

Swiss Re



Exploring New Frontiers Beyond Standard Degree Day Contracts



Weather
Risk
Management
Association

Sandeep Ramachandran

WRMA Annual Meeting

Miami

May 10, 2007



Agenda

- Traditional Product Slate
- End User Market
- Structured Weather Related Indexes
- Examples & Conclusion



Commonly traded weather indexes

- Degree Days (HDDs, CDDs, Customized)
 - $HDD = \max(65 - T_{avg}, 0)$
 - $CDD = \max(T_{avg} - 65, 0)$
- Temperature (Max, Min, Events)
- Precipitation (Inches, Events)
- Combinations (Custom Index, Multiple Trigger)
 - E.g. Days with Min Temp < 32 F & Precipitation > 0.5 inch

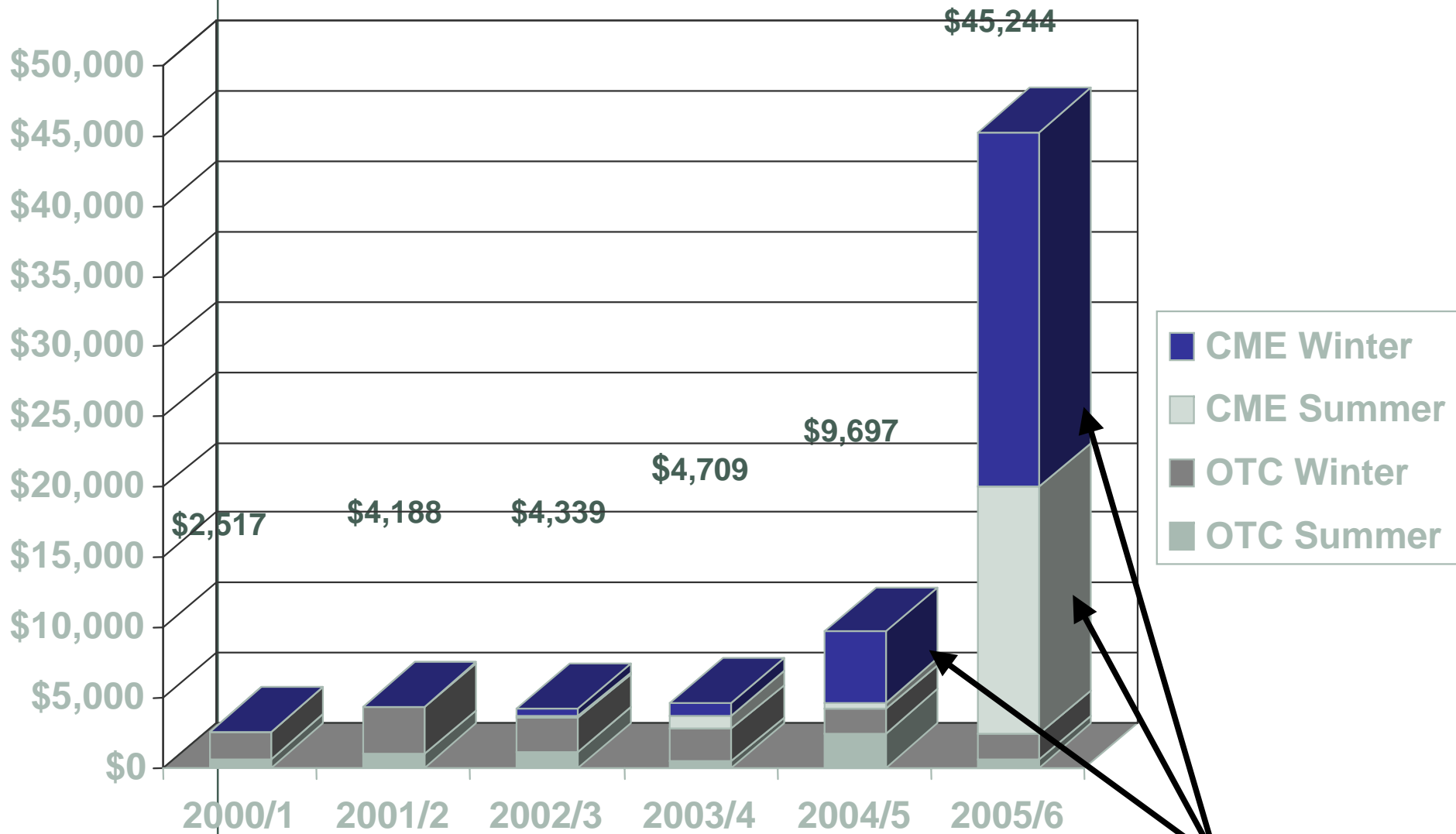


Structures

- Contracts - Swaps, Calls, Puts, Collars, Compound, Baskets
- Term – Weekly, Monthly, Seasonal, Multi-Year
- Limits – Most transactions capped to create finite exposures
- Hybrids – Weather-linked financings, securitizations
- Various instrument forms: derivative, insurance, reinsurance

Total Notional Value of weather risk contracts: 2000/1-2005/6
 (in millions of U.S. dollars)
 Price Waterhouse Coopers market survey

Swiss Re



Can we grow the end user business at a similar rate to the CME?



