**Appendix A: 2SLS First Stage Regression for Insured Acres**

I estimate the following first stage regression with endogenous acres insured as the dependent variable. Policy indicators, interactions between policy indicators and policy exposure measures, and lagged acres insured are included as instruments along with all exogenous variables from equation (15).

1. $\begin{array}{c}Acres Insured\_{it}=\left(1-δ\right)CRP\_{it-1}+α\_{i}+τ\_{t}+ψRent\_{it}+θDrought\_{st-1}+ϕP\_{it}\\+\sum\_{k=1}^{4}γ\_{k}Ω\_{k}+\sum\_{k=1}^{4}\sum\_{j=50}^{80}λ\_{jk}\left(Ω\_{k}\*Γ\_{ijk-1}\right)+μAcres Insured\_{it-1}+e\_{it}\end{array}$

The term$s Ω\_{k}$ for $k=1,…, 4$ are dummy variables representing each of the four major policy changes during the observation period. The value $k=1$ corresponds to the period following FCIRA of 1994 through 1998, $k=2$ corresponds to the ad-hoc subsidy period of 1999 and 2000, $k=3$ is the APRA period from 2001 to 2008, and $k=4$ represents the post 2008 Farm Bill period. Each dummy variable equals one in the years following the passage of its respective policy and becomes zero when a new policy replaces it, e.g. $Ω\_{1}$ “turns on” following FCIRA of 1994 and becomes zero in 1999 when ad-hoc subsidies are passed. The coefficients $γ\_{1}, …, γ\_{4}$ capture the effect of each policy change on insurance participation across all counties. I measure how the policy changes affect insurance take-up in specific counties with the variables $Γ\_{ijk-1}$.

Variables$ Γ\_{ijk-1}$ for $j=50, 60, 70, 80$, and $k=1,…, 4$ measure the percent of total cropland in county $i$ insured under policies with coverage level $j$.[[1]](#footnote-2) They are computed as:

1. $\begin{array}{c}Γ\_{ijk-1}=\frac{1}{T\_{k-1}}\sum\_{t\in k-1}^{}\frac{Acres Insured\_{ijk-1}}{Total Cropland\_{ik-1}}\end{array}$

where $Acres Insured\_{ijk-1}$ is the number of acres insured at coverage level $j$ during the policy period $k-1$, $Total Cropland\_{ik-1}$ is the total amount of cropland that could be insured during the $k-1$ time period, and $T\_{k-1}$ is the number of years contained in the period $k-1$. For example, to measure county $i$’s exposure to the ad-hoc subsidy rate increases of 1999 and 2000, I take the average proportion of cropland insured at each coverage level during the preceding policy period (1995-1998 in this example).

1. $\begin{array}{c}Γ\_{i, 50, 1}=\frac{1}{4}\sum\_{t=1995}^{1998}\frac{Acres Insured\_{i,50,t}}{Total Cropland\_{i,1}}\end{array}$
2. $\begin{array}{c}Γ\_{i, 60, 1}=\frac{1}{4}\sum\_{t=1995}^{1998}\frac{Acres Insured\_{i,60,t}}{Total Cropland\_{i,1}}\end{array}$
3. $\begin{array}{c}Γ\_{i, 70, 1}=\frac{1}{4}\sum\_{t=1995}^{1998}\frac{Acres Insured\_{i,70,t}}{Total Cropland\_{i,1}}\end{array}$
4. $\begin{array}{c}Γ\_{i, 80, 1}=\frac{1}{4}\sum\_{t=1995}^{1998}\frac{Acres Insured\_{i,80,t}}{Total Cropland\_{i,1}}\end{array}$

Each coefficient $λ\_{jk}$ captures the effect of each policy change on counties with varying levels of pre-policy preferences for each coverage level. Because FCIRA of 1994 had an outsized effect on catastrophic plans, we might expect the coefficient $λ\_{50,1}$ to be very large and significant in the first stage regression while $λ\_{70,1}$ may be small or insignificant. Similarly, $λ\_{60,3}, λ\_{70,3, }$ and $λ\_{80,3}$ should be large and significant while $λ\_{50,3}$ may be small because ARPA of 2000 favored high coverage buy-up plans. The variable$ Acres Insured\_{it-1}$ is total insured acres in the county during the previous year. It measures pre-determined preferences for crop insurance more generally and is predictive of future insurance participation. Importantly, lagged insured acres are not correlated with current CRP enrollment or re-enrollment decisions and adds predictive strength to the first stage regression. Its coefficient, $μ$, will have a positive and significant effect on insured acres in the first stage regression.

