Supplemental Appendix A

**Table A1.** Ordered Logit Parameter Estimates by Crop

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Corn | | | Soybeans | | |
| ***Soil:*** |  |  |  |  |  |  |
| NCCPI | -0.0143 | (0.0059) | \*\* | 0.0026 | (0.0042) |  |
| Highly Erodible Land | 0.8279 | (0.2958) | \*\*\* | 1.0936 | (0.2253) | \*\*\* |
| Well-Drained Soil | 0.7164 | (0.1831) | \*\*\* | 0.7387 | (0.1560) | \*\*\* |
|  |  |  |  |  |  |  |
| ***Farm Characteristics:*** |  |  |  |  |  |  |
| Irrigated Field | -0.4600 | (0.3335) |  | -0.3549 | (0.2893) |  |
| Log of Cropland | 0.3029 | (0.1107) | \*\*\* | 0.3164 | (0.1063) | \*\*\* |
| Intermediate Farm | 0.4435 | (0.2966) |  | -0.3797 | (0.2907) |  |
| Commercial Farm | -0.1321 | (0.3343) |  | -0.5198 | (0.3272) |  |
|  |  |  |  |  |  |  |
| ***Region and Climate:*** |  |  |  |  |  |  |
| Northern Crescent | 0.6371 | (0.3570) | \* | 0.2596 | (0.2815) |  |
| Northern Great Plains | 1.2483 | (0.5212) | \*\* | 1.8634 | (0.4545) | \*\*\* |
| Prairie Gateway | 0.437 | (0.4289) |  | 1.4887 | (0.3098) | \*\*\* |
| Southeast | 0.5289 | (0.5174) |  | 0.6111 | (0.4186) |  |
| Mississippi Portal |  |  |  | 1.7279 | (0.6095) | \*\*\* |
| Average Temperature | 4.8643 | (0.7321) | \*\*\* | 7.2206 | (0.9270) | \*\*\* |
| Average Temperature2 | -0.1270 | (0.0190) | \*\*\* | -0.2144 | (0.0276) | \*\*\* |
| Temperature Variability | -0.1140 | (0.0528) | \*\* | -0.2096 | (0.0631) | \*\*\* |
| Average Precipitation | -0.0359 | (0.0686) |  | -0.1659 | (0.0704) | \*\* |
| Average Precipitaion2 | 0.0003 | (0.0004) |  | -0.0003 | (0.0007) |  |
| Precipitation Variability | 0.0001 | (0.0003) |  | 0.00002 | (0.0002) |  |
| Temperature×Precipitation | -0.0015 | (0.0041) |  | 0.0109 | (0.0070) |  |
|  |  |  |  |  |  |  |
| ***Operator Characteristics:*** |  |  |  |  |  |  |
| Log of Age | 0.6099 | (0.4057) |  | 0.1833 | (0.3539) |  |
| Tenure | 0.1311 | (0.1845) |  | -0.1595 | (0.1467) |  |
| College Graduate | -0.0651 | (0.2056) |  | -0.0947 | (0.1814) |  |
|  |  |  |  |  |  |  |
| τ1 | 44.6941 | (8.5653) |  | 59.6438 | (8.1809) |  |
| τ2 | 46.3787 | (8.5617) |  | 61.2441 | (8.1867) |  |
| N | 1155 |  |  | 1324 |  |  |
| Pseudo R2 | 0.1027 |  |  | 0.1409 |  |  |
| LL | -784465 |  |  | -707577 |  |  |

