

Optimal Climate Crop Insurance Strategy: Contrasting Insurer and Farmer Interests

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Introduction

- Predictability of seasonal climate variations can help in reducing farm risk by tailoring agricultural management strategies to mitigate the impacts of adverse conditions or to take advantage of favorable conditions.
- Crop insurance offers farmers economic stability under the uncertainty of future random events, including climate.
- Our hypothesis is that both conflicts and synergies exist between farmers and insurers regarding crop insurance selection and that they are influenced largely by climate variability.
- Thus, our main goal is to analyze the potential synergies and conflicts of interest between farmers and insurers in the selection of an optimal crop insurance contract. Special attention is given to how climate information influences this decision-making process.

Literature Review

- In general, studies on climate and crop insurance have focused on selecting the best insurance product for farmers (e.g., Cabrera et al., 2006; Leigh et al., 2001; Mjelde et al., 1996); or
- Have developed parameters for potential new crop insurance products (e.g., Turvey et al., 2006; Martin et al., 2001).
- Less frequently, researchers have taken the viewpoint of the insurer (e.g., Ker and McGowan, 2000).
- Few articles have explored the interaction between farmers and the insurer (e.g., Menrad et al., 2005; Wang et al., 2003), and none have formally included climate into the analysis.
- Thus, our paper adds to the literature by contrasting both viewpoints (farmer and insurer) in the assessment of an optimal crop insurance selection process under the influence of climate variability.

DATA

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

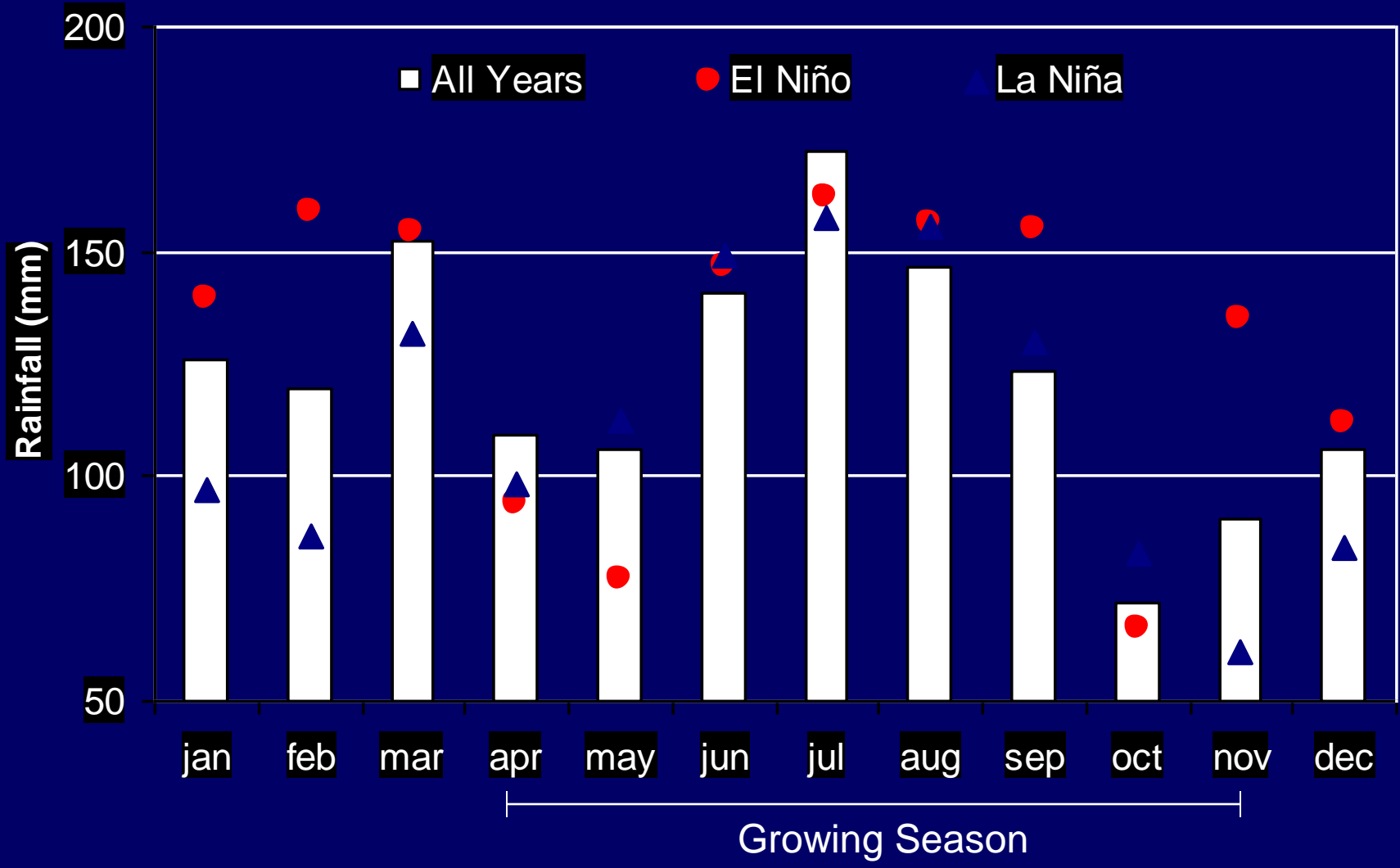
40 ha, non-irrigated, 50% peanut, 50% cotton

