

NCIS Economic Research Highlights

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The NCIS membership is generally aware of the association's agronomic research program, which is the basis for the development and maintenance of the crop insurance industry's loss adjustment procedures. In addition to the agronomic research conducted in affiliation with NCIS staff and the various agricultural land-grant universities, NCIS also supports an active economic analysis program led by Dr. Harun Bulut.

Dr. Bulut is Senior Economist at NCIS and has been with the association over eight years. In this role, he conducts economic research on various aspects of crop insurance. He holds a Ph.D. degree in economics from Iowa State University and has published in several professional journals, presents at professional meetings, and serves as referee to professional journals. He is involved with the applied risk analysis section of the Agricultural and Applied Economics Association (AAEA) and is serving as the chair for the section this year. Dr. Bulut grew up in Ankara, the capital city of Turkey, where he also earned B.S. and M.A. degrees in economics from METU and Bilkent University, respectively.



Harun Bulut, NCIS

The close of 2017 witnessed the publication of two major research efforts undertaken by Dr. Bulut.

- The first article, entitled "Managing Catastrophic Risk in Agriculture Through *Ex Ante* Subsidized Insurance or *Ex Post* Disaster Aid," was published on the *Journal of Agricultural and Resource Economics (JARE)* website in October 2017. (The article can be found online at <http://bit.ly/2Aku3gt>.)
- The second article, entitled "U.S. Farmers' Insurance Choices under Budget Heuristics," was published in the *Agricultural Finance Review (AFR)* website in December 2017. (This article can be found online at <http://bit.ly/2mcZfof>.)

In what follows, we provide a brief summary of these articles and offer some concluding thoughts at the end.

The *JARE* article primarily focuses on the government's choice of policy between ex-ante crop insurance and ex-post disaster aid in dealing with catastrophic risk in agriculture. Although this has been a policy issue for more than 30 years, it has gained prominence in recent years as Federal crop insurance has become the centerpiece of the U.S. agricultural safety



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net and has been either adopted in some form or is being considered by policymakers around the world. During the debate on the 2014 Farm Bill, the issue of public support for crop insurance underwent intense scrutiny, and the justification for crop insurance premium support continues to be questioned in light of policy and budget issues.

The agricultural economics literature provides a variety of reasons on government support for crop insurance as discussed in the article. Nevertheless, the qualitative and quantitative effects of political and economic determinants of the optimal premium support had not been analyzed within an equilibrium model. Without such an analysis, alternative policy proposals that call for reductions in premium support can underestimate farmers' equilibrium coverage demand response (see, for instance, Government Accountability Office, 2014, p. 22; Congressional Budget Office, 2017, p. 20). Because the underlying tradeoff between insurance uptake and *ad hoc* disaster aid is not taken into account, the proposed potential savings may not materialize. In providing guidance to these policy proposals, econometric evaluations of price responsiveness of farmers' crop insurance demand have been of limited value. The article fills this gap in the literature by approaching this policy issue in a novel way (with the tools of mathematical game theory) and considers a strategic interaction between government and farmers. Within that framework, the article brings together a political economy modeling as found in the literature

(Innes, 2003) and a modeling of farmers' insurance coverage choices in the presence of systemic risk from Dr. Bulut's earlier work (Bulut, Collins, and Zacharias, 2012).

In a nutshell, the article provides a reason for the possibility of underinsurance in the absence of premium support in that both disaster aid expectations and overconfidence derive a wedge between the actuarially estimated price and the price that is "fair" from the farmers' point of view. This effect has been found to be similar to the "reference price" concept introduced in Thaler (2008) and the modeling of "farmers' aversion for out of pocket payments" in Du, Feng and Hennessey (2017). The article then goes on to show that, with that anticipation of farmers' best responses, government actually prefers to subsidize agricultural insurance rather than solely rely on ex post disaster aid. The resulting premium support rate depends on the political environment, the degree of systemic risk, the distribution of farmers' risk preferences, and the nature and distribution of farmers' risk perceptions.

Government's preference for ex ante crop insurance holds despite the fact that disaster aid does not depend on the accuracy of farmers' perceptions and insurance options can be susceptible to perception issues (such as the form of overconfidence, or optimism bias, considered in the article). The underlying reason is that disas-

ter aid implies an implicit coverage level, which is not tailored to the individual farmer's risk management needs. Through premium support, government alleviates the risk-averse farmers' reluctance to pay premiums in the presence of free disaster aid and at the same time induces them to cover their risks through a more customized risk management tool. The ex ante political cost arising from insurance premium support appears to be much smaller than the would-be-ex post political cost arising from disaster aid in the absence of the insurance option. The analysis indicates that disaster aid can be used at a much lower capacity in the future but may not be eradicated when farmers are overconfident.

The *AFR* article takes on the empirical observation that, although the average coverage levels for revenue crop insurance products for major crops have been increasing, the regional differences in coverage uptake have persisted over time. Counties in the Corn Belt had predominantly higher coverage levels (that exceeded 75 percent), while counties in the Great Plains and the South had predominantly lower coverage levels (that were at 70 percent or below). To partly explain this phenomenon, the article proposes and evaluates a budget constraint (heuristic) effect within the standard decision model of under risk and uncertainty (expected utility theory framework) through simulation methods.¹

¹ In modeling how individuals make decisions under uncertainty, the standard expected utility theory framework states that an individual first finds out the level of utility he or she derives at each possible outcome and weigh them with the objective probabilities.