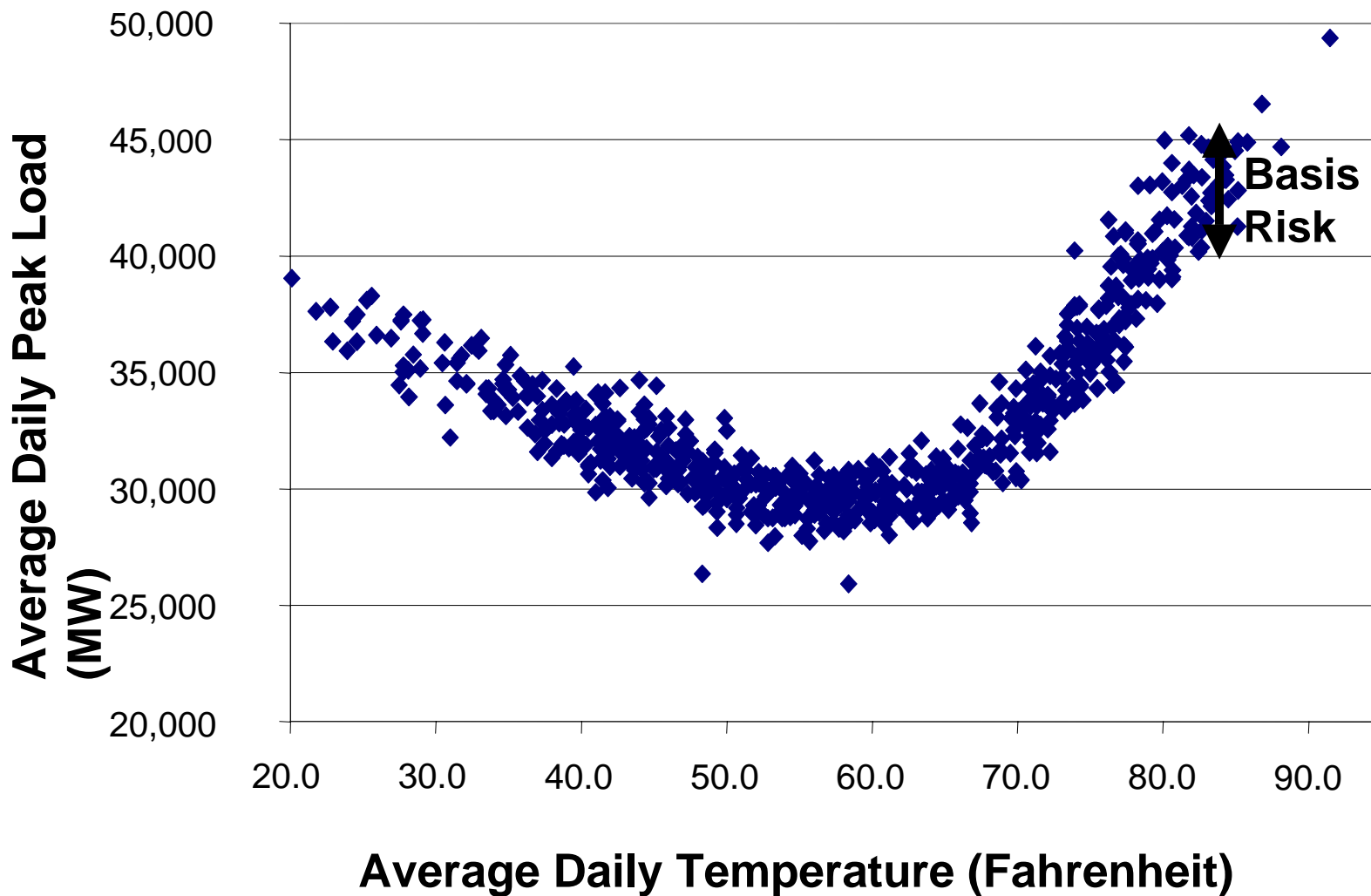
End User Market

- Steady repeat customers
- Larger Transactions
- Growth in international esp. developing country markets
- Traditionally, clients have been bearing basis risk between weather index and volume risk – Impediment to growth
- Need to offer more structured solutions
 - New indexes to reduce basis risk
 - Provide Volume and Price risk management solutions
- Pricing has been too expensive?



