## Supplementary Material

# Do Rainfall Shocks Prompt Commercial Input Purchases Amongst Smallholder Farmers in Diverse Regions and Environments in Malawi?

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- **Descriptive statistics**

Table S1: Descriptive statistics of explanatory variables by national sample and region

| | National | Northern | Central | Southern |
|---|---|---|---|---|
| Variables | mean | mean | mean | mean |
| ***Climate variables and rainfall shocks*** | | | | |
| Growing season rainfall shock (1-year lag) | 0.004 | -0.214 | -0.016 | 0.090 |
| Growing season rainfall shock (2-year lag) | -0.139 | -0.011 | 0.033 | -0.305 |
| Historical mean rainfall (growing season) (mm) | 944.987 | 1104.423 | 925.648 | 906.346 |
| Historical stdev rainfall (growing season) | 152.455 | 152.681 | 133.004 | 166.380 |
| Historical temperature(max)(growing season)(deg) | 28.194 | 26.793 | 27.252 | 29.334 |
| Historical stdev temperature(max)(growing season) | 0.585 | 0.545 | 0.607 | 0.582 |
| ***Household characteristics*** *(other controls)* | | | | |
| Agricultural implements access index | 0.268 | 0.912 | 0.356 | -0.007 |
| Household wealth index | -0.542 | -0.264 | -0.600 | -0.592 |
| Farm size(ha) | 0.665 | 0.695 | 0.796 | 0.561 |
| Number of plots | 1.488 | 1.552 | 1.663 | 1.341 |
| Family labour(weeks) | 26.585 | 27.092 | 30.121 | 23.873 |
| Access to government extension(1=yes) | 0.280 | 0.323 | 0.267 | 0.275 |
| Distance to ADMARC(km) | 8.650 | 11.564 | 7.883 | 8.242 |
| Received FISP coupon(1=yes) | 0.320 | 0.328 | 0.299 | 0.332 |
| Received fertilizer coupon(1=yes) | 0.318 | 0.326 | 0.296 | 0.330 |
| Received seed coupon(1=yes) | 0.147 | 0.203 | 0.092 | 0.168 |
| Age of household head (Years) | 44.167 | 44.972 | 43.672 | 44.258 |
| Household head attained at least JCE (1=yes) | 0.330 | 0.298 | 0.312 | 0.354 |
| Male household head(1=yes) | 0.710 | 0.769 | 0.755 | 0.659 |
| Household Size | 4.583 | 4.802 | 4.731 | 4.405 |
| Household dependency ratio (%) | 104.765 | 95.702 | 104.292 | 108.092 |
| Number of observations | 25631 | 4123 | 9001 | 12507 |

Notes: Statistics are not weighted: Source: LSMS-ISA data for Malawi. Stdev=standard deviation: ADMARC=Agricultural Development and Marketing Cooperation. We present a longer version of this Table which show the descriptive statistics by region and survey year.

***Do rainfall shocks prompt commercial input purchase amongst smallholder farmers in diverse regions and environments in Malawi? Lessons for adaptation***

## × Full tables of main results shown in Manuscript reporting Marginal effects (ME)

Table S2: The influence of rainfall shocks on input purchasing(general) in Malawi by region (Craggit Double hurdle models)

| | ***National*** | | ***Northern*** | | ***Central*** | | ***Southern*** | |
|---|---|---|---|---|---|---|---|---|
| VARIABLES | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| ***Climate risk variables*** | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) |
| Growing season drought shock(1-year lag) | 0.059*** | 0.078 | 0.033 | -0.018 | 0.041 | 0.200* | 0.120** | 0.662*** |
| | (0.0221) | (0.0645) | (0.0411) | (0.1200) | (0.0403) | (0.1213) | (0.0612) | (0.2118) |
| Growing season drought shock(2-year lag) | 0.102*** | 0.011 | -0.018 | -0.539** | 0.226** | 0.630** | 0.047 | -0.164 |
| | (0.0216) | (0.0630) | (0.0598) | (0.2167) | (0.0902) | (0.2798) | (0.0487) | (0.1379) |
| Growing season flood shock(1-year lag) | -0.155*** | 0.278*** | -0.020 | 0.494*** | -0.286*** | -0.052 | -0.280*** | 0.266** |
| | (0.0253) | (0.0630) | (0.0428) | (0.1093) | (0.0435) | (0.1376) | (0.0526) | (0.1308) |
| Long-term season average rainfall(mm) | 0.000** | 0.002*** | 0.000 | 0.001** | 0.000 | 0.002** | 0.001** | 0.001** |
| | (0.0001) | (0.0004) | (0.0002) | (0.0006) | (0.0003) | (0.0007) | (0.0002) | (0.0007) |
| Long-term season average temperature (deg) | -0.014*** | -0.180*** | 0.004 | -0.090*** | -0.030*** | -0.182*** | -0.009 | -0.187*** |
| | (0.0050) | (0.0134) | (0.0141) | (0.0346) | (0.0080) | (0.0226) | (0.0064) | (0.0187) |
| ***Other control variables*** | | | | | | | | |
| Number of plots cultivated | 0.011* | 0.082*** | -0.026** | 0.002 | 0.014* | 0.061*** | 0.028*** | 0.124*** |
| | (0.0058) | (0.0166) | (0.0133) | (0.0502) | (0.0084) | (0.0225) | (0.0093) | (0.0267) |
| Log farm size(ha) | 0.157*** | -0.992*** | 0.201*** | -0.764*** | 0.183*** | -0.754*** | 0.103*** | -1.344*** |
| | (0.0153) | (0.0474) | (0.0352) | (0.1052) | (0.0232) | (0.0725) | (0.0233) | (0.0745) |
| Household asset wealth index | 0.020*** | 0.162*** | 0.029*** | 0.114*** | 0.018** | 0.182*** | 0.017*** | 0.166*** |
| | (0.0042) | (0.0129) | (0.0066) | (0.0186) | (0.0084) | (0.0190) | (0.0060) | (0.0217) |
| Agricultural implement access score | 0.031*** | 0.151*** | 0.023*** | 0.106*** | 0.043*** | 0.152*** | 0.023*** | 0.173*** |
| | (0.0028) | (0.0075) | (0.0050) | (0.0130) | (0.0050) | (0.0107) | (0.0042) | (0.0128) |
| Log Distance to ADMARC(km) | -0.021** | -0.062*** | -0.029 | -0.048 | -0.009 | -0.050 | -0.025** | -0.081** |
| | (0.0084) | (0.0215) | (0.0184) | (0.0444) | (0.0141) | (0.0347) | (0.0120) | (0.0324) |
| Received fertilizer coupon(1=yes) | -0.162*** | -0.615*** | -0.205*** | -0.497*** | -0.139*** | -0.636*** | -0.179*** | -0.637*** |
| | (0.0095) | (0.0347) | (0.0285) | (0.1195) | (0.0142) | (0.0508) | (0.0139) | (0.0508) |
| Received seed coupon(1=yes) | 0.018 | -0.159*** | 0.061** | -0.094 | -0.001 | 0.008 | 0.042*** | -0.229*** |
| | (0.0111) | (0.0452) | (0.0299) | (0.1361) | (0.0197) | (0.0817) | (0.0155) | (0.0608) |
| Age of household head(years) | -0.003*** | -0.008*** | -0.003*** | -0.006*** | -0.004*** | -0.007*** | -0.003*** | -0.008*** |
| | (0.0002) | (0.0007) | (0.0005) | (0.0021) | (0.0003) | (0.0012) | (0.0003) | (0.0010) |
| Household head attained at least JCE (1=yes) | -0.001 | 0.063*** | 0.025 | 0.191*** | 0.007 | 0.020 | -0.011 | 0.076** |
| | (0.0063) | (0.0217) | (0.0160) | (0.0584) | (0.0101) | (0.0346) | (0.0090) | (0.0313) |
| Male household head(1=yes) | 0.055*** | 0.205*** | 0.040** | 0.151** | 0.054*** | 0.275*** | 0.056*** | 0.174*** |
| | (0.0071) | (0.0255) | (0.0184) | (0.0724) | (0.0116) | (0.0449) | (0.0102) | (0.0346) |
| Household Size | 0.006*** | 0.020*** | 0.006 | 0.001 | -0.000 | 0.013 | 0.012*** | 0.031*** |
| | (0.0018) | (0.0057) | (0.0040) | (0.0144) | (0.0028) | (0.0092) | (0.0025) | (0.0084) |
| Household dependency ratio(%) | 0.000 | -0.000*** | 0.000 | -0.000 | 0.000 | -0.001*** | -0.000 | -0.000** |
| | (0.0000) | (0.0001) | (0.0001) | (0.0004) | (0.0001) | (0.0002) | (0.0001) | (0.0002) |
| Sigma constant | | 1.139*** | | 1.094*** | | 1.119*** | | 1.153*** |
| | | (0.0078) | | (0.0216) | | (0.0126) | | (0.0112) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 25631 | 15058 | 4123 | 2019 | 9001 | 5484 | 12502 | 7555 |

Notes: Cluster robust standard errors with clustering specified at the primary sampling unit(village) are in parenthesis. ME=Marginal Effects. Hurdle 1 is a probit regression for the probability of input purchase whilst Hurdle 2 is the model for intensity of purchase for purchasers (log value of purchased inputs (USD/ha), * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Input purchasing is defined in general (fertilizer, agrochemicals, or seed).

Table S3:The influence of rainfall shocks on Fertilizer purchasing in Malawi by region (Craggit Double hurdle models)

| | ***National*** | | ***Northern*** | | ***Central*** | | ***Southern*** | |
|---|---|---|---|---|---|---|---|---|
| VARIABLES | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| ***Climate risk variables*** | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) |
| Growing season drought shock(1-year lag) | 0.032 | 0.054 | -0.037 | 0.089 | 0.051 | 0.223** | 0.062 | 0.636*** |
| | (0.0198) | (0.0481) | (0.0364) | (0.0851) | (0.0395) | (0.0948) | (0.0609) | (0.1712) |
| Growing season drought shock(2-year lag) | 0.070*** | 0.046 | -0.113** | -0.142 | 0.178** | 0.548** | -0.119*** | 0.146 |
| | (0.0197) | (0.0549) | (0.0530) | (0.1739) | (0.0843) | (0.2172) | (0.0423) | (0.1419) |
| Growing season flood shock(1-year lag) | 0.013 | 0.060 | 0.051 | 0.232** | 0.029 | -0.234** | 0.006 | 0.104 |
| | (0.0170) | (0.0521) | (0.0378) | (0.0924) | (0.0363) | (0.1029) | (0.0343) | (0.1283) |
| Long-term season average rainfall(mm) | 0.000 | 0.002*** | 0.000 | 0.002*** | 0.000 | 0.001** | 0.000 | 0.001 |
| | (0.0001) | (0.0003) | (0.0002) | (0.0005) | (0.0002) | (0.0006) | (0.0002) | (0.0007) |
| Long-term season average temperature (deg) | -0.051*** | -0.097*** | -0.020* | -0.065*** | -0.051*** | -0.094*** | -0.058*** | -0.101*** |
| | (0.0042) | (0.0102) | (0.0110) | (0.0204) | (0.0077) | (0.0167) | (0.0050) | (0.0149) |
| ***Other control variables*** | | | | | | | | |
| Number of plots cultivated | 0.049*** | -0.013 | 0.032*** | -0.005 | 0.059*** | -0.031 | 0.046*** | 0.011 |
| | (0.0044) | (0.0142) | (0.0109) | (0.0385) | (0.0070) | (0.0187) | (0.0065) | (0.0263) |
| Log farm size(ha) | 0.199*** | -1.116*** | 0.255*** | -0.926*** | 0.243*** | -0.982*** | 0.142*** | -1.501*** |
| | (0.0131) | (0.0434) | (0.0318) | (0.0941) | (0.0219) | (0.0629) | (0.0186) | (0.0720) |
| Household asset wealth index | 0.050*** | 0.094*** | 0.048*** | 0.077*** | 0.064*** | 0.116*** | 0.043*** | 0.090*** |
| | (0.0047) | (0.0088) | (0.0072) | (0.0125) | (0.0125) | (0.0135) | (0.0061) | (0.0136) |
| Agricultural implement access score | 0.040*** | 0.103*** | 0.027*** | 0.073*** | 0.049*** | 0.115*** | 0.041*** | 0.097*** |
| | (0.0025) | (0.0063) | (0.0048) | (0.0112) | (0.0048) | (0.0089) | (0.0035) | (0.0115) |
| Log Distance to ADMARC(km) | -0.033*** | -0.012 | -0.033** | 0.052 | -0.037*** | -0.032 | -0.027*** | -0.031 |
| | (0.0067) | (0.0182) | (0.0138) | (0.0354) | (0.0117) | (0.0252) | (0.0093) | (0.0339) |
| Received fertilizer coupon(1=yes) | -0.227*** | -0.272*** | -0.220*** | -0.193** | -0.258*** | -0.228*** | -0.214*** | -0.350*** |
| | (0.0085) | (0.0328) | (0.0244) | (0.0956) | (0.0139) | (0.0414) | (0.0120) | (0.0596) |
| Received seed coupon(1=yes) | -0.017 | 0.017 | -0.003 | -0.002 | -0.012 | 0.012 | -0.017 | 0.085 |
| | (0.0106) | (0.0420) | (0.0260) | (0.1143) | (0.0199) | (0.0634) | (0.0143) | (0.0664) |
| Age of household head(years) | -0.003*** | -0.003*** | -0.004*** | -0.002* | -0.004*** | -0.002** | -0.003*** | -0.002 |
| | (0.0002) | (0.0007) | (0.0005) | (0.0014) | (0.0003) | (0.0011) | (0.0003) | (0.0011) |
| Household head attained at least JCE (1=yes) | 0.006 | 0.080*** | 0.042*** | 0.159*** | 0.001 | 0.052 | 0.003 | 0.075** |
| | (0.0059) | (0.0201) | (0.0152) | (0.0426) | (0.0103) | (0.0319) | (0.0081) | (0.0317) |
| Male household head(1=yes) | 0.048*** | 0.114*** | 0.019 | 0.157*** | 0.058*** | 0.158*** | 0.048*** | 0.071** |
| | (0.0068) | (0.0247) | (0.0177) | (0.0601) | (0.0130) | (0.0407) | (0.0085) | (0.0359) |
| Household Size | 0.006*** | 0.005 | 0.007* | 0.002 | 0.006** | 0.008 | 0.006*** | 0.004 |
| | (0.0016) | (0.0053) | (0.0039) | (0.0109) | (0.0029) | (0.0082) | (0.0021) | (0.0088) |
| Household dependency ratio(%) | -0.000*** | -0.000*** | -0.000 | -0.000 | -0.000* | -0.001*** | -0.000 | -0.000 |
| | (0.0000) | (0.0001) | (0.0001) | (0.0003) | (0.0001) | (0.0002) | (0.0000) | (0.0002) |
| Sigma constant | | 0.821*** | | 0.751*** | | 0.832*** | | 0.817*** |
| | | (0.0079) | | (0.0167) | | (0.0122) | | (0.0124) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 25631 | 8796 | 4123 | 1508 | 9001 | 3923 | 12507 | 3365 |

Notes: Cluster robust standard errors with clustering specified at the primary sampling unit(village) are in parenthesis. ME=Marginal Effects. Hurdle 1 is a probit regression for the probability of purchasing fertilizer whilst Hurdle 2 is the model for intensity of purchase for purchasers (log value of purchased fertilizer (USD/ha), * p < 0.10, ** p < 0.05, *** p < 0.01.

## *Do rainfall shocks prompt commercial input purchase amongst smallholder farmers in diverse regions and environments in Malawi? Lessons for adaptation*

Table S4:The influence of rainfall shocks on use of purchased agrochemicals in Malawi by region (Craggit Double hurdle models)

| | ***National*** | | ***Northern*** | | ***Central*** | | ***Southern*** | |
|---|---|---|---|---|---|---|---|---|
| VARIABLES | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| ***Climate risk variables*** | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) |
| Growing season drought shock(1-year lag) | 0.039*** | 0.115 | 0.045*** | 0.254 | 0.024* | -0.549 | 0.069*** | -0.154 |
| | (0.0084) | (0.1274) | (0.0145) | (0.2301) | (0.0141) | (0.5205) | (0.0220) | (0.2598) |
| Growing season drought shock(2-year lag) | 0.011* | -0.087 | 0.010 | 0.068 | 0.000 | -0.950 | 0.050*** | -0.460* |
| | (0.0067) | (0.1194) | (0.0211) | (0.4118) | (0.0333) | (0.7597) | (0.0148) | (0.2549) |
| Growing season flood shock(1-year lag) | -0.022** | -0.049 | -0.012 | 0.149 | 0.007 | 0.198 | -0.044** | 0.020 |
| | (0.0086) | (0.1349) | (0.0165) | (0.1864) | (0.0176) | (0.4681) | (0.0175) | (0.2488) |
| Long-term season average rainfall(mm) | 0.000** | 0.001 | 0.000 | -0.000 | -0.000 | 0.004* | 0.000*** | -0.001 |
| | (0.0000) | (0.0008) | (0.0001) | (0.0009) | (0.0001) | (0.0022) | (0.0001) | (0.0016) |
| Long-term season average temperature (deg) | 0.005*** | -0.020 | 0.011** | 0.049 | -0.000 | -0.068 | 0.008*** | -0.023 |
| | (0.0018) | (0.0266) | (0.0046) | (0.0542) | (0.0030) | (0.0468) | (0.0026) | (0.0408) |
| ***Other control variables*** | | | | | | | | |
| Number of plots cultivated | 0.010*** | -0.006 | 0.006* | -0.052 | 0.004* | -0.039 | 0.018*** | 0.024 |
| | (0.0015) | (0.0348) | (0.0035) | (0.0870) | (0.0022) | (0.0560) | (0.0025) | (0.0492) |
| Log farm size(ha) | 0.043*** | -1.237*** | 0.037*** | -1.397*** | 0.044*** | -0.950*** | 0.041*** | -1.366*** |
| | (0.0047) | (0.1174) | (0.0116) | (0.2300) | (0.0070) | (0.2077) | (0.0072) | (0.1575) |
| Household asset wealth index | 0.001 | 0.021 | 0.002* | 0.009 | 0.002 | 0.019 | -0.001 | 0.035 |
| | (0.0007) | (0.0202) | (0.0013) | (0.0335) | (0.0013) | (0.0408) | (0.0014) | (0.0296) |
| Agricultural implement access score | 0.006*** | 0.070*** | 0.006*** | 0.027 | 0.006*** | 0.071*** | 0.007*** | 0.067*** |
| | (0.0007) | (0.0141) | (0.0012) | (0.0332) | (0.0010) | (0.0202) | (0.0013) | (0.0211) |
| Log Distance to ADMARC(km) | -0.005* | 0.121*** | -0.008 | -0.111 | -0.008** | 0.185** | -0.001 | 0.134** |
| | (0.0026) | (0.0416) | (0.0048) | (0.1165) | (0.0041) | (0.0802) | (0.0039) | (0.0532) |
| Received fertilizer coupon(1=yes) | -0.011** | -0.166* | -0.011 | -0.465* | -0.010 | -0.340* | -0.008 | -0.007 |
| | (0.0043) | (0.0975) | (0.0090) | (0.2394) | (0.0070) | (0.1802) | (0.0065) | (0.1257) |
| Received seed coupon(1=yes) | 0.013*** | 0.039 | 0.014 | 0.459* | 0.015* | 0.194 | 0.010 | -0.165 |
| | (0.0048) | (0.1095) | (0.0106) | (0.2557) | (0.0082) | (0.2014) | (0.0072) | (0.1419) |
| Age of household head(years) | -0.001*** | -0.004** | -0.001*** | -0.007 | -0.001*** | 0.002 | -0.001*** | -0.004 |
| | (0.0001) | (0.0020) | (0.0002) | (0.0046) | (0.0001) | (0.0040) | (0.0001) | (0.0024) |
| Household head attained at least JCE (1=yes) | -0.003 | 0.064 | 0.001 | 0.133 | -0.007 | 0.149 | -0.003 | 0.007 |
| | (0.0025) | (0.0546) | (0.0067) | (0.1206) | (0.0041) | (0.1046) | (0.0035) | (0.0684) |
| Male household head(1=yes) | 0.011*** | 0.141** | 0.003 | 0.442** | 0.016*** | 0.147 | 0.011*** | 0.034 |
| | (0.0029) | (0.0662) | (0.0067) | (0.1904) | (0.0059) | (0.1488) | (0.0040) | (0.0774) |
| Household Size | -0.000 | 0.014 | 0.000 | 0.049 | -0.000 | -0.004 | -0.000 | 0.021 |
| | (0.0006) | (0.0157) | (0.0016) | (0.0354) | (0.0010) | (0.0281) | (0.0009) | (0.0227) |
| Household dependency ratio(%) | -0.000 | -0.000 | -0.000 | -0.000 | 0.000 | -0.001 | -0.000 | -0.000 |
| | (0.0000) | (0.0004) | (0.0000) | (0.0007) | (0.0000) | (0.0008) | (0.0000) | (0.0006) |
| Sigma constant | | 0.698*** | | 0.633*** | | 0.747*** | | 0.654*** |
| | | (0.0168) | | (0.0356) | | (0.0323) | | (0.0215) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 25631 | 906 | 4123 | 138 | 9001 | 290 | 12502 | 478 |

Notes: Cluster robust standard errors with clustering specified at the primary sampling unit(village) are in parenthesis. ME=Marginal Effects.Hurdle 1 is a probit regression for the probability of using purchased agrochemicals while Hurdle 2 is the model for intensity of agrochemical purchase for purchasers (log value of purchased agrochemicals (USD/ha), * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

## *Do rainfall shocks prompt commercial input purchase amongst smallholder farmers in diverse regions and environments in Malawi? Lessons for adaptation*

Table S5:The influence of rainfall shocks on use of purchased seeds in Malawi by region (Craggit Double hurdle models)

| | ***National*** | | ***Northern*** | | ***Central*** | | ***Southern*** | |
|---|---|---|---|---|---|---|---|---|
| VARIABLES | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| ***Climate risk variables*** | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) |
| Growing season drought shock(1-year lag) | 0.069*** | -0.025 | 0.080** | 0.065 | 0.012 | -0.370*** | 0.030 | 0.377*** |
| | (0.0200) | (0.0475) | (0.0372) | (0.0854) | (0.0378) | (0.0922) | (0.0560) | (0.1225) |
| Growing season drought shock(2-year lag) | 0.089*** | 0.031 | 0.090* | 0.257* | 0.092 | -0.184 | 0.141*** | 0.185** |
| | (0.0197) | (0.0432) | (0.0536) | (0.1339) | (0.0805) | (0.1893) | (0.0425) | (0.0903) |
| Growing season flood shock(1-year lag) | -0.102*** | 0.080 | 0.017 | 0.255** | -0.066* | -0.010 | -0.246*** | -0.001 |
| | (0.0184) | (0.0520) | (0.0377) | (0.1087) | (0.0383) | (0.1005) | (0.0377) | (0.1127) |
| Long-term season average rainfall(mm) | 0.000 | 0.001*** | -0.000 | 0.000 | 0.000 | 0.002** | 0.001** | 0.001*** |
| | (0.0001) | (0.0003) | (0.0002) | (0.0005) | (0.0002) | (0.0006) | (0.0002) | (0.0005) |
| Long-term season average temperature (deg) | 0.003 | 0.012 | -0.003 | 0.006 | -0.006 | -0.022 | 0.012** | 0.031*** |
| | (0.0039) | (0.0088) | (0.0111) | (0.0243) | (0.0060) | (0.0156) | (0.0052) | (0.0114) |
| ***Other control variables*** | | | | | | | | |
| Number of plots cultivated | 0.049*** | -0.001 | 0.048*** | -0.005 | 0.043*** | -0.005 | 0.058*** | 0.010 |
| | (0.0048) | (0.0143) | (0.0106) | (0.0385) | (0.0073) | (0.0212) | (0.0083) | (0.0222) |
| Log farm size(ha) | 0.041*** | -1.382*** | 0.046 | -1.559*** | 0.048** | -1.311*** | 0.020 | -1.403*** |
| | (0.0147) | (0.0403) | (0.0337) | (0.1189) | (0.0226) | (0.0647) | (0.0234) | (0.0565) |
| Household asset wealth index | 0.017*** | 0.033*** | 0.030*** | 0.022 | 0.026*** | 0.069*** | 0.007* | 0.020*** |
| | (0.0031) | (0.0062) | (0.0061) | (0.0163) | (0.0063) | (0.0108) | (0.0040) | (0.0068) |
| Agricultural implement access score | 0.016*** | 0.010* | 0.018*** | 0.009 | 0.023*** | 0.001 | 0.002 | 0.016* |
| | (0.0024) | (0.0060) | (0.0046) | (0.0138) | (0.0041) | (0.0098) | (0.0039) | (0.0091) |
| Log Distance to ADMARC(km) | -0.008 | 0.006 | -0.007 | -0.004 | -0.021** | 0.022 | 0.001 | -0.006 |
| | (0.0067) | (0.0161) | (0.0156) | (0.0474) | (0.0104) | (0.0269) | (0.0100) | (0.0218) |
| Received fertilizer coupon(1=yes) | -0.087*** | -0.088*** | -0.094*** | -0.154 | -0.055*** | -0.065 | -0.111*** | -0.093** |
| | (0.0099) | (0.0271) | (0.0265) | (0.1080) | (0.0150) | (0.0418) | (0.0149) | (0.0374) |
| Received seed coupon(1=yes) | -0.008 | -0.253*** | -0.047 | -0.335*** | -0.028 | -0.209*** | 0.031* | -0.227*** |
| | (0.0120) | (0.0354) | (0.0302) | (0.1249) | (0.0211) | (0.0681) | (0.0171) | (0.0457) |
| Age of household head(years) | -0.003*** | -0.002*** | -0.003*** | -0.003 | -0.004*** | -0.001 | -0.003*** | -0.002*** |
| | (0.0002) | (0.0006) | (0.0005) | (0.0020) | (0.0003) | (0.0012) | (0.0003) | (0.0008) |
| Household head attained at least JCE (1=yes) | 0.004 | 0.014 | 0.023 | 0.070 | 0.016 | 0.020 | -0.015 | 0.003 |
| | (0.0067) | (0.0172) | (0.0160) | (0.0537) | (0.0111) | (0.0320) | (0.0096) | (0.0216) |
| Male household head(1=yes) | 0.048*** | 0.039* | 0.053*** | -0.061 | 0.043*** | -0.018 | 0.053*** | 0.074*** |
| | (0.0076) | (0.0204) | (0.0195) | (0.0572) | (0.0130) | (0.0395) | (0.0108) | (0.0261) |
| Household Size | 0.010*** | 0.016*** | 0.008* | 0.006 | 0.008** | 0.005 | 0.015*** | 0.026*** |
| | (0.0018) | (0.0048) | (0.0041) | (0.0128) | (0.0031) | (0.0086) | (0.0026) | (0.0064) |
| Household dependency ratio(%) | 0.000 | -0.000 | -0.000 | -0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (0.0000) | (0.0001) | (0.0001) | (0.0004) | (0.0001) | (0.0002) | (0.0001) | (0.0001) |
| Sigma constant | | 0.831*** | | 0.857*** | | 0.861*** | | 0.801*** |
| | | (0.0083) | | (0.0255) | | (0.0160) | | (0.0101) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 25631 | 11171 | 4123 | 1309 | 9001 | 3680 | 12507 | 6182 |

