insurance Economic Impact Analytics</td>
</tr>
<tr>
<td>Social Protection</td>
<td>Social Protection Scale-Up Design and Financing Tool</td>
</tr>
<tr>
<td>Social Protection</td>
<td>Cost Benefit Analysis Framework</td>
</tr>
<tr>
<td>Property catastrophe insurance</td>
<td>Insurance Decision Making Tool and other ad-hoc analytics.</td>
</tr>
</tbody>
</table>
DRF Analytics Case Studies
Central America: expansion of CCRIF
DRF Analytics Case Studies
Uruguay: risk management on energy sector
Uruguay: DRM on electricity sector
The problem and the strategy

- Drought
- Poor hydropower generation
  - Thermal generation
  - Imports

Higher Costs to meet demand
Fiscal Impact

Renewable energies (long term)
Financial Strategy (in the transition)
Uruguay: DRM on electricity sector

• Partnership with Macroeconomics and Fiscal Management Global Practice to support Uruguay to strengthen resilience to drought.

• Universidad de la República Oriental del Uruguay developed an open-source software, SimSEE, which optimizes and simulates key variable related to Energy Sector.

• DRFI assessed, through a stochastic model, the financial risk that UTE faces due to an increase in the cost of meeting the electricity demand.

• Risk Management: change in Electricity Matrix (renewable)
Uruguay: DRF on electricity sector
Financial Strategy (in the transition)

• Weather and Oil Price Insurance:
  • to cover the risk of high oil prices and insufficient rainfall

• Energy Stabilization Fund (FEE, in Spanish)
  • The rules of contributions and withdrawals of the FEE depend on the actual vs expected hydroelectric generation, and are regulated by Decree 305/2014.

• Contingent Investment Project Finance (CIPF)
  • Is aimed to be used in case a drought increases the costs of UTE.
  • The disbursement is triggered when the FEE’s balance falls below a pre-specified trigger and a drought is in course.

• Cash Reserves
  • Available at the start of each year with money from UTE’s day-to-day operations
Uruguay: Dynamic Financial Analysis

Inputs

- Simulations from SimSEE
- Initial Balance of the FEE
- Wording of the Weather and Oil Price Insurance
- Contingent Loan specifications (2016 to 2018)
- Amount of the Cash Reserve
Uruguay: Dynamic Financial Analysis
Some outputs

Evolution of:
- Target Value of Fund Coverage (VOCF, in Spanish)
- Expected Value of FEE
Uruguay: Dynamic Financial Analysis

Some outputs

- Amount that should be contributed by the Government (95% Confidence Level)
DRF Analytics Case Studies
Kenya: Hunger Safety Net Program
Hunger Safety Net Programme

- HSNP Phase 2 (2013-17): Operates in 4 poorest Counties in Kenya providing up to 100K HHs (Group 1) regular, unconditional electronic cash transfers ($25 a month)
- Designed to scale up and down in response to weather shocks (e.g. drought/ El Nino), an extra ~300K HHs eligible for emergency CTs (Group 2)
- Approx. 95% of HHs in 4 counties were voluntarily registered, ~60% of beneficiaries are women
- Payments are electronic, directly into fully functioning bank accounts using biometric and pin enabled bank cards via banking agent network
A DRF ‘decision making’ tool was developed to support the decision making process for financing HSNP scalability

REQUIREMENTS FOR SCALABILITY (THE PROBLEM):

1. Ongoing social protection systems
2. Early warning / data systems
3. Safety net has capacity to absorb additional resources
4. Risk financing strategies
   1. How much
   2. How to finance

THE SOLUTION:

- Developed user friendly Tool to support policy dialog in providing financial analysis surrounding these questions
- Output from Tool used to help decide how to fund costs and how scarce resources can be allocated optimally
DRF Tool/ Solution for SSN Challenge

Tool Inputs
- Scale Up Strategy
- Historical Drought Data
- Household Data

Analytics Tool

Quantitative Outputs
- Average Scale Up Costs
- Historical Scale Up Costs
- Risk Financing Output
- Monthly scenario analysis
The user interface of the DRF Tool was kept simple and intuitive to support capacity building efforts.

<table>
<thead>
<tr>
<th>INPUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Exchange Rate (enter rate)</strong></td>
</tr>
<tr>
<td>Currency: USD</td>
</tr>
<tr>
<td>Exchange Rate: KSh to USD/GBP: 91.64</td>
</tr>
<tr>
<td><strong>2. Geographical Coverage (on/off option)</strong></td>
</tr>
<tr>
<td>Mandera: Yes, Marsabit: No, Turkana: Yes, Wajir: Yes</td>
</tr>
<tr>
<td><strong>3. Scale Type (select one trigger or two triggers)</strong></td>
</tr>
<tr>
<td>Choose: Severe and Extreme</td>
</tr>
<tr>
<td><strong>4. Population Coverage (input scale out percentage)</strong></td>
</tr>
<tr>
<td>Routine Households: 27%, First Scale Out: 50%, Second Scale Out: 75%</td>
</tr>
<tr>
<td><strong>5. Transfer Amount per Household (input number for monthly payout amount)</strong></td>
</tr>
<tr>
<td>Routine Households (Core Case Load) [Total Transfer Amount]</td>
</tr>
<tr>
<td>First Scale Out Additional Households: $27, $27, $50</td>
</tr>
<tr>
<td>Second Scale Out Additional Households: $50</td>
</tr>
<tr>
<td><strong>6. HSNP Triggers (input values)</strong></td>
</tr>
<tr>
<td>Set Triggers</td>
</tr>
<tr>
<td>First Trigger: 20, Second Trigger: 20</td>
</tr>
<tr>
<td><strong>7. Payout subject to bank account cap (select)</strong></td>
</tr>
<tr>
<td>Choose: Yes</td>
</tr>
</tbody>
</table>

DISASTER RISK FINANCING AND INSURANCE PROGRAM (DRFIP)
The DRF Tool produced outputs that helped GoK assess the entered scalability design, and select one which is optimal.
The DRF Tool also produced indicative analysis on different financial instruments to manage the cost.
The HSNP successfully scaled up in April 2015 in response to drought in Northern Kenya

Scalability Strategy Design:
- Counties in **serve drought**: payouts to **50% of households**
- Counties in **extreme drought**: payouts to **75% of households**
- Monthly payout per household is the same as current routine payout (KSH 2450 per month, approx. **US$26 per month**)
- No extra funds to routine HSNP households

The Results:
- Jan/Feb/Mar scale up payouts cost approx. **USD 4.5 million**
- Payout **funded by DFID** who have been a key partner in the design, development and operation of the HSNP
Key Takeaways

1. Tool enabled GoK to meet one requirement of scalability
2. The Tool enabled GoK to ‘monetize’ policy decisions
   - Understand trade offs
   - Shaped the policy dialogue on scalability design
3. The Tools and results provide inputs into the discussion, but are not a silver bullet
   - Implications of operationalizing a program
   - Political implications of decisions