 Table A1 displays the first stage regression results used for the IV estimation shown in Table 2. Specification (2) drops the policy indicators due to perfect collinearity with year fixed effects. The signs on all four policy indicators are statistically insignificant in the first specification with the exception of the ARPA dummy, suggesting that crop insurance legislation does not increase insurance use in counties with no preference for insurance prior to each policy change. Ten of the 16 interaction instruments between policy indicators and policy exposure measures are statistically significant at the 0.10 level. Policy changes generally have the largest effects on insurance in counties with established preferences for the types of insurance targeted by each policy change. Lagged insured acres has a positive and statistically significant influence on current acres insured. An additional acre insured is associated with a 0.82 to 0.84 acre increase in insured acreage the following year. I interpret predicted acres insured from the first state regression as the exogenous portion of insurance participation resulting from government policy and pre-determined decisions that is uncorrelated with CRP enrollment.

The first stage regressions show high joint significance among instruments. Table A1 reports F-statistics for excluded regressors of 7,911.52 and 6,315.37, respectively, confirming that the chosen instruments are highly relevant. I reject under-identification and weak-identification of insured acreage based on Angrist-Pischke chi-squared and F statistics which are significant at the 0.01 level in both specifications. I perform a Sargan-Hansen test for over-identifying restrictions where the null hypothesis is that all chosen instruments are valid and are correctly excluded from the second stage regression. The null is rejected at the 10 percent significant level for specification (1) (no temporal controls) but cannot be rejected for specification (2). Because the policy change dummy variables absorb the effects of national CRP policy changes when year fixed effects are left out, the Sargan-Hansen test shows that year fixed effects should not be excluded from the model. Instrument validity is supported when year fixed effects are controlled for, further emphasizing the importance of controlling for government policy related to CRP.

Comparing IV and OLS results (see Table A2) shows a discrepancy between the estimated coefficients on acres insured. The OLS model estimates an average crowding out effect of two to three acres per 1,000 insured while IV estimates are between three and four per 1,000. A Durbin-Wu-Hausman test is performed by regressing CRP acres on the residuals from the first stage regression. The estimated coefficient instructs me to reject the hypothesis that crop insurance usage is exogenous to CRP participation at the 0.10 level for both specifications. If in fact insurance participation is exogenous, the IV estimator may be inefficient relative to OLS but remains consistent given the strong relevancy of the instruments. Running the OLS model by farm production region produces results consistent with those shown in Table 3, though point estimates tend to be slightly smaller in magnitude.