Notes: Cluster robust standard errors with clustering specified at the primary sampling unit(village) are in parenthesis. ME=Marginal Effects. Hurdle 1 is a probit regression for the probability of using purchased agrochemicals while Hurdle 2 is the model for intensity of purchased seeds for purchasers (log quantity of purchased seed(kg/ha), * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table S6:The influence of rainfall shocks on use of hired labor in Malawi by region (Craggit Double hurdle models)

| | ***National*** | | ***Northern*** | | ***Central*** | | ***Southern*** | |
|---|---|---|---|---|---|---|---|---|
| VARIABLES | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| ***Climate risk variables*** | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) |
| Growing season drought shock(1-year lag) | -0.007 | -0.063 | 0.042 | 0.183 | -0.039 | -0.112 | -0.019 | 0.095 |
| | (0.0145) | (0.0791) | (0.0281) | (0.1349) | (0.0284) | (0.1557) | (0.0413) | (0.2328) |
| Growing season drought shock(2-year lag) | 0.031** | -0.105 | 0.063 | -0.358 | -0.013 | 0.289 | 0.004 | -0.522*** |
| | (0.0140) | (0.0750) | (0.0401) | (0.2266) | (0.0630) | (0.3195) | (0.0294) | (0.1608) |
| Growing season flood shock(1-year lag) | -0.018 | 0.145* | -0.037 | 0.109 | -0.109*** | 0.041 | -0.018 | 0.190 |
| | (0.0149) | (0.0758) | (0.0266) | (0.1687) | (0.0286) | (0.1615) | (0.0325) | (0.1600) |
| Long-term season average rainfall(mm) | 0.000*** | 0.001* | 0.000 | 0.000 | 0.000** | 0.000 | 0.000 | 0.002* |
| | (0.0001) | (0.0004) | (0.0001) | (0.0005) | (0.0002) | (0.0011) | (0.0002) | (0.0008) |
| Long-term season average temperature (deg) | -0.008** | -0.027* | -0.004 | 0.065* | -0.002 | -0.051* | -0.014*** | -0.028 |
| | (0.0031) | (0.0158) | (0.0084) | (0.0367) | (0.0053) | (0.0287) | (0.0041) | (0.0197) |
| ***Other control variables*** | | | | | | | | |
| Number of plots cultivated | 0.005 | 0.033 | -0.004 | -0.060 | 0.000 | -0.011 | 0.015** | 0.115*** |
| | (0.0039) | (0.0226) | (0.0085) | (0.0583) | (0.0060) | (0.0337) | (0.0066) | (0.0321) |
| Log farm size(ha) | 0.123*** | -1.096*** | 0.159*** | -0.741*** | 0.145*** | -0.821*** | 0.082*** | -1.549*** |
| | (0.0123) | (0.0698) | (0.0314) | (0.1550) | (0.0202) | (0.1065) | (0.0180) | (0.1073) |
| Household asset wealth index | 0.056*** | 0.075*** | 0.043*** | 0.090*** | 0.061*** | 0.091*** | 0.057*** | 0.058*** |
| | (0.0040) | (0.0092) | (0.0067) | (0.0194) | (0.0082) | (0.0157) | (0.0058) | (0.0111) |
| Agricultural implement access score | 0.023*** | 0.054*** | 0.015*** | 0.052*** | 0.025*** | 0.046*** | 0.026*** | 0.053*** |
| | (0.0018) | (0.0088) | (0.0033) | (0.0182) | (0.0030) | (0.0126) | (0.0029) | (0.0146) |
| Log Distance to ADMARC(km) | -0.007 | -0.040 | -0.013 | -0.040 | 0.002 | -0.053 | -0.008 | -0.013 |
| | (0.0052) | (0.0261) | (0.0121) | (0.0575) | (0.0093) | (0.0413) | (0.0071) | (0.0385) |
| Received fertilizer coupon(1=yes) | 0.011* | -0.145*** | -0.003 | -0.012 | -0.004 | -0.196*** | 0.022** | -0.142** |
| | (0.0069) | (0.0427) | (0.0195) | (0.1222) | (0.0104) | (0.0637) | (0.0103) | (0.0611) |
| Received seed coupon(1=yes) | 0.028*** | 0.168*** | 0.033* | 0.006 | 0.039*** | 0.119 | 0.026** | 0.242*** |
| | (0.0080) | (0.0488) | (0.0198) | (0.1284) | (0.0149) | (0.0868) | (0.0110) | (0.0671) |
| Age of household head(years) | -0.001*** | -0.001 | -0.000 | -0.001 | -0.001*** | -0.001 | -0.000** | 0.000 |
| | (0.0001) | (0.0009) | (0.0004) | (0.0023) | (0.0002) | (0.0014) | (0.0002) | (0.0013) |
| Household head attained at least JCE (1=yes) | 0.001 | 0.072** | 0.037*** | 0.115 | 0.001 | 0.154*** | -0.004 | -0.024 |
| | (0.0048) | (0.0301) | (0.0126) | (0.0793) | (0.0084) | (0.0481) | (0.0065) | (0.0437) |
| Male household head(1=yes) | -0.001 | 0.004 | -0.040*** | 0.146* | 0.005 | -0.034 | 0.004 | 0.022 |
| | (0.0055) | (0.0357) | (0.0128) | (0.0836) | (0.0100) | (0.0641) | (0.0077) | (0.0490) |
| Household Size | -0.017*** | -0.037*** | -0.018*** | -0.064*** | -0.017*** | -0.047*** | -0.016*** | -0.014 |
| | (0.0015) | (0.0090) | (0.0033) | (0.0198) | (0.0025) | (0.0148) | (0.0021) | (0.0132) |
| Household dependency ratio(%) | 0.000*** | 0.000 | 0.000*** | -0.000 | 0.000 | 0.000 | 0.000** | -0.000 |
| | (0.0000) | (0.0002) | (0.0001) | (0.0006) | (0.0001) | (0.0003) | (0.0000) | (0.0003) |
| Log Family labor(weeks) | -0.012*** | 0.002 | -0.002 | 0.049*** | -0.015*** | -0.004 | -0.015*** | -0.024*** |
| | (0.0014) | (0.0063) | (0.0027) | (0.0102) | (0.0027) | (0.0123) | (0.0020) | (0.0084) |
| Sigma constant | | 0.899*** | | 0.883*** | | 0.901*** | | 0.872*** |
| | | (0.0096) | | (0.0248) | | (0.0169) | | (0.0127) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 25631 | 4433 | 4123 | 706 | 9001 | 1678 | 12502 | 2049 |

Notes: Cluster robust standard errors with clustering specified at the primary sampling unit(village) are in parenthesis. ME=Marginal Effects. Hurdle 1 is a probit regression for the probability of using hired labor, while Hurdle 2 is the model for intensity of use (log days of hired labor(#/ha), * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

***Do rainfall shocks prompt commercial input purchase amongst smallholder farmers in diverse regions and environments in Malawi? Lessons for adaptation***

## × Full tables of results reporting coefficients:

Table S7: The influence of rainfall shocks on input purchasing(general) in Malawi by region (Craggit Double hurdle models)

| | ***National*** | | ***Northern*** | | ***Central*** | | ***Southern*** | |
|---|---|---|---|---|---|---|---|---|
| VARIABLES | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| ***Climate risk variables*** | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) |
| Growing season drought shock(1-year lag) | 0.175*** | 0.078 | 0.098 | -0.018 | 0.124 | 0.200* | 0.353** | 0.662*** |
| | (0.0652) | (0.0645) | (0.1204) | (0.1200) | (0.1233) | (0.1213) | (0.1796) | (0.2118) |
| Growing season drought shock(2-year lag) | 0.300*** | 0.011 | -0.052 | -0.539** | 0.690** | 0.630** | 0.137 | -0.164 |
| | (0.0639) | (0.0630) | (0.1749) | (0.2167) | (0.2758) | (0.2798) | (0.1429) | (0.1379) |
| Growing season flood shock(1-year lag) | -0.455*** | 0.278*** | -0.058 | 0.494*** | -0.874*** | -0.052 | -0.823*** | 0.266** |
| | (0.0751) | (0.0630) | (0.1251) | (0.1093) | (0.1356) | (0.1376) | (0.1571) | (0.1308) |
| Long-term season average rainfall(mm) | 0.001** | 0.002*** | 0.0001 | 0.001** | 0.001 | 0.002** | 0.002** | 0.001** |
| | (0.0004) | (0.0004) | (0.0006) | (0.0006) | (0.0009) | (0.0007) | (0.0007) | (0.0007) |
| Long-term season average temperature (deg) | -0.042*** | -0.180*** | 0.013 | -0.090*** | -0.090*** | -0.182*** | -0.027 | -0.187*** |
| | (0.0147) | (0.0134) | (0.0413) | (0.0346) | (0.0247) | (0.0226) | (0.0187) | (0.0187) |
| ***Other control variables*** | | | | | | | | |
| Number of plots cultivated | 0.034* | 0.082*** | -0.077* | 0.002 | 0.044* | 0.061*** | 0.082*** | 0.124*** |
| | (0.0171) | (0.0166) | (0.0392) | (0.0502) | (0.0257) | (0.0225) | (0.0273) | (0.0267) |
| Log farm size(ha) | 0.464*** | -0.992*** | 0.588*** | -0.764*** | 0.559*** | -0.754*** | 0.304*** | -1.344*** |
| | (0.0453) | (0.0474) | (0.1034) | (0.1052) | (0.0716) | (0.0725) | (0.0686) | (0.0745) |
| Household asset wealth index | 0.059*** | 0.162*** | 0.085*** | 0.114*** | 0.054** | 0.182*** | 0.049*** | 0.166*** |
| | (0.0123) | (0.0129) | (0.0192) | (0.0186) | (0.0256) | (0.0190) | (0.0175) | (0.0217) |
| Agricultural implement access score | 0.091*** | 0.151*** | 0.067*** | 0.106*** | 0.133*** | 0.152*** | 0.066*** | 0.173*** |
| | (0.0083) | (0.0075) | (0.0149) | (0.0130) | (0.0156) | (0.0107) | (0.0124) | (0.0128) |
| Log Distance to ADMARC(km) | -0.062** | -0.062*** | -0.084 | -0.048 | -0.028 | -0.050 | -0.074** | -0.081** |
| | (0.0247) | (0.0215) | (0.0538) | (0.0444) | (0.0431) | (0.0347) | (0.0352) | (0.0324) |
| Received fertilizer coupon(1=yes) | -0.476*** | -0.615*** | -0.599*** | -0.497*** | -0.426*** | -0.636*** | -0.524*** | -0.637*** |
| | (0.0286) | (0.0347) | (0.0845) | (0.1195) | (0.0445) | (0.0508) | (0.0417) | (0.0508) |
| Received seed coupon(1=yes) | 0.054 | -0.159*** | 0.179** | -0.094 | -0.002 | 0.008 | 0.124*** | -0.229*** |
| | (0.0328) | (0.0452) | (0.0875) | (0.1361) | (0.0604) | (0.0817) | (0.0456) | (0.0608) |
| Age of household head(years) | -0.010*** | -0.008*** | -0.010*** | -0.006*** | -0.012*** | -0.007*** | -0.008*** | -0.008*** |
| | (0.0006) | (0.0007) | (0.0015) | (0.0021) | (0.0009) | (0.0012) | (0.0008) | (0.0010) |
| Household head attained at least JCE (1=yes) | -0.003 | 0.063*** | 0.073 | 0.191*** | 0.020 | 0.020 | -0.034 | 0.076** |
| | (0.0185) | (0.0217) | (0.0469) | (0.0584) | (0.0310) | (0.0346) | (0.0263) | (0.0313) |
| Male household head(1=yes) | 0.161*** | 0.205*** | 0.118** | 0.151** | 0.167*** | 0.275*** | 0.164*** | 0.174*** |
| | (0.0210) | (0.0255) | (0.0536) | (0.0724) | (0.0355) | (0.0449) | (0.0301) | (0.0346) |
| Household Size | 0.018*** | 0.020*** | 0.017 | 0.001 | -0.001 | 0.013 | 0.035*** | 0.031*** |
| | (0.0052) | (0.0057) | (0.0116) | (0.0144) | (0.0087) | (0.0092) | (0.0075) | (0.0084) |
| Household dependency ratio(%) | 0.0001 | - | 0.0001 | -0.0001 | 0.0001 | -0.001*** | -0.0001 | -0.0001** |
| | (0.0001) | 0.0001*** | (0.0003) | (0.0004) | (0.0002) | (0.0002) | (0.0002) | (0.0002) |
| | | (0.0001) | | | | | | |
| Sigma constant | | 1.139*** | | 1.094*** | | 1.119*** | | 1.153*** |
| | | (0.0078) | | (0.0216) | | (0.0126) | | (0.0112) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 25631 | 15058 | 4123 | 2019 | 9001 | 5484 | 12502 | 7555 |

Notes: Cluster robust standard errors with clustering specified at the primary sampling unit(village) are in parenthesis. Hurdle 1 is a probit regression for the probability of input purchase whilst Hurdle 2 is the model for intensity of purchase for purchasers (log value of purchased inputs (USD/ha), * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Input purchasing is defined in general (fertilizer, agrochemicals, or seed).

Table S8:The influence of rainfall shocks on Fertilizer purchasing in Malawi by region (Craggit Double hurdle models)

| | ***National*** | | ***Northern*** | | ***Central*** | | ***Southern*** | |
|---|---|---|---|---|---|---|---|---|
| VARIABLES | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| ***Climate risk variables*** | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) |
| Growing season drought shock(1-year lag) | 0.107 | 0.054 | -0.119 | 0.089 | 0.156 | 0.223** | 0.231 | 0.636*** |
| | (0.0665) | (0.0481) | (0.1168) | (0.0851) | (0.1220) | (0.0948) | (0.2257) | (0.1712) |
| Growing season drought shock(2-year lag) | 0.234*** | 0.046 | -0.361** | -0.142 | 0.550** | 0.548** | -0.441*** | 0.146 |
| | (0.0661) | (0.0549) | (0.1701) | (0.1739) | (0.2610) | (0.2172) | (0.1560) | (0.1419) |
| Growing season flood shock(1-year lag) | 0.045 | 0.060 | 0.162 | 0.232** | 0.088 | -0.234** | 0.023 | 0.104 |
| | (0.0569) | (0.0521) | (0.1215) | (0.0924) | (0.1122) | (0.1029) | (0.1273) | (0.1283) |
| Long-term season average rainfall(mm) | 0.001 | 0.002*** | 0.001 | 0.002*** | 0.001 | 0.001** | 0.000 | 0.001 |
| | (0.0004) | (0.0003) | (0.0005) | (0.0005) | (0.0007) | (0.0006) | (0.0007) | (0.0007) |
| Long-term season average temperature (deg) | -0.171*** | -0.097*** | -0.066* | -0.065*** | -0.156*** | -0.094*** | -0.214*** | -0.101*** |
| | (0.0144) | (0.0102) | (0.0354) | (0.0204) | (0.0242) | (0.0167) | (0.0190) | (0.0149) |
| ***Other control variables*** | | | | | | | | |
| Number of plots cultivated | 0.164*** | -0.013 | 0.101*** | -0.005 | 0.183*** | -0.031 | 0.172*** | 0.011 |
| | (0.0149) | (0.0142) | (0.0352) | (0.0385) | (0.0217) | (0.0187) | (0.0244) | (0.0263) |
| Log farm size(ha) | 0.668*** | -1.116*** | 0.817*** | -0.926*** | 0.750*** | -0.982*** | 0.528*** | -1.501*** |
| | (0.0445) | (0.0434) | (0.1029) | (0.0941) | (0.0692) | (0.0629) | (0.0695) | (0.0720) |
| Household asset wealth index | 0.169*** | 0.094*** | 0.153*** | 0.077*** | 0.198*** | 0.116*** | 0.159*** | 0.090*** |
| | (0.0162) | (0.0088) | (0.0238) | (0.0125) | (0.0392) | (0.0135) | (0.0232) | (0.0136) |
| Agricultural implement access score | 0.135*** | 0.103*** | 0.086*** | 0.073*** | 0.151*** | 0.115*** | 0.153*** | 0.097*** |
| | (0.0085) | (0.0063) | (0.0154) | (0.0112) | (0.0151) | (0.0089) | (0.0131) | (0.0115) |
| Log Distance to ADMARC(km) | -0.112*** | -0.012 | -0.104** | 0.052 | -0.113*** | -0.032 | -0.101*** | -0.031 |
| | (0.0224) | (0.0182) | (0.0444) | (0.0354) | (0.0361) | (0.0252) | (0.0346) | (0.0339) |
| Received fertilizer coupon(1=yes) | -0.762*** | -0.272*** | -0.703*** | -0.193** | -0.797*** | -0.228*** | -0.793*** | -0.350*** |
| | (0.0297) | (0.0328) | (0.0807) | (0.0956) | (0.0455) | (0.0414) | (0.0461) | (0.0596) |
| Received seed coupon(1=yes) | -0.056 | 0.017 | -0.011 | -0.002 | -0.037 | 0.012 | -0.063 | 0.085 |
| | (0.0354) | (0.0420) | (0.0833) | (0.1143) | (0.0614) | (0.0634) | (0.0532) | (0.0664) |
| Age of household head(years) | -0.011*** | -0.003*** | -0.012*** | -0.002* | -0.012*** | -0.002** | -0.009*** | -0.002 |
| | (0.0006) | (0.0007) | (0.0016) | (0.0014) | (0.0010) | (0.0011) | (0.0009) | (0.0011) |
| Household head attained at least JCE (1=yes) | 0.019 | 0.080*** | 0.134*** | 0.159*** | 0.003 | 0.052 | 0.012 | 0.075** |
| | (0.0198) | (0.0201) | (0.0488) | (0.0426) | (0.0317) | (0.0319) | (0.0299) | (0.0317) |
| Male household head(1=yes) | 0.162*** | 0.114*** | 0.060 | 0.157*** | 0.180*** | 0.158*** | 0.178*** | 0.071** |
| | (0.0227) | (0.0247) | (0.0567) | (0.0601) | (0.0402) | (0.0407) | (0.0318) | (0.0359) |
| Household Size | 0.021*** | 0.005 | 0.022* | 0.002 | 0.020** | 0.008 | 0.021*** | 0.004 |
| | (0.0054) | (0.0053) | (0.0126) | (0.0109) | (0.0089) | (0.0082) | (0.0079) | (0.0088) |
| Household dependency ratio(%) | -0.000*** | -0.000*** | -0.000 | -0.000 | -0.000* | -0.001*** | -0.000 | -0.000 |
| | (0.0001) | (0.0001) | (0.0003) | (0.0003) | (0.0002) | (0.0002) | (0.0002) | (0.0002) |
| Sigma constant | | 0.821*** | | 0.751*** | | 0.832*** | | 0.817*** |
| | | (0.0079) | | (0.0167) | | (0.0122) | | (0.0124) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 25631 | 8796 | 4123 | 1508 | 9001 | 3923 | 12507 | 3365 |

Notes: Cluster robust standard errors with clustering specified at the primary sampling unit(village) are in parenthesis. Hurdle 1 is a probit regression for the probability of purchasing fertilizer whilst Hurdle 2 is the model for intensity of purchase for purchasers (log value of purchased fertilizer (USD/ha), * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

## *Do rainfall shocks prompt commercial input purchase amongst smallholder farmers in diverse regions and environments in Malawi? Lessons for adaptation*

Table S9:The influence of rainfall shocks on use of purchased agrochemicals in Malawi by region (Craggit Double hurdle models)

| | ***National*** | | ***Northern*** | | ***Central*** | | ***Southern*** | |
|---|---|---|---|---|---|---|---|---|
| VARIABLES | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| ***Climate risk variables*** | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) |
| Growing season drought shock(1-year lag) | 0.615*** | 0.115 | 0.681*** | 0.254 | 0.391* | -0.549 | 1.101*** | -0.154 |
| | (0.1317) | (0.1274) | (0.2106) | (0.2301) | (0.2333) | (0.5205) | (0.3481) | (0.2598) |
| Growing season drought shock(2-year lag) | 0.179* | -0.087 | 0.152 | 0.068 | 0.003 | -0.950 | 0.798*** | -0.460* |
| | (0.1059) | (0.1194) | (0.3189) | (0.4118) | (0.5511) | (0.7597) | (0.2386) | (0.2549) |
| Growing season flood shock(1-year lag) | -0.347** | -0.049 | -0.177 | 0.149 | 0.115 | 0.198 | -0.706** | 0.020 |
| | (0.1362) | (0.1349) | (0.2503) | (0.1864) | (0.2909) | (0.4681) | (0.2783) | (0.2488) |
| Long-term season average rainfall(mm) | 0.001** | 0.001 | 0.001 | -0.000 | -0.001 | 0.004* | 0.005*** | -0.001 |
| | (0.0007) | (0.0008) | (0.0009) | (0.0009) | (0.0016) | (0.0022) | (0.0012) | (0.0016) |
| Long-term season average temperature (deg) | 0.078*** | -0.020 | 0.174** | 0.049 | -0.002 | -0.068 | 0.123*** | -0.023 |
| | (0.0286) | (0.0266) | (0.0678) | (0.0542) | (0.0497) | (0.0468) | (0.0423) | (0.0408) |
| ***Other control variables*** | | | | | | | | |
| Number of plots cultivated | 0.152*** | -0.006 | 0.090* | -0.052 | 0.069* | -0.039 | 0.291*** | 0.024 |
| | (0.0225) | (0.0348) | (0.0523) | (0.0870) | (0.0357) | (0.0560) | (0.0366) | (0.0492) |
| Log farm size(ha) | 0.679*** | -1.237*** | 0.557*** | -1.397*** | 0.721*** | -0.950*** | 0.659*** | -1.366*** |
| | (0.0719) | (0.1174) | (0.1705) | (0.2300) | (0.1111) | (0.2077) | (0.1111) | (0.1575) |
| Household asset wealth index | 0.016 | 0.021 | 0.034* | 0.009 | 0.033 | 0.019 | -0.009 | 0.035 |
| | (0.0113) | (0.0202) | (0.0193) | (0.0335) | (0.0212) | (0.0408) | (0.0223) | (0.0296) |
| Agricultural implement access score | 0.101*** | 0.070*** | 0.098*** | 0.027 | 0.104*** | 0.071*** | 0.106*** | 0.067*** |
| | (0.0100) | (0.0141) | (0.0156) | (0.0332) | (0.0165) | (0.0202) | (0.0197) | (0.0211) |
| Log Distance to ADMARC(km) | -0.075* | 0.121*** | -0.114 | -0.111 | -0.134** | 0.185** | -0.017 | 0.134** |
| | (0.0414) | (0.0416) | (0.0733) | (0.1165) | (0.0682) | (0.0802) | (0.0622) | (0.0532) |
| Received fertilizer coupon(1=yes) | -0.166** | -0.166* | -0.165 | -0.465* | -0.162 | -0.340* | -0.122 | -0.007 |
| | (0.0679) | (0.0975) | (0.1369) | (0.2394) | (0.1156) | (0.1802) | (0.1041) | (0.1257) |
| Received seed coupon(1=yes) | 0.210*** | 0.039 | 0.219 | 0.459* | 0.251* | 0.194 | 0.158 | -0.165 |
| | (0.0764) | (0.1095) | (0.1616) | (0.2557) | (0.1350) | (0.2014) | (0.1151) | (0.1419) |
| Age of household head(years) | -0.010*** | -0.004** | -0.010*** | -0.007 | -0.010*** | 0.002 | -0.010*** | -0.004 |
| | (0.0012) | (0.0020) | (0.0028) | (0.0046) | (0.0021) | (0.0040) | (0.0017) | (0.0024) |
| Household head attained at least JCE (1=yes) | -0.052 | 0.064 | 0.018 | 0.133 | -0.109 | 0.149 | -0.053 | 0.007 |
| | (0.0396) | (0.0546) | (0.1024) | (0.1206) | (0.0681) | (0.1046) | (0.0560) | (0.0684) |
| Male household head(1=yes) | 0.171*** | 0.141** | 0.045 | 0.442** | 0.259*** | 0.147 | 0.173*** | 0.034 |
| | (0.0459) | (0.0662) | (0.1001) | (0.1904) | (0.0961) | (0.1488) | (0.0627) | (0.0774) |
| Household Size | -0.003 | 0.014 | 0.007 | 0.049 | -0.002 | -0.004 | -0.008 | 0.021 |
| | (0.0101) | (0.0157) | (0.0244) | (0.0354) | (0.0173) | (0.0281) | (0.0148) | (0.0227) |
| Household dependency ratio(%) | -0.000 | -0.000 | -0.000 | -0.000 | 0.000 | -0.001 | -0.001 | -0.000 |
| | (0.0002) | (0.0004) | (0.0006) | (0.0007) | (0.0004) | (0.0008) | (0.0004) | (0.0006) |
| Sigma constant | | 0.698*** | | 0.633*** | | 0.747*** | | 0.654*** |
| | | (0.0168) | | (0.0356) | | (0.0323) | | (0.0215) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 25631 | 906 | 4123 | 138 | 9001 | 290 | 12502 | 478 |

Notes: Cluster robust standard errors with clustering specified at the primary sampling unit(village) are in parenthesis. Hurdle 1 is a probit regression for the probability of using purchased agrochemicals while Hurdle 2 is the model for intensity of agrochemical purchase for purchasers (log value of purchased agrochemicals(USD/ha), * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

## *Do rainfall shocks prompt commercial input purchase amongst smallholder farmers in diverse regions and environments in Malawi? Lessons for adaptation*