Reducing Basis Risk

PJM Power Load/Temperature Summer 2000 - Summer 2006





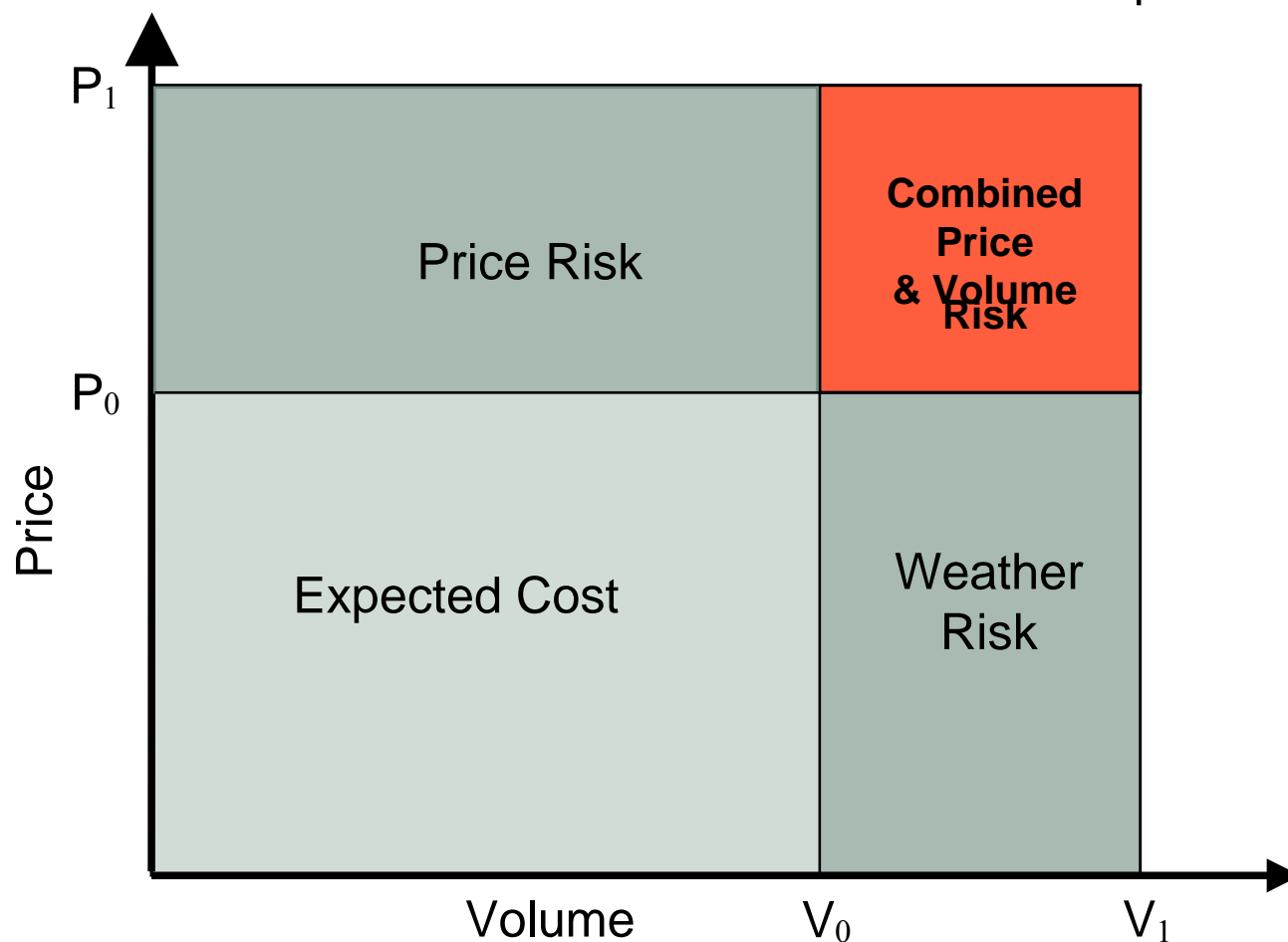
Structured Weather related Indexes

- Wind Risk
 - Lack of Wind over sustained periods
 - Excess Wind related to hurricanes
- Stream flow
- Sunlight hours/Solar Radiation
- Misery Index
 - Heat and Humidity based in summer
 - Wind Chill factored in winter
- Electricity Load
 - Based on system load reported by operator
- Agricultural Yield
 - Based on agricultural yield on a regional, county, farm unit