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| **Table A1. The Relationship Between Endogenous Crop Insurance Participation and Instrumental Variables.**  |
|  |  | **First Stage Regression - Dependent Variable: Acres Insured** |
|  |  | **(1)** |  | **(2)** |
| Variable |   | Coef. | Std. Error |   | Coef. | Std. Error |
| FCIRA Dum |  | 7,908.03\*\*\* | (1,269.80) |  | \_ | \_ |
| Ad-hoc Dum |  | 6,170.80\*\*\* | (1,219.47) |  | \_ | \_ |
| ARPA Dum |  | 6,304.13\*\*\* | (1,370.81) |  | \_ | \_ |
| 2008 Farm Bill Dum |  | 11,334.97\*\*\* | (2,089.98) |  | \_ | \_ |
| FCIRA \* Percent 50-55% pre-FCIRA |  | 205,182.40\*\*\* | (45,765.45) |  | 199,212.50\*\*\* | (45,178.38) |
| FCIRA \* Percent 60-65% pre-FCIRA |  | 7,902.80 | (5,096.70) |  | 7,358.30 | (4,761.50) |
| FCIRA \* Percent 70-75% pre-FCIRA |  | -6,251.14 | (4,167.77) |  | -5,557.68 | (4,009.30) |
| FCIRA \* Percent 80-85% pre-FCIRA |  | 5,060.61 | (7,492.17) |  | 3,724.72 | (7,126.27) |
| Ad-hoc \* Percent 50-55% pre-Ad-hoc |  | 31,391.07\*\*\* | (7,375.95) |  | 29,119.34\*\*\* | (6,806.30) |
| Ad-hoc \* Percent 60-65% pre-Ad-hoc |  | 9,417.27 | (9,792.40) |  | 7,345.32 | (9,453.71) |
| Ad-hoc \* Percent 70-75% pre-Ad-hoc |  | 31,701.23 | (21,001.02) |  | 28,044.39 | (20,163.04) |
| Ad-hoc \* Percent 80-85% pre-Ad-hoc |  | -15,793.73 | (27,751.76) |  | -18,912.17 | (26,793.73) |
| ARPA \* Percent 50-55% pre-ARPA |  | 26,445.24\*\* | (12,108.00) |  | 26,870.73\*\* | (11,148.76) |
| ARPA \* Percent 60-65% pre-ARPA |  | 13,850.38 | (11,508.59) |  | 13,316.24 | (11,289.32) |
| ARPA \* Percent 70-75% pre-ARPA |  | -16,676.18 | (16,095.35) |  | -16,775.10 | (14,237.81) |
| ARPA \* Percent 80-85% pre-ARPA |  | 13,533.26\*\*\* | (4,181.15) |  | 12,780.67\*\*\* | (4,051.89) |
| Farm Bill \* Percent 50-55% pre-Farm Bill | 376,561.40\*\* | (166,618.90) |  | 353,470.90\*\* | (161,481.00) |
| Farm Bill \* Percent 60-65% pre-Farm Bill | 52,523.96 | (34,429.21) |  | 49,971.92 | (33,050.80) |
| Farm Bill \* Percent 70-75% pre-Farm Bill | 83,218.00 | (65,593.94) |  | 76,445.83 | (64,486.65) |
| Farm Bill \* Percent 80-85% pre-Farm Bill | -25,197.00\*\*\* | (9,272.56) |  | -25,640.65\*\*\* | (9,025.79) |
| Acres Insured Lag |  | 0.82\*\*\* | (0.03) |  | 0.84\*\*\* | (0.02) |
| Exogenous Control Variables |  | Yes |  |  | Yes |  |
| Year Fixed Effects |   | No |   |   | Yes |   |
| Observations |  | 68,900 |  |  | 68,900 |  |
| Counties |   | 2,756 |   |   | 2,756 |   |
| F-Statistic |  | 28,380.92 |  |  | 8.99E+07 |  |
| F-Statistic for Excluded Instruments |   | 7,911.52 |   |   | 6,315.37 |   |
| ***Notes***: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. First stage regression estimated using Ordinary Least Squares. Standard errors clustered at the state level are shown in parenthesis. Instruments include indicators for policy changes, policy indicators interacted with measures of policy change exposure, and a one year lag of acres insured. Policy indicators in (2) are dropped due to multicollinearity with year fixed effects. All exogenous control variables shown in the second stage regressions are included. |