Table S10:The influence of rainfall shocks on use of purchased seeds in Malawi by region (Craggit Double hurdle models)

| | ***National*** | | ***Northern*** | | ***Central*** | | ***Southern*** | |
|---|---|---|---|---|---|---|---|---|
| VARIABLES | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| ***Climate risk variables*** | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) |
| Growing season drought shock(1-year lag) | 0.186*** | -0.025 | 0.230** | 0.065 | 0.033 | -0.370*** | 0.082 | 0.377*** |
| | (0.0539) | (0.0475) | (0.1069) | (0.0854) | (0.1021) | (0.0922) | (0.1497) | (0.1225) |
| Growing season drought shock(2-year lag) | 0.239*** | 0.031 | 0.259* | 0.257* | 0.248 | -0.184 | 0.377*** | 0.185** |
| | (0.0533) | (0.0432) | (0.1541) | (0.1339) | (0.2177) | (0.1893) | (0.1141) | (0.0903) |
| Growing season flood shock(1-year lag) | -0.274*** | 0.080 | 0.047 | 0.255** | -0.177* | -0.010 | -0.658*** | -0.001 |
| | (0.0497) | (0.0520) | (0.1082) | (0.1087) | (0.1037) | (0.1005) | (0.1016) | (0.1127) |
| Long-term season average rainfall(mm) | 0.0001 | 0.001*** | -0.001 | 0.0001 | 0.001 | 0.002** | 0.001** | 0.001*** |
| | (0.0003) | (0.0003) | (0.0005) | (0.0005) | (0.0006) | (0.0006) | (0.0006) | (0.0005) |
| Long-term season average temperature (deg) | 0.007 | 0.012 | -0.008 | 0.006 | -0.017 | -0.022 | 0.033** | 0.031*** |
| | (0.0105) | (0.0088) | (0.0317) | (0.0243) | (0.0163) | (0.0156) | (0.0139) | (0.0114) |
| ***Other control variables*** | | | | | | | | |
| Number of plots cultivated | 0.133*** | -0.001 | 0.137*** | -0.005 | 0.116*** | -0.005 | 0.155*** | 0.010 |
| | (0.0131) | (0.0143) | (0.0308) | (0.0385) | (0.0199) | (0.0212) | (0.0223) | (0.0222) |
| Log farm size(ha) | 0.110*** | -1.382*** | 0.131 | -1.559*** | 0.131** | -1.311*** | 0.053 | -1.403*** |
| | (0.0397) | (0.0403) | (0.0967) | (0.1189) | (0.0611) | (0.0647) | (0.0625) | (0.0565) |
| Household asset wealth index | 0.047*** | 0.033*** | 0.087*** | 0.022 | 0.069*** | 0.069*** | 0.018* | 0.020*** |
| | (0.0083) | (0.0062) | (0.0177) | (0.0163) | (0.0171) | (0.0108) | (0.0108) | (0.0068) |
| Agricultural implement access score | 0.043*** | 0.010* | 0.052*** | 0.009 | 0.063*** | 0.001 | 0.004 | 0.016* |
| | (0.0065) | (0.0060) | (0.0133) | (0.0138) | (0.0111) | (0.0098) | (0.0103) | (0.0091) |
| Log Distance to ADMARC(km) | -0.020 | 0.006 | -0.021 | -0.004 | -0.057** | 0.022 | 0.002 | -0.006 |
| | (0.0181) | (0.0161) | (0.0448) | (0.0474) | (0.0282) | (0.0269) | (0.0268) | (0.0218) |
| Received fertilizer coupon(1=yes) | -0.236*** | -0.088*** | -0.271*** | -0.154 | -0.150*** | -0.065 | -0.298*** | -0.093** |
| | (0.0269) | (0.0271) | (0.0760) | (0.1080) | (0.0405) | (0.0418) | (0.0403) | (0.0374) |
| Received seed coupon(1=yes) | -0.022 | -0.253*** | -0.134 | -0.335*** | -0.075 | -0.209*** | 0.082* | -0.227*** |
| | (0.0325) | (0.0354) | (0.0868) | (0.1249) | (0.0571) | (0.0681) | (0.0458) | (0.0457) |
| Age of household head(years) | -0.009*** | -0.002*** | -0.010*** | -0.003 | -0.010*** | -0.001 | -0.007*** | -0.002*** |
| | (0.0006) | (0.0006) | (0.0014) | (0.0020) | (0.0010) | (0.0012) | (0.0008) | (0.0008) |
| Household head attained at least JCE (1=yes) | 0.012 | 0.014 | 0.066 | 0.070 | 0.044 | 0.020 | -0.041 | 0.003 |
| | (0.0180) | (0.0172) | (0.0462) | (0.0537) | (0.0300) | (0.0320) | (0.0258) | (0.0216) |
| Male household head(1=yes) | 0.130*** | 0.039* | 0.152*** | -0.061 | 0.115*** | -0.018 | 0.142*** | 0.074*** |
| | (0.0206) | (0.0204) | (0.0560) | (0.0572) | (0.0352) | (0.0395) | (0.0290) | (0.0261) |
| Household Size | 0.028*** | 0.016*** | 0.022* | 0.006 | 0.021** | 0.005 | 0.039*** | 0.026*** |
| | (0.0048) | (0.0048) | (0.0117) | (0.0128) | (0.0083) | (0.0086) | (0.0070) | (0.0064) |
| Household dependency ratio(%) | 0.000 | -0.000 | -0.000 | -0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (0.0001) | (0.0001) | (0.0003) | (0.0004) | (0.0002) | (0.0002) | (0.0001) | (0.0001) |
| Sigma constant | | 0.831*** | | 0.857*** | | 0.861*** | | 0.801*** |
| | | (0.0083) | | (0.0255) | | (0.0160) | | (0.0101) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 25631 | 11171 | 4123 | 1309 | 9001 | 3680 | 12507 | 6182 |

Notes: Cluster robust standard errors with clustering specified at the primary sampling unit(village) are in parenthesis. Hurdle 1 is a probit regression for the probability of using purchased agrochemicals while Hurdle 2 is the model for intensity of purchased seeds for purchasers (log quantity of purchased seed(kg/ha), $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.

Table S11:The influence of rainfall shocks on use of hired labor in Malawi by region (Craggit Double hurdle models)

| | ***National*** | | ***Northern*** | | ***Central*** | | ***Southern*** | |
|---|---|---|---|---|---|---|---|---|
| VARIABLES | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| ***Climate risk variables*** | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) | Coef(se) |
| Growing season drought shock(1-year lag) | -0.030 | -0.063 | 0.191 | 0.183 | -0.171 | -0.112 | -0.090 | 0.095 |
| | (0.0659) | (0.0791) | (0.1280) | (0.1349) | (0.1243) | (0.1557) | (0.1957) | (0.2328) |
| Growing season drought shock(2-year lag) | 0.139** | -0.105 | 0.289 | -0.358 | -0.057 | 0.289 | 0.018 | -0.522*** |
| | (0.0632) | (0.0750) | (0.1825) | (0.2266) | (0.2755) | (0.3195) | (0.1394) | (0.1608) |
| Growing season flood shock(1-year lag) | -0.082 | 0.145* | -0.168 | 0.109 | -0.479*** | 0.041 | -0.086 | 0.190 |
| | (0.0676) | (0.0758) | (0.1204) | (0.1687) | (0.1258) | (0.1615) | (0.1540) | (0.1600) |
| Long-term season average rainfall(mm) | 0.001*** | 0.001* | 0.001 | 0.0001 | 0.002** | 0.0001 | 0.0001 | 0.002* |
| | (0.0004) | (0.0004) | (0.0006) | (0.0005) | (0.0008) | (0.0011) | (0.0007) | (0.0008) |
| Long-term season average temperature (deg) | -0.035** | -0.027* | -0.019 | 0.065* | -0.010 | -0.051* | -0.068*** | -0.028 |
| | (0.0138) | (0.0158) | (0.0382) | (0.0367) | (0.0232) | (0.0287) | (0.0194) | (0.0197) |
| ***Other control variables*** | | | | | | | | |
| Number of plots cultivated | 0.022 | 0.033 | -0.017 | -0.060 | 0.001 | -0.011 | 0.071** | 0.115*** |
| | (0.0178) | (0.0226) | (0.0389) | (0.0583) | (0.0261) | (0.0337) | (0.0315) | (0.0321) |
| Log farm size(ha) | 0.559*** | -1.096*** | 0.724*** | -0.741*** | 0.636*** | -0.821*** | 0.388*** | -1.549*** |
| | (0.0562) | (0.0698) | (0.1446) | (0.1550) | (0.0887) | (0.1065) | (0.0856) | (0.1073) |
| Household asset wealth index | 0.255*** | 0.075*** | 0.194*** | 0.090*** | 0.265*** | 0.091*** | 0.271*** | 0.058*** |
| | (0.0186) | (0.0092) | (0.0310) | (0.0194) | (0.0368) | (0.0157) | (0.0282) | (0.0111) |
| Agricultural implement access score | 0.102*** | 0.054*** | 0.067*** | 0.052*** | 0.110*** | 0.046*** | 0.124*** | 0.053*** |
| | (0.0084) | (0.0088) | (0.0149) | (0.0182) | (0.0132) | (0.0126) | (0.0140) | (0.0146) |
| Log Distance to ADMARC(km) | -0.031 | -0.040 | -0.061 | -0.040 | 0.008 | -0.053 | -0.038 | -0.013 |
| | (0.0234) | (0.0261) | (0.0553) | (0.0575) | (0.0406) | (0.0413) | (0.0334) | (0.0385) |
| Received fertilizer coupon(1=yes) | 0.051* | -0.145*** | -0.016 | -0.012 | -0.018 | -0.196*** | 0.105** | -0.142** |
| | (0.0311) | (0.0427) | (0.0886) | (0.1222) | (0.0456) | (0.0637) | (0.0485) | (0.0611) |
| Received seed coupon(1=yes) | 0.128*** | 0.168*** | 0.151* | 0.006 | 0.171*** | 0.119 | 0.121** | 0.242*** |
| | (0.0363) | (0.0488) | (0.0899) | (0.1284) | (0.0651) | (0.0868) | (0.0521) | (0.0671) |
| Age of household head(years) | -0.003*** | -0.001 | -0.001 | -0.001 | -0.005*** | -0.001 | -0.002** | 0.000 |
| | (0.0007) | (0.0009) | (0.0018) | (0.0023) | (0.0011) | (0.0014) | (0.0010) | (0.0013) |
| Household head attained at least JCE (1=yes) | 0.005 | 0.072** | 0.166*** | 0.115 | 0.003 | 0.154*** | -0.018 | -0.024 |
| | (0.0218) | (0.0301) | (0.0572) | (0.0793) | (0.0368) | (0.0481) | (0.0308) | (0.0437) |
| Male household head(1=yes) | -0.006 | 0.004 | -0.183*** | 0.146* | 0.023 | -0.034 | 0.019 | 0.022 |
| | (0.0251) | (0.0357) | (0.0595) | (0.0836) | (0.0439) | (0.0641) | (0.0364) | (0.0490) |
| Household Size | -0.075*** | -0.037*** | -0.082*** | -0.064*** | -0.075*** | -0.047*** | -0.076*** | -0.014 |
| | (0.0066) | (0.0090) | (0.0150) | (0.0198) | (0.0109) | (0.0148) | (0.0101) | (0.0132) |
| Household dependency ratio(%) | 0.0001*** | 0.0001 | 0.001*** | -0.0001 | 0.0001 | 0.0001 | 0.001** | -0.000 |
| | (0.0001) | (0.0002) | (0.0003) | (0.0006) | (0.0003) | (0.0003) | (0.0002) | (0.0003) |
| Log Family labor(weeks) | -0.055*** | 0.002 | -0.009 | 0.049*** | -0.066*** | -0.004 | -0.071*** | -0.024*** |
| | (0.0065) | (0.0063) | (0.0125) | (0.0102) | (0.0116) | (0.0123) | (0.0094) | (0.0084) |
| Sigma constant | | 0.899*** | | 0.883*** | | 0.901*** | | 0.872*** |
| | | (0.0096) | | (0.0248) | | (0.0169) | | (0.0127) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 25631 | 4433 | 4123 | 706 | 9001 | 1678 | 12502 | 2049 |

Notes: Cluster robust standard errors with clustering specified at the primary sampling unit(village) are in parenthesis. Hurdle 1 is a probit regression for the probability of using hired labor, while Hurdle 2 is the model for intensity of use (log days of hired labor(#/ha), * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

***Do rainfall shocks prompt commercial input purchase amongst smallholder farmers in diverse regions and environments in Malawi? Lessons for adaptation***

- **Full Table from heterogeneity analysis by household resource endowments and Gender of household head**
  - **A. Figures and tables from descriptive analysis(wealth, gender, and access to information heterogeneities)**
    - **RICH vs POOR Descriptive statistics on input purchasing**

Table S12: T-test mean comparison of input purchases in poor and rich households based on household resource endowments

| Variables | Rich | Poor | ttest(p-value) | Full_sample |
|---|---|---|---|---|
| Purchased any inputs (1=yes) | 0.650 | 0.525 | 0.000*** | 0.587 |
| Value of purchased inputs (USD/ha) | 88.683 | 55.785 | 0.000*** | 73.993 |
| Purchased inorganic fertilizer(1=yes) | 0.484 | 0.275 | 0.000*** | 0.379 |
| Value of purchased fertilizer (USD/ha) | 107.791 | 87.665 | 0.000*** | 100.542 |
| Purchased agrochemicals (herbicides or pesticide)(1=yes) | 0.054 | 0.017 | 0.000*** | 0.036 |
| Value of purchased agrochemicals (USD/ha) | 10.776 | 10.561 | 0.767 | 10.726 |
| Purchased seed (1=yes) | 0.501 | 0.443 | 0.000*** | 0.472 |
| Value of purchased seed (USD/ha) | 18.728 | 16.631 | 0.000*** | 17.750 |
| Quantity of seed purchased(kg/ha) | 19.314 | 23.486 | 0.000*** | 21.256 |
| Hired labor(1=yes) | 0.251 | 0.095 | 0.000*** | 0.173 |
| Hire labor(days) | 23.074 | 22.195 | 0.269 | 22.833 |
| Observations | 12815 | 12816 | | 25631 |

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

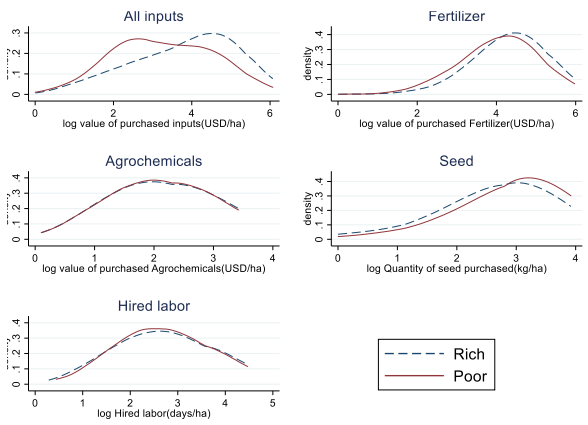


*Figure S1:Comparing intensity of input purchases by rich and poor.*

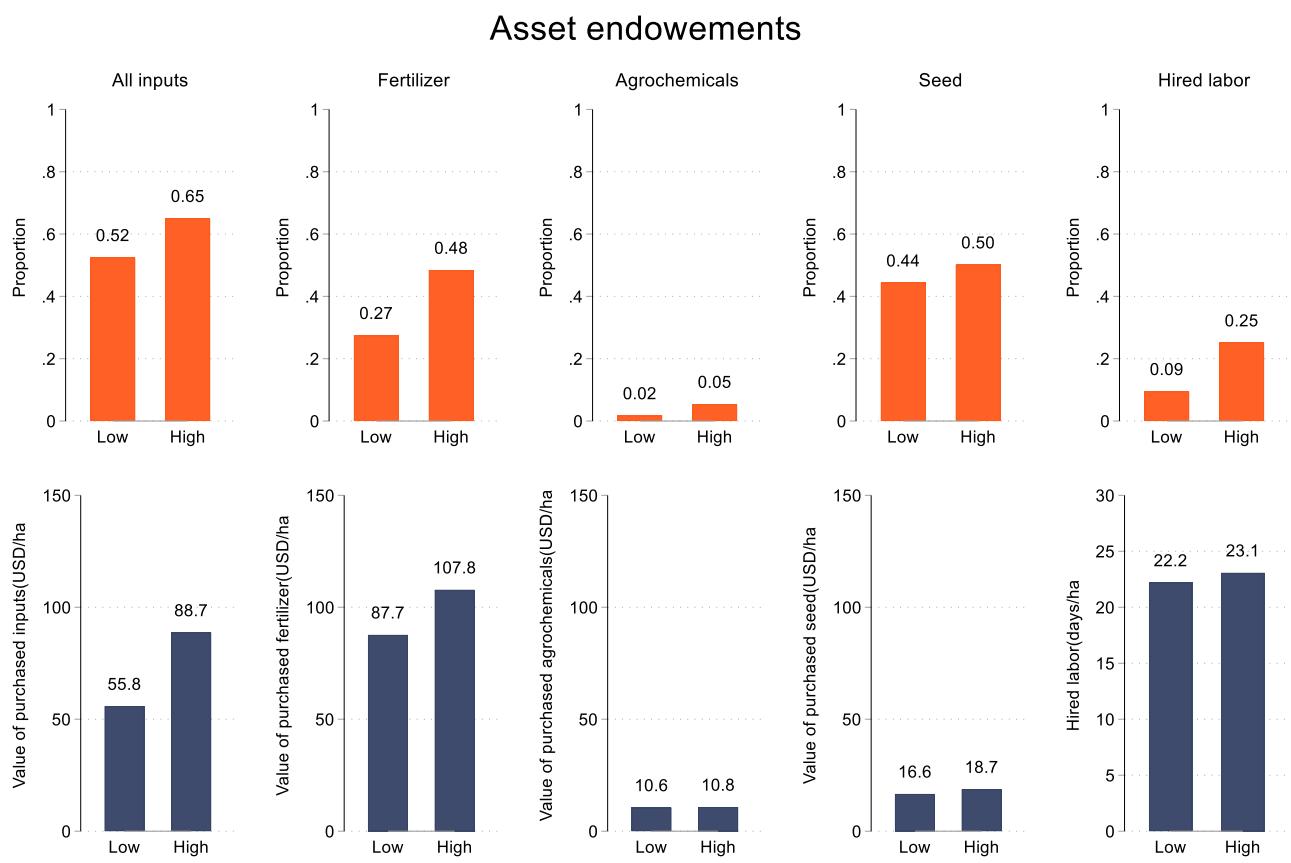


*Figure S2:Input purchase by household asset wealth endowments category (Low vs High).Source: Authors' elaboration of LSMS-ISA datafor Malawi*

***Do rainfall shocks prompt commercial input purchase amongst smallholder farmers in diverse regions and environments in Malawi? Lessons for adaptation***

- **Male vs. Female-headed households descriptive statistics on input purchasing**

Table S13: T-test mean comparison of input purchases in Female and Male headed households

| | Female | Male | t_test(p-value) | Full_sample |
|---|---|---|---|---|
| Purchased any inputs (1=yes) | 0.514 | 0.618 | 0.000*** | 0.587 |
| Value of purchased inputs (USD/ha) | 56.063 | 80.088 | 0.000*** | 73.993 |
| Purchased inorganic fertilizer(1=yes) | 0.271 | 0.424 | 0.000*** | 0.379 |
| Value of purchased fertilizer (USD/ha) | 88.831 | 103.689 | 0.000*** | 100.542 |
| Purchased agrochemicals (herbicides or pesticide) (1=yes) | 0.019 | 0.042 | 0.000*** | 0.036 |
| Value of purchased agrochemicals (USD/ha) | 10.484 | 10.772 | 0.729 | 10.726 |
| Purchased seed (1=yes) | 0.414 | 0.496 | 0.000*** | 0.472 |
| Value of purchased seed (USD/ha) | 15.063 | 18.685 | 0.000*** | 17.750 |
| Quantity of seed purchased(kg/ha) | 22.016 | 20.992 | 0.002*** | 21.256 |
| Hired labor(1=yes) | 0.147 | 0.183 | 0.000*** | 0.173 |
| Hire labor(days) | 23.687 | 22.553 | 0.168 | 22.833 |
| Farmsize(ha) | 0.536 | 0.784 | 0.002*** | 0.712 |
| Agriculture implement access score | -0.358 | 0.524 | 0.000*** | 0.268 |
| Household asset wealth index | -0.799 | -0.437 | 0.000*** | -0.542 |
| Government extension(1=yes) | 0.264 | 0.286 | 0.000*** | 0.280 |
| Access to borrowed credit(yes) | 0.197 | 0.223 | 0.000*** | 0.215 |
| Received input coupon(1=yes) | 0.315 | 0.322 | 0.289 | 0.320 |

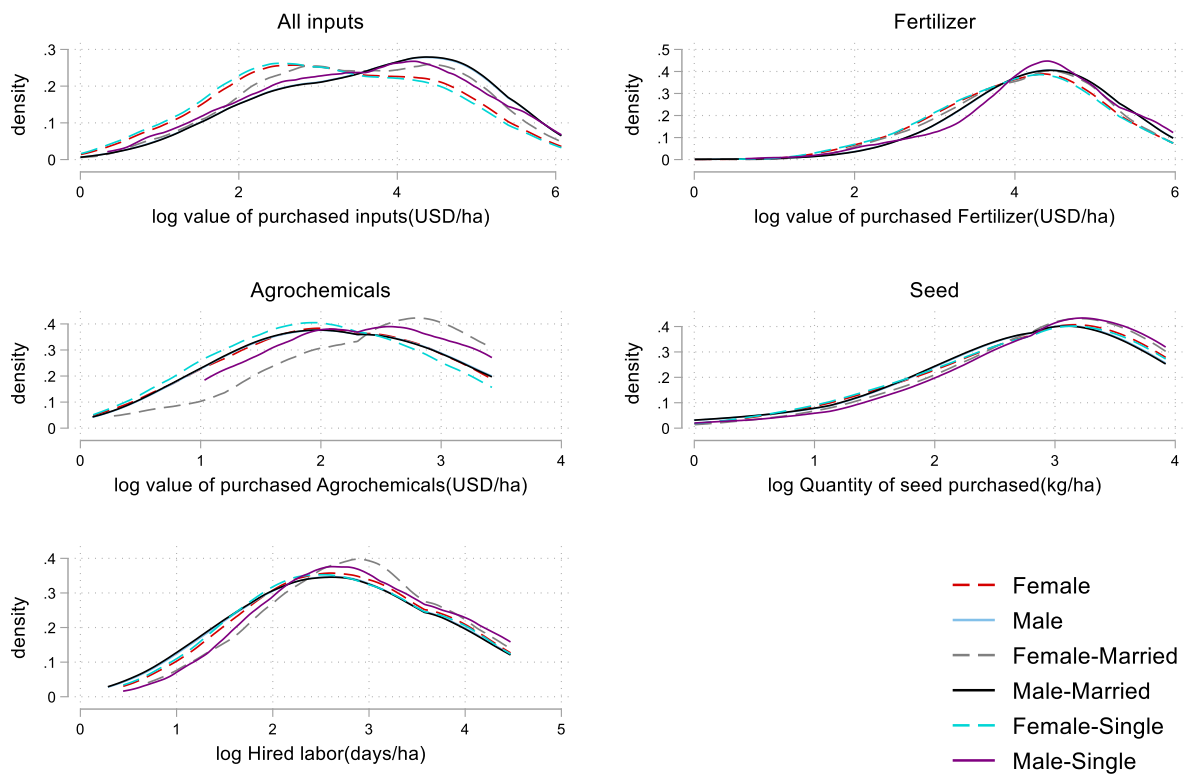


*Figure S3: Comparing intensity of input purchases by Gender and marital status of household head.*

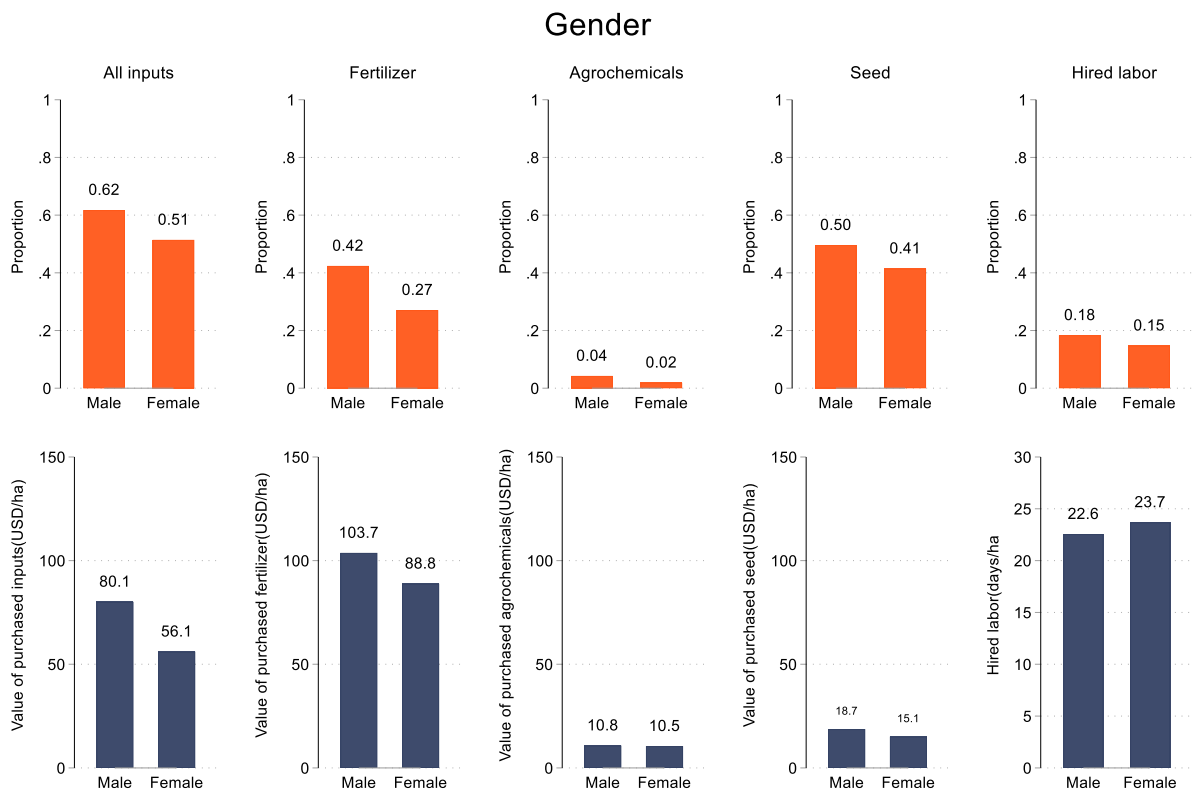


*Figure S4:Input purchase by gender of household head (Male vs Female).Source: Authors' elaboration of LSMS-ISA data for Malawi*

- **Access vs. No access to information: descriptive statistics on input purchasing (purchase and intensity)**