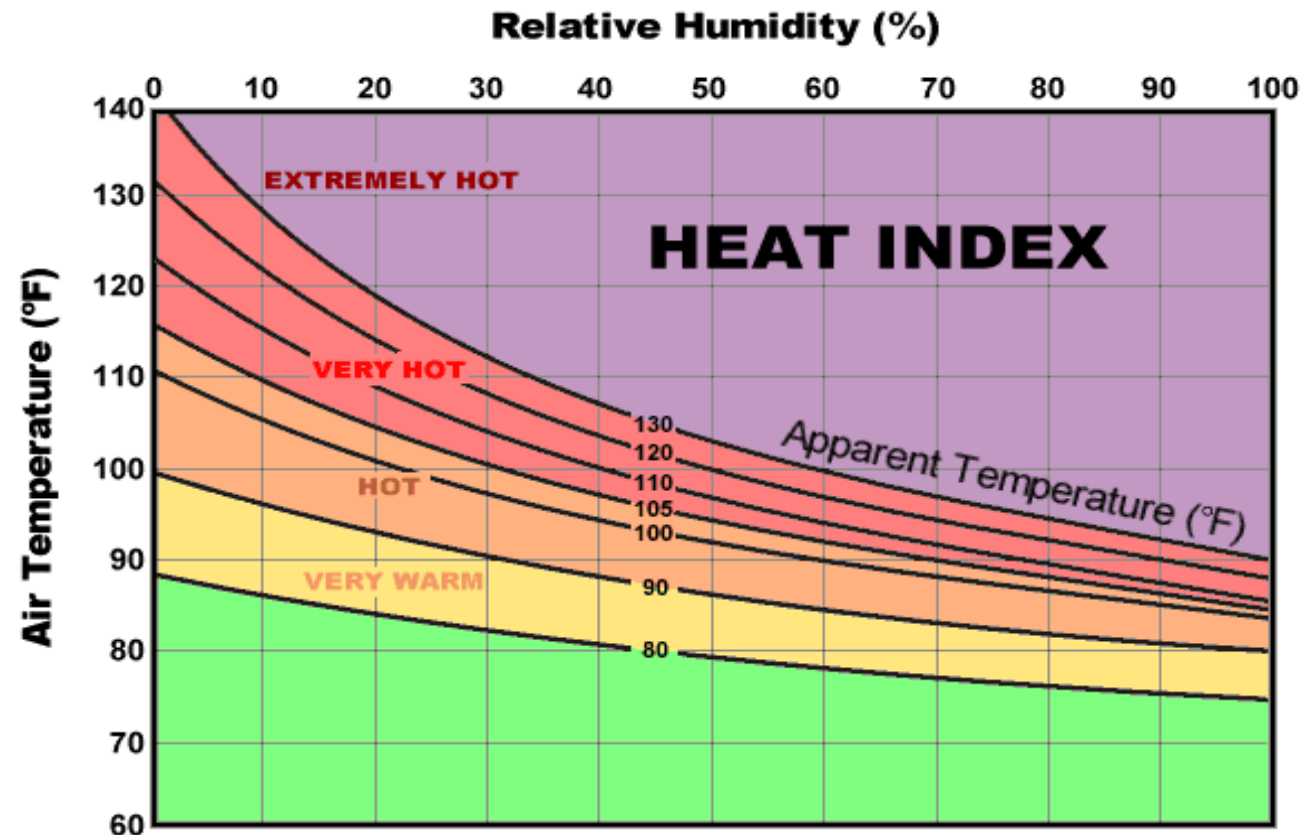
Price & Volume Risk Solutions

- Combined weather and price solutions act as more efficient cash flow hedges than weather and/or the price hedges separately.
- Eliminates correlation risk between volume and price risk





