



Optimal Climate Crop Insurance Strategy: Contrasting Insurer and Farmer Interests

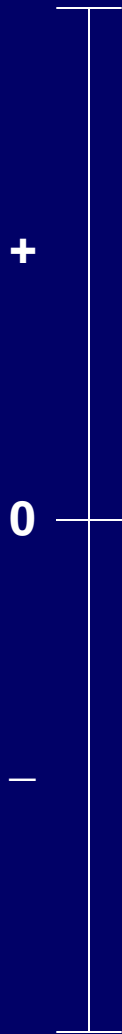
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Farm Net Income Before Insurance

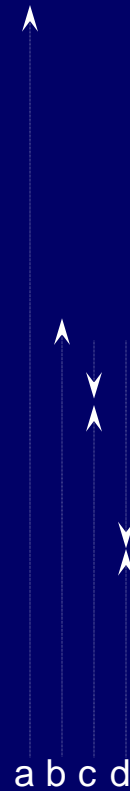


Farmer



Vs.

Insurer



Strategy:

Maximize Gain

Minimize Loss

Jackson Co., FL (30.774N, 85.226W) farm

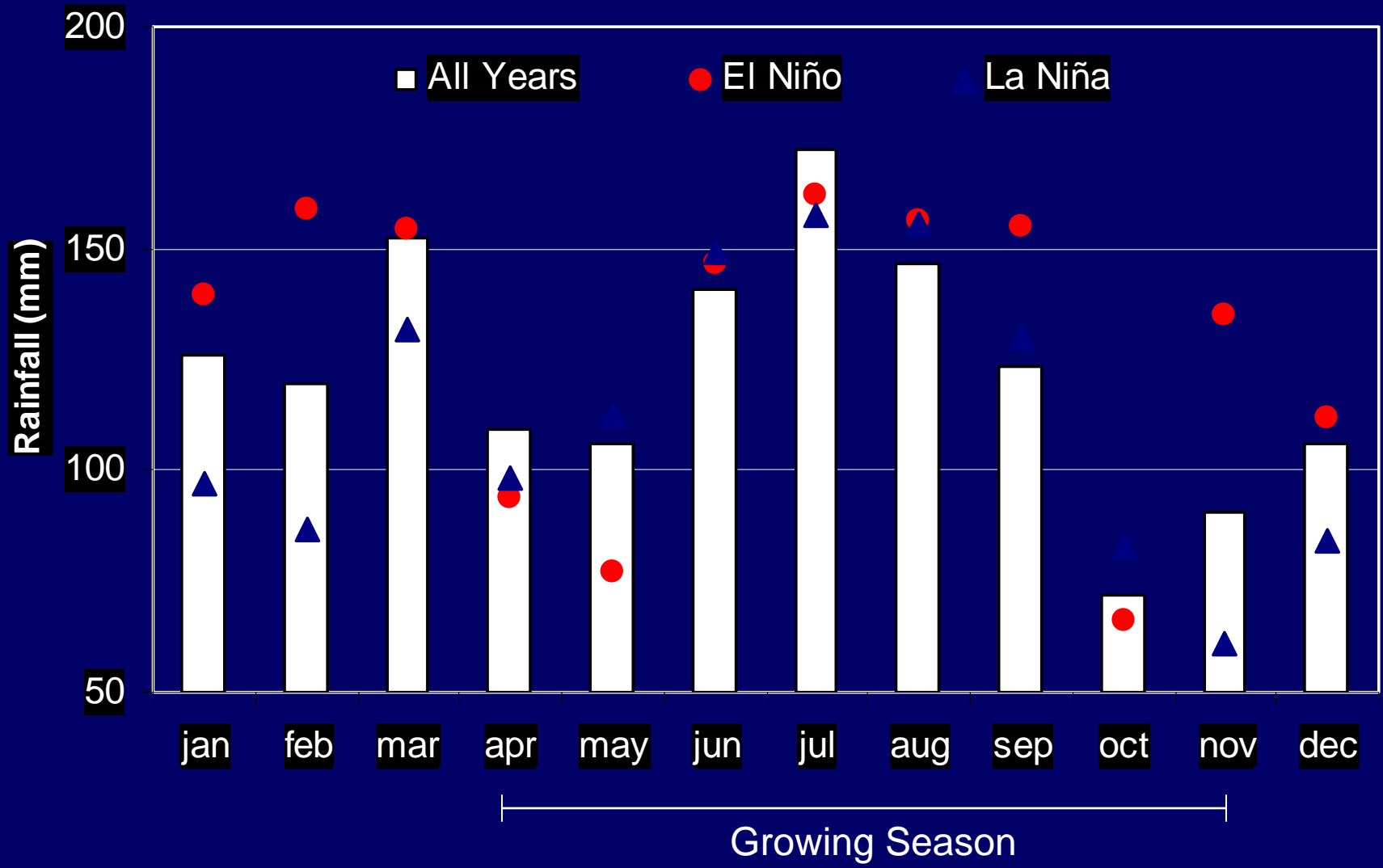
40 ha, non-irrigated, 50% peanut, 50% cotton