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| **Table A2. The Relationship Between Crop Insurance Participation and Enrollment in the Conservation Reserve Program (CRP).** |
|  |  | **OLS Fixed Effects** |
|  |  | **(1)** |  | **(2)** |
|  |  | **Acres Enrolled in CRP** |  | **Acres Enrolled in CRP** |
| Variable |   | Coef. | Std. Error |   | Coef. | Std. Error |
| CRP Rent ($ per acre enrolled) |  | 30.348\*\*\* | (8.890) |  | 20.508\*\*\* | (6.262) |
| CRP Acres Lag |  | 0.877\*\*\* | (0.011) |  | 0.881\*\*\* | (0.011) |
| Acres Insured |  | -0.003\*\* | (0.001) |  | -0.002\* | (0.001) |
| Drought |  | 293.854\* | (163.029) |  | 152.487 | (173.337) |
| Expected Price |  | 177.331\*\*\* | (50.512) |  | -233.359\*\* | (101.610) |
| Year Fixed Effects |   | No |   |   | Yes |   |
| Observations |  | 68,900 |  |  | 68,900 |  |
| Counties |   | 2,756 |   |   | 2,756 |   |
| R-Square |  | 0.81 |  |  | 0.82 |  |
| ***Notes***: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Estimates generated using OLS fixed effects regression. Standard errors clustered at the state level are shown in parenthesis. Drought is an indicator equal to 1 if the PDSI was less than -2 in the previous year to reflect producer expectations. CRP rental payments are expressed in real terms using the PPI. Futures prices for corn (Dec.), soybeans (Nov.), and wheat (Sep.) are converted to real terms and weighted by historical production of each commodity over the previous 10 years.  |

**Appendix B: Empirical Extensions and Robustness Checks**

To further explore the results of this paper and check their robustness, I test the empirical relationships under different time periods and with alternative specifications and models. The effect of crop insurance on net new CRP enrollment should be large in years when CRP General Sign-ups are offered and small when they are not. This is because the clear majority of CRP acres enter the program through the General Sign-up convention during the study period.[[2]](#footnote-3) Continuous Sign-ups are offered every year after 1996 though these contracts constitute a small percentage of overall program participation. Land enrolled under the Continuous convention is small and highly targeted as opposed to the whole field or whole farm practices typical of General Sign-ups.

 Column (1) of Table B1 compares relevant IV estimates during General and non-General Sign-up years by interacting the insured acreage and rental rate variables with a dummy variable indicating when a General Sign-up was offered.[[3]](#footnote-4) The un-interacted variables represent the effects during non-General Sign-up years. Effects during General Sign-up years are calculated as the sum of the un-interacted and interacted coefficients. As expected, the crowding out effect of federal crop insurance is largest when a General Sign-up takes place. The un-interacted coefficient is -0.002 but is not statistically significant at the 0.10 significance level, suggesting a negative but weak relationship between insurance use and CRP participation in non-General Sign-up years.

 The impact of rental rates on net new enrollment in CRP is positive for all time periods but is 24 percent larger when a General Sign-up is offered. A one dollar increase in average rental rates during a General Sign-up year brings in an additional 5.3 acres relative to a non-General Sign-up year. The difference in rental rate responsiveness may be an artifact of the competitive bidding process and FSA policy. The government establishes maximum soil rental rates it is willing to pay during General Sign-ups to achieve program goals. This rental rate cap, along with the national acreage cap, holds large sway over CRP participation. The larger acreage response could be channeling the effect of government changes to maximum rental rates.

 A possible source of bias in the main results presented in Table 2 is the interaction between government policy governing CRP (run by USDA FSA) and policy governing federal crop insurance (run by USDA RMA). The national cap on CRP enrollment changes periodically, usually following the passage of the Farm Bill. Figure 4 displays changes in the enrollment cap between 1989 and 2013. The cap falls on two occasions during the observation period, once following the Farm Bill of 1996 and again after the Farm Bill of 2008. The change brought about by the 2008 Farm Bill does not take effect until 2010 while the reduction made by the 1996 Farm Bill takes effect immediately. These cuts closely parallel the timing of changes in crop insurance subsidies brought about by the Federal Crop Insurance Reform Act of 1994 (FCIRA) and the 2008 Farm Bill. The negative effect of crop insurance on CRP enrollment may be exaggerated if policy induced changes in acres insured correlate with reductions in total allowable CRP enrollment. In other words, overlapping government policy could render the IV strategy invalid if policy induced crop insurance increases take place alongside policy induced CRP reductions.

 To test this, I run two restricted versions of the main IV model. I first exclude periods during which the national CRP enrollment cap was lowered: the period from 1996 to 2001 and the period from 2010 to 2013, and present the results in column (2) of Table B1. The estimated effect of crop insurance participation is robust to the exclusion of these time periods. The point estimate is unchanged from the main regression results at -0.003 and remains statistically significant. I then estimate the model excluding the FCIRA policy period (1995-1998) and the 2008 Farm Bill policy period (2009-2013) and report the results in Table B1 column (3). Again, the coefficient on insured acres is robust in sign and significance but falls in magnitude to -0.002.