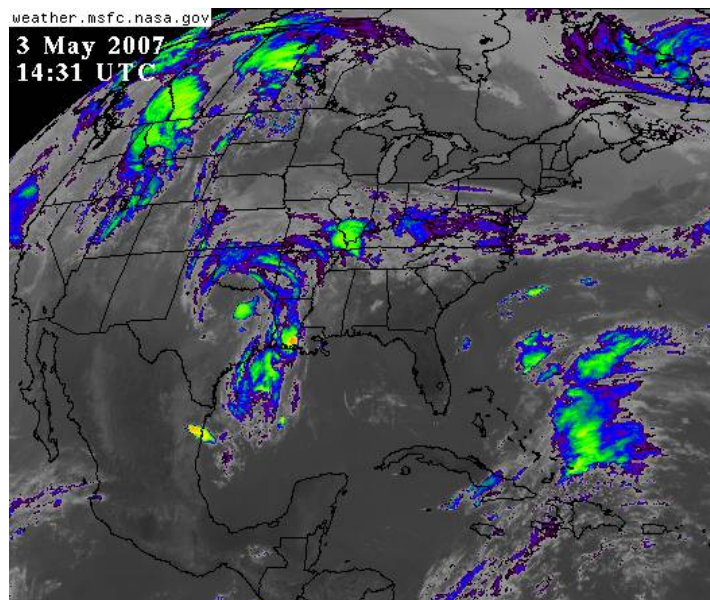
Heat Index (HI) versus CDD



- Summer energy demand more closely correlated to HI due to the relative humidity input.
- Increase in relative humidity from 20% to 100% can cause 100% increase in energy consumption