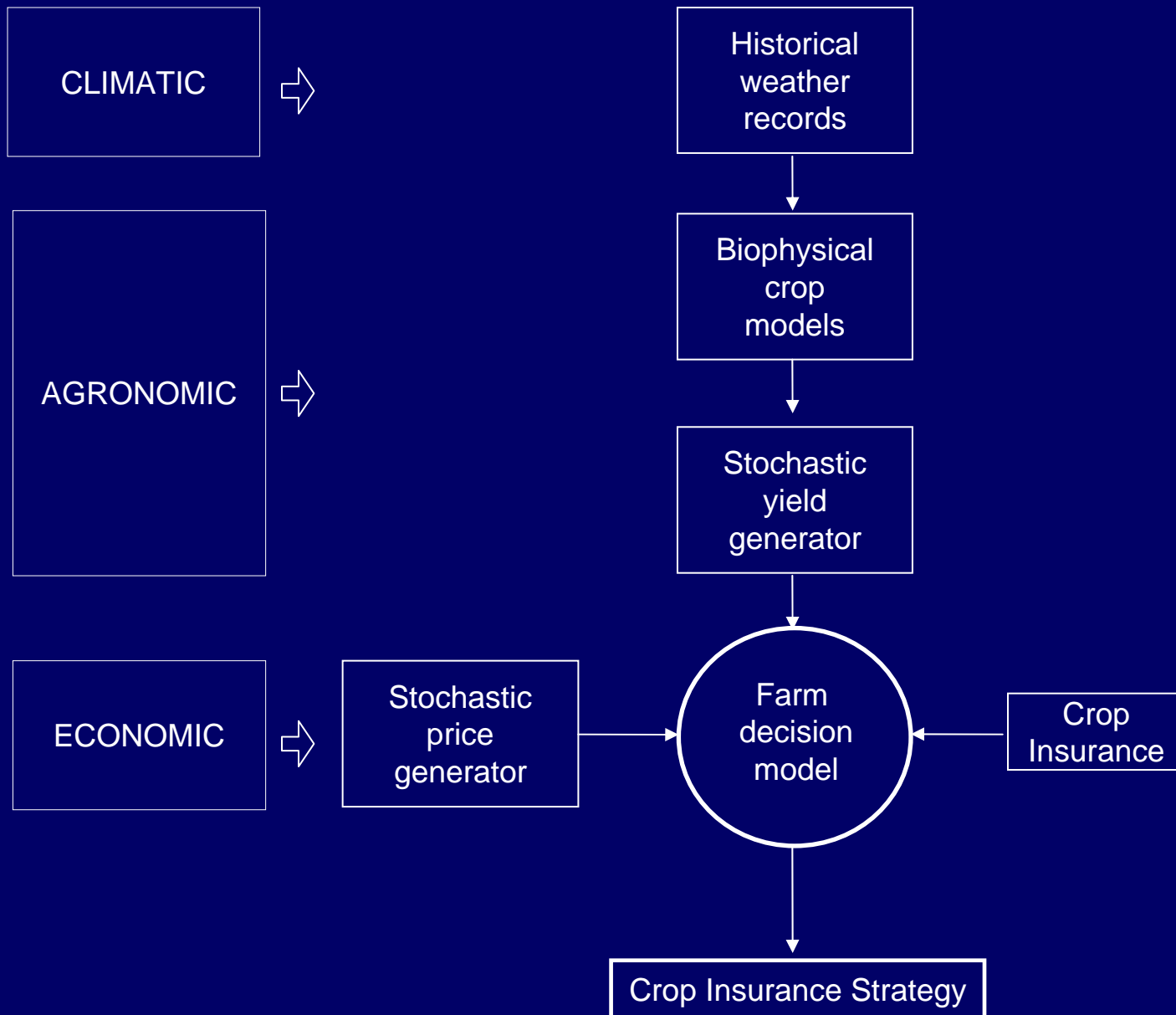
Dothan Loamy Sand soil type

65 (1939-2003) ENSO phases

Most popular crop insurance contracts

Premium subsidies included for insurer





Farmer

$$\max_x E\{U(W_f)\} = \sum_{n=1}^N U(W_0 + \sum_{j=1}^2 Y_j P_j X_j + IY_j PB_j X_j - C_j X_j - \text{Pr}_j X_j) / N$$

$$U(W_f) = W_f^{1-R_r} / (1-R_r)$$

Insurer

$$\min_x E\{L\} = \sum_{n=1}^N \sum_{j=1}^2 X_j IY_j PB_j - X_j \text{Pr}_j / N$$