It should be noted that the CRP acreage cap is lifted in 2002 from 36.4 million acres to 39.2 million acres. The timing of this change corresponds closely to the subsidy rate increases of the Agricultural Risk Protection Act of 2000 (ARPA). To the extent that policy overlaps bias the main results, the impact of crop insurance on CRP may be biased in a positive direction. More to the point, the identification strategy relies on degrees of exposure to crop insurance policy changes and pre-determined insurance behavior, not just the discrete policy changes themselves. General increases in crop insurance on a large scale may be correlated to general draw downs in CRP due to policy timing, but pre-determined insurance preferences should be independent of administrative changes at the national level.

 The main empirical model expressed by equation (15) assumes a constant average CRP exit rate for all time periods and geographic regions. To test this assumption I interact lagged CRP acreage with dummy variables representing each national enrollment cap period during the study period (see Figure 4) and each of the 10 farm production regions shown in Figure 5. Exit rates are likely influenced by the prevailing enrollment cap and related administrative decisions such as maximum soil rental rates and re-enrollment incentives offered by FSA.

The crowding out of CRP acreage by crop insurance travels through two channels: reduced re-enrollment (higher exit rate) and potential new acres deterred from enrollment. If exit rates are heterogeneous across regions and over time in ways that are correlated with crop insurance variables, then the exit rate portion of the insurance effect could be exaggerated.

 Column (4) of Table B1 reports the effect of lagged CRP enrollment (i.e. exit rates) for each of four periods: 1989-1995 when the national enrollment cap was 45 million acres, 1996-2001 when the cap was lowered to 36.4 million acres, 2002-2009 in which the cap was raised to 39.2 million acres, and 2010-2013 when the cap fell to 32 million acres. The implied CRP exit rate (computed by subtracting the coefficient on lagged CRP acreage from one) remains relatively constant at between 0.04 and 0.05 during the first three periods but rises to 0.12 during the later period when the national cap fell to its lowest point since the program began.[[4]](#footnote-5) Statistical tests fail to reject the null hypothesis that annual CRP exit rates were unchanged between 1989 and 2009 but a statistically significant difference does emerge after 2010 when the 2008 Farm Bill cap reduction takes effect. Region specific exit rates are also included in the regression but suppressed in Table B1. CRP exit rates vary significantly across regions with Western, Plains, Great Lakes, and Corn Belt states having higher average rates of exit relative to Pacific and Eastern states.

 After controlling for time period and region specific exit rates, the effect of insured acres falls from -0.003 to -0.001 but remains statistically significant at the 0.05 level. Running the specification shown in column (4) separately for each production region follows the same pattern with insurance effects generally remaining negative and significant but falling in magnitude. This suggests that at least some of the effects estimated in Tables 2 and 3 are driven by heterogeneous exit rates not captured by the model as expressed in equation (15).

 To test for any remaining unobserved policy or production shocks, I include state by year fixed effects in the main IV regression and present the results in column (5) of Table B1. State specific time trends controls for all unobservable factors that vary both temporally and spatially (at the state level) and that affect both CRP and crop insurance acreage. The inclusion of state by year fixed effects weakens both the size and significance of all control variables with the exception of lagged CRP enrollment, generally reflecting the statistical demands placed on the model. The drought indicator drops out of the regression as it is observed at the state-by-year level. The impact of crop insurance acreage on CRP however, remains negative and statistically significant at the 0.05 level but shrinks in magnitude to -0.001.

