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**CLIMATE RISK
MANAGEMENT FOR
THE COFFEE INDUSTRY**

October, 2009

Overview

The coffee industry of Jamaica represents one of the largest earners of foreign exchange, approximately US\$30 million in 2008. However, coffee production has faced many extreme weather events during the past years, principally hurricanes, which have destabilized the industry due to declining productivity and crop damage. Due to the increased frequency of weather events that have affected not only the coffee industry but agriculture in general, the GOJ has approached the World Bank and other donors for assistance in designing financial protection for agriculture. In 2008, the World Bank approved a *Non-Lending Technical Assistance Program for the Caribbean, financed in part by the European Union AAACP funds*.

At the request of the Ministry of Agriculture (MOA) of Jamaica, the World Bank supported the preparation of a Weather Risk Management Strategy for the Agriculture sector of Jamaica and began to assess the technical options to provide assistance to the Jamaican Coffee Industry Board (CIB) for the design and implementation of a financial market-based mechanism to transfer weather risks to the international market. The World Bank has agreed to provide technical assistance to CIB in the form of: (i) weather risk layering, (ii) risk qualification, (iii) structuring a weather insurance product, (iv) reinsurance negotiations, and (v) the design of delivery channels for premium collection and payouts.

If the weather risk transfer mechanism is deemed feasible and eventually implemented, the following outcomes are expected to be achieved: (i) avoiding income losses to coffee farmers in case of adverse systematic climate shock by having an agriculture insurance mechanism; and (ii) improve the efficiency and effectiveness of CIB emergency response to coffee farmers in case of a natural disaster by adopting a transparent and fast paying indemnity payment mechanism.

Learning from past experiences.

Hurricane Gilbert showed the great need for crop insurance in the coffee industry. Post Gilbert recovery was achieved thanks to funds from the Coffee Development Project. Between 1992 and May 2006, the industry benefited from a multi peril insurance program managed by the Trustees of Insurance Fund, which involved Munich Re, Swiss Re, and other reinsurers.¹ After Hurricane Ivan devastated Jamaica and triggered many claims against the Trust, the claim management process failed, resulting in claims totaling 110% of the sum insured. The loss adjustment process was lengthy, costly, and contentious. One of the major constraints with that insurance program was that the insurance policy was based on aggregate production shortfalls and there were significant differences between the real coverage and that stated in the insurance policy. This meant that claim response was not properly defined, and the farmers did not understand the basis of the insurance that was provided to them. Furthermore, farmers themselves had to assess their own production losses after a disaster with no technical support. This meant that it was difficult for CIB to adjust for real losses and verify claims. Considerable efforts were made after a hurricane in November 2001 to implement an improved farmer registration system and adjusting the sum insured based on a 3 year rolling average production per farmer. However, even with these improvements, mobilizing individual

¹ The CIB collected premiums through factories, and operated an insurance scheme based on field loss assessment, acting as an unregulated insurer. The insurance scheme suffered from many structural and operational difficulties.

farmers for undertaking field loss adjustments after a natural disaster proved very difficult due to logistics disruptions, number of claims, and difficulties in measuring damages to the coffee crop.

In August 2005, Swiss Re and the local insurance companies withdrew from the program. In May 2006, Munich Re, the largest and most influential reinsurer announced their withdrawal. Several reasons led to that decision: (i) adverse selection problems; (ii) lack of clarity about who was and was not insured; (iii) the unclear legal position of the Trust as an insurer; (iv) the absence of a strong local partner to handle the technical and administrative challenges of managing an insurance scheme; and (v) a history of inaccuracy and failure of technical control and transparency. At present, there is no insurance or risk transfer mechanism in place for the coffee industry. CIB's objective is to financially manage weather risks through crop insurance or delivery of post-disaster mitigation assistance jointly with the Ministry of Agriculture. The current situation, however, presents an opportunity to introduce a new insurance product that may be more responsive to the needs of the Jamaican coffee growers and that can regain the confidence of the reinsurance market in the sector.

Aware of the past technical constraints with the insurance scheme and the unhappiness of farmers about the way coffee crop insurance was managed, CIB realized that a new program structure had to be designed addressing those concerns. CIB and the

Trustees believe that some characteristics of the previous program can be incorporated in the future, but that the previous experience reveals that an indemnity based, individual-farmer, and traditional crop insurance program is not feasible for the coffee industry.

Suggested Pilot Insurance Project: Location and Technical Challenges.

The Coffee Industry Board suggested that the financial market-based mechanism should be implemented in the Blue Mountain (BM) region, which given its specialization, higher marketed values, and export orientation, differs tremendously in comparison with the Lowland or Non-Blue Mountain (NBM) area. This meant that any risk transfer instrument for BM coffee farmers would need to be more commercially oriented and market based. An aggregated catastrophe-type coverage with public support would be more suitable for the NBM farmers.