$$CVaR_\alpha [L(x, \theta)] \leq v$$

Peanut

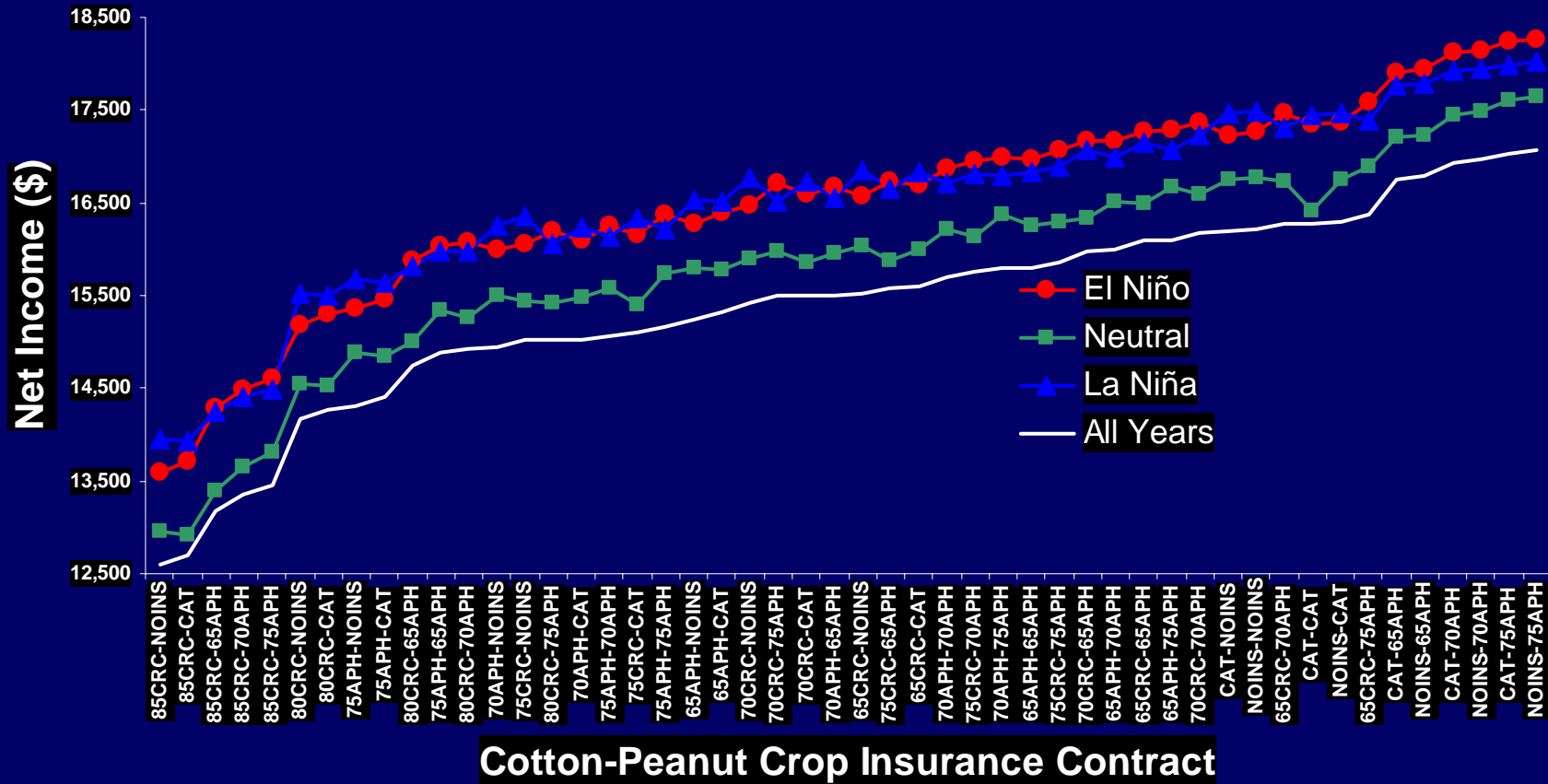
$$\sum_{m=1}^9 X_{m,j} = 0.5$$

Cotton

$$\sum_{m=10}^{13} X_{m,j} = 0.5$$