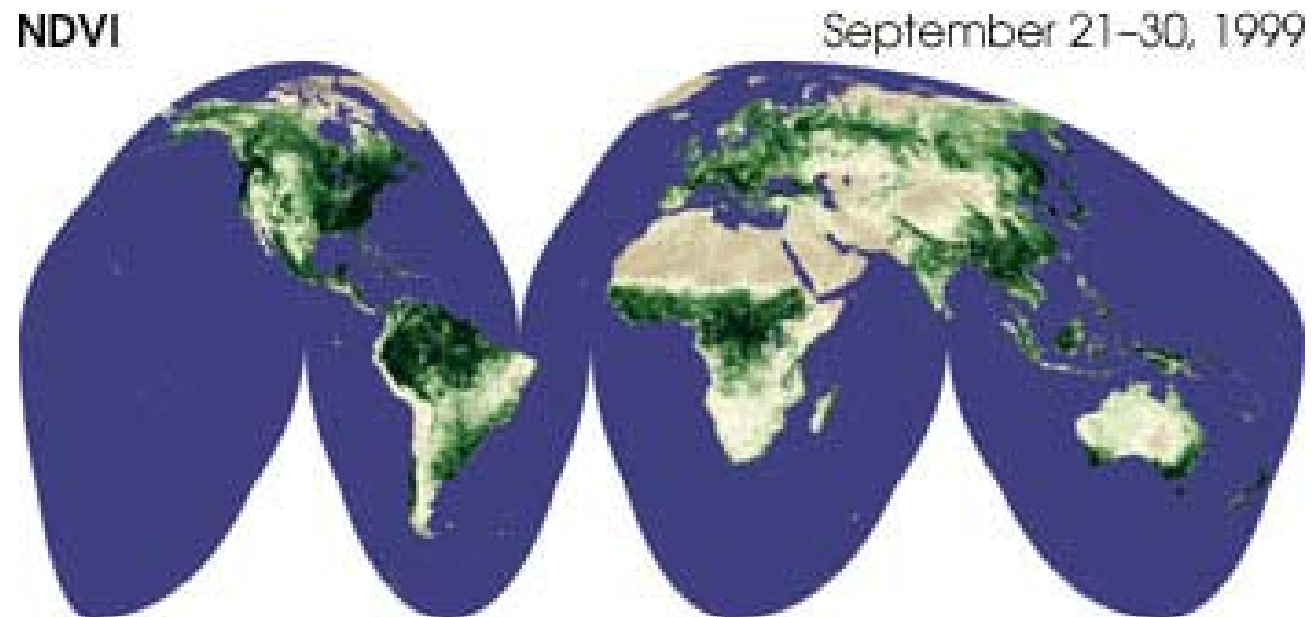
Use of Satellite Imagery for Index calculation



Pros	Cons
Reduces (Eliminates?) moral hazard risk	Complexity in index calculation & settlement
Reliable Historical data set for analysis	Potential issues due to cloud cover for precipitation
Globally available data sets	Resolution may not be adequate

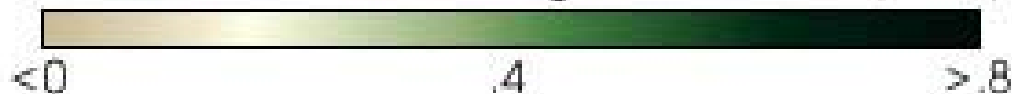


Normalized Difference Vegetative Index (NDVI)



Normalized Difference Vegetation Index (NDVI)

Source: NASA



- Calculated from visible and near infrared light reflected by vegetation
- Indicator of drought/lack of vegetation
- Objectively computed globally from NOAA satellite imagery



Conclusion

- Significant potential for end user growth
- Need to be innovative with structured solutions to minimize basis risk
- Use of satellite imagery particularly for precipitation related transactions and reduction of moral hazard
- Growth in end-user business is important for health of market



Contact Information

For additional information, please contact:

Swiss Re Capital Management and Advisory
55 East 52nd Street
New York, NY 10055

Sandeep Ramachandran 212-407-7319
Director, Environmental and Commodity Markets
Head Americas Weather and Energy
Sandeep_Ramachandran@Swissre.com



Disclaimer

- We are providing these materials solely for the purpose of providing information that may be useful in analyzing the markets and products discussed herein; however, the information herein should not be construed or interpreted as recommending any investment in any particular product, instrument, security or securities and should not be relied on as the sole source of information upon which to base an investment decision. The information contained in these materials was obtained from sources believed to be reliable, however, we make no guarantee regarding its accuracy or completeness. Any discussion in these materials reflects the views and judgment of the party or parties that prepared it as of the date of hereof, and is subject to change. You hereby unconditionally agree that we are not responsible to you for any of the information or content herein and that any use you make of this information is totally your own responsibility and at your own risk. Any decisions you make to invest in the instruments discussed in these materials will be based solely on your own evaluation of your financial circumstances, investment objectives, risk tolerance, liquidity needs and any other factors that you deem relevant.
- This information may not be reproduced or circulated without our written permission, and may not be distributed in any jurisdiction where such distribution is restricted by law or regulation.