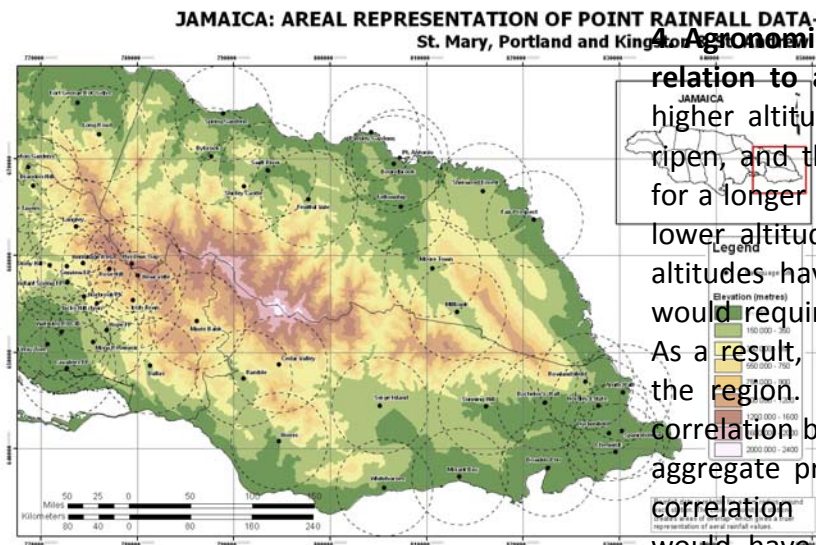
On the other hand, the design of a parametric insurance product in the Blue Mountains is technically challenging because of the following reasons:

1. There are no wind gauges in the Blue Mountain area, for pricing and contract monitoring. The meteorological data available in the BM area is very limited, and the existing stations are located in the western part of the island. The initial assessment shows that detailed technical analysis based on existing rainfall gauges might be enough to capture rainfall events for parts of the BM area. However, even though risk modeling techniques could simulate wind and expected recurrence of

wind speeds using existing wind historic from hurricane modeling (satellite imagery), in the future, under an insurance scheme, there will be a need for the installation of new wind and rain gauges in the BM coffee region. This weather data infrastructure would help to trigger payments once the insurance contracts are in place.

2. There is a need for a practical financial arrangement that can help to overcome the financing gap problem that farmers face, which deals with the lack of liquidity at the moment the premiums are due. It is hard for farmers to pay premiums in advance because they do not have liquidity at the moment premiums are due. This can be solved, as was done in the past, via a cess deduction per box of coffee cherries collected by CIB. In other words, the insurance premiums could be deducted from the farmer's product delivery from the previous harvest.. However, another problem is that farmers deliver coffee berries to different dealers and factories, and that makes the collection of premiums more complex. In any case, CIB and factories would need to secure premium insurance payments by June from farmers, banks, government, and/or donors.

Map 1. Location of rain gauge stations in BM and 5km radius.



Source: Jamaica Meteorological Service.

3. Due to the presence of significant basis risk, there is a need to design a complementary risk coverage mechanism.

According to CIB, there is a great variation of damages caused by wind and rain across the BM region, including in severe events. This reflects the extreme topography in the BM area and its impact on localized wind patterns. This means that there is a high potential for basis risk in any index insurance scheme for the BM, even with a high density of weather stations. The percentage damages vary from farm to farm, even in the same district. Furthermore, elevation is very important because of the difference in topography related to wind speeds. However, hurricanes cause direct damages and indirect impacts on coffee harvest and transportation. This shows a great need for a higher density of gauges, which can help to reduce basis risk. On the other hand,

some type of financial mechanism can help to compensate for actual losses incurred by farmers.

4. Agronomic cycle of coffee trees varies in relation to altitude and coffee areas. In higher altitudes, it takes berries longer to ripen, and they are exposed to hurricanes for a longer period of time than they are in lower altitudes. Coffee trees at different altitudes have a different risk profile and would require distinct insurance contracts. As a result, premium rates will vary across the region. In conclusion, there is a high correlation between hurricane patterns and aggregate production levels. However, the correlation with individual farm yields would have to be determined by proper technical wind/rainfall loss models. Similarly, insurance products for coffee growers in NBM areas need to account for multi-cropping, but other crops need an income compensation instrument rather than one directly linked to losses in coffee production.

Options Considered

The World Bank and CIB have discussed the following 5 technical options for a weather risk transfer mechanism for coffee farmers in the Blue Mountains: (i) Traditional crop insurance; (ii) An aggregate parametric trigger for the industry as a whole; (iii) Parametric insurance with individual farmer contracts; (iv) Same as (iii), but creating a contingency fund for addressing basis risk; and (v) Doing nothing. Except for the last option, all possibilities could be designed to create transparency for farmers regarding type of coverage; and ensuring proper contractual insurance arrangements. In order to achieve both of this key objectives, option (iii) above, (an index insurance

product for individual farmers) has been deemed more appropriate.