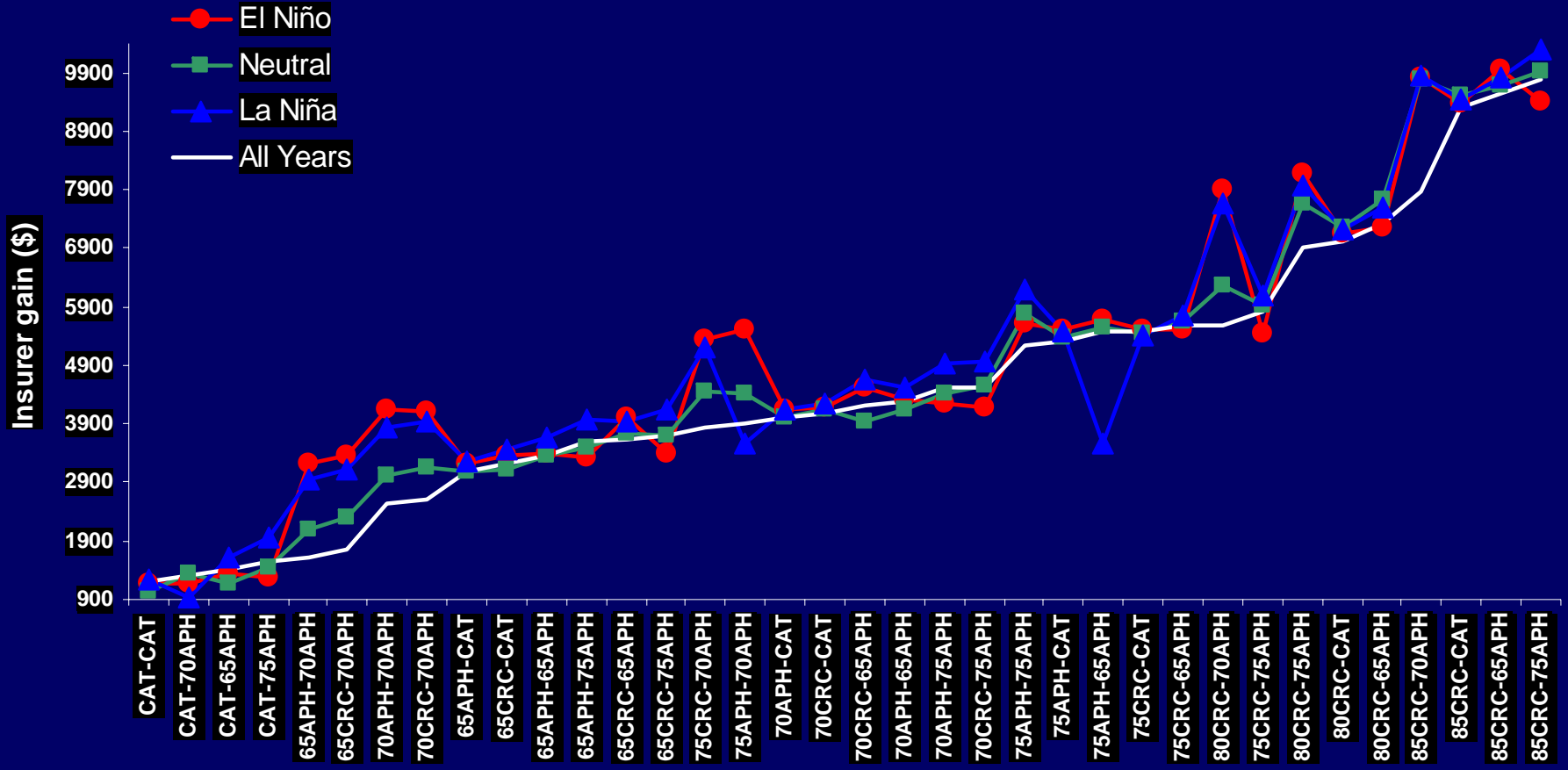
$$X_m \geq 0$$

Farmer



Insurance: APH or MPCl, CRC, and CAT

Insurer



Farmer

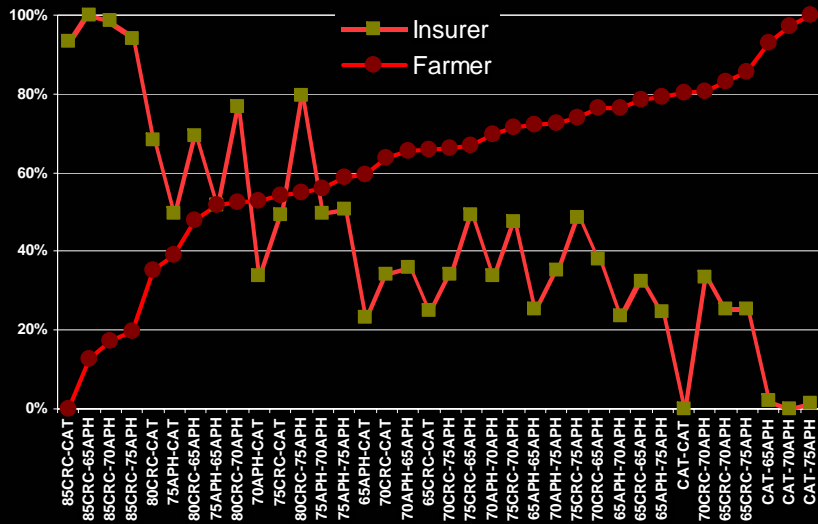
	CRRA				
	0	1	2	3	4
EL Niño	CAT-75APH	CAT-75APH	CAT-65APH	CAT-65APH	CAT-65APH
Neutral	CAT-75APH	CAT-75APH	CAT-70APH	CAT-70APH	CAT-70APH
La Niña	CAT-75APH	CAT-75APH	CAT-70APH	CAT-70APH	CAT-70APH