Table S14: T-test mean comparison of input purchases by access to information

| | Access | No access | t_test(p-value) | Full_sample |
|---|---|---|---|---|
| Purchased any inputs (1=yes) | 0.623 | 0.527 | 0.000*** | 0.587 |
| Value of purchased inputs (USD/ha) | 75.260 | 71.439 | 0.016** | 73.993 |
| Purchased inorganic fertilizer(1=yes) | 0.403 | 0.339 | 0.000*** | 0.379 |
| Value of purchased fertilizer (USD/ha) | 99.464 | 102.930 | 0.097* | 100.542 |
| Purchased agrochemicals (herbicides or pesticide) (1=yes) | 0.040 | 0.027 | 0.000*** | 0.036 |
| Value of purchased agrochemicals (USD/ha) | 10.361 | 11.761 | 0.045** | 10.726 |
| Purchased seed (1=yes) | 0.486 | 0.448 | 0.000*** | 0.472 |
| Value of purchased seed (USD/ha) | 18.001 | 17.246 | 0.042** | 17.750 |
| Quantity of seed purchased(kg/ha) | 20.754 | 22.268 | 0.000*** | 21.256 |
| Hired labor(1=yes) | 0.188 | 0.148 | 0.000*** | 0.173 |
| Hire labor(days) | 23.061 | 22.339 | 0.345 | 22.833 |

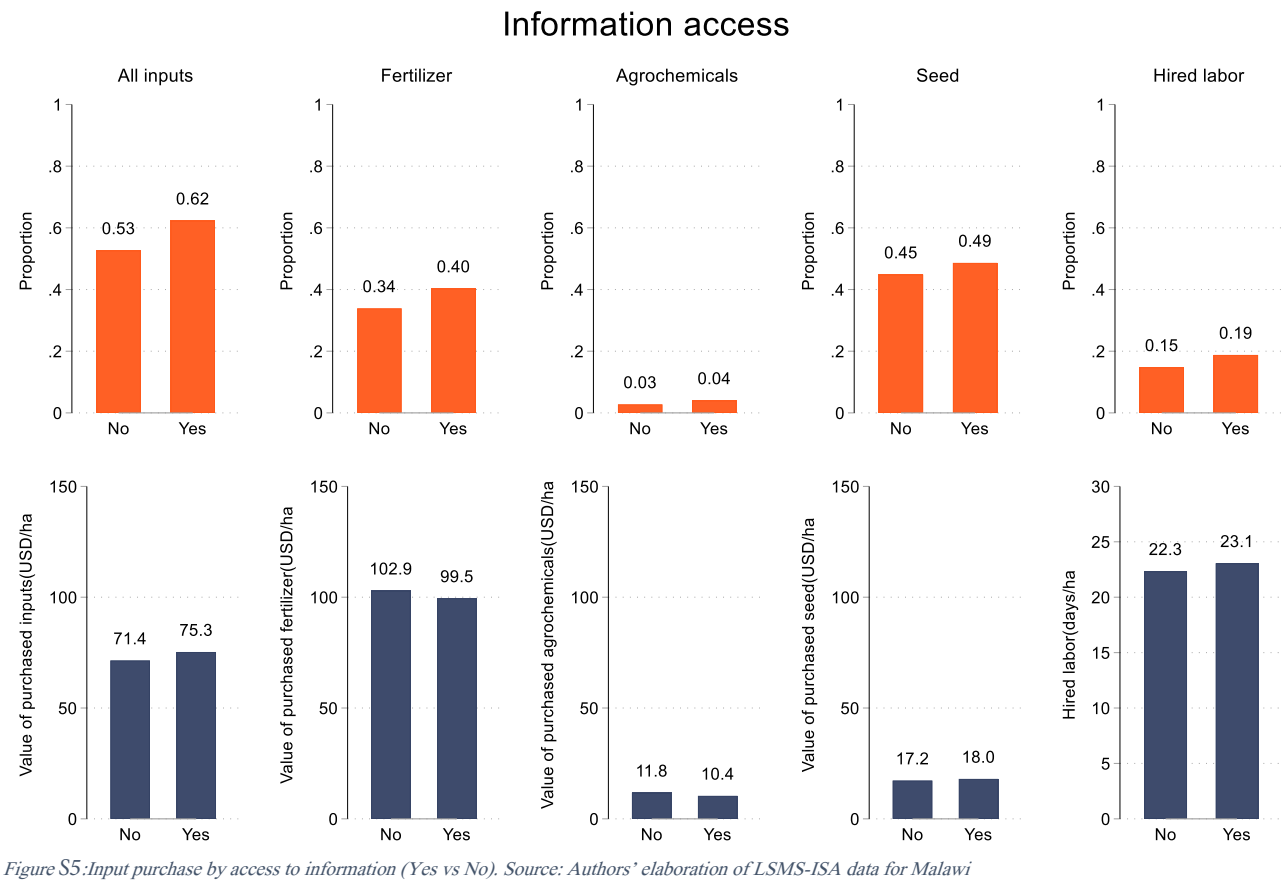


*Figure S5:Input purchase by access to information (Yes vs No). Source: Authors' elaboration of LSMS-ISA data for Malawi*

## B. Econometric analysis full tables by (wealth, gender, and access to information heterogeneities)

- **WEALTH HETEROGENEITY: -Econometric results: POOR Sub-sample**

Table S15: The impact of climate risk on input purchasing in Malawi in the group of the relatively poorer Households-Double Hurdle Craggit Models

| | ALL INPUTS | | FERTILIZER | | AGROCHEMICALS | | SEED | | HIRED LABOR | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| **Poor** | | | | | | | | | | |
| Growing season drought shock(1-year lag) | 0.029 | 0.022 | -0.062 | -0.015 | 0.286 | -0.249 | 0.062 | -0.050 | -0.023 | -0.006 |
| | (0.0780) | (0.0981) | (0.0834) | (0.0918) | (0.2470) | (0.2809) | (0.0738) | (0.0755) | (0.1024) | (0.1255) |
| Growing season drought shock(2-year lag) | 0.210*** | -0.104 | 0.064 | -0.099 | -0.099 | 0.020 | 0.140** | 0.095 | 0.225** | -0.078 |
| | (0.0739) | (0.0844) | (0.0822) | (0.0905) | (0.1613) | (0.2918) | (0.0714) | (0.0618) | (0.0957) | (0.1399) |
| Growing season flood shock(1-year lag) | -0.540*** | 0.263*** | -0.012 | 0.099 | -0.442** | 0.393 | -0.304*** | 0.050 | -0.210** | 0.252* |
| | (0.0822) | (0.0865) | (0.0744) | (0.0854) | (0.1988) | (0.2861) | (0.0641) | (0.0661) | (0.0890) | (0.1387) |
| Long-term season average rainfall(mm) | 0.001** | 0.001** | 0.000 | 0.001** | 0.001 | 0.000 | 0.001 | 0.001*** | 0.001* | 0.001 |
| | (0.0004) | (0.0005) | (0.0004) | (0.0005) | (0.0013) | (0.0021) | (0.0004) | (0.0004) | (0.0006) | (0.0008) |
| Long-term season average temperature (deg) | -0.029* | -0.166*** | -0.155*** | -0.111*** | 0.078* | -0.052 | 0.009 | 0.012 | -0.035** | -0.009 |
| | (0.0153) | (0.0168) | (0.0165) | (0.0154) | (0.0455) | (0.0518) | (0.0135) | (0.0111) | (0.0176) | (0.0247) |
| Number of plots cultivated | 0.059** | 0.098*** | 0.166*** | -0.008 | 0.260*** | -0.097 | 0.133*** | -0.000 | 0.067** | 0.058 |
| | (0.0231) | (0.0286) | (0.0227) | (0.0282) | (0.0433) | (0.0795) | (0.0219) | (0.0248) | (0.0296) | (0.0452) |
| Log farm size(ha) | 0.410*** | -1.489*** | 0.602*** | -1.592*** | 0.530*** | -1.650*** | 0.157** | -1.493*** | 0.401*** | -1.495*** |
| | (0.0648) | (0.0832) | (0.0695) | (0.0797) | (0.1447) | (0.2815) | (0.0616) | (0.0644) | (0.1072) | (0.1583) |
| Household asset wealth index | 0.280*** | 0.809*** | 0.655*** | 0.590*** | 0.148 | 0.240 | 0.061 | 0.144*** | 1.039*** | 0.244*** |
| | (0.0550) | (0.0626) | (0.0554) | (0.0584) | (0.1442) | (0.2268) | (0.0527) | (0.0460) | (0.0640) | (0.0837) |
| Agricultural implement access score | 0.166*** | 0.208*** | 0.239*** | 0.098*** | 0.109** | 0.075 | 0.056*** | 0.032 | 0.065** | 0.065 |
| | (0.0213) | (0.0256) | (0.0225) | (0.0268) | (0.0531) | (0.0799) | (0.0208) | (0.0195) | (0.0302) | (0.0443) |
| Log Distance to ADMARC(km) | -0.055** | -0.065** | -0.123*** | 0.015 | 0.033 | 0.168* | 0.001 | 0.003 | -0.011 | -0.060 |
| | (0.0272) | (0.0284) | (0.0271) | (0.0307) | (0.0679) | (0.0939) | (0.0235) | (0.0213) | (0.0332) | (0.0426) |
| Received fertilizer coupon(1=yes) | -0.458*** | -0.590*** | -0.776*** | -0.208*** | 0.017 | -0.061 | -0.222*** | -0.065* | 0.104** | -0.111 |
| | (0.0378) | (0.0510) | (0.0430) | (0.0617) | (0.1172) | (0.1956) | (0.0370) | (0.0389) | (0.0471) | (0.0755) |
| Received seed coupon(1=yes) | -0.024 | -0.206*** | -0.114** | -0.048 | 0.057 | 0.359 | -0.070 | -0.205*** | 0.137** | 0.179** |
| | (0.0478) | (0.0705) | (0.0571) | (0.0920) | (0.1490) | (0.2411) | (0.0489) | (0.0530) | (0.0586) | (0.0862) |
| Age of household head(years) | -0.010*** | -0.007*** | -0.011*** | -0.002 | -0.007*** | -0.003 | -0.008*** | -0.001 | -0.002 | -0.000 |
| | (0.0008) | (0.0010) | (0.0009) | (0.0012) | (0.0022) | (0.0044) | (0.0008) | (0.0008) | (0.0011) | (0.0015) |
| Household head attained at least JCE (1=yes) | -0.039 | 0.012 | -0.049* | 0.080** | -0.239*** | 0.079 | -0.016 | -0.011 | -0.062* | -0.045 |
| | (0.0262) | (0.0328) | (0.0288) | (0.0352) | (0.0777) | (0.1217) | (0.0267) | (0.0248) | (0.0364) | (0.0547) |
| Male household head(1=yes) | 0.104*** | 0.090** | 0.072** | 0.046 | 0.099 | 0.116 | 0.111*** | 0.046 | -0.096** | -0.028 |
| | (0.0291) | (0.0358) | (0.0309) | (0.0385) | (0.0760) | (0.1251) | (0.0282) | (0.0282) | (0.0382) | (0.0595) |
| Household Size | 0.023*** | 0.023** | 0.023*** | -0.002 | 0.030 | 0.035 | 0.039*** | 0.019** | -0.091*** | -0.026 |
| | (0.0079) | (0.0096) | (0.0087) | (0.0099) | (0.0202) | (0.0304) | (0.0075) | (0.0079) | (0.0119) | (0.0206) |
| Household dependency ratio(%) | -0.000 | -0.001*** | -0.000*** | -0.000 | -0.001** | -0.001 | 0.000 | -0.000 | 0.000* | -0.000 |
| | (0.0002) | (0.0002) | (0.0002) | (0.0002) | (0.0004) | (0.0007) | (0.0002) | (0.0002) | (0.0002) | (0.0004) |
| Log Family labor(weeks) | | | | | | | | | -0.061*** | -0.002 |
| | | | | | | | | | (0.0110) | (0.0112) |
| Sigma constant | | 1.142*** | | 0.838*** | | 0.653*** | | 0.801*** | | 0.836*** |
| | | (0.0107) | | (0.0122) | | (0.0351) | | (0.0111) | | (0.0157) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 12816 | 6724 | 12816 | 3168 | 12075 | 211 | 12816 | 5199 | 12796 | 1216 |

Notes: Cluster robust standard errors with clustering specified at the primary sampling unit(village) are in parenthesis. Hurdle 1 is a probit regression for the probability of input purchase whilst Hurdle 2 is the model for intensity of purchase for purchaser * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

- **WEALTH HETEROGENEITY: Econometric results: RICH Sub-Sample**

Table S16: The impact of climate risk on input purchasing in Malawi in the group of relatively richer households- Double Hurdle Craggit Models

| | ALL INPUTS | | FERTILIZER | | AGROCHEMICALS | | SEED | | HIRED LABOR | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| **Rich** | | | | | | | | | | |
| Growing season drought shock(1-year lag) | 0.286*** | 0.143** | 0.209*** | 0.123** | 0.718*** | 0.121 | 0.266*** | -0.021 | -0.015 | -0.079 |
| | (0.0786) | (0.0729) | (0.0781) | (0.0541) | (0.1363) | (0.1360) | (0.0640) | (0.0580) | (0.0747) | (0.0920) |
| Growing season drought shock(2-year lag) | 0.340*** | 0.074 | 0.296*** | 0.129** | 0.240** | -0.030 | 0.305*** | -0.016 | 0.096 | -0.125 |
| | (0.0771) | (0.0748) | (0.0788) | (0.0590) | (0.1184) | (0.1422) | (0.0611) | (0.0546) | (0.0732) | (0.0843) |
| Growing season flood shock(1-year lag) | -0.365*** | 0.281*** | 0.138* | 0.046 | -0.319** | -0.117 | -0.245*** | 0.092 | -0.015 | 0.104 |
| | (0.0924) | (0.0739) | (0.0716) | (0.0573) | (0.1550) | (0.1474) | (0.0618) | (0.0682) | (0.0811) | (0.0849) |
| Long-term season average rainfall(mm) | 0.001 | 0.002*** | 0.001 | 0.002*** | 0.002** | 0.000 | 0.000 | 0.001** | 0.001** | 0.001 |
| | (0.0006) | (0.0005) | (0.0005) | (0.0004) | (0.0007) | (0.0009) | (0.0004) | (0.0004) | (0.0005) | (0.0005) |
| Long-term season average temperature (deg) | -0.054*** | -0.183*** | -0.186*** | -0.078*** | 0.083*** | -0.021 | 0.006 | 0.011 | -0.033** | -0.032* |
| | (0.0197) | (0.0154) | (0.0177) | (0.0114) | (0.0282) | (0.0292) | (0.0128) | (0.0117) | (0.0166) | (0.0182) |
| Number of plots cultivated | 0.008 | 0.049** | 0.145*** | -0.030* | 0.118*** | 0.003 | 0.127*** | 0.001 | 0.000 | 0.024 |
| | (0.0205) | (0.0197) | (0.0190) | (0.0162) | (0.0256) | (0.0379) | (0.0159) | (0.0170) | (0.0202) | (0.0258) |
| Log farm size(ha) | 0.445*** | -0.826*** | 0.649*** | -0.982*** | 0.680*** | -1.177*** | 0.053 | -1.331*** | 0.572*** | -1.007*** |
| | (0.0582) | (0.0547) | (0.0564) | (0.0509) | (0.0848) | (0.1242) | (0.0490) | (0.0510) | (0.0665) | (0.0781) |
| Household asset wealth index | 0.043*** | 0.136*** | 0.135*** | 0.083*** | 0.005 | 0.014 | 0.044*** | 0.033*** | 0.218*** | 0.072*** |
| | (0.0117) | (0.0117) | (0.0150) | (0.0081) | (0.0117) | (0.0202) | (0.0084) | (0.0065) | (0.0169) | (0.0095) |
| Agricultural implement access score | 0.050*** | 0.115*** | 0.090*** | 0.085*** | 0.079*** | 0.077*** | 0.033*** | 0.009 | 0.069*** | 0.049*** |
| | (0.0094) | (0.0076) | (0.0096) | (0.0065) | (0.0110) | (0.0151) | (0.0075) | (0.0072) | (0.0090) | (0.0095) |
| Log Distance to ADMARC(km) | -0.063** | -0.058** | -0.099*** | -0.026 | -0.111** | 0.090* | -0.036 | 0.006 | -0.026 | -0.028 |
| | (0.0320) | (0.0256) | (0.0277) | (0.0204) | (0.0436) | (0.0487) | (0.0234) | (0.0214) | (0.0276) | (0.0306) |
| Received fertilizer coupon(1=yes) | -0.536*** | -0.673*** | -0.818*** | -0.319*** | -0.254*** | -0.226** | -0.261*** | -0.107*** | -0.010 | -0.149*** |
| | (0.0392) | (0.0428) | (0.0381) | (0.0397) | (0.0806) | (0.1138) | (0.0371) | (0.0382) | (0.0390) | (0.0514) |
| Received seed coupon(1=yes) | 0.108** | -0.148*** | -0.028 | 0.035 | 0.254*** | 0.004 | 0.015 | -0.265*** | 0.116** | 0.163*** |
| | (0.0427) | (0.0540) | (0.0436) | (0.0478) | (0.0891) | (0.1241) | (0.0421) | (0.0456) | (0.0451) | (0.0590) |
| Age of household head(years) | -0.009*** | -0.008*** | -0.011*** | -0.003*** | -0.011*** | -0.005** | -0.009*** | -0.002** | -0.004*** | -0.001 |
| | (0.0009) | (0.0010) | (0.0009) | (0.0008) | (0.0015) | (0.0022) | (0.0008) | (0.0009) | (0.0009) | (0.0011) |
| Household head attained at least JCE (1=yes) | 0.040 | 0.109*** | 0.094*** | 0.077*** | 0.005 | 0.042 | 0.028 | 0.034 | 0.050* | 0.111*** |
| | (0.0274) | (0.0273) | (0.0271) | (0.0231) | (0.0457) | (0.0597) | (0.0257) | (0.0244) | (0.0285) | (0.0363) |
| Male household head(1=yes) | 0.156*** | 0.218*** | 0.154*** | 0.127*** | 0.137** | 0.178** | 0.142*** | 0.019 | -0.045 | -0.005 |
| | (0.0318) | (0.0362) | (0.0334) | (0.0319) | (0.0615) | (0.0794) | (0.0317) | (0.0303) | (0.0344) | (0.0450) |
| Household Size | 0.007 | 0.009 | 0.010 | 0.003 | -0.018 | 0.010 | 0.019*** | 0.016*** | -0.079*** | -0.041*** |
| | (0.0067) | (0.0070) | (0.0070) | (0.0061) | (0.0121) | (0.0183) | (0.0061) | (0.0062) | (0.0079) | (0.0101) |
| Household dependency ratio(%) | 0.000 | -0.000** | -0.000 | -0.000*** | 0.000 | 0.000 | -0.000 | 0.000 | 0.001*** | 0.000 |
| | (0.0002) | (0.0002) | (0.0002) | (0.0002) | (0.0003) | (0.0005) | (0.0002) | (0.0002) | (0.0002) | (0.0002) |
| Log Family labor(weeks) | | | | | | | | | -0.053*** | 0.002 |
| | | | | | | | | | (0.0079) | (0.0075) |
| Sigma constant | | 1.110*** | | 0.792*** | | 0.685*** | | 0.853*** | | 0.914*** |
| | | (0.0098) | | (0.0094) | | (0.0183) | | (0.0109) | | (0.0113) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 12815 | 8334 | 12815 | 5628 | 12789 | 695 | 12815 | 5972 | 12815 | 3217 |

Notes: Cluster robust standard errors with clustering specified at the primary sampling unit(village) are in parenthesis. Hurdle 1 is a probit regression for the probability of input purchase whilst Hurdle 2 is the model for intensity of purchase for purchaser * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

- **GENDER HETEROGENEITY: - Econometric results: Female-headed households**

Table S17: The impact of climate risk on input purchasing in Malawi in female-headed households- Double Hurdle Craggit Models

| | ALL INPUTS | | FERTILIZER | | AGROCHEMICALS | | SEED | | HIRED LABOR | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 |
| Female headed | | | | | | | | | | |
| Growing season drought shock(1-year lag) | 0.086 | 0.017 | -0.110 | 0.043 | 0.121 | -0.063 | 0.055 | -0.053 | 0.028 | 0.158 |
| | (0.0880) | (0.1108) | (0.0958) | (0.1007) | (0.1828) | (0.3538) | (0.0859) | (0.0782) | (0.1014) | (0.1404) |
| Growing season drought shock(2-year lag) | 0.389*** | -0.066 | 0.164* | 0.079 | 0.220 | 0.275 | 0.400*** | -0.042 | 0.047 | 0.009 |
| | (0.0799) | (0.0995) | (0.0846) | (0.1073) | (0.1744) | (0.2801) | (0.0779) | (0.0760) | (0.0874) | (0.1340) |
| Growing season flood shock(1-year lag) | -0.435*** | 0.236** | -0.022 | 0.082 | -0.682** | -0.815* | -0.347*** | 0.052 | -0.026 | 0.329** |
| | (0.0914) | (0.1189) | (0.0878) | (0.1169) | (0.3270) | (0.4882) | (0.0860) | (0.0996) | (0.1021) | (0.1525) |
| Long-term season average rainfall(mm) | -0.000 | 0.001 | -0.000 | 0.000 | -0.002** | 0.002* | -0.000 | 0.000 | 0.002*** | 0.000 |
| | (0.0004) | (0.0005) | (0.0004) | (0.0005) | (0.0008) | (0.0010) | (0.0004) | (0.0004) | (0.0004) | (0.0005) |
| Long-term season average temperature (deg) | -0.041*** | -0.187*** | -0.182*** | -0.111*** | 0.152*** | 0.085*** | 0.019* | 0.015 | -0.027** | -0.020 |
| | (0.0118) | (0.0144) | (0.0127) | (0.0146) | (0.0315) | (0.0328) | (0.0109) | (0.0098) | (0.0137) | (0.0177) |
| Number of plots cultivated | 0.078*** | 0.097** | 0.126*** | 0.011 | 0.247*** | -0.077 | 0.135*** | 0.031 | 0.030 | 0.145*** |
| | (0.0282) | (0.0383) | (0.0299) | (0.0365) | (0.0492) | (0.0954) | (0.0265) | (0.0299) | (0.0341) | (0.0476) |
| Log farm size(ha) | 0.501*** | -1.511*** | 0.791*** | -1.605*** | 0.132 | -2.101*** | 0.178** | -1.602*** | 0.536*** | -1.588*** |
| | (0.0791) | (0.1033) | (0.0824) | (0.0912) | (0.1758) | (0.2871) | (0.0768) | (0.0797) | (0.1140) | (0.1459) |
| Household asset wealth index | 0.066** | 0.213*** | 0.178*** | 0.128*** | -0.003 | 0.067* | 0.022 | 0.010 | 0.298*** | 0.105*** |
| | (0.0275) | (0.0219) | (0.0458) | (0.0170) | (0.0326) | (0.0359) | (0.0186) | (0.0160) | (0.0380) | (0.0256) |
| Agricultural implement access score | 0.091*** | 0.184*** | 0.147*** | 0.122*** | 0.139*** | 0.057** | -0.000 | 0.017 | 0.127*** | 0.057*** |
| | (0.0175) | (0.0207) | (0.0213) | (0.0160) | (0.0282) | (0.0287) | (0.0152) | (0.0150) | (0.0182) | (0.0218) |
| Log Distance to ADMARC(km) | -0.021 | -0.117*** | -0.081*** | -0.049 | -0.037 | 0.209** | -0.022 | 0.048* | -0.081** | 0.006 |
| | (0.0296) | (0.0372) | (0.0314) | (0.0382) | (0.0662) | (0.1019) | (0.0275) | (0.0267) | (0.0326) | (0.0467) |
| Received fertilizer coupon(1=yes) | -0.392*** | -0.696*** | -0.726*** | -0.193** | -0.186 | 0.222 | -0.161*** | -0.051 | 0.155*** | -0.133* |
| | (0.0472) | (0.0694) | (0.0542) | (0.0804) | (0.1317) | (0.2683) | (0.0454) | (0.0475) | (0.0553) | (0.0788) |
| Received seed coupon(1=yes) | 0.026 | -0.192** | -0.058 | -0.137 | 0.126 | -0.061 | -0.009 | -0.354*** | 0.077 | 0.190** |
| | (0.0577) | (0.0900) | (0.0702) | (0.1047) | (0.1553) | (0.2831) | (0.0571) | (0.0655) | (0.0680) | (0.0953) |
| Age of household head(years) | -0.010*** | -0.006*** | -0.010*** | -0.000 | -0.004 | 0.000 | -0.009*** | -0.002** | 0.003** | 0.001 |
| | (0.0010) | (0.0014) | (0.0011) | (0.0014) | (0.0024) | (0.0044) | (0.0010) | (0.0010) | (0.0013) | (0.0016) |
| Household head attained at least JCE (1=yes) | -0.039 | -0.051 | -0.097** | 0.010 | -0.148* | 0.096 | -0.040 | 0.061* | -0.121*** | -0.032 |
| | (0.0335) | (0.0450) | (0.0377) | (0.0440) | (0.0892) | (0.1250) | (0.0332) | (0.0338) | (0.0439) | (0.0597) |
| Household Size | 0.017* | 0.017 | 0.011 | 0.002 | 0.028 | 0.013 | 0.033*** | 0.024** | -0.079*** | 0.000 |
| | (0.0090) | (0.0117) | (0.0100) | (0.0113) | (0.0194) | (0.0316) | (0.0087) | (0.0097) | (0.0135) | (0.0184) |
| Household dependency ratio(%) | -0.000 | -0.001*** | -0.000** | -0.001*** | -0.001*** | 0.000 | -0.000 | -0.000 | 0.000** | -0.000 |
| | (0.0002) | (0.0002) | (0.0002) | (0.0002) | (0.0004) | (0.0008) | (0.0001) | (0.0002) | (0.0002) | (0.0003) |
| Log Family labor(weeks) | | | | | | | | | -0.063*** | -0.015 |
| | | | | | | | | | (0.0121) | (0.0123) |
| Sigma constant | | 1.184*** | | 0.846*** | | 0.656*** | | 0.798*** | | 0.875*** |
| | | (0.0147) | | (0.0150) | | (0.0367) | | (0.0132) | | (0.0178) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *N* | 7432 | 3820 | 7432 | 1863 | 7432 | 146 | 7432 | 2879 | 7432 | 1096 |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- **GENDER HETEROGENEITY: - Econometric results: Male headed households**