Lagged CRP acreage is included as an independent variable in all models due to the stock-flow nature of CRP at the county level. This strategy may generate inconsistent estimates as the lagged dependent variable is correlated with the contemporaneous error term. The panel dataset includes a large number of counties (high N) over a relatively short time period (small T), suggesting the need for a dynamic panel data model approach. To generate more consistent coefficients, I estimate the main regression equation (15) with an Arellano-Bond model which instruments for endogenous lagged CRP acres using deeper lags of the dependent variable via the first-differenced generalized method of moments (GMM).[[5]](#footnote-6) Two-year lags of insured acres and county average CRP rental rates serve as instruments for endogenous insurance and CRP rent variables.[[6]](#footnote-7) Crop insurance policy shocks and policy shock exposures used in the main instrumental variables (IV) regressions are included as additional instruments.

 Results of the Arellano-Bond model with and without year fixed effects are presented in Table B2. The estimated crowding out effects of crop insurance are unchanged from the main regression estimates shown in Table 2 at -0.004 and -0.003 and remain statistically significant.[[7]](#footnote-8) The coefficient on lagged CRP enrollment falls from 0.88 in the IV model to 0.83 when estimated via Arellano-Bond. The difference suggests the average CRP exit rate estimated in the main results (12 percent) is biased downward. After correcting for the correlation between the lagged dependent variable and the contemporaneous error term, the average exit rate is closer to 17 percent. The estimated effects of CRP rental rates and commodity futures prices grow larger in magnitude though their signs and statistical significance remain robust. The effects of CRP rental rates and commodity prices could be under-reported by the IV fixed effects method and therefore may be considered lower and upper bounds, respectively, of their true effects.

 The main regression uses an indicator variable to represent drought conditions based on the Palmer Drought Severity Index (PDSI). It was shown in Table 2 that, once year fixed effects are applied, the model does not demonstrate a statistically significant relationship between climate conditions and CRP participation. The discrete approach affords a simple interpretation but reduces variation and may prevent the model from detecting the true relationship between climate and enrollment. I replace the drought indicator variable with a one year lag of the original PDSI and re-run the main IV models. Results are reported in Table B3. The coefficients on the PDSI are negative and statistically significant at the 0.05 level in both specifications, though the application of year fixed effects reduces the magnitude by nearly half. Focusing on column (2), a one unit increase in the state level PDSI reduces CRP acreage within a county by about 60 acres the following year. Wetter conditions are associated with less CRP participation which suggests that improved growing conditions increase the opportunity cost of enrollment. The strength of the relationship however, is weak. A one percent increase in the PDSI reduces acres in CRP by a mere 0.003 percent. Presumably, precipitation reduces CRP up to a point, beyond which extra moisture depresses yields and makes CRP more attractive. Adding a square of the PDSI indicates a downward facing quadratic relationship though the coefficient on the squared term is not statistically significant.