Insurer

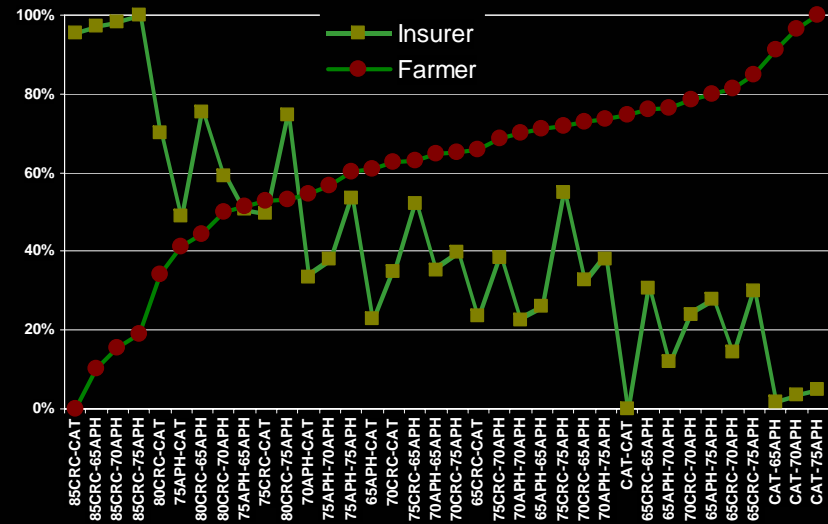
	Risk value	90%	95%	99%
El Niño	<4000	85CRC-65APH	85CRC-65APH	75APH-CAT
	>4000	85CRC-65APH	75APH-CAT	NA
Neutral	<2000	85CRC-75APH	85CRC-75APH	65APH-CAT
	2000-4000	85CRC-75APH	85CRC-75APH	75APH-CAT
	>4000	85CRC-75APH	75APH-CAT	NA
La Niña	<0	85CRC-75APH	85CRC-75APH	85CRC-CAT
	0-2000	85CRC-75APH	85CRC-75APH	70APH-CAT
	2000-4000	85CRC-75APH	85CRC-75APH	75APH-CAT
	>4000	85CRC-CAT	85CRC-CAT	NA

Synergies 75APH-75APH, 75CRC-CAT

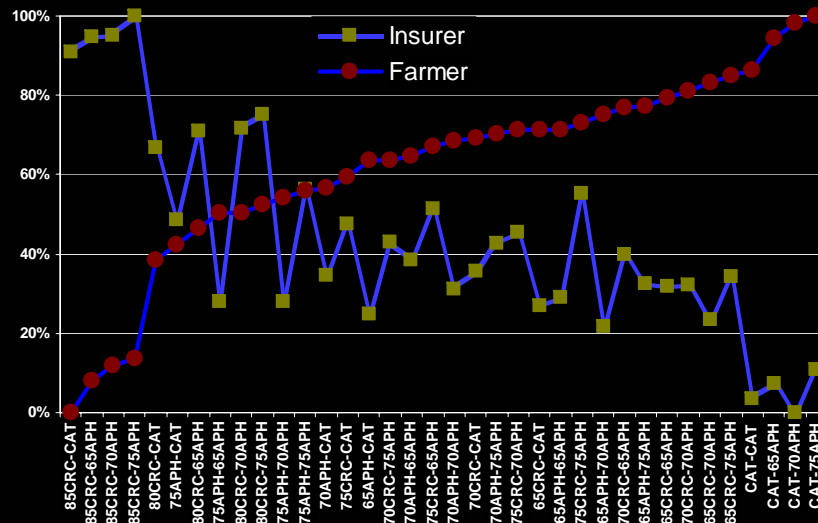
El Niño: 75APH-70APH



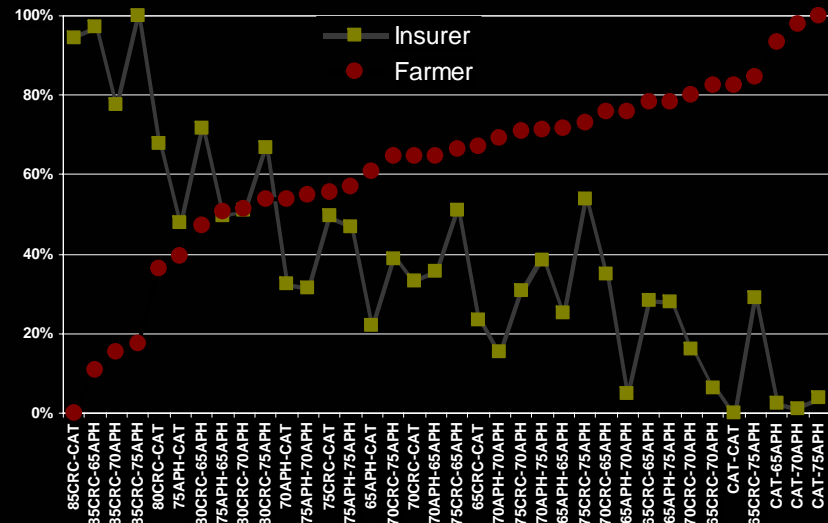
Neutral: 75APH-CAT, 80CRC-70APH, 75APH-65APH