Dothan Loamy Sand soil type

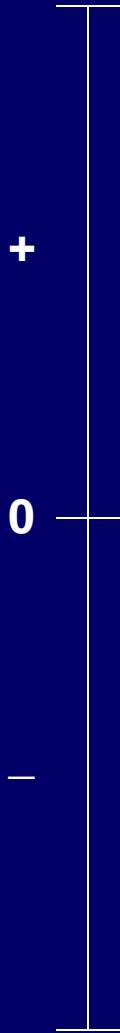
65 (1939-2003) ENSO phases

Most popular crop insurance contracts

Premium subsidies included for insurer



Farm Net Income Before Insurance



Farmer



Vs.

Insurer

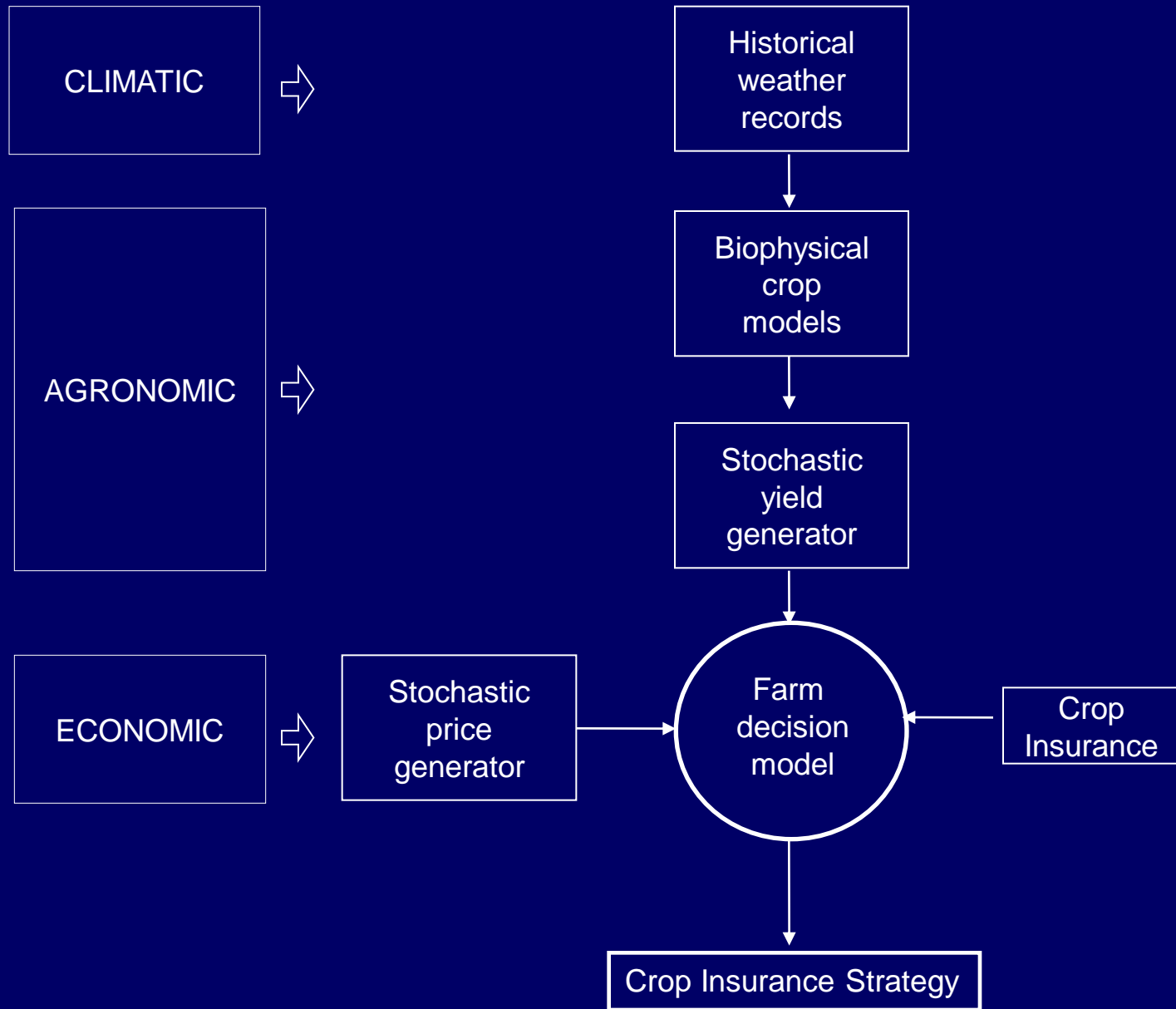


Strategy:

Maximize Gain

Minimize Loss

METHODOLOGY



Farmer

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

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

Insurer

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

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

Peanut

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

Cotton

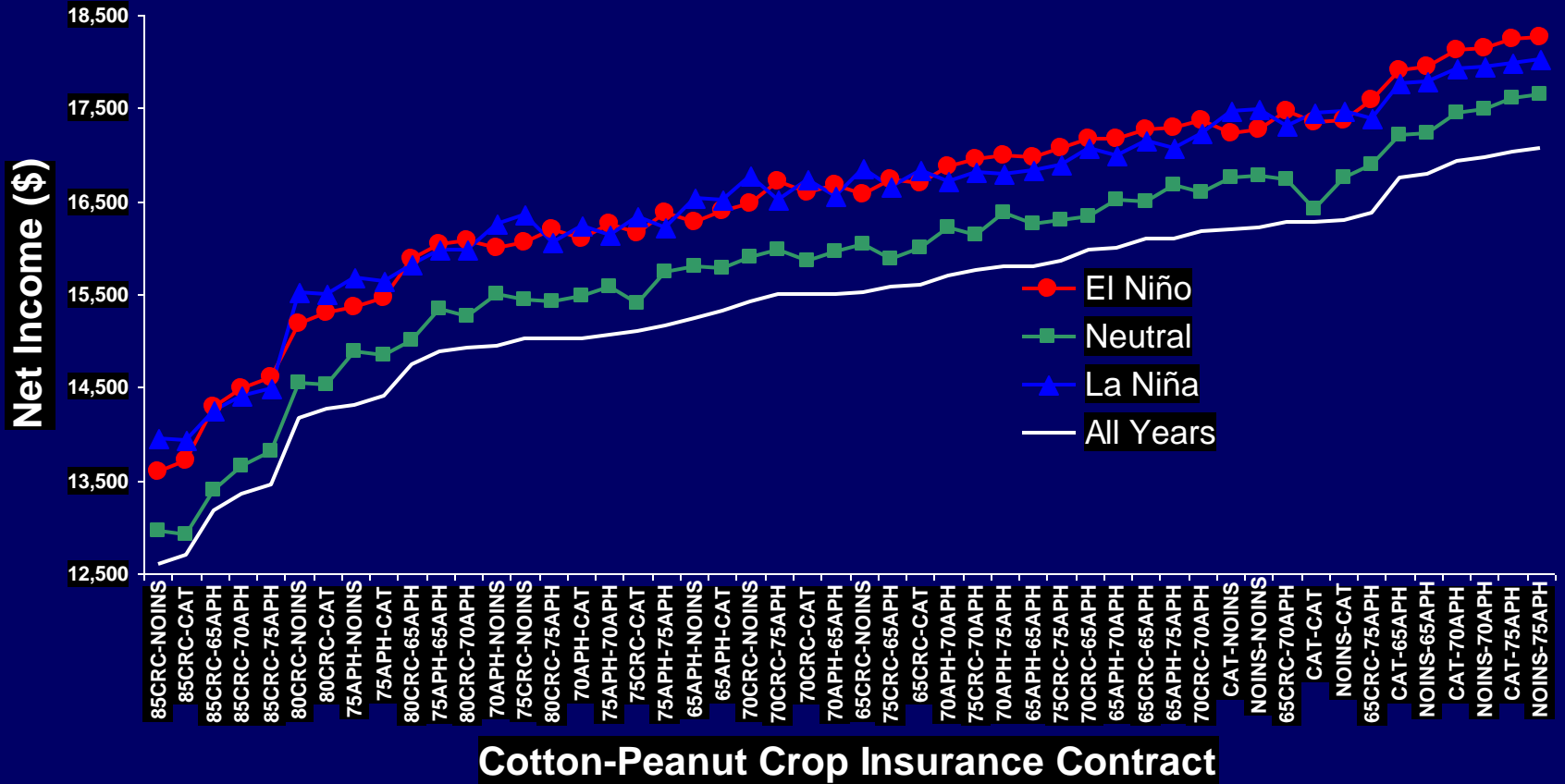
$$\sum_{m=10}^{13} X_{m,j} = 0.5$$

$$X_m \geq 0$$

RESULTS

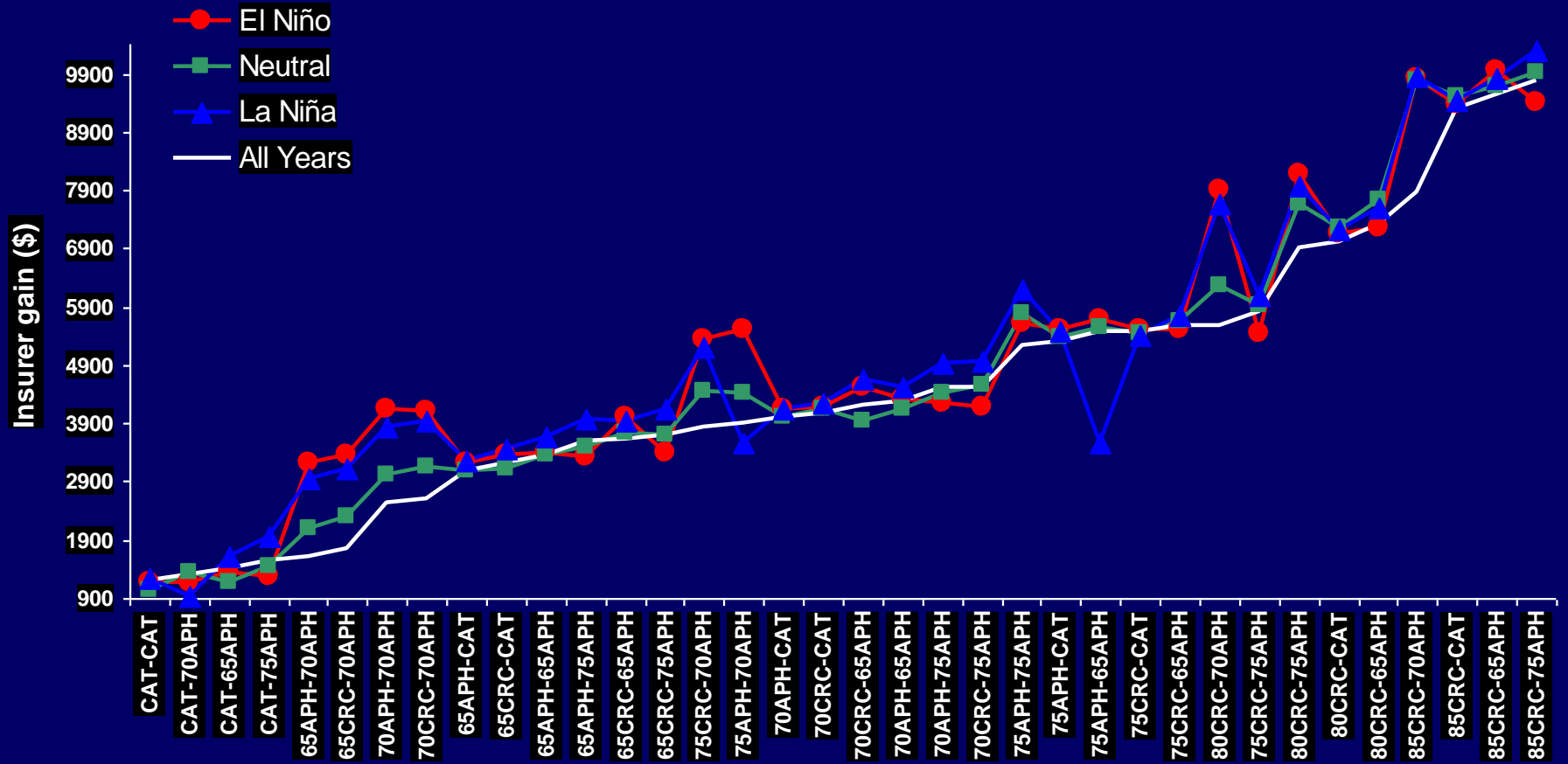
Farmer's best section
Insurer's best selection
Synergies and conflicts
Insurer loss ratio