*Table S18: The impact of climate risk on input purchasing in Malawi in male-headed households- Double Hurdle Craggit Models*

| | ALL INPUTS | | FERTILIZER | | AGROCHEMICALS | | SEED | | HIRED LABOR | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| **Male headed households** | | | | | | | | | | |
| Growing season drought shock(1-year lag) | 0.145** | 0.185*** | 0.159** | 0.101** | 0.289** | 0.005 | 0.096* | -0.009 | -0.060 | -0.121 |
| | (0.0666) | (0.0652) | (0.0720) | (0.0504) | (0.1146) | (0.1281) | (0.0582) | (0.0494) | (0.0728) | (0.0934) |
| Growing season drought shock(2-year lag) | 0.272*** | 0.023 | 0.115* | 0.064 | 0.138 | -0.142 | 0.285*** | 0.116** | 0.155** | -0.238*** |
| | (0.0695) | (0.0659) | (0.0690) | (0.0587) | (0.1064) | (0.1133) | (0.0563) | (0.0454) | (0.0691) | (0.0836) |
| Growing season flood shock(1-year lag) | -0.512*** | 0.280*** | 0.104 | 0.017 | -0.406*** | -0.040 | -0.348*** | 0.049 | -0.161** | 0.045 |
| | (0.0836) | (0.0687) | (0.0643) | (0.0567) | (0.1563) | (0.1416) | (0.0551) | (0.0574) | (0.0736) | (0.0850) |
| Long-term season average rainfall(mm) | -0.000 | 0.001*** | 0.000 | 0.001*** | -0.000 | 0.001** | -0.000 | 0.001*** | 0.001*** | 0.001*** |
| | (0.0003) | (0.0003) | (0.0003) | (0.0002) | (0.0004) | (0.0005) | (0.0002) | (0.0002) | (0.0003) | (0.0004) |
| Long-term season average temperature (deg) | -0.044*** | -0.179*** | -0.197*** | -0.091*** | 0.164*** | 0.033* | 0.017** | 0.016*** | -0.009 | -0.045*** |
| | (0.0103) | (0.0090) | (0.0099) | (0.0076) | (0.0179) | (0.0185) | (0.0073) | (0.0063) | (0.0099) | (0.0110) |
| Number of plots cultivated | 0.019 | 0.076*** | 0.165*** | -0.020 | 0.140*** | 0.026 | 0.126*** | -0.004 | 0.009 | 0.017 |
| | (0.0191) | (0.0177) | (0.0168) | (0.0150) | (0.0235) | (0.0356) | (0.0146) | (0.0158) | (0.0196) | (0.0254) |
| Log farm size(ha) | 0.417*** | -0.932*** | 0.576*** | -1.070*** | 0.685*** | -1.246*** | 0.005 | -1.321*** | 0.505*** | -1.052*** |
| | (0.0511) | (0.0526) | (0.0500) | (0.0471) | (0.0779) | (0.1168) | (0.0438) | (0.0443) | (0.0637) | (0.0783) |
| Household asset wealth index | 0.062*** | 0.165*** | 0.176*** | 0.094*** | 0.006 | 0.033 | 0.052*** | 0.033*** | 0.255*** | 0.073*** |
| | (0.0135) | (0.0144) | (0.0166) | (0.0096) | (0.0125) | (0.0218) | (0.0094) | (0.0069) | (0.0201) | (0.0102) |
| Agricultural implement access score | 0.094*** | 0.150*** | 0.133*** | 0.103*** | 0.099*** | 0.069*** | 0.050*** | 0.008 | 0.110*** | 0.053*** |
| | (0.0091) | (0.0082) | (0.0091) | (0.0068) | (0.0100) | (0.0142) | (0.0072) | (0.0065) | (0.0092) | (0.0096) |
| Log Distance to ADMARC(km) | -0.056** | -0.037* | -0.074*** | -0.003 | -0.139*** | 0.110*** | -0.041** | -0.021 | -0.029 | -0.016 |
| | (0.0257) | (0.0222) | (0.0238) | (0.0185) | (0.0391) | (0.0370) | (0.0190) | (0.0174) | (0.0243) | (0.0282) |
| Received fertilizer coupon(1=yes) | -0.485*** | -0.549*** | -0.685*** | -0.284*** | -0.285*** | -0.168 | -0.268*** | -0.108*** | 0.024 | -0.142*** |
| | (0.0338) | (0.0392) | (0.0335) | (0.0367) | (0.0758) | (0.1024) | (0.0304) | (0.0316) | (0.0365) | (0.0510) |
| Received seed coupon(1=yes) | 0.058 | -0.132*** | -0.055 | 0.079* | 0.226*** | -0.020 | -0.049 | -0.239*** | 0.182*** | 0.150*** |
| | (0.0397) | (0.0507) | (0.0391) | (0.0461) | (0.0863) | (0.1176) | (0.0373) | (0.0411) | (0.0418) | (0.0572) |
| Age of household head(years) | -0.009*** | -0.008*** | -0.011*** | -0.003*** | -0.010*** | -0.006** | -0.008*** | -0.002** | -0.006*** | -0.002 |
| | (0.0007) | (0.0009) | (0.0007) | (0.0008) | (0.0013) | (0.0022) | (0.0007) | (0.0007) | (0.0008) | (0.0011) |
| Household head attained at least JCE (1=yes) | 0.011 | 0.091*** | 0.050** | 0.089*** | -0.021 | 0.034 | 0.034 | 0.009 | 0.036 | 0.103*** |
| | (0.0226) | (0.0255) | (0.0235) | (0.0229) | (0.0413) | (0.0602) | (0.0212) | (0.0207) | (0.0255) | (0.0361) |
| Household Size | 0.012* | 0.020*** | 0.017** | 0.005 | -0.018 | 0.020 | 0.025*** | 0.014** | -0.079*** | -0.047*** |
| | (0.0064) | (0.0068) | (0.0066) | (0.0063) | (0.0115) | (0.0180) | (0.0060) | (0.0058) | (0.0079) | (0.0107) |
| Household dependency ratio(%) | 0.000* | -0.000* | -0.000 | -0.000* | 0.000 | -0.000 | 0.000 | 0.000 | 0.001*** | 0.000* |
| | (0.0002) | (0.0002) | (0.0002) | (0.0002) | (0.0003) | (0.0005) | (0.0002) | (0.0002) | (0.0002) | (0.0003) |
| Log Family labor(weeks) | | | | | | | | | -0.045*** | 0.004 |
| | | | | | | | | | (0.0073) | (0.0070) |
| Sigma constant | | 1.146*** | | 0.824*** | | 0.717*** | | 0.846*** | | 0.918*** |
| | | (0.0086) | | (0.0090) | | (0.0183) | | (0.0098) | | (0.0109) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 18199 | 11238 | 18199 | 6933 | 18199 | 760 | 18199 | 8292 | 18199 | 3337 |

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

- **INFORMATION ACCESS HETEROGENEITY: Econometric results Access to information sub-sample**

*Table S19: The impact of climate risk on input purchasing in Malawi in the sub-sample of households with access to information- Double Hurdle Craggit Models*

| | ALL INPUTS | | FERTILIZER | | AGROCHEMICALS | | SEED | | HIRED LABOR | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle1 |
| main | | | | | | | | | | |
| Growing season drought shock(1-year lag) | 0.214*** | 0.274*** | 0.225*** | 0.176*** | 0.325*** | 0.079 | 0.112* | -0.018 | -0.015 | 0.033 |
| | (0.0610) | (0.0664) | (0.0698) | (0.0514) | (0.1147) | (0.1251) | (0.0579) | (0.0488) | (0.0694) | (0.0898) |
| Growing season drought shock(2-year lag) | 0.402*** | 0.018 | 0.242*** | 0.021 | 0.140 | -0.149 | 0.386*** | 0.052 | 0.127* | -0.087 |
| | (0.0685) | (0.0684) | (0.0721) | (0.0662) | (0.1138) | (0.1190) | (0.0620) | (0.0501) | (0.0694) | (0.0869) |
| Growing season flood shock(1-year lag) | -0.316*** | 0.299*** | 0.166** | 0.023 | -0.487*** | 0.006 | -0.336*** | 0.082 | -0.024 | 0.162* |
| | (0.0905) | (0.0821) | (0.0771) | (0.0715) | (0.1851) | (0.1722) | (0.0709) | (0.0661) | (0.0848) | (0.0983) |
| Long-term season average rainfall(mm) | -0.000 | 0.001*** | 0.000 | 0.001*** | -0.001* | 0.002*** | -0.000 | 0.001*** | 0.001*** | 0.001** |
| | (0.0003) | (0.0003) | (0.0003) | (0.0002) | (0.0005) | (0.0005) | (0.0002) | (0.0002) | (0.0003) | (0.0004) |
| Long-term season average temperature (deg) | -0.040*** | -0.169*** | -0.183*** | -0.093*** | 0.167*** | 0.060*** | 0.014* | 0.024*** | -0.008 | -0.046*** |
| | (0.0099) | (0.0096) | (0.0104) | (0.0084) | (0.0187) | (0.0189) | (0.0080) | (0.0065) | (0.0096) | (0.0113) |
| Number of plots cultivated | 0.055*** | 0.071*** | 0.162*** | -0.018 | 0.134*** | 0.024 | 0.122*** | 0.014 | 0.018 | -0.019 |
| | (0.0215) | (0.0198) | (0.0190) | (0.0176) | (0.0268) | (0.0414) | (0.0168) | (0.0172) | (0.0212) | (0.0274) |
| Log farm size(ha) | 0.475*** | -0.984*** | 0.644*** | -1.084*** | 0.626*** | -1.266*** | 0.089* | -1.379*** | 0.474*** | -1.014*** |
| | (0.0530) | (0.0552) | (0.0531) | (0.0520) | (0.0841) | (0.1288) | (0.0473) | (0.0468) | (0.0672) | (0.0816) |
| Household asset wealth index | 0.082*** | 0.159*** | 0.181*** | 0.094*** | -0.005 | 0.024 | 0.055*** | 0.034*** | 0.286*** | 0.074*** |
| | (0.0151) | (0.0159) | (0.0205) | (0.0110) | (0.0142) | (0.0273) | (0.0102) | (0.0077) | (0.0194) | (0.0110) |
| Agricultural implement access score | 0.089*** | 0.156*** | 0.126*** | 0.110*** | 0.106*** | 0.074*** | 0.048*** | 0.008 | 0.109*** | 0.053*** |
| | (0.0097) | (0.0089) | (0.0098) | (0.0076) | (0.0113) | (0.0140) | (0.0077) | (0.0070) | (0.0093) | (0.0099) |
| Log Distance to ADMARC(km) | -0.055** | -0.041* | -0.076*** | -0.001 | -0.134*** | 0.165*** | -0.041** | -0.004 | -0.040* | -0.000 |
| | (0.0239) | (0.0228) | (0.0237) | (0.0195) | (0.0420) | (0.0426) | (0.0199) | (0.0171) | (0.0237) | (0.0299) |
| Received fertilizer coupon(1=yes) | -0.497*** | -0.607*** | -0.756*** | -0.294*** | -0.334*** | -0.041 | -0.193*** | -0.077** | 0.055 | -0.141*** |
| | (0.0356) | (0.0416) | (0.0368) | (0.0404) | (0.0855) | (0.1123) | (0.0338) | (0.0329) | (0.0390) | (0.0525) |
| Received seed coupon(1=yes) | 0.000 | -0.095* | -0.005 | 0.063 | 0.208** | -0.010 | -0.119*** | -0.257*** | 0.100** | 0.184*** |
| | (0.0407) | (0.0534) | (0.0422) | (0.0508) | (0.0934) | (0.1339) | (0.0408) | (0.0414) | (0.0435) | (0.0612) |
| Age of household head(years) | -0.011*** | -0.010*** | -0.012*** | -0.004*** | -0.010*** | -0.006*** | -0.009*** | -0.002*** | -0.003*** | -0.001 |
| | (0.0007) | (0.0009) | (0.0008) | (0.0008) | (0.0014) | (0.0021) | (0.0007) | (0.0007) | (0.0008) | (0.0011) |
| Household head attained at least JCE (1=yes) | -0.017 | 0.076*** | 0.007 | 0.089*** | -0.028 | 0.053 | -0.006 | 0.020 | -0.006 | 0.117*** |
| | (0.0232) | (0.0267) | (0.0252) | (0.0247) | (0.0449) | (0.0640) | (0.0224) | (0.0214) | (0.0273) | (0.0371) |
| Household Size | 0.017*** | 0.028*** | 0.023*** | 0.006 | -0.001 | 0.022 | 0.030*** | 0.021*** | -0.082*** | -0.039*** |
| | (0.0062) | (0.0068) | (0.0065) | (0.0065) | (0.0109) | (0.0192) | (0.0057) | (0.0057) | (0.0078) | (0.0112) |
| Household dependency ratio(%) | -0.000** | -0.001*** | -0.001*** | -0.000*** | -0.001* | -0.000 | -0.000** | -0.000 | 0.001*** | 0.000 |
| | (0.0001) | (0.0002) | (0.0001) | (0.0002) | (0.0003) | (0.0005) | (0.0001) | (0.0001) | (0.0002) | (0.0002) |
| Log Family labor(weeks) | | | | | | | | | -0.056*** | 0.002 |
| | | | | | | | | | (0.0082) | (0.0075) |
| Sigma constant | | 1.143*** | | 0.839*** | | 0.712*** | | 0.832*** | | 0.914*** |
| | | (0.0090) | | (0.0095) | | (0.0199) | | (0.0098) | | (0.0112) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 16152 | 10065 | 16152 | 6059 | 16152 | 670 | 16152 | 7468 | 16152 | 3033 |

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- **INFORMATION ACCESS HETEROGENEITY: Econometric results No Access to information sub-sample**

*Table S20: The impact of climate risk on input purchasing in Malawi in the sub-group of households with no access to information- Double Hurdle Craggit Models*

| | ALL INPUTS | | FERTILIZER | | AGROCHEMICALS | | SEED | | HIRED LABOR | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle1 |
| main | | | | | | | | | | |
| Growing season drought shock(1-year lag) | -0.063 | -0.164 | -0.232** | -0.113 | 0.096 | -0.176 | 0.009 | -0.018 | -0.105 | -0.257* |
| | (0.1063) | (0.1174) | (0.1031) | (0.0953) | (0.1743) | (0.2762) | (0.0978) | (0.0906) | (0.1199) | (0.1500) |
| Growing season drought shock(2-year lag) | 0.169* | -0.038 | -0.067 | 0.136 | 0.280* | -0.067 | 0.223*** | 0.102 | 0.172* | -0.366*** |
| | (0.0890) | (0.0941) | (0.0849) | (0.0836) | (0.1441) | (0.1936) | (0.0763) | (0.0685) | (0.0970) | (0.1242) |
| Growing season flood shock(1-year lag) | -0.689*** | 0.195** | -0.024 | -0.005 | -0.467** | -0.241 | -0.381*** | -0.001 | -0.252*** | 0.037 |
| | (0.0901) | (0.0950) | (0.0740) | (0.0785) | (0.1863) | (0.1923) | (0.0664) | (0.0707) | (0.0924) | (0.1323) |
| Long-term season average rainfall(mm) | 0.000 | -0.000 | -0.001* | 0.000 | -0.000 | 0.001 | -0.000 | 0.001** | 0.002*** | 0.001 |
| | (0.0004) | (0.0004) | (0.0004) | (0.0004) | (0.0006) | (0.0009) | (0.0003) | (0.0003) | (0.0004) | (0.0005) |
| Long-term season average temperature (deg) | -0.045*** | -0.210*** | -0.216*** | -0.104*** | 0.159*** | -0.002 | 0.025** | 0.004 | -0.026* | -0.028 |
| | (0.0134) | (0.0133) | (0.0124) | (0.0123) | (0.0267) | (0.0286) | (0.0101) | (0.0097) | (0.0149) | (0.0173) |
| Number of plots cultivated | -0.007 | 0.087*** | 0.148*** | -0.003 | 0.182*** | -0.065 | 0.142*** | -0.021 | 0.015 | 0.168*** |
| | (0.0237) | (0.0276) | (0.0220) | (0.0217) | (0.0351) | (0.0700) | (0.0202) | (0.0242) | (0.0279) | (0.0407) |
| Log farm size(ha) | 0.397*** | -1.126*** | 0.621*** | -1.304*** | 0.588*** | -1.246*** | -0.012 | -1.385*** | 0.512*** | -1.522*** |
| | (0.0716) | (0.0880) | (0.0691) | (0.0726) | (0.1234) | (0.2329) | (0.0678) | (0.0705) | (0.0995) | (0.1264) |
| Household asset wealth index | 0.043** | 0.200*** | 0.178*** | 0.108*** | 0.024 | 0.052** | 0.045*** | 0.019 | 0.223*** | 0.086*** |
| | (0.0185) | (0.0214) | (0.0263) | (0.0146) | (0.0203) | (0.0206) | (0.0144) | (0.0117) | (0.0279) | (0.0148) |
| Agricultural implement access score | 0.107*** | 0.191*** | 0.173*** | 0.113*** | 0.103*** | 0.085*** | 0.030** | 0.023** | 0.091*** | 0.048*** |
| | (0.0144) | (0.0156) | (0.0156) | (0.0124) | (0.0185) | (0.0310) | (0.0121) | (0.0106) | (0.0163) | (0.0184) |
| Log Distance to ADMARC(km) | -0.027 | -0.104*** | -0.073** | -0.049 | -0.087 | 0.008 | -0.020 | -0.006 | -0.058 | -0.013 |
| | (0.0344) | (0.0350) | (0.0311) | (0.0307) | (0.0572) | (0.0751) | (0.0271) | (0.0253) | (0.0376) | (0.0423) |
| Received fertilizer coupon(1=yes) | -0.407*** | -0.580*** | -0.618*** | -0.219*** | -0.175* | -0.447** | -0.297*** | -0.133*** | 0.085* | -0.134* |
| | (0.0437) | (0.0593) | (0.0453) | (0.0557) | (0.1054) | (0.1873) | (0.0395) | (0.0478) | (0.0497) | (0.0727) |
| Received seed coupon(1=yes) | 0.138*** | -0.262*** | -0.143** | -0.014 | 0.227* | 0.108 | 0.087* | -0.289*** | 0.233*** | 0.106 |
| | (0.0520) | (0.0795) | (0.0584) | (0.0781) | (0.1161) | (0.2103) | (0.0493) | (0.0624) | (0.0612) | (0.0822) |
| Age of household head(years) | -0.010*** | -0.007*** | -0.011*** | -0.001 | -0.009*** | -0.005 | -0.009*** | -0.002* | -0.003*** | -0.000 |
| | (0.0009) | (0.0013) | (0.0010) | (0.0011) | (0.0020) | (0.0040) | (0.0009) | (0.0010) | (0.0011) | (0.0015) |
| Household head attained at least JCE (1=yes) | -0.011 | -0.007 | -0.004 | 0.023 | -0.098 | 0.111 | 0.017 | 0.023 | 0.001 | -0.036 |
| | (0.0302) | (0.0385) | (0.0328) | (0.0350) | (0.0679) | (0.1087) | (0.0297) | (0.0299) | (0.0361) | (0.0526) |
| Household Size | 0.039*** | 0.035*** | 0.032*** | 0.017** | 0.011 | -0.001 | 0.044*** | 0.017** | -0.062*** | -0.025* |
| | (0.0083) | (0.0098) | (0.0087) | (0.0087) | (0.0151) | (0.0293) | (0.0074) | (0.0079) | (0.0111) | (0.0151) |
| Household dependency ratio(%) | -0.000 | -0.001*** | -0.000* | -0.001*** | -0.000 | -0.000 | -0.000 | 0.000 | 0.000 | -0.000 |
| | (0.0002) | (0.0002) | (0.0002) | (0.0002) | (0.0004) | (0.0007) | (0.0002) | (0.0002) | (0.0002) | (0.0003) |
| Log Family labor(weeks) | | | | | | | | | -0.047*** | -0.005 |
| | | | | | | | | | (0.0103) | (0.0116) |
| Sigma constant | | 1.179*** | | 0.810*** | | 0.698*** | | 0.841*** | | 0.891*** |
| | | (0.0134) | | (0.0135) | | (0.0325) | | (0.0134) | | (0.0166) |
| Survey year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| District fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 9479 | 4993 | 9479 | 2737 | 9479 | 236 | 9479 | 3703 | 9479 | 1400 |

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

***Do rainfall shocks prompt commercial input purchase amongst smallholder farmers in diverse regions and environments in Malawi? Lessons for adaptation***

- **Plotted marginal effects:** Plotting marginal effects showing the relationship between rainfall variables on input purchase decisions in:

**A. national sample**
**B. heterogeneous regions,**
**C. different socioeconomic groups**
**D. and in Male and female headed households**

**A: National sample figures**

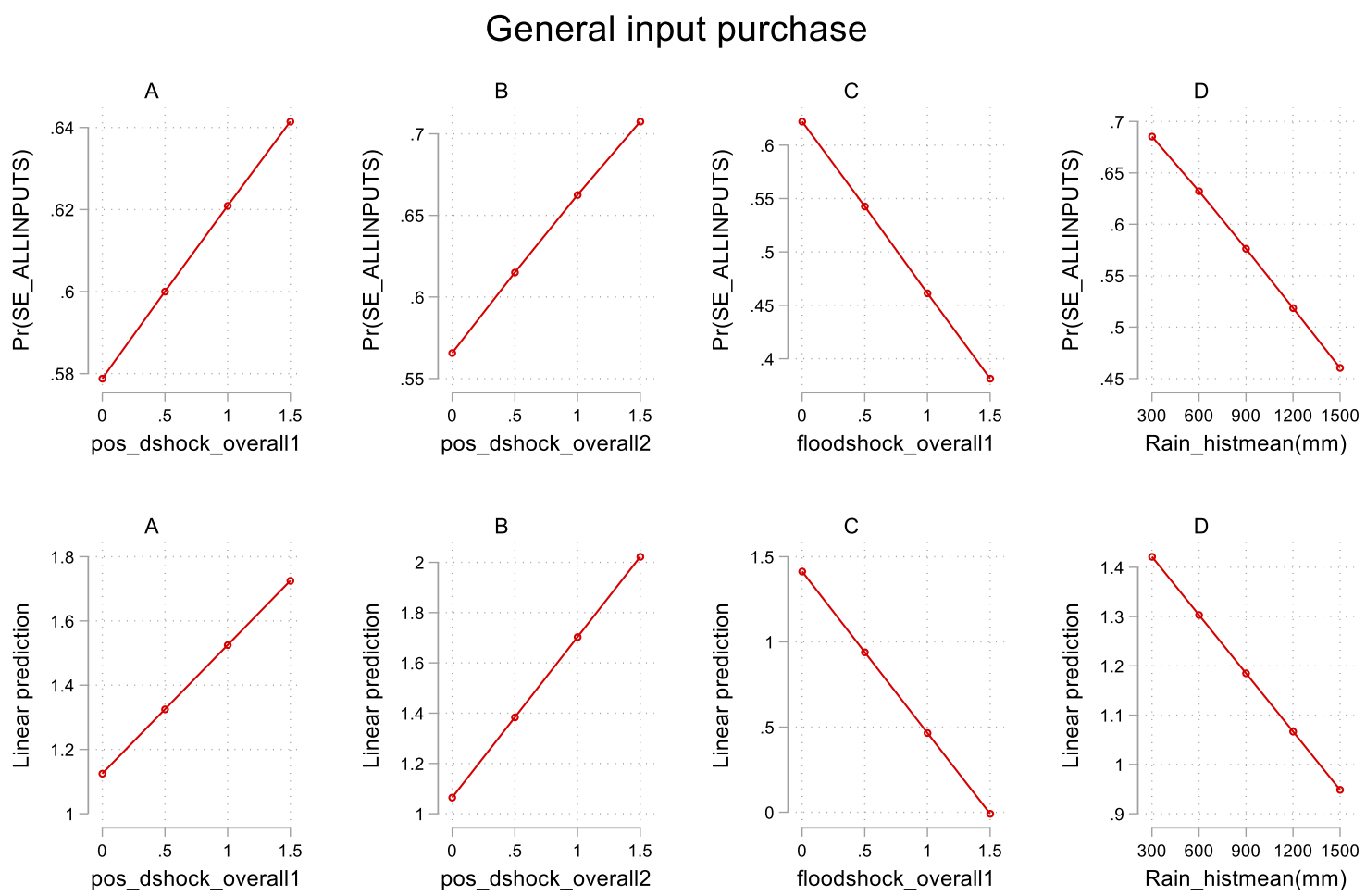


*Figure S6: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) in the national sample.*

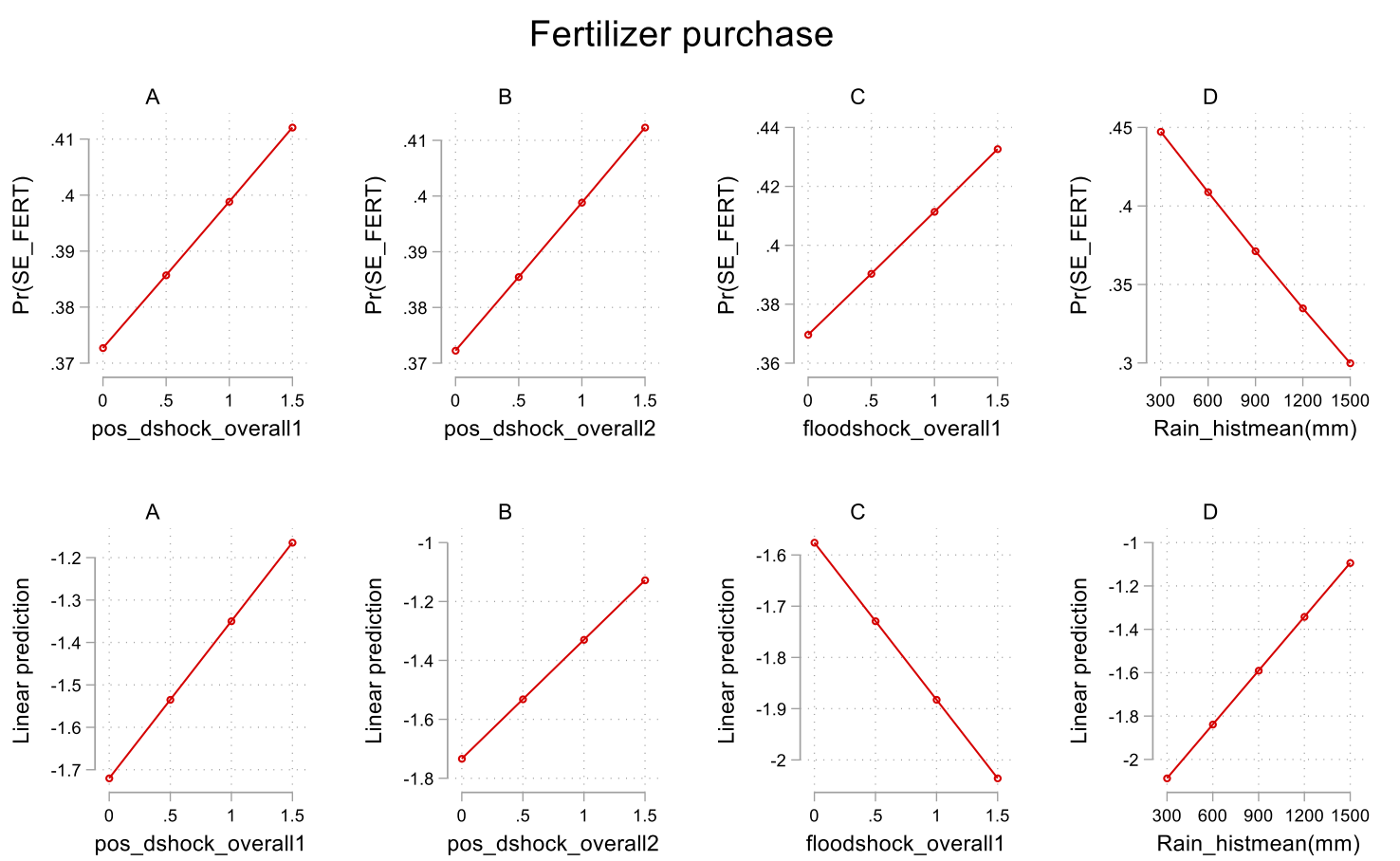


*Figure S7: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) in the national sample.*