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| **Table B1. Check for Robustness of the Effect of Crop Insurance on CRP Enrollment.** |
|  | **Fixed Effects (with IV) - Dependent Variable: Acres Enrolled in CRP** |
|  | **(1)** |  | **(2)** |  | **(3)** |  | **(4)** |  | **(5)** |
|  | General vs. Non-General Sign-up Years |  | Exclude CRP Cap Reduction Periods |  | Excluding FCIRA and 2008 Farm Bill Periods |  | Test for Differences in CRP Exit Rates |  | Control for State Specific Time Trends |
| Variable | Coef. | Std. Error |   | Coef. | Std. Error |   | Coef. | Std. Error |   | Coef. | Std. Error |   | Coef. | Std. Error |
| CRP Rent ($ per acre) | 22.176\*\*\* | (8.065) |  | 24.916\*\*\* | (8.126) |  | 22.707\*\*\* | (7.128) |  | 15.904\*\*\* | (5.225) |  | 13.232 | (10.931) |
| CRP Rent × General | 5.341\*\* | (2.635) |  |  |  |  |  |  |  |  |  |  |  |  |
| CRP Acres Lag | 0.879\*\*\* | (0.012) |  | 0.896\*\*\* | (0.018) |  | 0.863\*\*\* | (0.017) |  |  |  |  | 0.888\*\*\* | (0.012) |
| CRP Lag (1989-1995) |  |  |  |  |  |  |  |  |  | 0.963\*\*\* | (0.008) |  |  |  |
| CRP Lag (1996-2001) |  |  |  |  |  |  |  |  |  | 0.956\*\*\* | (0.011) |  |  |  |
| CRP Lag (2002-2009) |  |  |  |  |  |  |  |  |  | 0.951\*\*\* | (0.010) |  |  |  |
| CRP Lag (2010-2013) |  |  |  |  |  |  |  |  |  | 0.883\*\*\* | (0.015) |  |  |  |
| Acres Insured | -0.002 | (0.002) |  | -0.003\*\*\* | (0.001) |  | -0.002\*\*\* | (0.001) |  | -0.001\*\* | (0.001) |  | -0.001\*\* | (0.001) |
| Acres Insured × General | -0.003\*\* | (0.001) |  |  |  |  |  |  |  |  |  |  |  |  |
| Drought | 188.820 | (165.697) |  | 366.559\*\* | (177.932) |  | 200.999 | (146.869) |  | 166.543 | (138.917) |  | \_ | \_ |
| Expected Price | -207.269\*\* | (93.755) |  | 54.904 | (73.305) |  | 37.089 | (68.324) |  | -111.306\*\* | (46.833) |  | -87.787 | (79.673) |
| CRP Acres Lag × Region | No |  |  | No |  |  | No |  |  | Yes |  |  | No |  |
| Year Fixed Effects | Yes |  |  | Yes |  |  | Yes |  |  | Yes |  |  | Yes |  |
| State-by-Year Fixed Effects | No |  |  | No |  |  | No |  |  | No |  |  | Yes |  |
| Observations | 68,900 |  |  | 41,340 |  |  | 44,096 |  |  | 68,900 |  |  | 68,900 |  |
| Counties | 2,756 |   |   | 2,756 |   |   | 2,756 |   |   | 2,756 |   |   | 2,756 |   |
| R-Square | 0.82 |   |   | 0.91 |   |   | 0.86 |   |   | 0.83 |   |   | 0.85 |   |
| ***Notes***: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Estimates generated using Two Stage Least Squares regressions with county fixed effects. Standard errors clustered at the state level are shown in parenthesis. Specifications (1) tests for differential impacts of crop insurance and CRP rent during General Sign-up vs. non-General Sign-up years. Specification (2) excludes periods when the national CRP enrollment cap was lowered while (3) excludes the periods following FCIRA of 1994 and the 2008 Farm Bill. (4) controls for time period and region specific CRP exit rates. (5) includes state-by-year fixed effects to control for unobserved region specific time trends. Drought is an indicator equal to 1 if the PDSI was less than -2 in the previous year to reflect producer expectations. The Drought variable is dropped from (5) as it varies by state and year. CRP rental payments are expressed in real terms using the PPI. Futures prices for corn (Dec.), soybeans (Nov.), and wheat (Sep.) are converted to real terms and weighted by historical production of each commodity over the previous 10 years.  |

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| **Table B2. Arellano-Bond Dynamic Panel Data Model.** |
|  | **Arellano-Bond GMM** |
|  | **(1)** |  | **(2)** |
|  | **Acres Enrolled in CRP** |  | **Acres Enrolled in CRP** |
| Variable | Coef. | Std. Error |   | Coef. | Std. Error |
| CRP Rent ($ per acre enrolled) | 28.233\*\*\* | (2.274) |  | 38.876\*\*\* | (5.302) |
| CRP Acres Lag | 0.853\*\*\* | (0.009) |  | 0.827\*\*\* | (0.011) |
| Acres Insured | -0.004\*\*\* | (0.000) |  | -0.003\*\*\* | (0.0005) |
| Drought | 29.625 | (18.398) |  | -25.540 | (20.364) |
| Expected Price | 235.142\*\*\* | (14.029) |  | -255.051\*\*\* | (44.643) |
| Year Fixed Effects | No |   |   | Yes |   |
| Observations | 63,388 |  |  | 63,388 |  |
| Counties | 2,756 |   |   | 2,756 |   |
| Wald χ2 | 9,426.47 |  |  | 23,013.75 |  |
| ***Notes***: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Arellano-Bond dynamic panel data model estimated by first-differenced GMM. Two-step heteroskedasticity-autocorrelation robust standard errors are shown in parenthesis. Lagged CRP acres are instrumented for using deeper lags (lags 2-4). Endogenous acres insured and the CRP rental rate are instrumented for using 2-year lags of each. An additional set of exogenous crop insurance policy shocks and policy shock exposures are included as IVs. An Arellano-Bond test indicates no autocorrelation is present in the first-differenced error term in order 2. Drought is an indicator equal to 1 if the PDSI was less than -2 in the previous year to reflect producer expectations. CRP rental payments are expressed in real terms using the PPI. Futures prices for corn (Dec.), soybeans (Nov.), and wheat (Sep.) are converted to real terms and weighted by historical production of each commodity over the previous 10 years.  |