Standard errors in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

**Table A2.** Summary Statistics Corn Fields by Region (Standard Deviations in Parentheses)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Corn | Heartland | | Northern Crescent | | Northern Great Plains | | Prairie Gateway | | Southeast | |
| NCCPI | 66.0 | (16.9) | 45.6 | (18.2) | 27.38 | (7.94) | 44.4 | (13.5) | 48.3 | (23.3) |
| Highly Erodible Land\* | 0.127 | (0.333) | 0.064 | (0.246) | 0.037 | (0.189) | 0.150 | (0.358) | 0.033 | (0.179) |
| Well-Drained Soil\* | 0.530 | (0.500) | 0.723 | (0.449) | 0.820 | (0.386) | 0.931 | (0.254) | 0.658 | (0.477) |
| Irrigated Field\* | 0.032 | (0.176) | 0.00006 | (0.00767) | 0.139 | (0.347) | 0.358 | (0.481) | 0.031 | (0.175) |
| Log of Cropland | 6.57 | (1.06) | 6.17 | (1.03) | 7.372 | (0.999) | 6.98 | (1.05) | 5.56 | (1.15) |
| Intermediate Farm\* | 0.150 | (0.357) | 0.234 | (0.425) | 0.175 | (0.382) | 0.221 | (0.416) | 0.327 | (0.472) |
| Commercial Farm\* | 0.749 | (0.434) | 0.657 | (0.476) | 0.808 | (0.396) | 0.720 | (0.450) | 0.437 | (0.499) |
| Average Temperature | 17.55 | (1.40) | 15.770 | (1.035) | 14.988 | (0.704) | 19.99 | (2.91) | 19.70 | (2.94) |
| Temperature Variability | 26.83 | (2.89) | 27.17 | (2.55) | 33.795 | (0.692) | 25.78 | (7.05) | 18.82 | (2.94) |
| Average Precipitation | 94.43 | (7.56) | 90.49 | (6.58) | 63.91 | (7.40) | 80.2 | (16.8) | 108.4 | (14.1) |
| Precipitation Variability | 2684 | (590) | 2128 | (503) | 1634 | (253) | 2954 | (1160) | 3725 | (1883) |
| Log of Age | 3.99 | (0.22) | 4.001 | (0.194) | 3.93 | (0.24) | 3.99 | (0.24) | 4.04 | (0.18 |
| Tenure\* | 0.482 | (0.500) | 0.644 | (0.480) | 0.473 | (0.502) | 0.427 | (0.496) | 0.733 | (0.445) |
| College Graduate\* | 0.204 | (0.403) | 0.176 | (0.382) | 0.243 | (0.431) | 0.333 | (0.473) | 0.138 | (0.347) |

\* Binary variables.

**Table A3.** Summary Statistics for Soybean Fields by Region (Standard Deviations in Parenthesis)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Soybeans | Heartland | | Northern Crescent | | Northern Great Plains | | Prairie Gateway | | Southeast | | Mississippi Portal | |
| NCCPI | 61.9 | (17.7) | 52.3 | (14.2) | 28.2 | (10.9) | 54.1 | (13.9) | 50.2 | (24.0) | 68.4 | (15.6) |
| Highly Erodible Land\* | 0.177 | (0.382) | 0.084 | (0.278) | 0.014 | (0.116) | 0.232 | (0.424) | 0.174 | (0.382) | 0.029 | (0.169) |
| Well-Drained Soil\* | 0.579 | (0.494) | 0.489 | (0.501) | 0.649 | (0.480) | 0.901 | (0.300) | 0.901 | (0.300) | 0.321 | (0.468) |
| Irrigated Field\* | 0.041 | (0.199) | 0.016 | (0.124) | 0.044 | (0.206) | 0.138 | (0.347) | 0.018 | (0.135) | 0.379 | (0.486) |
| Log of Cropland | 6.49 | (1.07) | 5.95 | (1.39) | 7.374 | (0.919) | 6.829 | (0.919) | 6.183 | (1.199) | 7.20 | (1.29) |
| Intermediate Farm\* | 0.233 | (0.423) | 0.250 | (0.434) | 0.152 | (0.361) | 0.289 | (0.455) | 0.282 | (0.453) | 0.122 | (0.328) |
| Commercial Farm\* | 0.645 | (0.479) | 0.573 | (0.496) | 0.785 | (0.413) | 0.631 | (0.484) | 0.525 | (0.503) | 0.838 | (0.369) |
| Average Temperature | 19.05 | (1.34) | 17.240 | (0.737) | 15.966 | (0.858) | 20.610 | (0.984) | 20.895 | (1.177) | 23.625 | (0.981) |
| Temperature Variability | 19.48 | (2.21) | 19.14 | (1.79) | 25.532 | (0.661) | 21.40 | (1.41) | 15.40 | (1.22) | 13.65 | (2.21) |
| Average Precipitation | 94.92 | (7.35) | 91.59 | (6.20) | 69.30 | (5.92) | 96.4 | (13.5) | 102.3 | (6.59) | 101.3 | (10.7) |
| Precipitation Variability | 2783 | (627) | 2065 | (515) | 1629 | (184) | 3435 | (890) | 3037 | (812) | 3994 | (9958) |
| Log of Age | 4.02 | (0.22) | 4.03 | (0.19) | 3.94 | (0.21) | 4.01 | (0.22) | 4.06 | (0.21) | 4.04 | (0.20) |
| Tenure\* | 0.481 | (0.500) | 0.442 | (0.498) | 0.363 | (0.483) | 0.477 | (0.502) | 0.599 | (0.494) | 0.423 | (0.495) |
| College Graduate\* | 0.249 | (0.433) | 0.161 | (0.369) | 0.223 | (0.419) | 0.216 | (0.414) | 0.161 | (0.370) | 0.335 | (0.473) |

\* Binary variables.