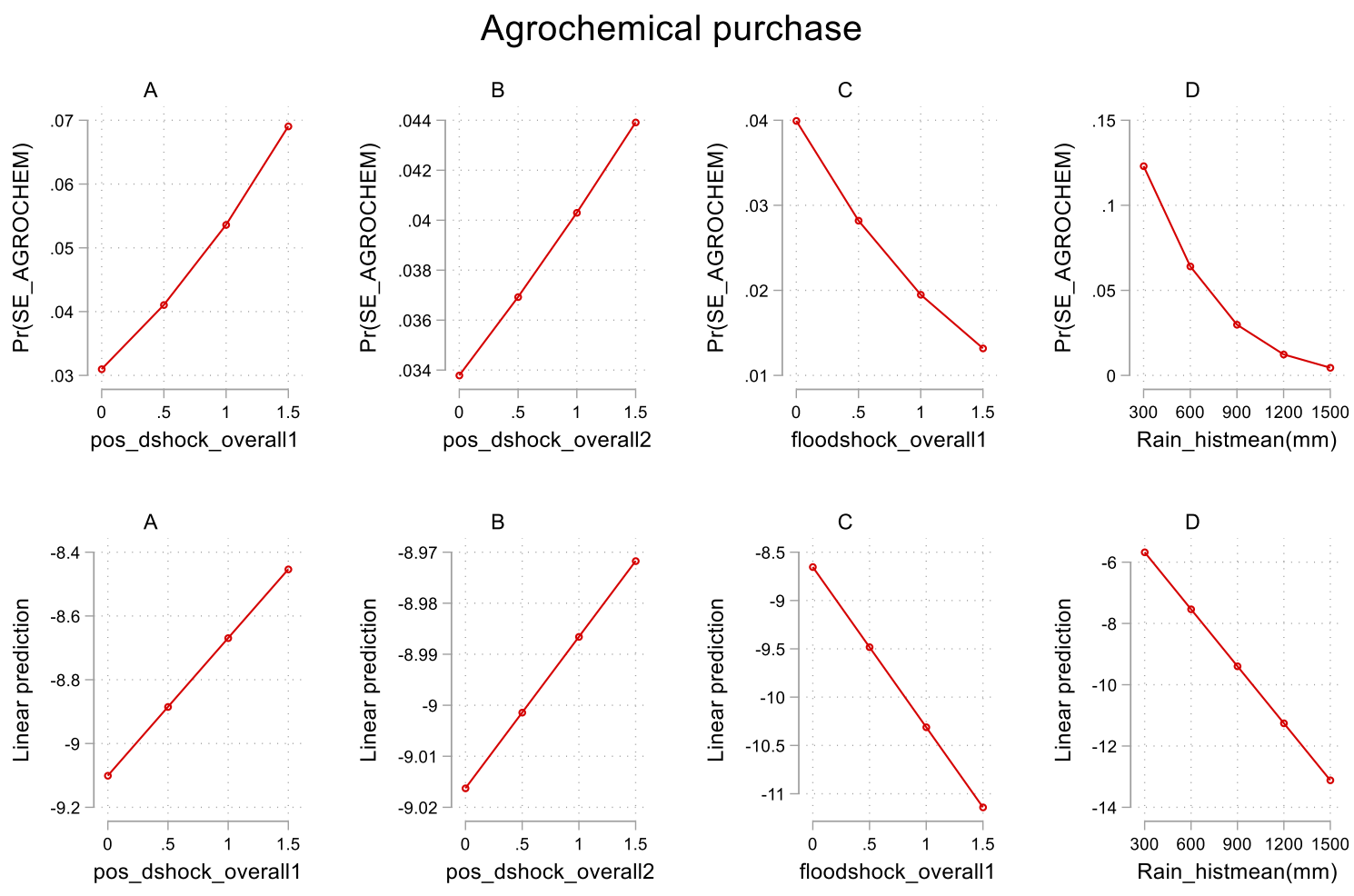


*Figure S8: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) in the national sample.*

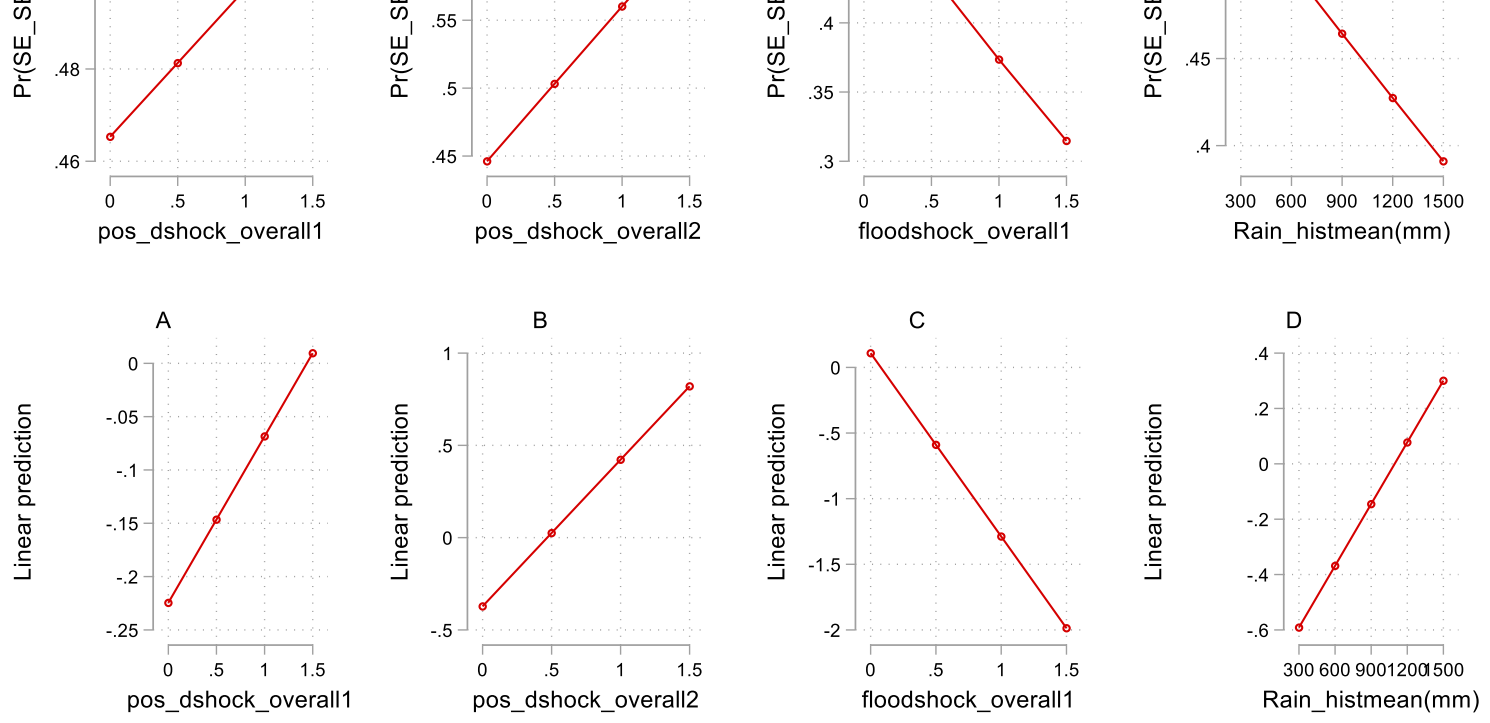


*Figure S9: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) in the national sample.*

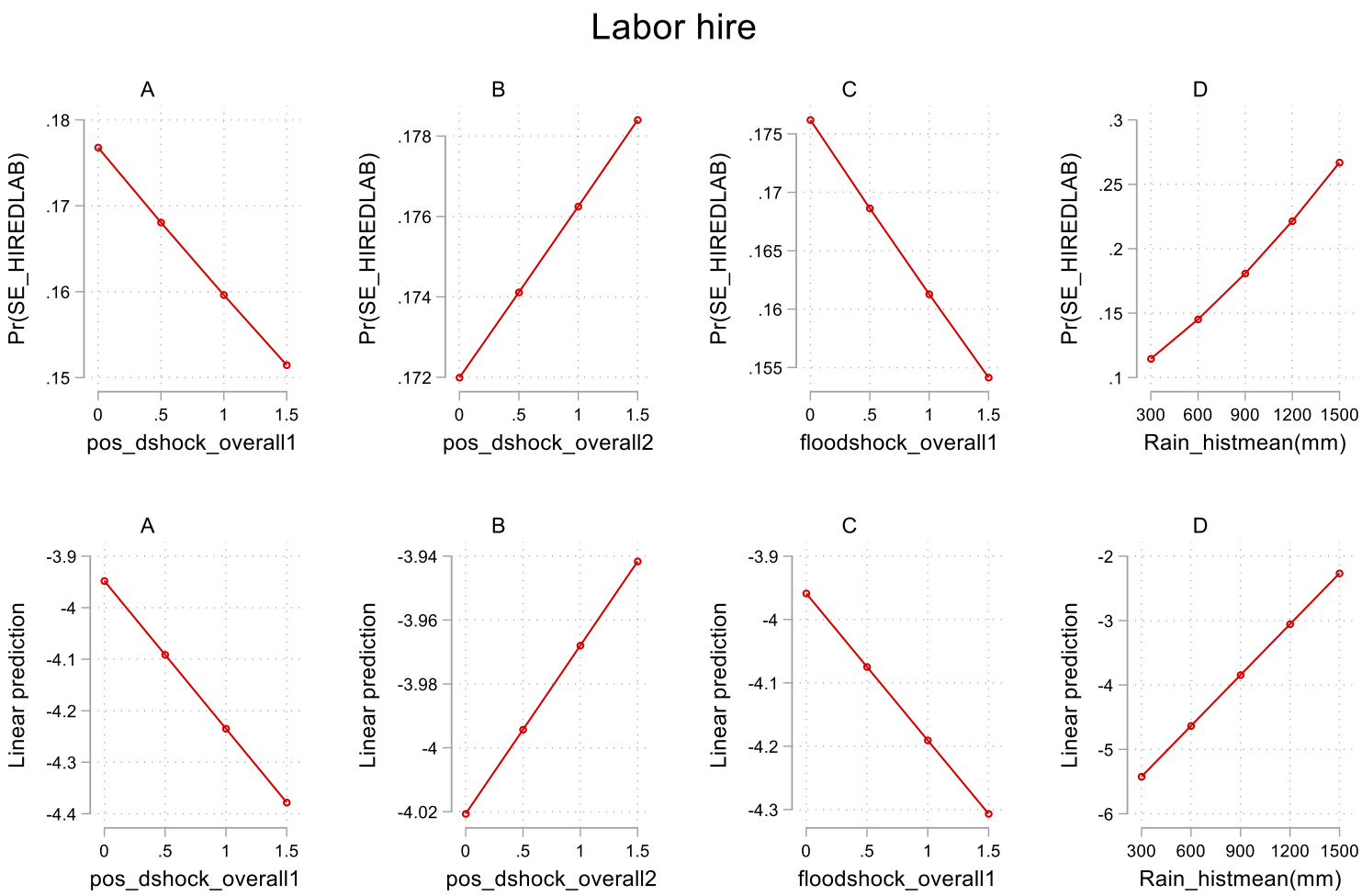


*Figure S10:Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) in the national sample.*

**B: Heterogeneity: Regional figures**

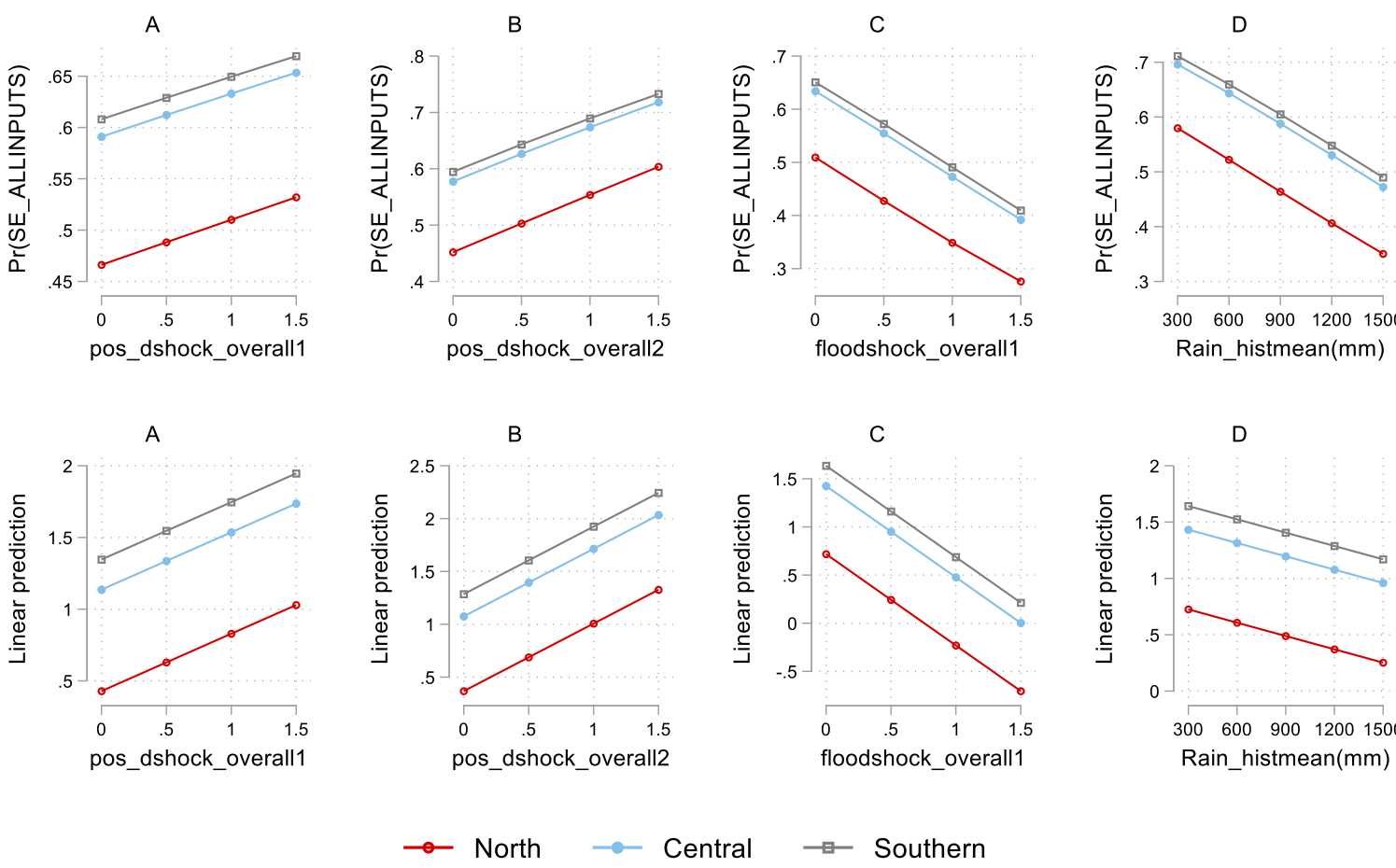


*Figure S11: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by region.*

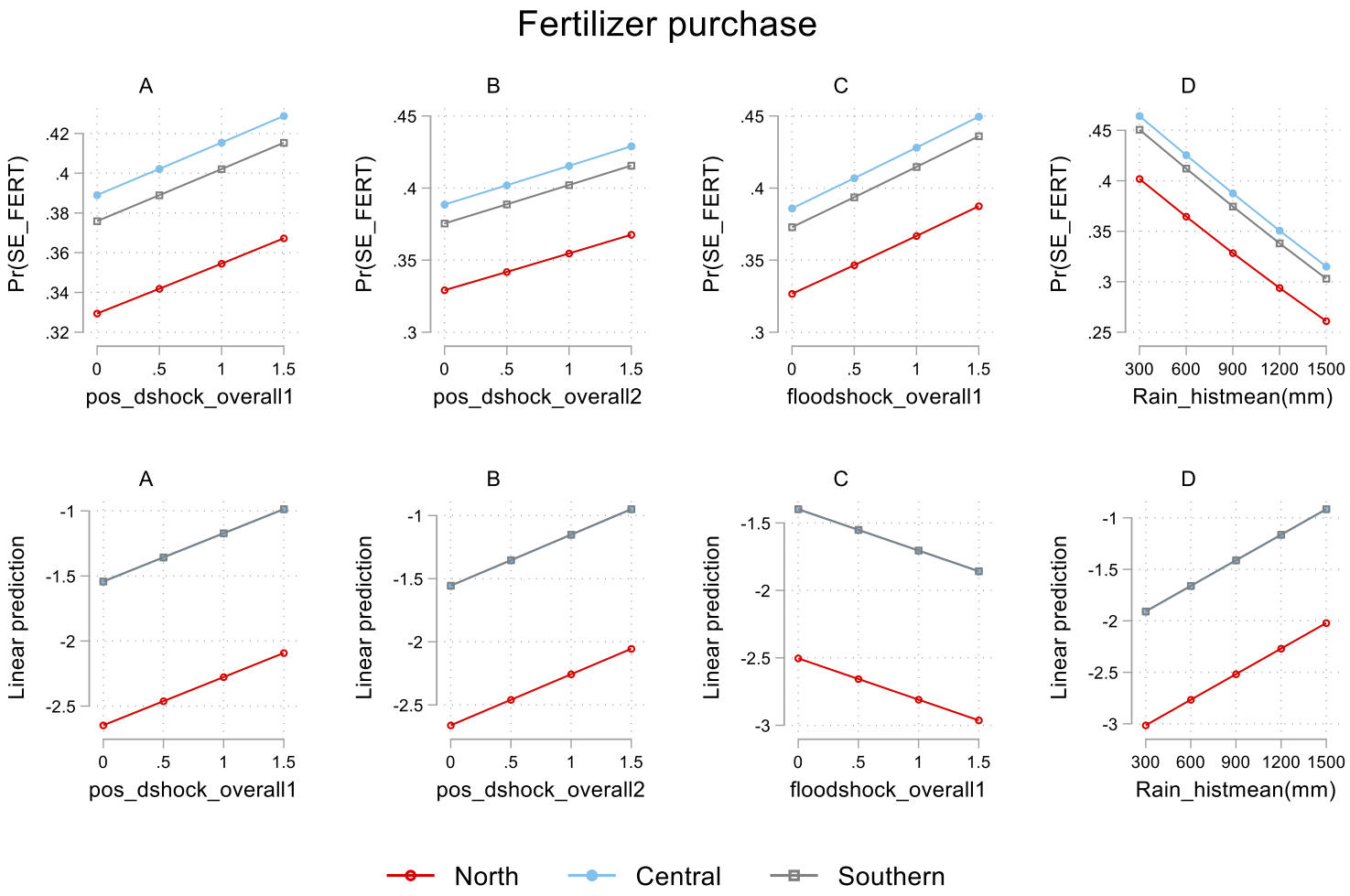


*Figure S12: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of Fertilizer purchase (bottom panel) by region.*

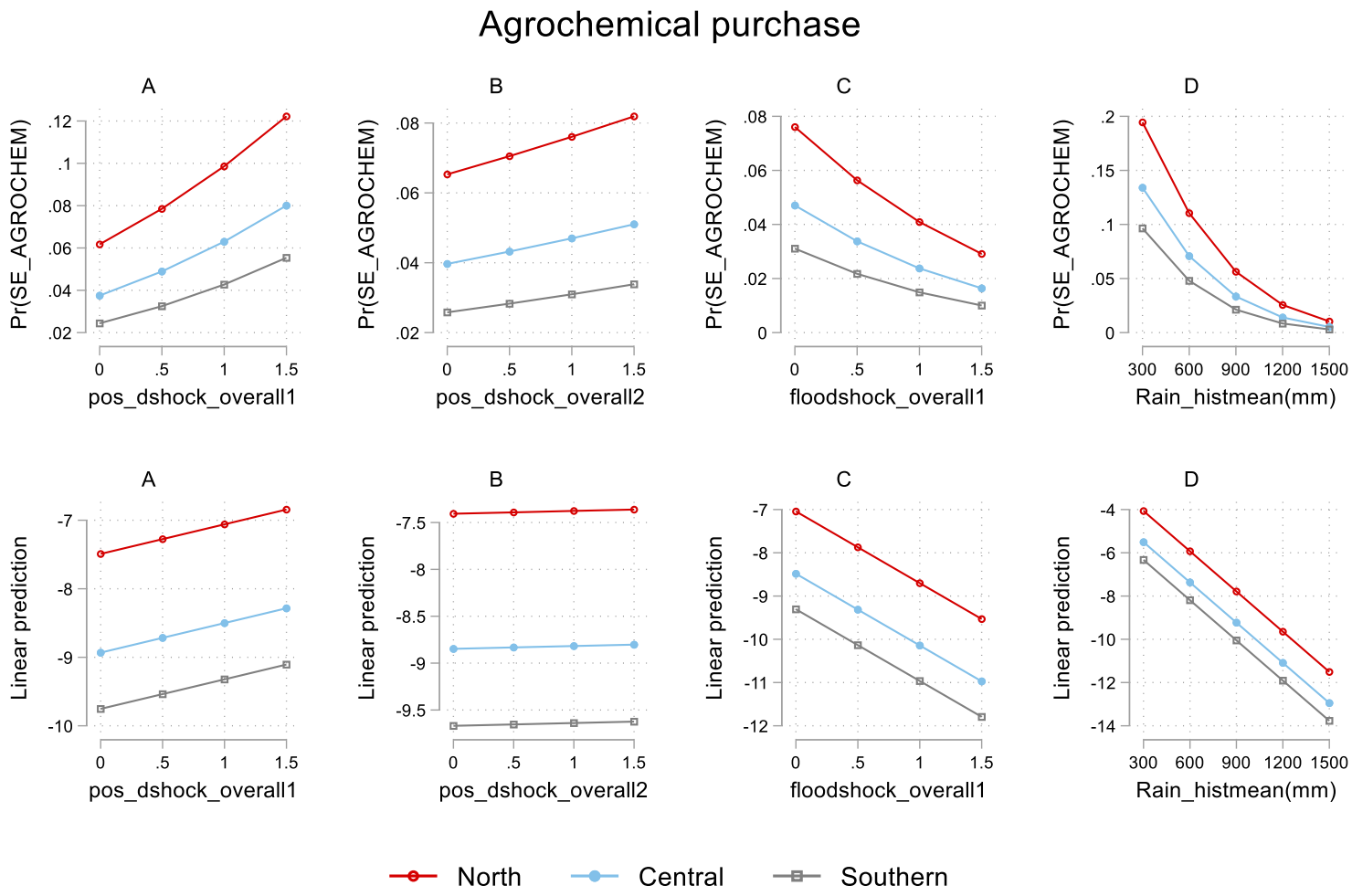


*Figure S13: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of Agrochemical purchase (bottom panel) by region.*

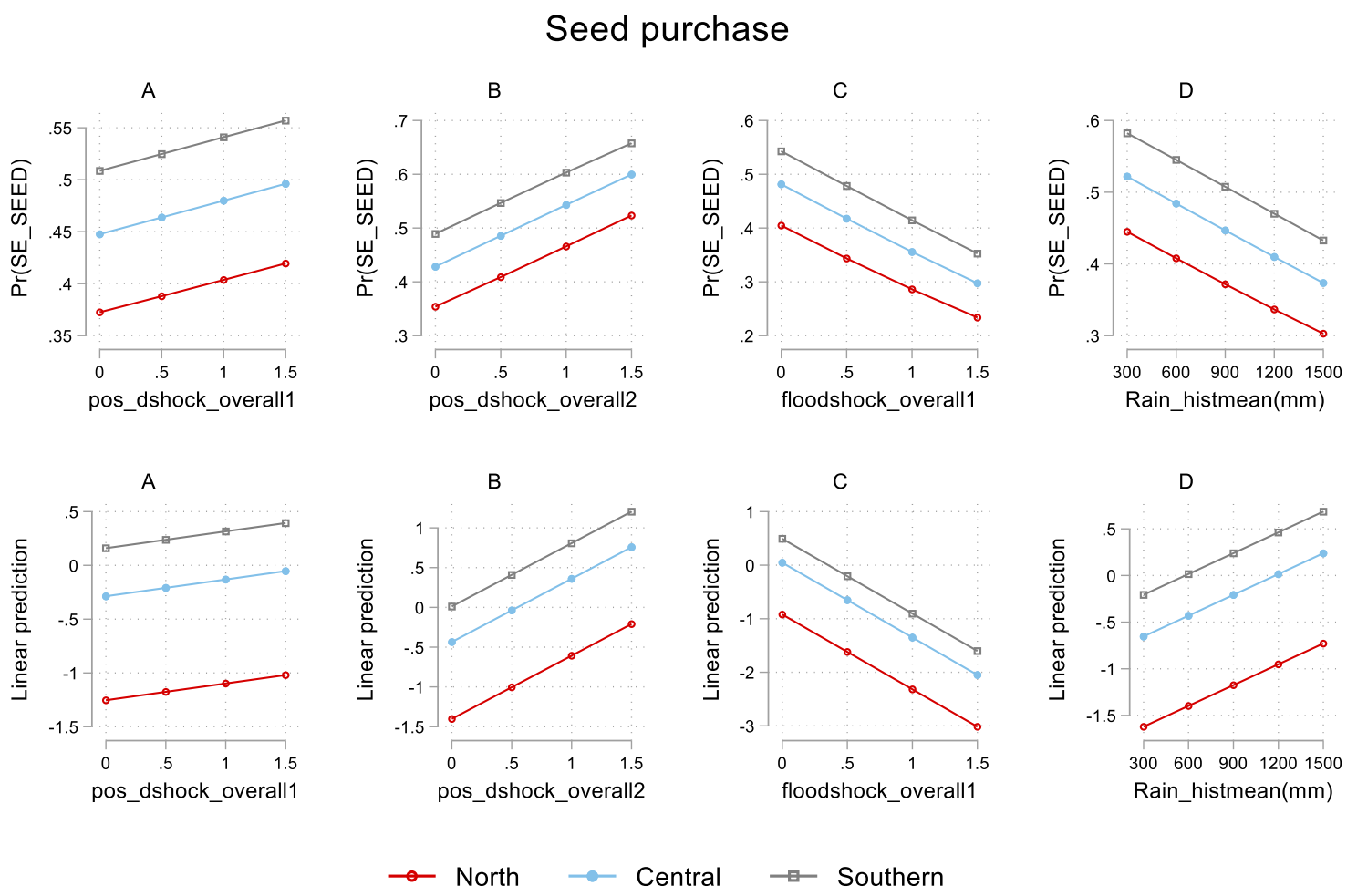


*Figure S14: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of Seed purchase (bottom panel) by region.*