See a summary matrix of advantages and disadvantages for each option in Table 1 below, which was used as basis for the technical discussions.

Pilot Program

Due to the complexities in designing and developing a weather risk transfer instrument for the Jamaican coffee farmers, a 2-phase project schedule is proposed:

Phase 1: Project preparation that includes: (i) Detailed assessment and agreed workplan with the CIB; (ii) Risk Modeling (wind speed and rainfall); (iii) Product design and stakeholder formation; (iv) Analysis and insurance preparation; (v) Budgeting for implementation phase; (vi) Present findings to CIB and the Ministry of Agriculture. *This phase will be implemented between June 1 – April 30, 2010.*

Phase 2: Implementation of Project will be based on the findings in Phase 1. The second phase involves: (i) Organizing the project and technical support; (ii) Finishing product design and insurance details; (iii) Agreeing on the process for policy sales and premium payments; (iv) Sorting legal issues and regulatory approval; (v) Designing distribution channels and farmer information; (vi) installing automatic stations; (vii) Marketing, sales, and monitoring.

Table 1: Blue Mountain Coffee /Options for a risk transfer mechanism

Options considered	Advantages	Disadvantages	Observations
<p>1. Indemnity Crop Insurance</p>	<ul style="list-style-type: none"> • Indemnity according to individual farmer loss 	<ul style="list-style-type: none"> • Loss assessment highly problematic or infeasible, and costly • Full insurance and claims management unit would be needed in CIB • High moral hazard and anti-selection • Reinsurers will not provide support • Insurers unwilling to provide cover or scheme management 	<ul style="list-style-type: none"> • This option has been tried and is highly challenging. • There are almost insurmountable operational difficulties due to small farm size in major industry-wide catastrophe event. • Inadvisable for CIB to act as quasi-insurance company. • Learn from experiences of previous scheme
<p>2. Aggregate Parametric Trigger (either (a) index based on hurricane track parameters or (b) based on triggers at a series of weather stations)</p>	<ul style="list-style-type: none"> • Likely to be acceptable to reinsurers • Payouts based on independent and transparent parameters • (a) would be easy to implement 	<ul style="list-style-type: none"> • Cannot operate without setting up scheme to distribute aggregate payout to individual farmers • Does not solve loss assessment needs at individual farmer level • Trigger type (a) gives high basis risk even at whole-industry level and cannot capture excess rainfall • Trigger type (b) 	<ul style="list-style-type: none"> • This option would make aggregate payment to CIB. • Does not address how to distribute claims to farmers • Neither hurricane track or weather-based option addresses underlying difficulty of previous scheme

Options considered	Advantages	Disadvantages	Observations
		requires new local station network in coffee areas as in (3)	
<p>3. Parametric Trigger with individual contract to farmers</p> <p>(Based on weather stations)</p>	<ul style="list-style-type: none"> • Transparent index • Rapid claims payment • No field loss assessment • Simple product allowing insurance contract to farm level • Likely to be acceptable to insurers and reinsurers • CIB act as distributor and not as insurer 	<ul style="list-style-type: none"> • High Basis Risk • Few existing rain stations and no wind stations in coffee areas • Setting premium rates and triggers, and defining sub-zones, is technically challenging, and needs risk modeling • New automatic weather stations needed • Needs careful extension to farmers. Farmers may be dissatisfied because of basis risk • Premium rates and affordability unknown – increase in frequency of recent events 	<ul style="list-style-type: none"> • High basis risk means that this option needs to be considered as “income supplement” and not “crop insurance”.
<p>4. As (3) but with additional Basis Risk Fund</p>	<ul style="list-style-type: none"> • Basis Risk Fund targets farmers who are genuinely affected by loss when trigger not hit 	<ul style="list-style-type: none"> • Individual farm assessment required for localized damages to be compensated under the Basis Risk Fund • Difficult to define coverage and to limit the circumstances which the Fund is 	<ul style="list-style-type: none"> • This Fund would still need conventional individual farmer loss assessment (as per previous scheme). • It would be essential to clearly define and limit situations in which Fund responds to claims, to be

Options considered	Advantages	Disadvantages	Observations
		<p>required to compensate. This depends on extent of basis risk and on the triggers levels of the parametric product as in (3)</p>	<p>operationally and financially feasible</p> <ul style="list-style-type: none"> It is recognized that the Basis Risk Fund would carry operational challenges and its feasibility needs further assessment during the preparation of the parametric product
<p>5. Nothing</p>	<ul style="list-style-type: none"> Decision that insurance solutions are highly challenging or “too difficult” 	<ul style="list-style-type: none"> Financial protection against major events is extremely highly demanded by the industry and ranked as a top priority 	<ul style="list-style-type: none"> The need for some insurance or financial mechanism is so strong that “no action” is not an option. Insurance is just one of many measures needed by the industry, e.g. including improved credit availability, productivity increase.