As discussed in detail in the article, budget effect may stem from tight profit margins and mental accounting. Facing tight operating profit margins over the last 15 years, farmers appear to spend about at most five to ten percent of their crop budget on crop insurance premiums. On the other hand, a budget heuristic can be implicit or explicit and can apply to high income individuals as part of mental accounting. In light of research from behavioral economics and marketing science, farmers may be assigning low budgets for goods such as crop insurance that may be perceived to be vague in benefits and yet certain in costs at the moment of decision (that is, salient in costs), despite being desirable in the long run (Thaler, 2008; Du, Feng, and Hennessy, 2017). Farmers may also be comparing crop insurance premium to a benchmark expenditure in their production budget. The upshot is that, under such a heuristic, farmers may begin with a set amount of money and ask their agents to find them the best value within that constraint.

The article points out that the budget constraint hypothesis is consistent with a suite of empirical observations. The bulk of corn, soybean, wheat, and upland cotton acres are within five percent of the expected crop value, yet some acres (especially for wheat and cotton) are within five to ten percent of the expected crop value. Limited acres with expenditures beyond ten percent have been observed. Coverage demand is lower in such regions where the insurance product is more expensive — despite the price being commensurate with the risk. Beyond coverage choices, farmers have markedly shifted their preferences from basic and optional units to enterprise units since a provision of the 2008 Farm Bill increased subsidy rates for enterprise units. Meanwhile, the 2014 Farm Bill introduced supplemental area based products (the Stacked Income Protection (STAX) program specifically for upland cotton and the Supplemental Coverage Option, SCO, for other crops). Apparently, the legislative intent was to ameliorate the aforementioned differences in insurance coverage uptake across regions. However, SCO and STAX products saw limited uptake. Finally, a recent empirical finding in the literature (Du, Feng and Hennessy, 2017) indicates that farmers reveal some aversion to incurring out of pocket premium in their crop insurance coverage choices.

In light of these observations, the article extends Dr. Bulut's earlier work (Bulut and Collins, 2014) by adding a budget constraint effect to the simulation analysis. The budget effect is modeled

as it has been revealed through the data on actual choices. Covering fairly representative farm situations in 2015, the article demonstrates that farmers' choices are generally consistent with the expected utility maximization behavior so long as a budget constraint in effect. The overall conclusion is that when it comes to farmers' choices regarding crop insurance products and coverage levels, budget constraints matter. Moreover, the simulation analysis confirms the intuition that, whenever farmers operate under a budget constraint, SCO and STAX do not appear to be the solution to increase coverage levels in counties that had predominantly low coverage levels (below 70 percent) such as those in the Great Plains and the South. The article ends with a number of suggestions for future research avenues.

Both articles make contributions toward a better understanding of crop insurance demand. The *JARE* article emphasizes a "reference price" effect, while the *AFR* article emphasizes "budget heuristic" effect — as a modification of the standard expected utility theory framework. To reiterate, both effects can be found in Thaler (2008) as part of mental accounting² and can be consistent with the modeling of farmers' aversion for out of pocket payments in Du, Feng and Hennessy (2017). In the absence of such effects, the expected utility model predicts that a risk-averse, rational farmer facing actuarially fair premium rates (without even requiring any premium support) should buy insurance at the highest possible level, which would be 85 percent with individual crop insurance plans. That in turn poses a question as to the gap between this theoretical prediction and farmers' actual choices as discussed above. To explain this gap, one could turn to the alternative decision-making framework cumulative prospect theory (Babcock, 2015). The cumulative prospect theory was originally developed in Tversky and Kahneman (1992) and may be employed to explain some of the anomalies that are not compatible with expected utility theory.³ The *AFR* article carries out an extensive simulation analysis with respect to the cumulative prospect theory framework and evaluates the findings in Babcock (2015) as well.

In closing, both research endeavors undertaken by Dr. Bulut were recognized as contributions to the agricultural economics literature. These

articles have been published in academic journals and featured here in *Crop Insurance TODAY*® magazine (see the references for a select list) have been already cited by outside researchers and are expected to stimulate future research. Such an impact adds to the credibility of the association's responses regarding program and policy changes. Just as it is vitally important to incorporate the latest agronomic research into the crop insurance industry's loss adjustment procedures, it is equally important that the industry maintain a viable analytical research program, most particularly in the field of agricultural economics. NCIS needs to be part of the academic conversation as crop insurance has become a mainstay of the profession's focus for at least the past decade.

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² Richard Thaler was the winner of 2017 Nobel prize in economics.

³ In modeling how individuals make decisions under uncertainty, the cumulative prospect theory blends economics and psychology and states that the individual would compare each possible outcome to a reference point first and code those outcomes as gains or losses. The individual would then weigh the values he or she is deriving from gains or losses with the subjective probabilities.