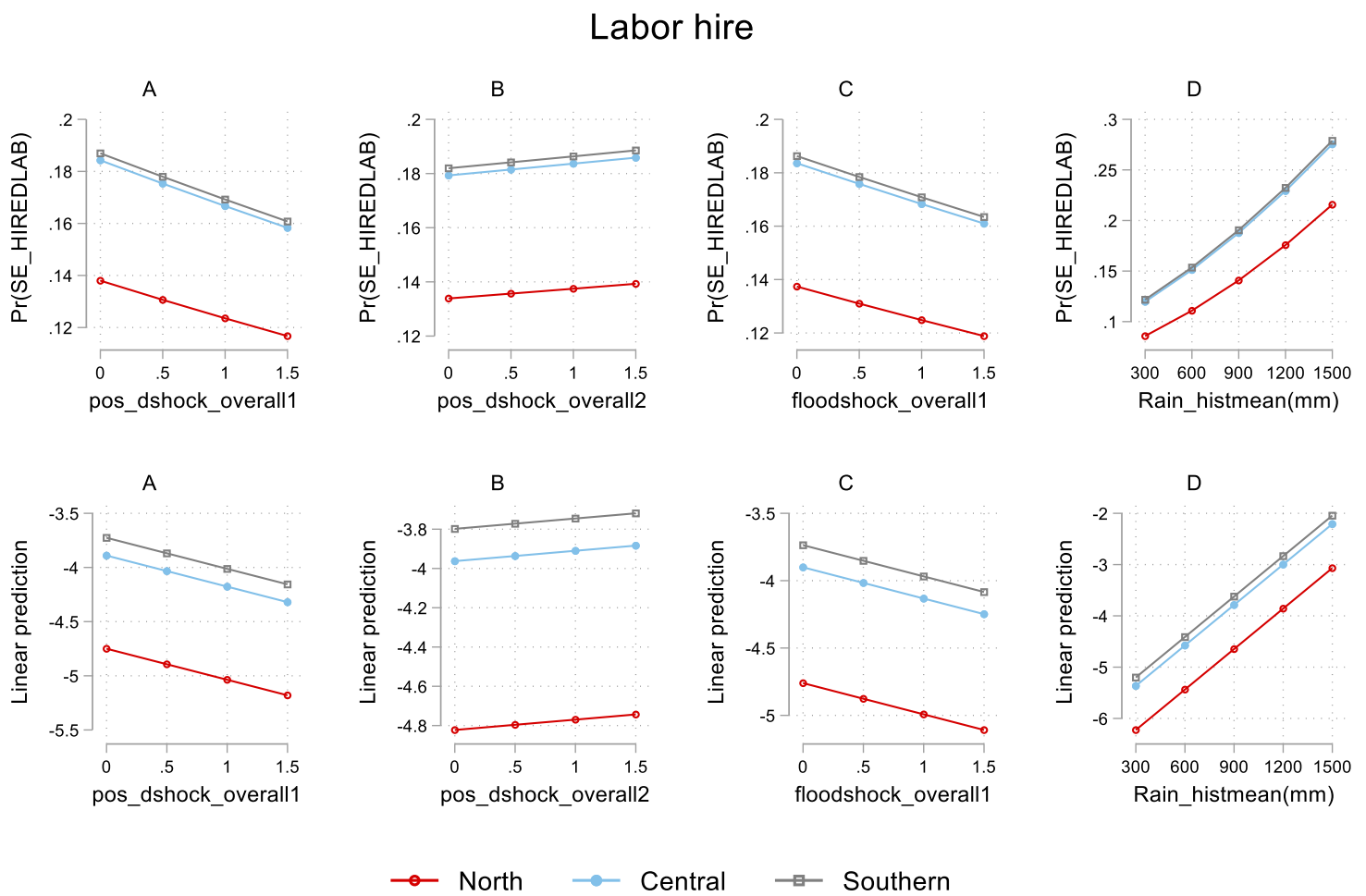


*Figure S15: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of Labor purchase (bottom panel) by region.*

**C: Heterogeneity: Adaptive capacity(asset endowements) figures**

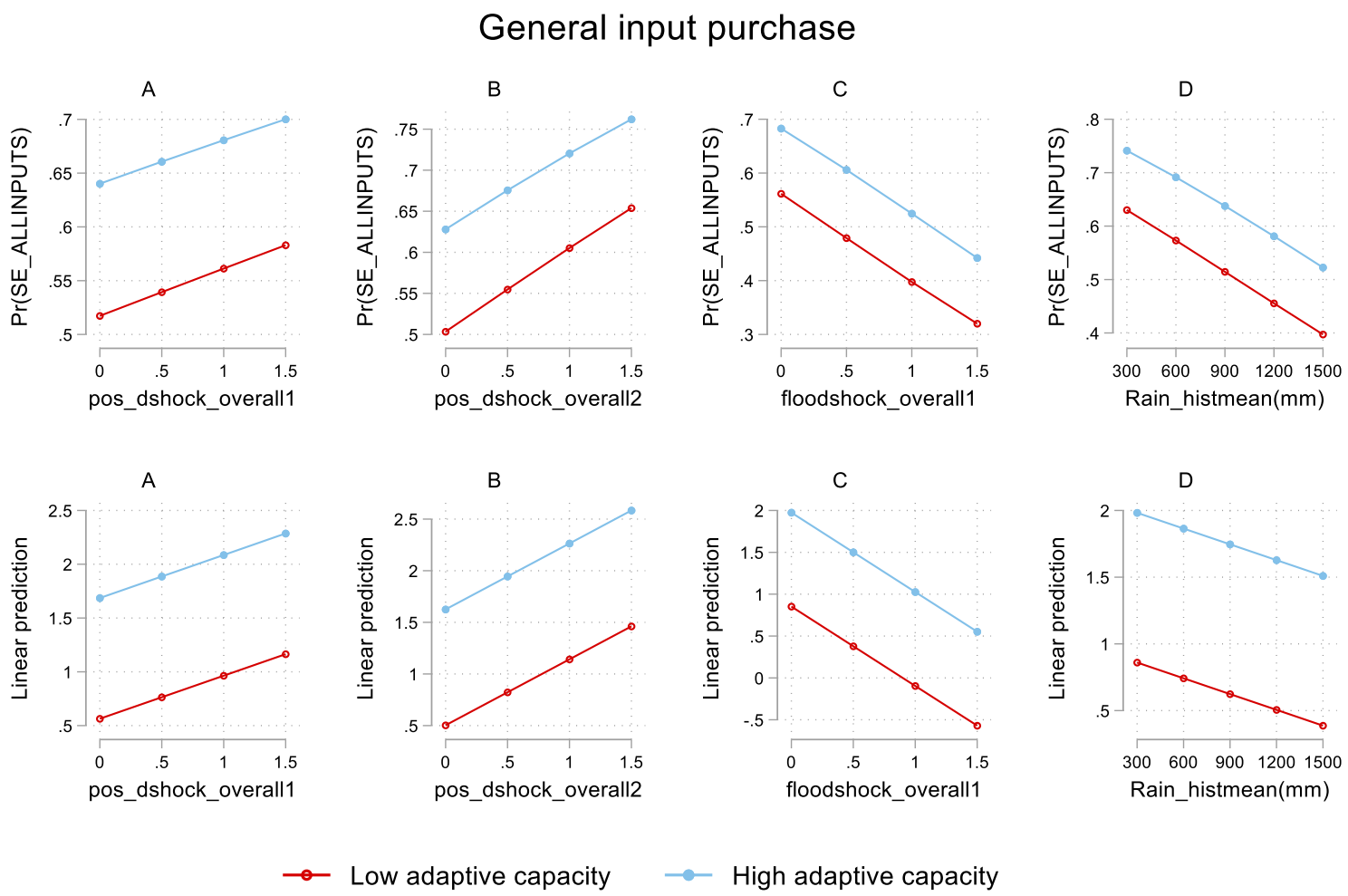


*Figure S16: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by adaptive capacity.*

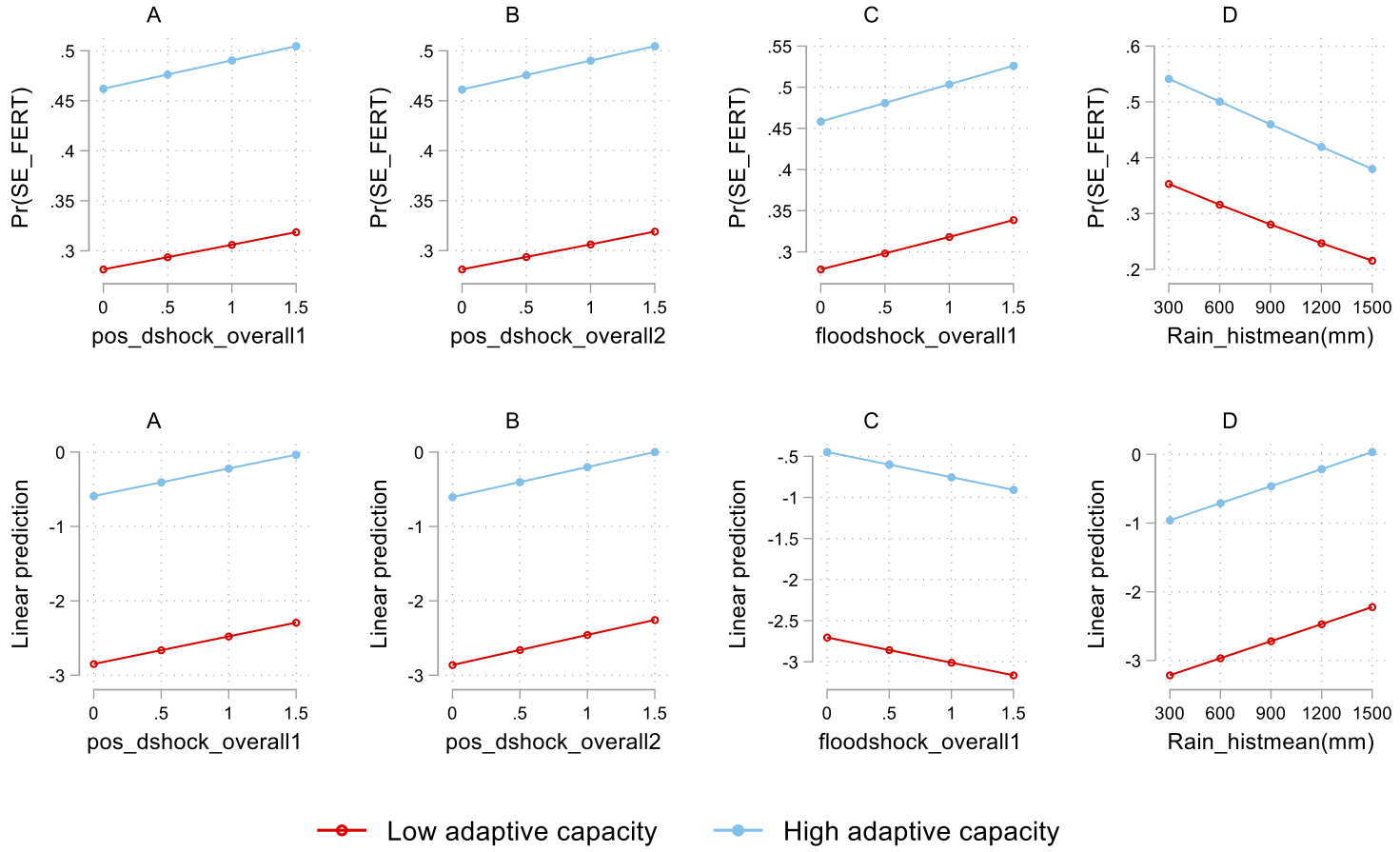


*Figure S17: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by adaptive capacity.*

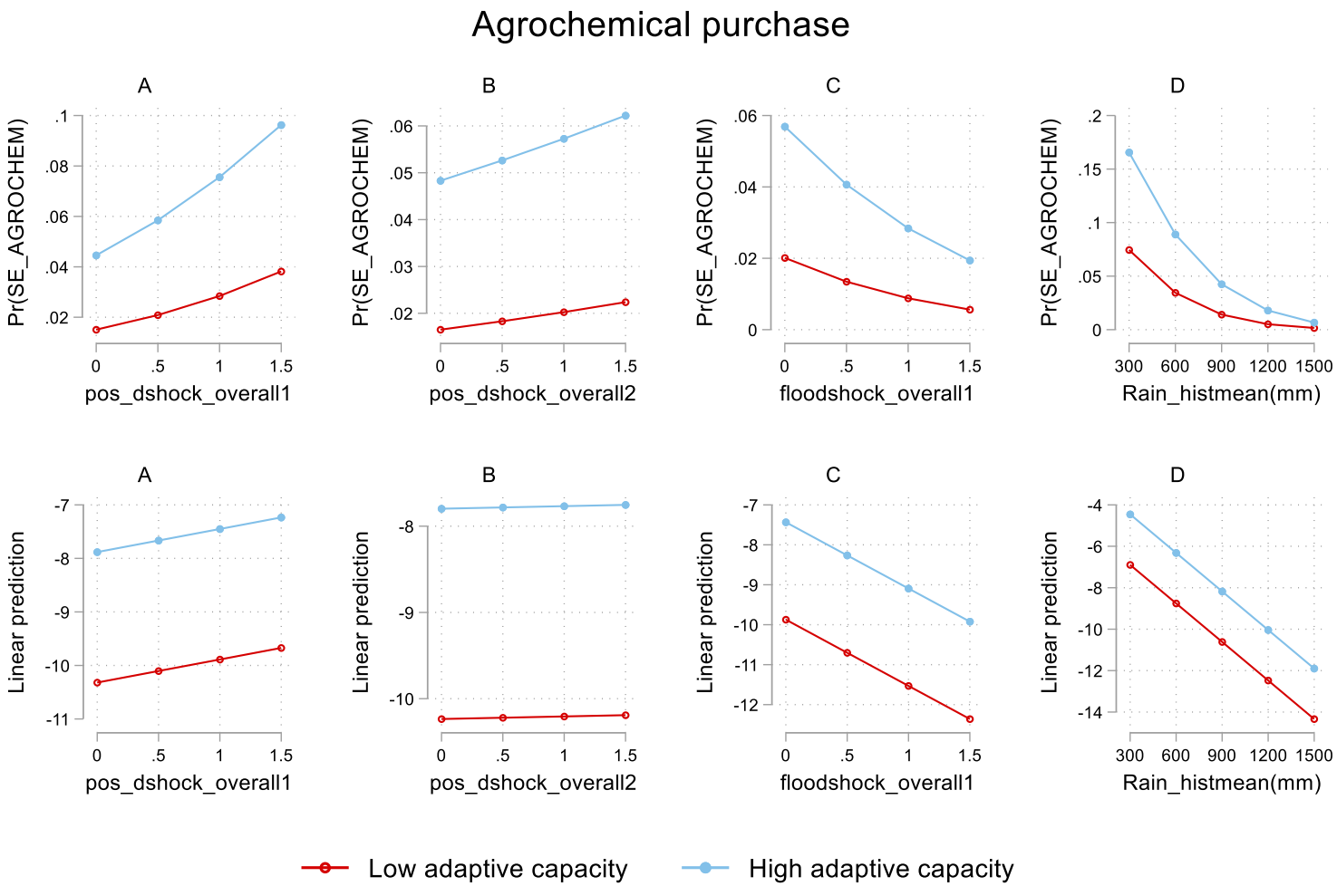


*Figure S18: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by adaptive capacity.*




*Figure S19: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by adaptive capacity.*

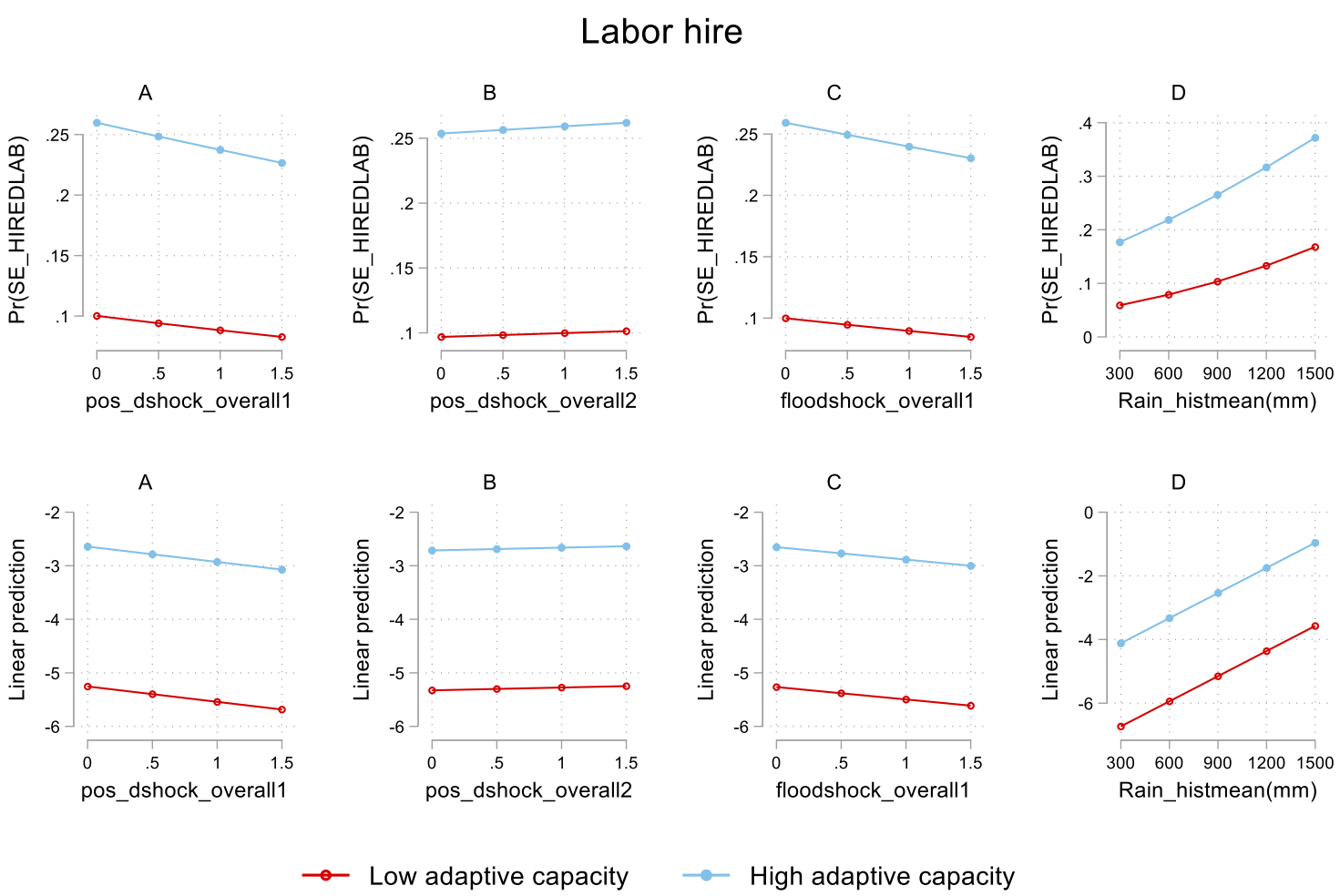


*Figure S20: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by adaptive capacity.*