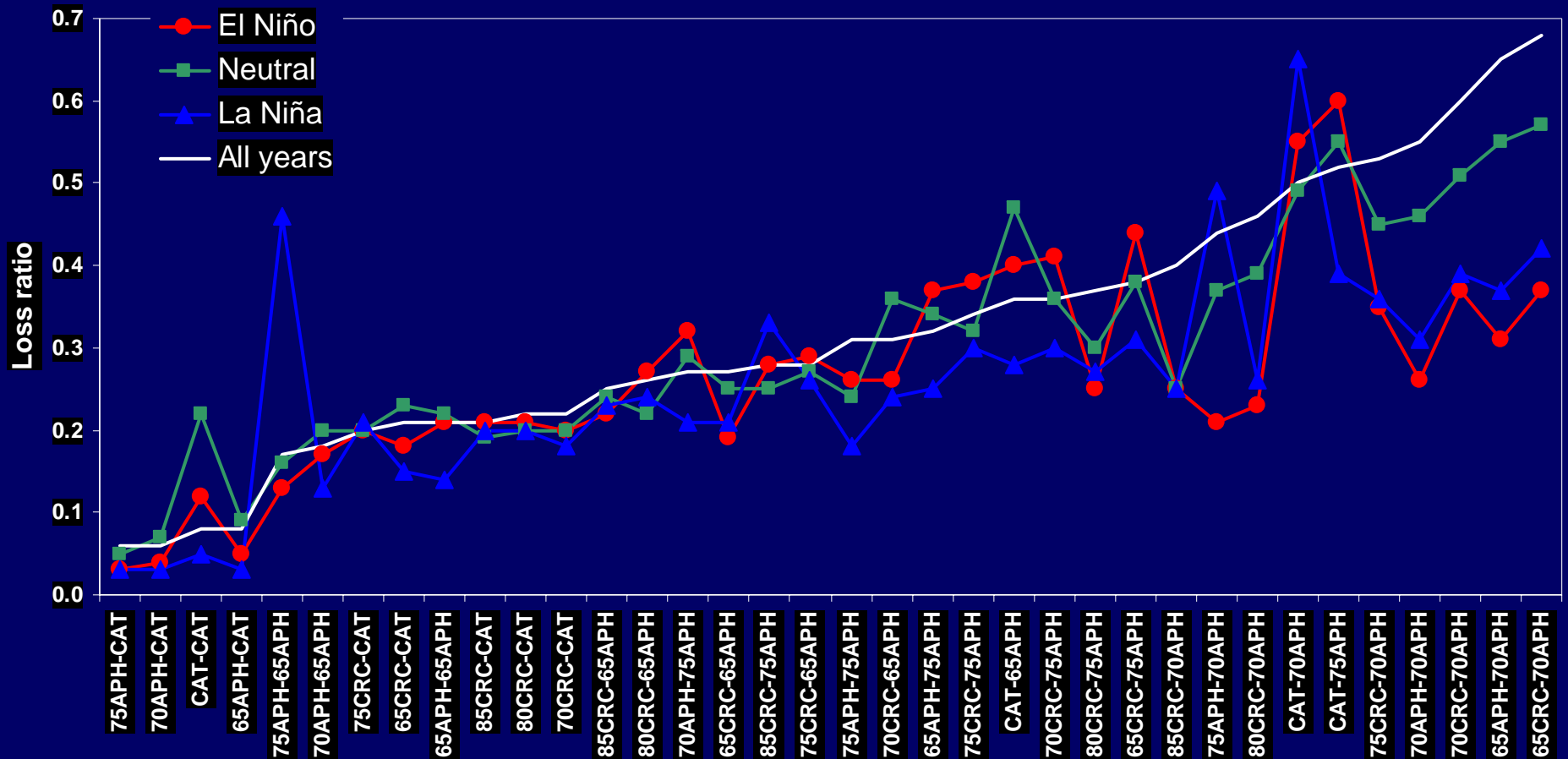
La Niña: 75APH-CAT



All Years: 75CRC-CAT, 75APH-75APH

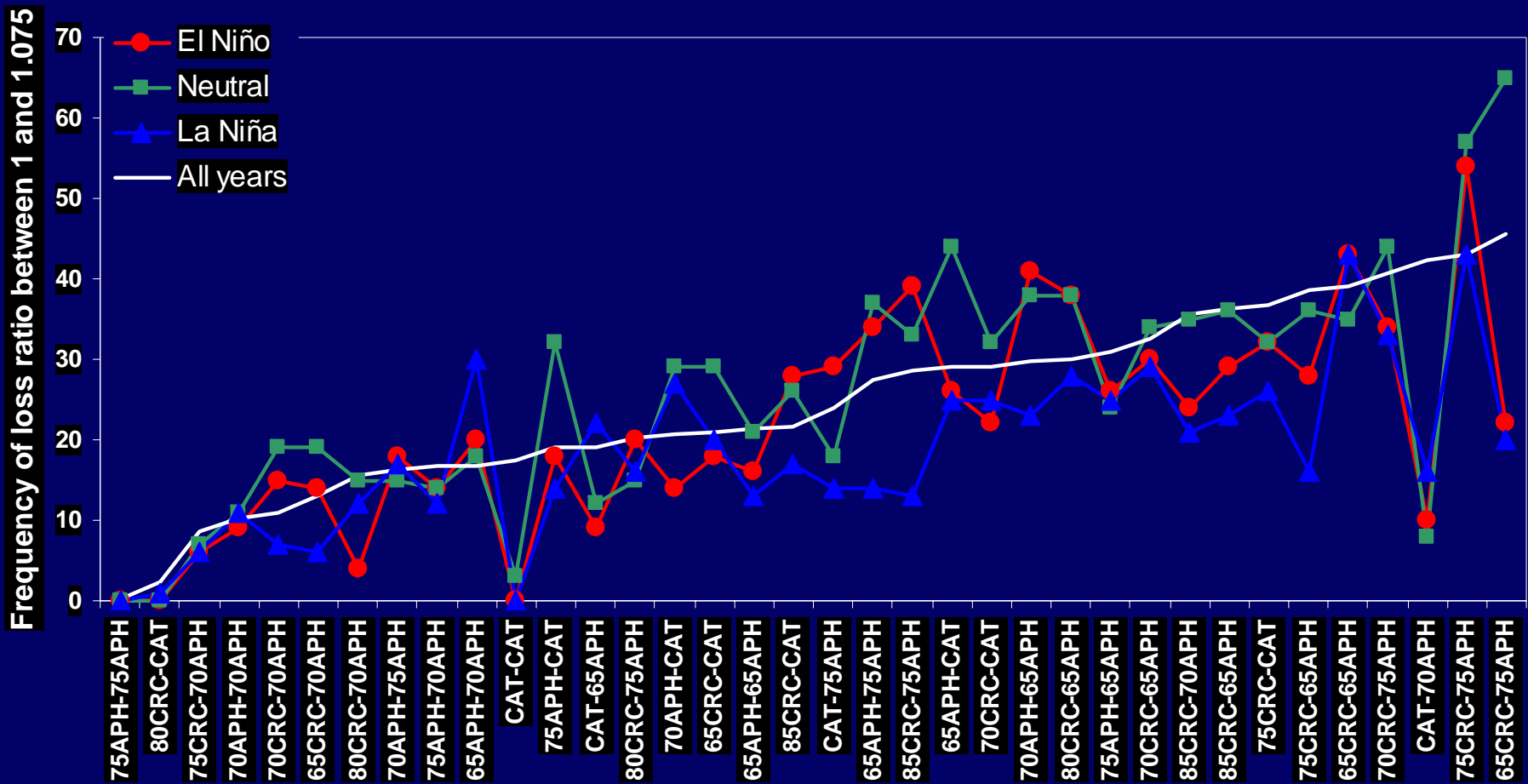


Indemnity paid / Premium received



Loss Ratio Target : 1.075 Average: 0.32

2004 RMA Cotton: 0.54 Peanut: 1.29



Implications

- ENSO climate variability impacts farmer and insurer crop insurance selection
- Conflict of interest exists, but seems workable
- Premiums and/or subsidies could be decreased or better assigned
- Consistent with previous studies: Crop insurance could be privately promoted
- Further study including spatial distribution