Farmer



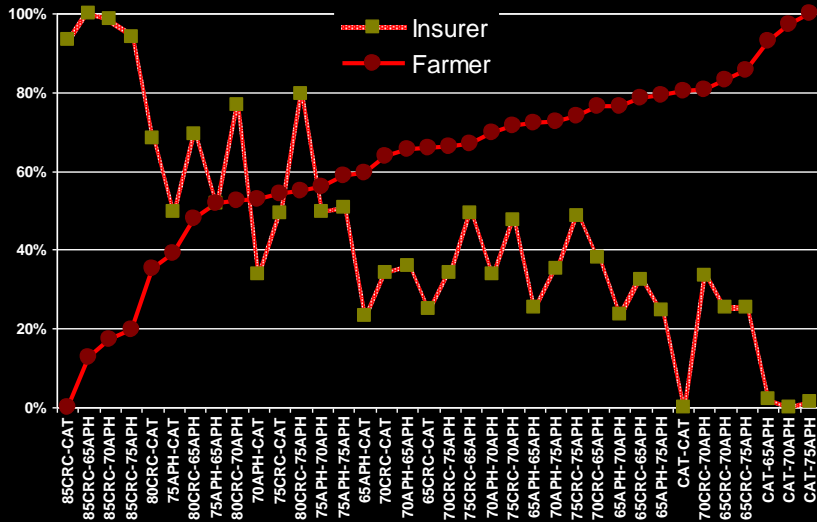
Insurance: APH or MPCIC, CRC, and CAT

Insurer

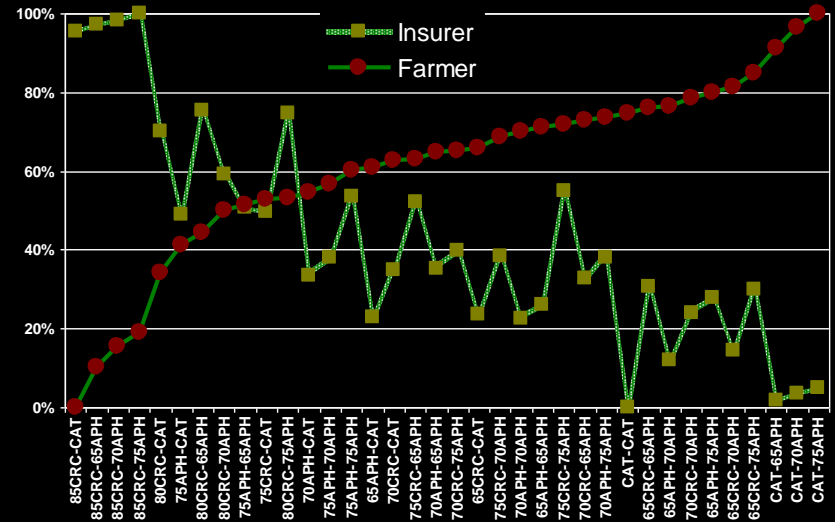


Synergies 75APH-75APH, 75CRC-CAT