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| **Table B3. The Impact of the Palmer Drought Severity Index (PDSI) on CRP Enrollment.** |
|  |  | **IV Fixed Effects** |
|  |  | **(1)** |  | **(2)** |
|  |  | **Acres Enrolled in CRP** |  | **Acres Enrolled in CRP** |
| Variable |   | Coef. | Std. Error |   | Coef. | Std. Error |
| CRP Rent ($ per acre enrolled) | 33.234\*\*\* | (10.422) |  | 25.593\*\*\* | (8.109) |
| CRP Acres Lag |  | 0.879\*\*\* | (0.011) |  | 0.881\*\*\* | (0.011) |
| Acres Insured |  | -0.004\*\*\* | (0.002) |  | -0.003\*\* | (0.001) |
| PDSI Lag |  | -105.179\*\*\* | (22.511) |  | -59.770\*\* | (27.577) |
| Expected Price |  | 154.783\*\*\* | (46.533) |  | -237.385\*\* | (104.566) |
| Year Fixed Effects |   | No |   |   | Yes |   |
| Observations |  | 68,900 |  |  | 68,900 |  |
| Counties |   | 2,756 |   |   | 2,756 |   |
| R-Square |  | 0.81 |  |  | 0.82 |  |
| ***Notes***: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Estimates generated using Two Stage Least Squares regressions with county fixed effects. Standard errors clustered at the state level are shown in parenthesis. The state level Palmer Drought Severity Index (PDSI) measures long run soil moisture levels. Positive (negative) values indicate wet (dry) conditions. CRP rental payments are expressed in real terms using the PPI. Futures prices for corn (Dec.), soybeans (Nov.), and wheat (Sep.) are converted to real terms and weighted by historical production of each commodity over the previous 10 years.  |

1. Note that in computing policy exposure measures, I combine policies at the 50 and 55 percent coverage level into one group and refer to it as the 50 percent coverage level. I do the same for 60, 70, and 80 percent coverage categories. [↑](#footnote-ref-2)
2. Continuous Sign-ups have steadily gained popularity since their introduction in 1996 as the program attempts to target specific conservation practices. [↑](#footnote-ref-3)
3. General Sign-ups during the study period were offered in 1989, 1991, 1992, 1995, 1997, 1998, 2000, 2003, 2004, 2006, and 2010-2013. Non-General Sign-up years include 1993, 1994, 1996, 1999, 2001, 2002, 2005, 2007, 2008, and 2009. Continuous Sign-ups are offered every year after 1996 meaning that 1993 and 1994 represent years in which no means of entering CRP are available. [↑](#footnote-ref-4)
4. The cap was lowered even further after 2013 to below 25 million acres. [↑](#footnote-ref-5)
5. To keep the instrument matrix manageable and limit the number of over-identifying restrictions, I restrict the number of lags of the dependent variable used as instruments to three (lags two through four). [↑](#footnote-ref-6)
6. Two lags of the endogenous regressors are required to satisfy the GMM moment conditions required by the Arellano-Bond model. [↑](#footnote-ref-7)
7. The standard errors of the point estimates fall in the Arellano-Bond model, making the associated p-values smaller. This is likely due to the errors being clustered at the county level as opposed to the state level. The Arellano-Bond command in Stata (XTABOND) does not allow for clustering at levels other than the panel groups, in this case counties. [↑](#footnote-ref-8)