Effects of Crop Insurance on Farm Survival

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Introduction:

Producers are exposed to various risks in their revenue stream due to unexpected changes in price and quantity caused by various factors including adverse weather, crop pests or diseases, and unpredictable changes in demand. Over the past two decades, the U.S. federal crop insurance program has rapidly expanded to cover about 300 million acres of farmland with crop insurance.

Despite expansion of crop insurance programs, both in the United States and globally, little is known about the effects crop insurance has on farm survival. While some argue that crop insurance increases farm survival time by providing indemnity payments to farms when they face financial shocks from declining crop prices or yields, others may argue that crop insurance may not affect survivability. The government offers disaster assistance to help producers recover financially from natural disaster events. Additionally, producers have other means to manage risk through contracts, diversification, government programs, off-farm income, etc.. These individuals believe that crop insurance may be used as a way to transfer money rather than reducing risks. Therefore, it is important to identify if, and to what degree, crop insurance may have influenced farm survival.

Procedures:

To analyze effects of crop insurance on farm survival, three different models were employed: 1) Kaplan-Meier survival curve, 2) Ordinary Least Squares (OLS), and 3) Cox Proportional Hazard Model (Cox). A farm-level panel dataset of 1,016 farms for the period 1996 to 2015 from the Kansas Farm Management Association (KFMA) was used in this analysis. Of these farms, 893 farms reported that they purchased crop insurance every year since 1996 while the remaining 123 farms did not report purchasing any crop insurance products since 1996. For this study, a farm exit was defined as a farm not actively participating in KFMA for more than two years from the last year in the analysis, 2015, to take into account the temporary absence of some farms in these data. To control for the systematic differences between farms that purchased crop insurance and those that did not purchase crop insurance, we used a method called Propensity Score Matching (PSM).

Results:

Figure 1 displays the estimated survival curves for farms that purchase crop insurance and for farms that did not purchase crop insurance. Farm survival probability was estimated for each group for the 20-year window. Survival rates were higher for farms that purchase crop insurance implying farms that purchased crop insurance were more likely to stay in KFMA longer. Thus, the result suggests there is a positive effect of crop insurance on farm survival.

Table 1 reports the estimates from both the OLS model and Cox model. The OLS estimated coefficient of crop insurance implies how much longer the insured farms survived due to crop insurance. The result indicates that farms that purchased crop insurance are likely to survive about seven years longer when compared to farms that did not purchase crop insurance. The estimated coefficient on crop insurance in

the Cox model can be interpreted as the effect of crop insurance on a conditional probability of farm exit. In other words, it implies that crop insurance is positively associated with farm survival by decreasing the rate of farm exit by 72.2%.[1]

In summary, our results indicate that crop insurance has a positive and significant impact on farm survival. Our findings indicate that crop insurance plays a significant role as a risk management tool for farms. The possible channels are: a) financial distress mitigation, b) stabilization of cash flow and c) liquidity improvement.

References

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[1] The coefficient, -1.283, suggests that the estimate hazard ratio (relative risk) of farm exit for farms that purchased crop insurance relative to farms that did not purchase crop insurance is $e^{-1.283}$, 0.278. It implies that farms with crop insurance reduces the rate of farm exit by 72.2 % (1-0.278).

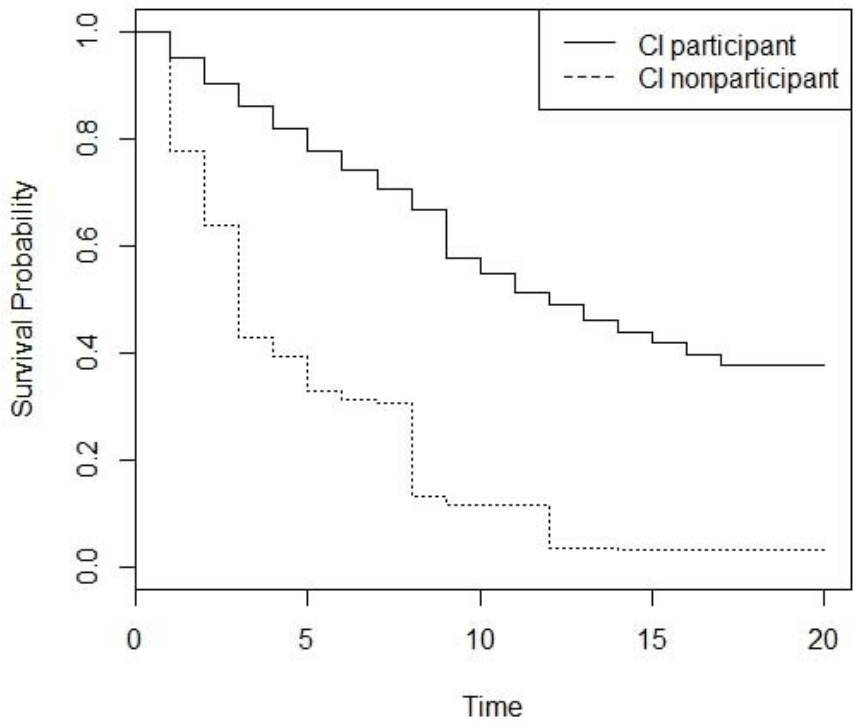

Figure 1. Kaplan-Meier Survival Curves of Crop Insurance (CI)

Table 1. Effects of Crop Insurance on Farm Survival

Variables	Model 1[a]	Model 2[a]
Crop insurance	7.073*** (1.595)	-1.283*** (0.051)
Number of observations	2,148	2,148

Note: Robust standard errors appear in parentheses. Asterisks ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

[a]Model 1 are results from the Ordinary Least Square while Model 2 are results from the Cox Proportional Hazard Model.

Source: Kim et al. (2017)