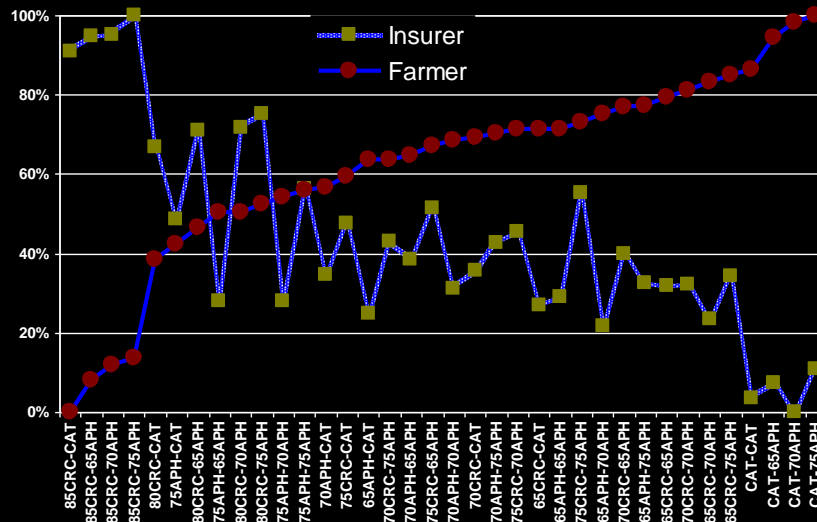
El Niño: 75APH-70APH



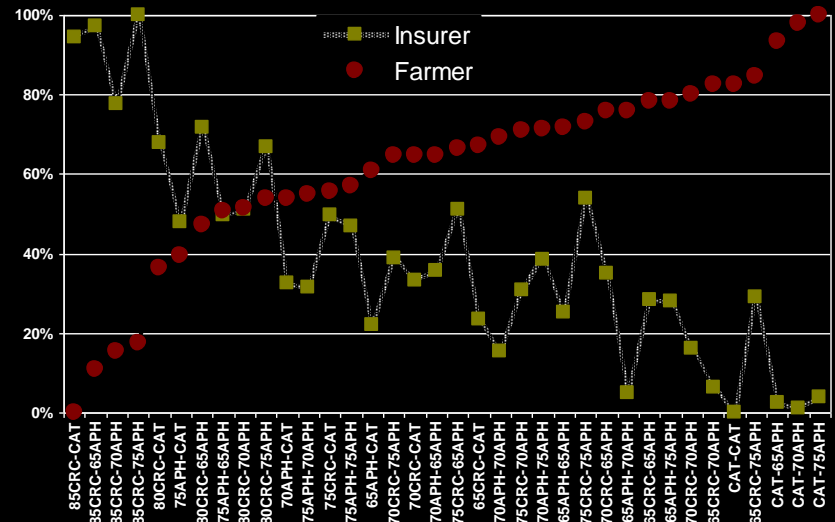
Neutral: 75APH-CAT, 80CRC-70APH, 75APH-65APH



