Wheat Area-Yield Insurance Effectiveness: Simulating Rates in Australian Reality

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Wheat Area-Yield Insurance Effectiveness
Simulating Rates in Australian Reality

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Introduction
Agribusiness inherently encounters various risks. These include risks arising from producer behavior to those resulting from changing weather conditions. Rising scrutiny and deliberation on climate change/severity forecasts a progressively important need for yield risk mitigation tools. Such tools include financial markets and insurance schemes, with insurance taking the predominant role with regard to yield risk.

Area Yield Insurance is one of several crop insurance schemes available in the US. AYI differentiates itself by releasing indemnities on an aggregate rather than individual level, thus reducing administrative costs and the impact of both moral hazard and adverse selection.

As is the case with many forms of yield insurance, AYI requires excessive subsidization in its current form. This study primarily addresses effectiveness and benefits offered to Australian producers through AYI, as well viability and risk diversification opportunities.

Methodology
Shire Data acquired through Agro Climatic simulation by University of Queensland

Shire Selection: 5 Shires producing wheat, in 2 groups of close proximity for comparison of homogeneous characteristics.

WA: Beverly, Koorda, Dumbleyung
QLD: Emerald, Wambo

Results
The following graphic displays the variations in yield between an individual Farm (not insured) and the Shire yield over 112 years.

Farm level variation is much greater than Shire yield (displayed in blue). If individual farms share the direction of yield fluctuations with the shire, indemnity payments can decrease the variability experienced by farms- hence the shire as a whole.

Through indemnity pay-off, based on coverage level, the variation within each farm is reduced, allowing for more stable income. The yield under insurance is represented by actual yield + indemnity.

Indemnity is paid out when a pre-determined threshold shire yield is breached; resulting is payouts for all insured.

The graph above shares a visible relationship with graph below describing yield correlation within shires (as simulated yield divergence increases). Correlation of inter-shire yields describes the suitability of a shire for AYI.

Variance reduction is thus influenced to the greatest degree by farm suitability of a shire for AYI.

Shire variance reduction comparison, displaying a single farm simulation within each shire yield set.

Shown are the actual mean yield (displayed in blue) and the mean yield with AYI (displayed in orange).

The table above displays inter-shire correlations and the corresponding distance in km between them. The results offer insight for risk diversification within Australia. Ideally between homogenous farms between heterogeneous shires.

Financial markets, shire characteristic diversification and global reinsurers are a few potential solutions for systemic risk elimination.

Conclusions
The WA shires represent significantly lower variance reduction than those located in QLD, and through this experience weaker insurance effectiveness.

The study explores assorted factors such as varying climatic zones, severity of yield fluctuations, and most importantly shire boundary description and homogeneity of influencing characteristics.

Regrettably it appears that significant variance reduction occurs at higher coverage, hence implying high premium rates (not pictured) and greater subsidization.

EU and CE results encourage further study on producer demand and risk aversion as factors influencing the viability of AYI success. A significant observation lies in highest CE change at 90% CE.

Literature Cited
Australian Bureau of Meteorology. (2001). Australia

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