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A1**. Predicted Probabilities as NCCPI Increases for Non-Irrigated Corn Fields in the Heartland

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A2.** Predicted Probabilities as NCCPI Increases on Non-Irrigated Corn Fields in the Northern Crescent

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A3**. Predicted probabilities as NCCPI increases on non-irrigated corn fields in the Northern Great Plains

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A4.** Predicted Probabilities as NCCPI Increases for Well-Drained, Non-Irrigated Corn Fields in the Prairie Gateway

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A5.** Predicted Probabilities as NCCPI Increases on Non-Irrigated Corn Fields in the Southeast

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A6.** Predicted Probabilities as the Log of Cropland Increases on Non-Irrigated Corn Fields in the Heartland

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, well-drained cropland

Panel (c): Non-HEL, poorly-drained cropland

**Figure A7**. Predicted probabilities as the log of cropland increases on non-irrigated corn fields in the Northern Crescent

Panel (b): HEL, well-drained cropland

Panel (d): HEL, poorly-drained cropland

Panel (a): Non-HEL, well-drained cropland

Panel (c): Non-HEL, poorly-drained cropland

**Figure A8**. Predicted probabilities as the log of cropland increases on non-irrigated corn fields in the Northern Great Plains

Panel (b): HEL, well-drained cropland

Panel (d): HEL, poorly-drained cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A9**. Predicted probabilities as the log of cropland increases on non-irrigated corn fields in the Prairie Gateway

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A10**. Predicted Probabilities as the Log of Cropland Increases on Non-Irrigated Corn Fields in the Southeast

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland in the Heartland

Panel (c): Non-HEL cropland in the Heartland

**Figure A11**. Predicted Probabilities as the Average Temperature Increases on Non-Irrigated Corn Fields in the Heartland

Panel (b): HEL, Well-Drained Cropland in the Heartland

Panel (d): HEL cropland in the Heartland

Panel (a): Non-HEL, well-drained cropland

Panel (c): Non-HEL, poorly-drained cropland

**Figure A12**. Predicted Probabilities as Average Temperature Increases on Non-Irrigated Corn Fields in the Northern Crescent

Panel (b): HEL, well-drained cropland

Panel (d): HEL, poorly-drained cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A13.** Predicted Probabilities as Average Temperature Increases on Non-Irrigated Corn Fields in the Northern Great Plains

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A14.** Predicted Probabilities as Average Temperature Increases on Non-Irrigated Corn Fields in the Prairie Gateway

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A15**. Predicted Probabilities as Average Temperature Increases on Non-Irrigated Corn Fields in the Southeast

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A16.** Predicted Probabilities as the Log of Cropland Increases on Non-Irrigated Soybean Fields in the Heartland

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A17**. Predicted Probabilities as the Log of Cropland Increases on Non-Irrigated Soybean Fields in the Northern Crescent

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A18.** Predicted Probabilities as the Log of Cropland Increases on Non-Irrigated Soybean Fields in the Northern Great Plains

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A19.** Predicted Probabilities as the Log of Cropland Increases on Non-Irrigated Soybean Fields in the Prairie Gateway

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A20.** Predicted Probabilities as the Log of Cropland Increases on Non-Irrigated Soybean Fields in the Southeast

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A21.** Predicted probabilities as the Log of Cropland Increases on Non-Irrigated Soybean Fields in the Mississippi Portal

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A22.** Predicted Probabilities as the Variability in Average Temperature Increases on Non-Irrigated Soybean Fields in the Heartland

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A23**. Predicted probabilities as the variability in average temperature increases on non-irrigated soybean fields in the Northern Crescent

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A24**. Predicted probabilities as the variability in average temperature increases on non-irrigated soybean fields in the Northern Great Plains

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (c): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A25.** Predicted Probabilities as the Variability in Average Temperature Increases on Non-Irrigated Soybean Fields in the Prairie Gateway

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A26.** Predicted probabilities as the variability in average temperature increases on non-irrigated soybean fields in the Southeast

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland

Panel (a): Non-HEL, Well-Drained Cropland

Panel (c): Non-HEL, Poorly-Drained Cropland

**Figure A27**. Predicted Probabilities as the Variability in Average Temperature Increases on Non-Irrigated Soybean Fields in the Mississippi Portal

Panel (b): HEL, Well-Drained Cropland

Panel (d): HEL, Poorly-Drained Cropland