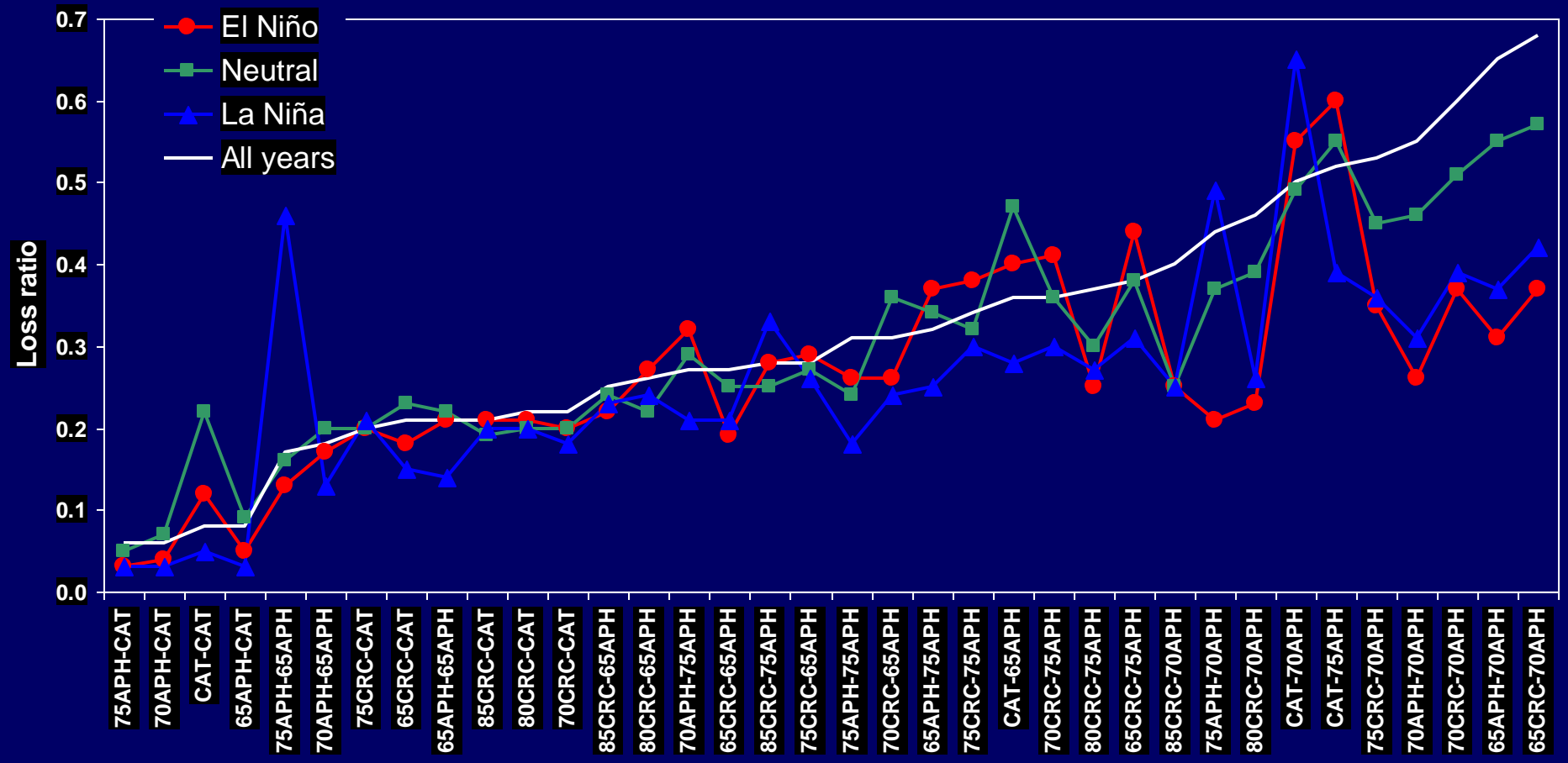
La Niña: 75APH-CAT



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

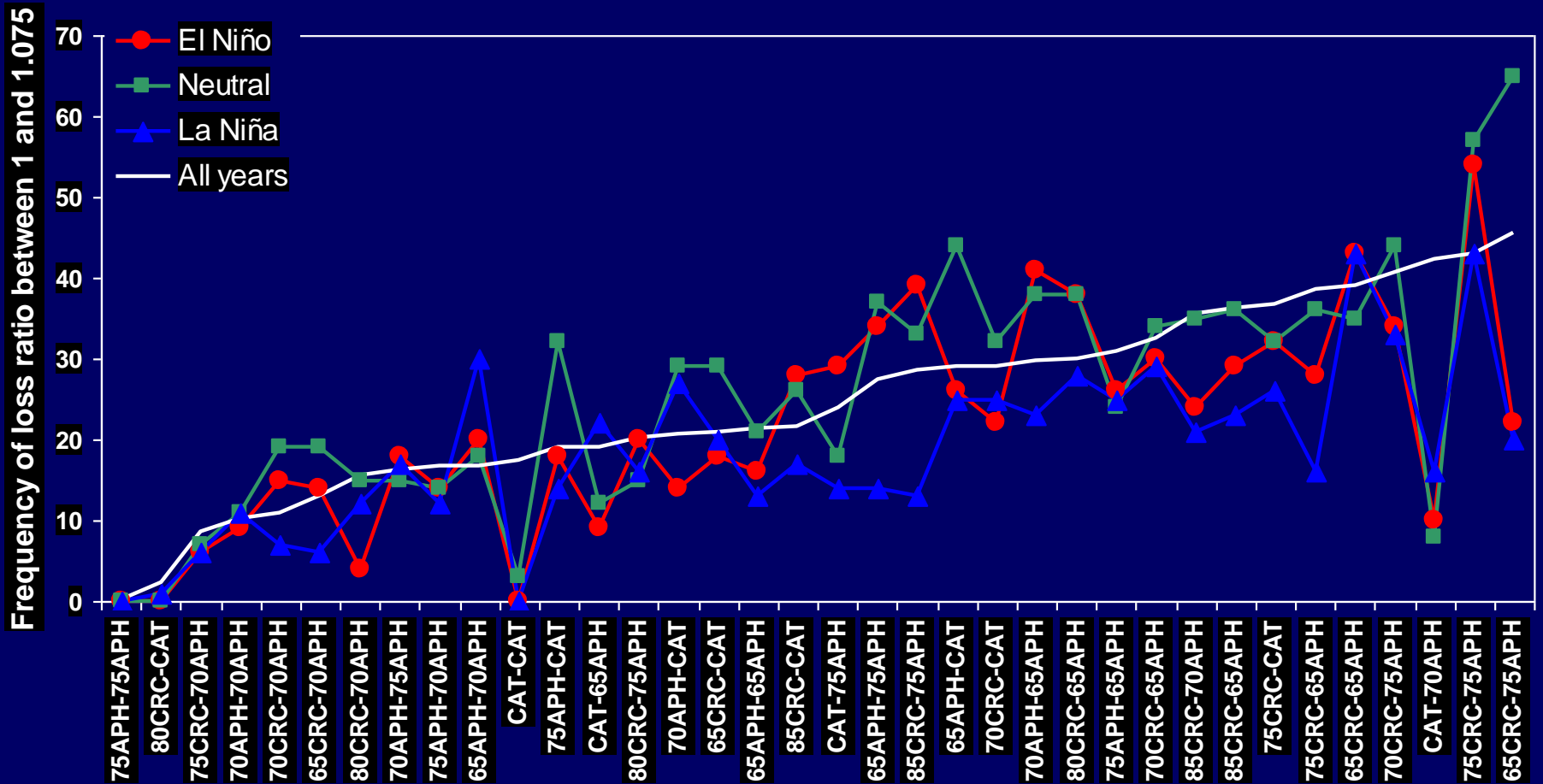


Indemnity paid / Premium received



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