**D: Heterogeneity: Gender Figures**

- **Female single-headed family vs. Male headed family**

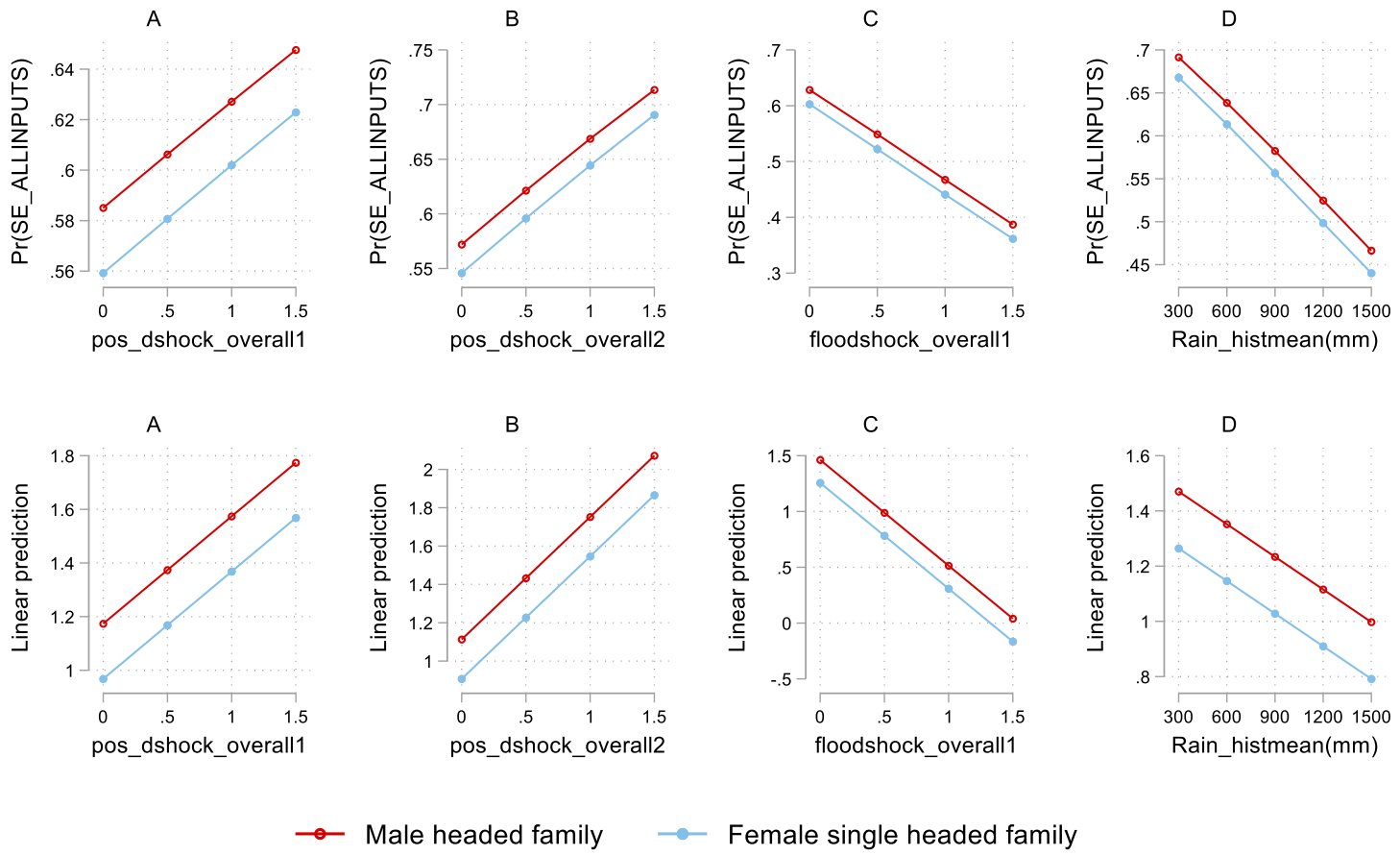


*Figure S21: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by gender.*

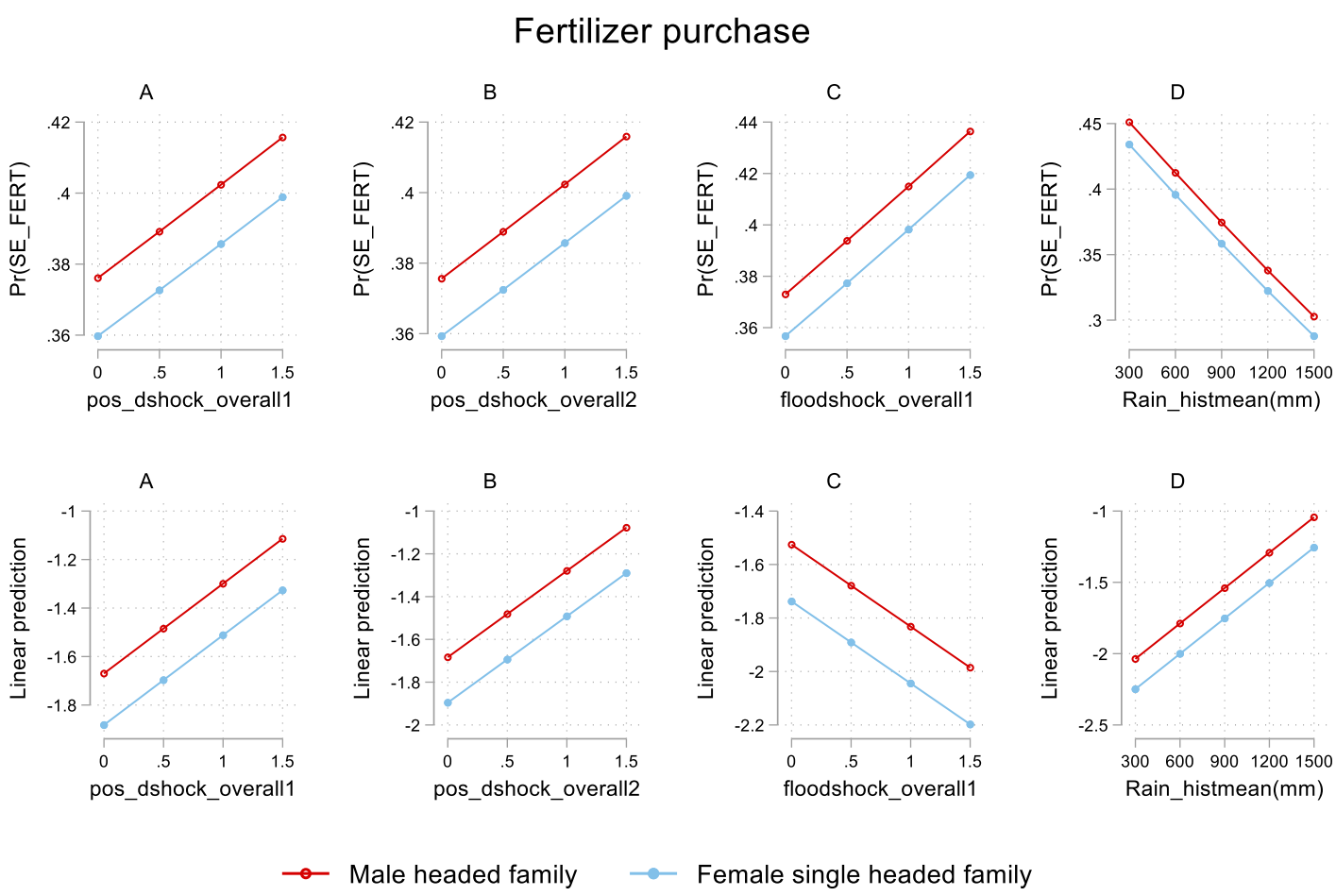


*Figure S22: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by gender.*

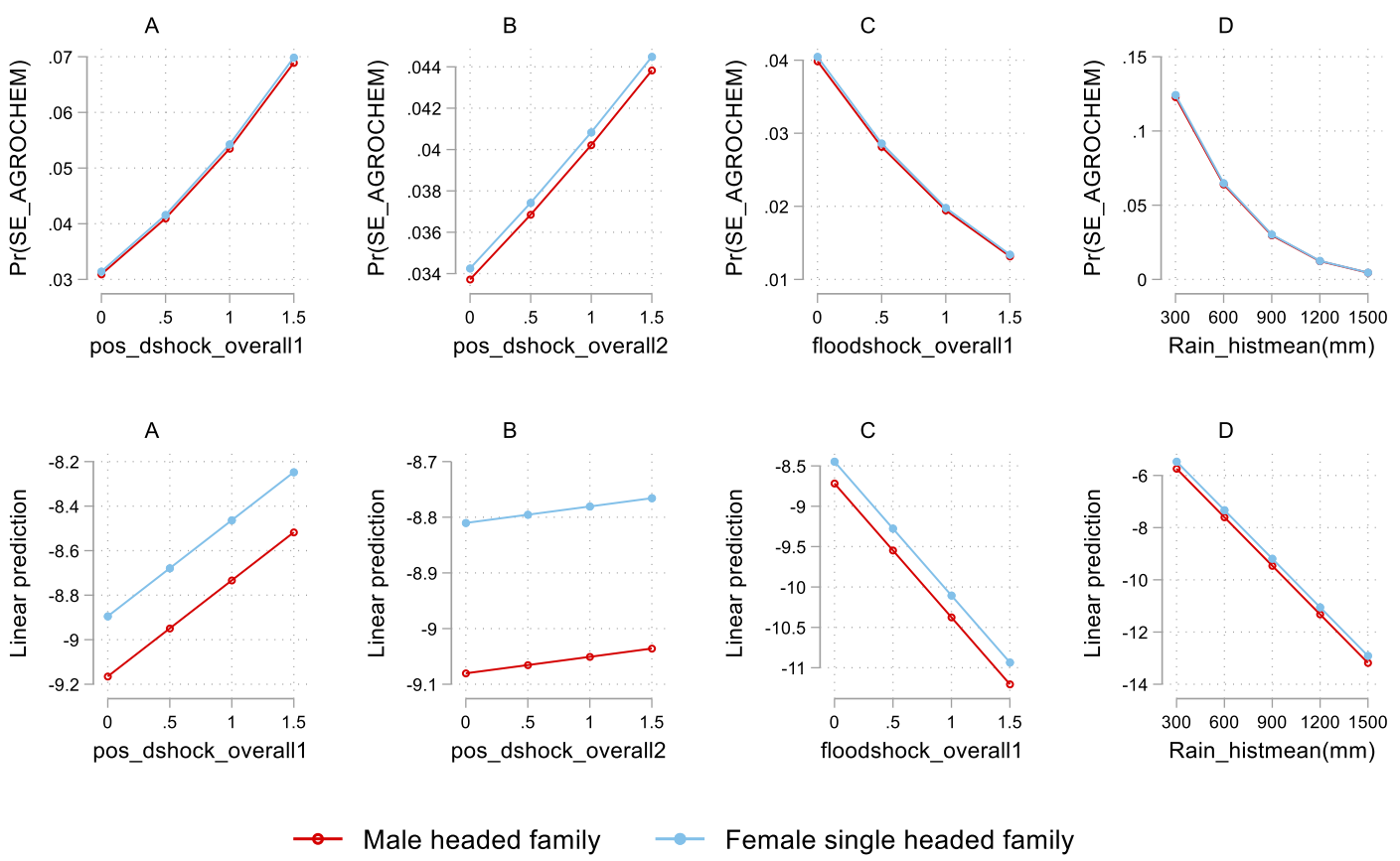


*Figure S23: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by gender.*

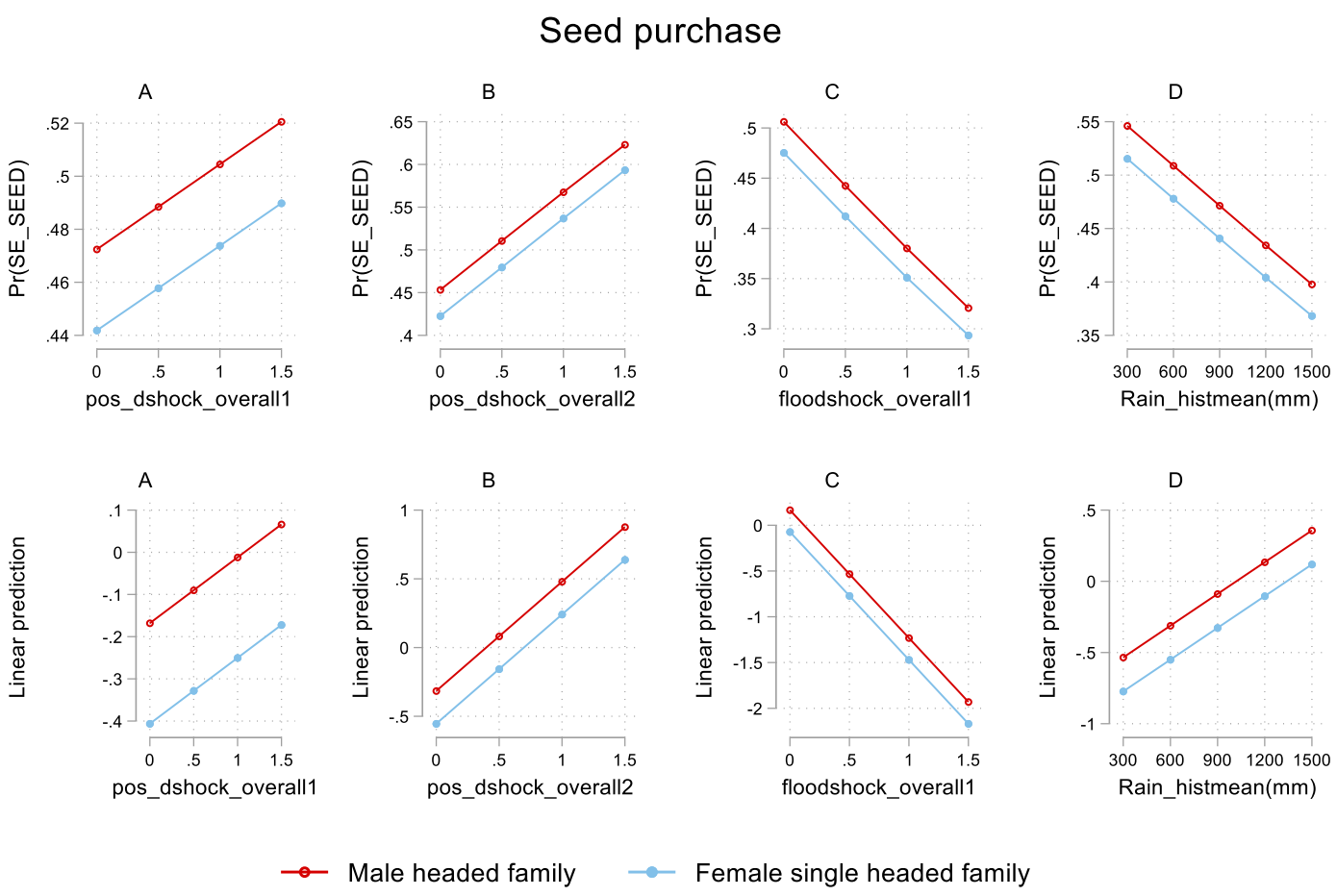


*Figure S24: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by gender.*

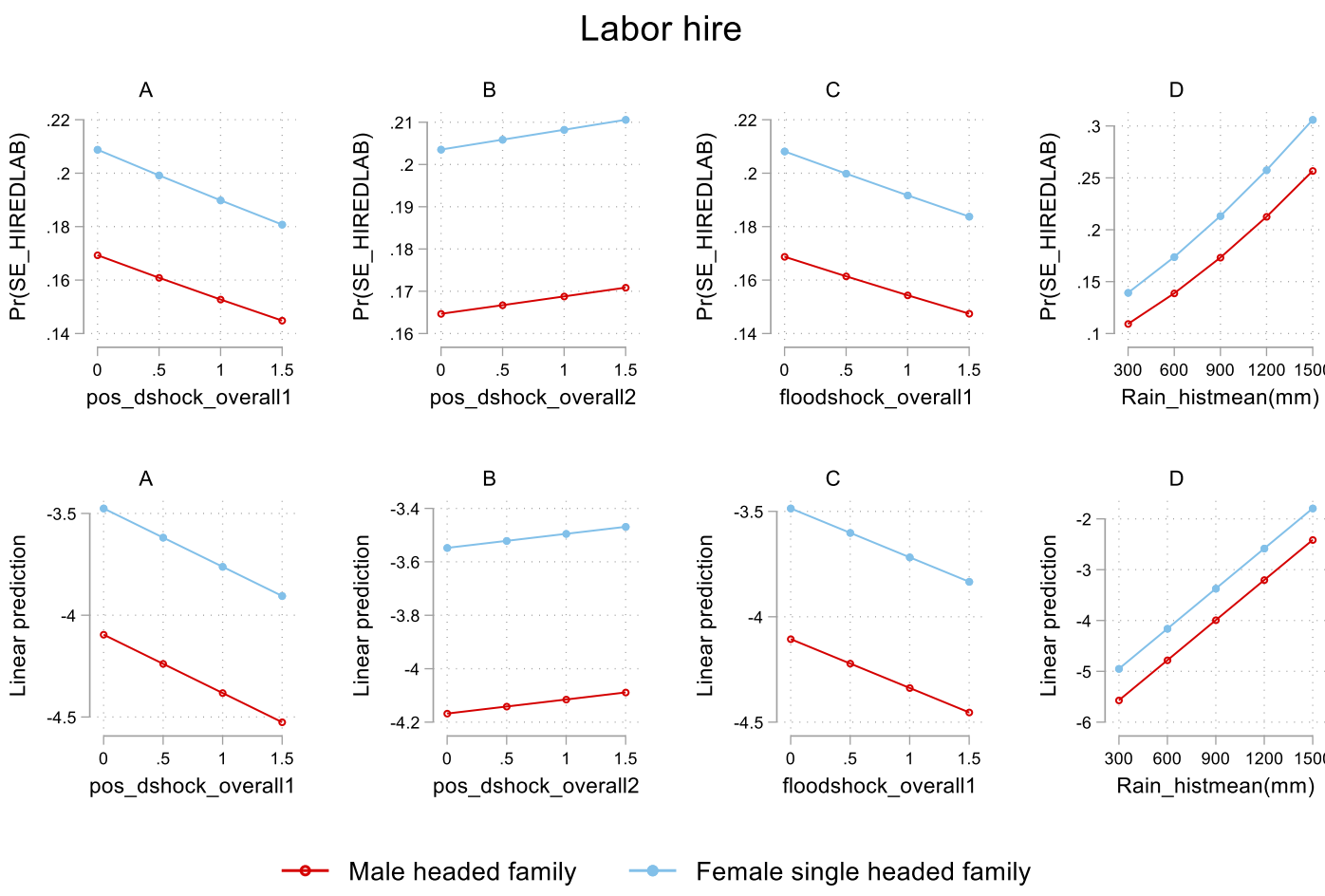


*Figure S25: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase*
*(bottom panel) by gender.*

- **Female-headed vs. Male headed**

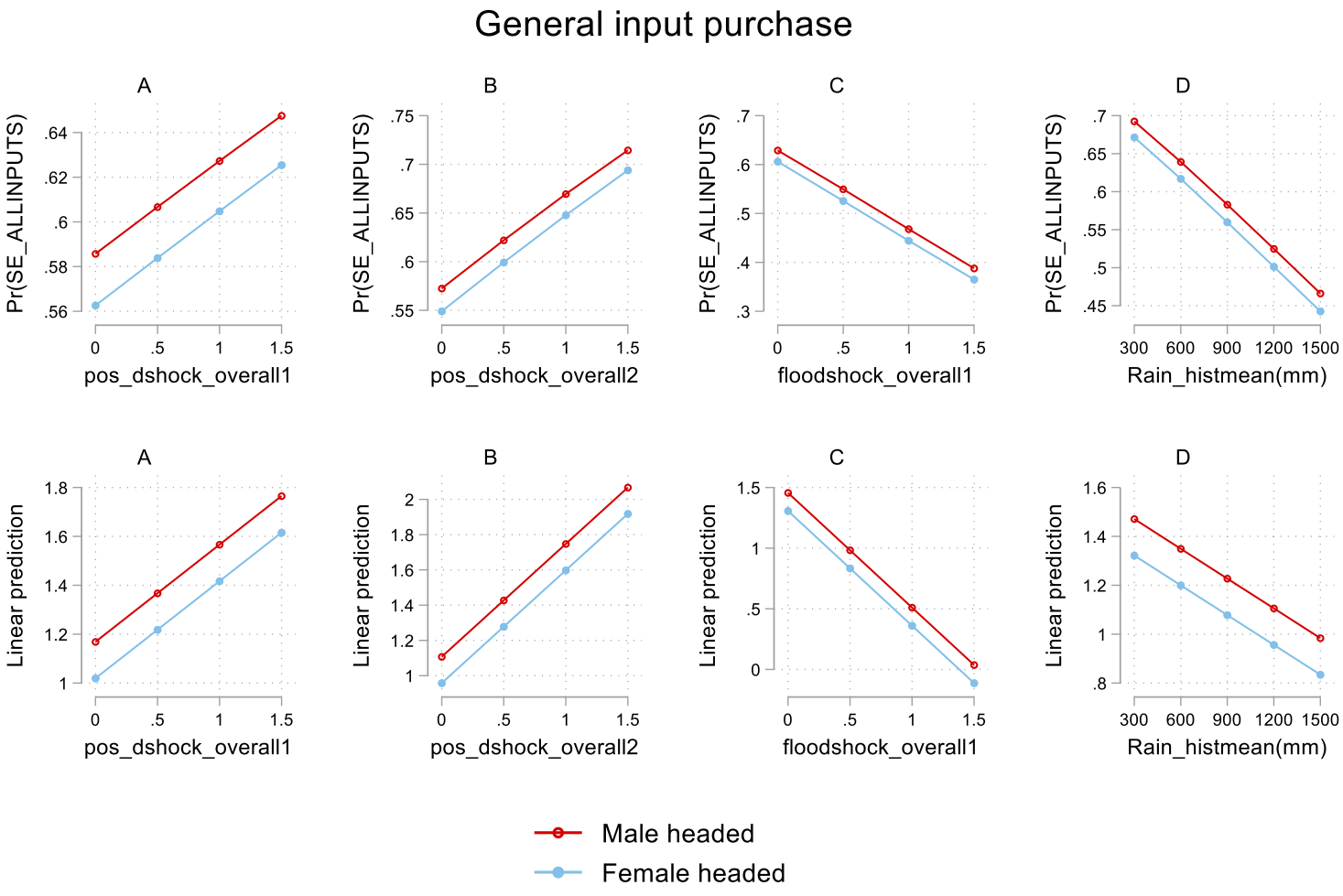


*Figure S26: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by gender.*

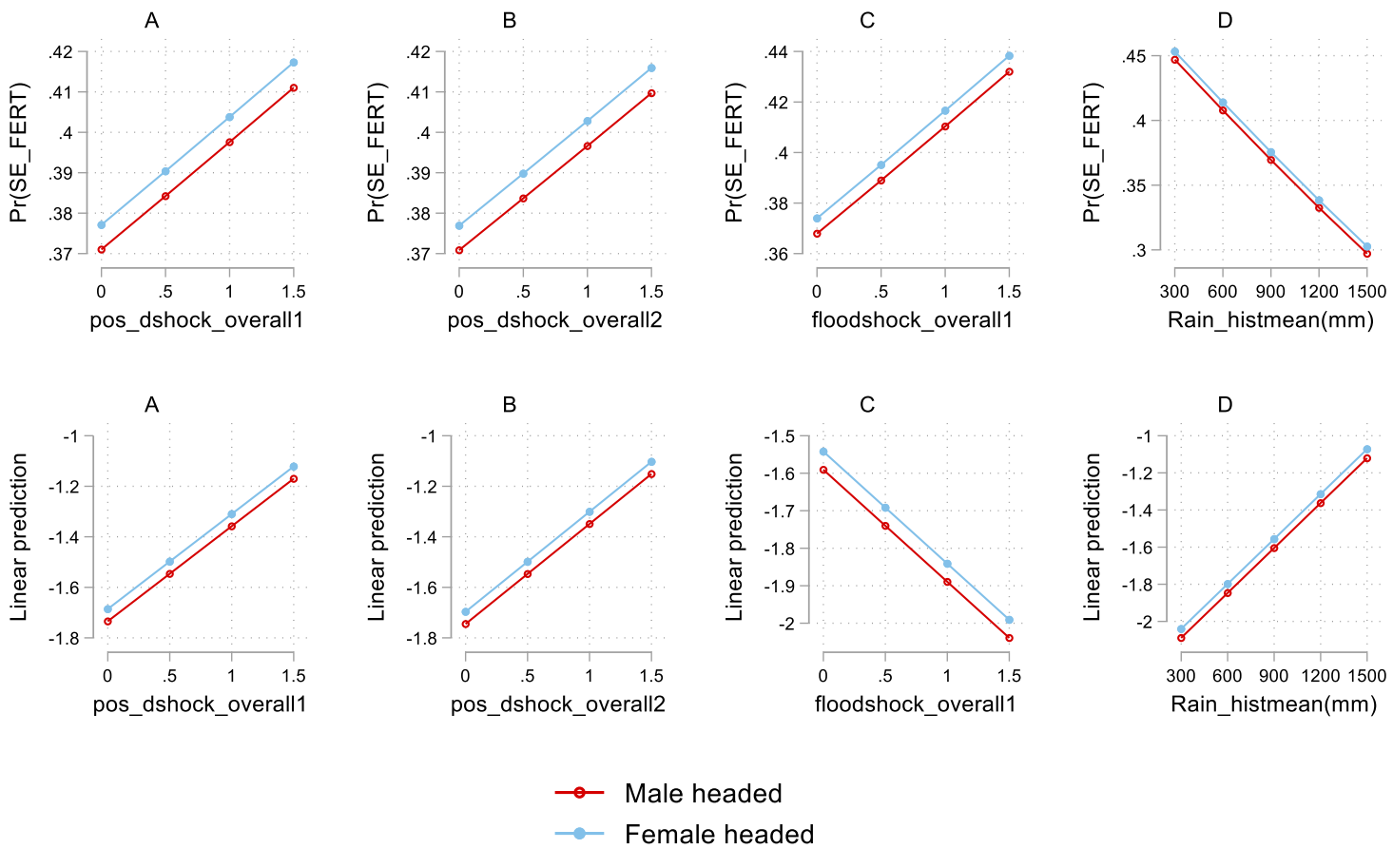


*Figure S27: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by gender.*

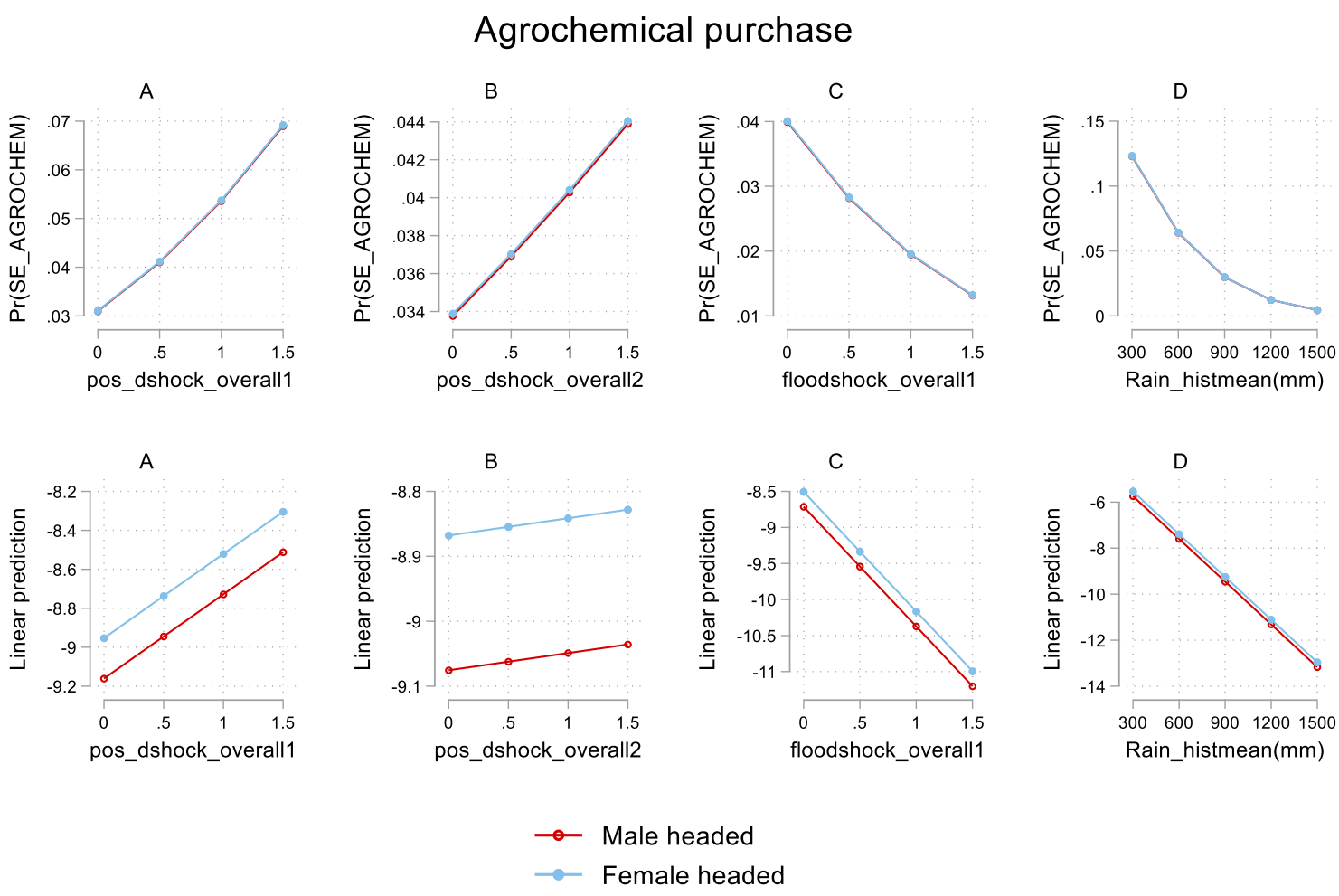


*Figure S28: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by gender.*

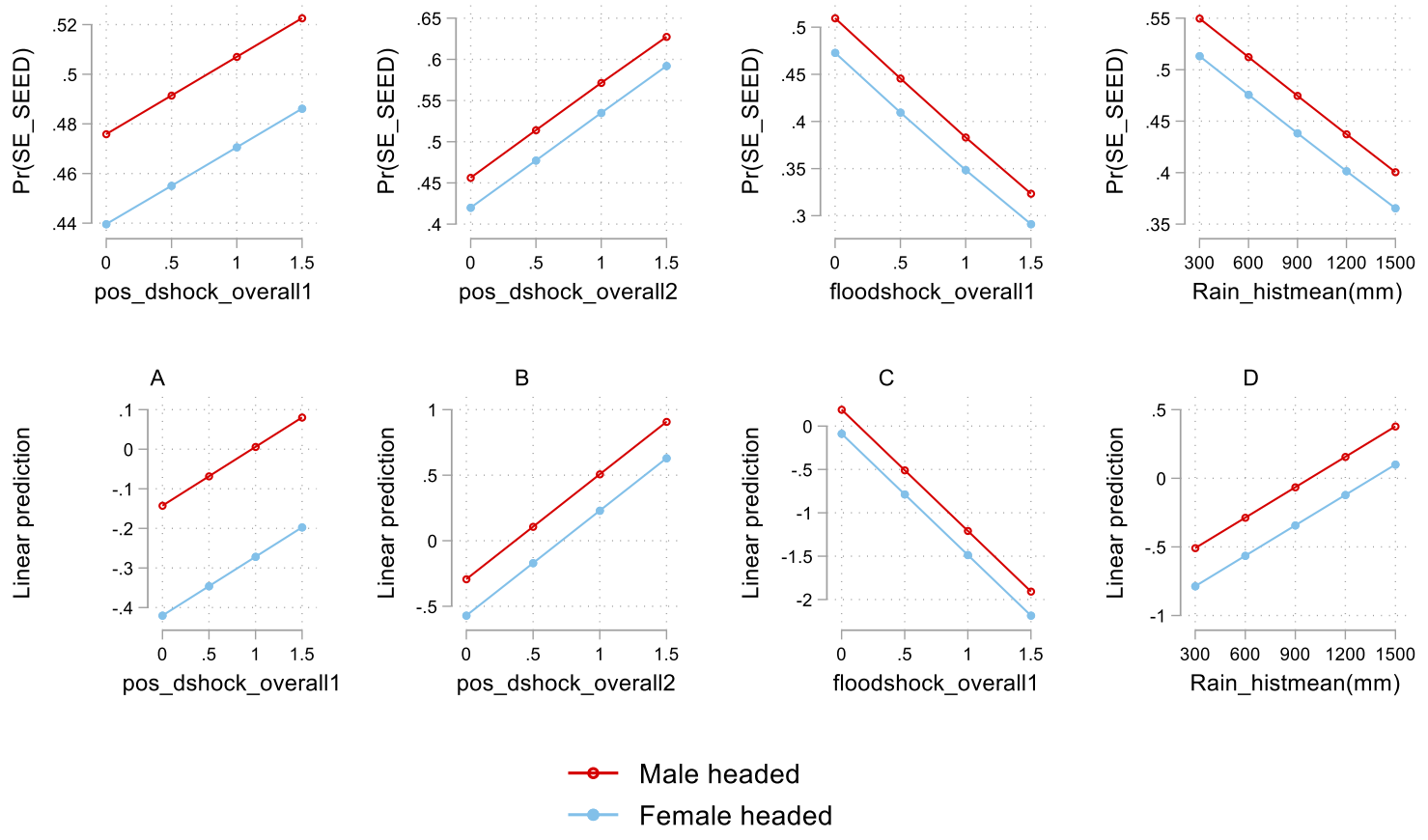


*Figure S29: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by gender.*

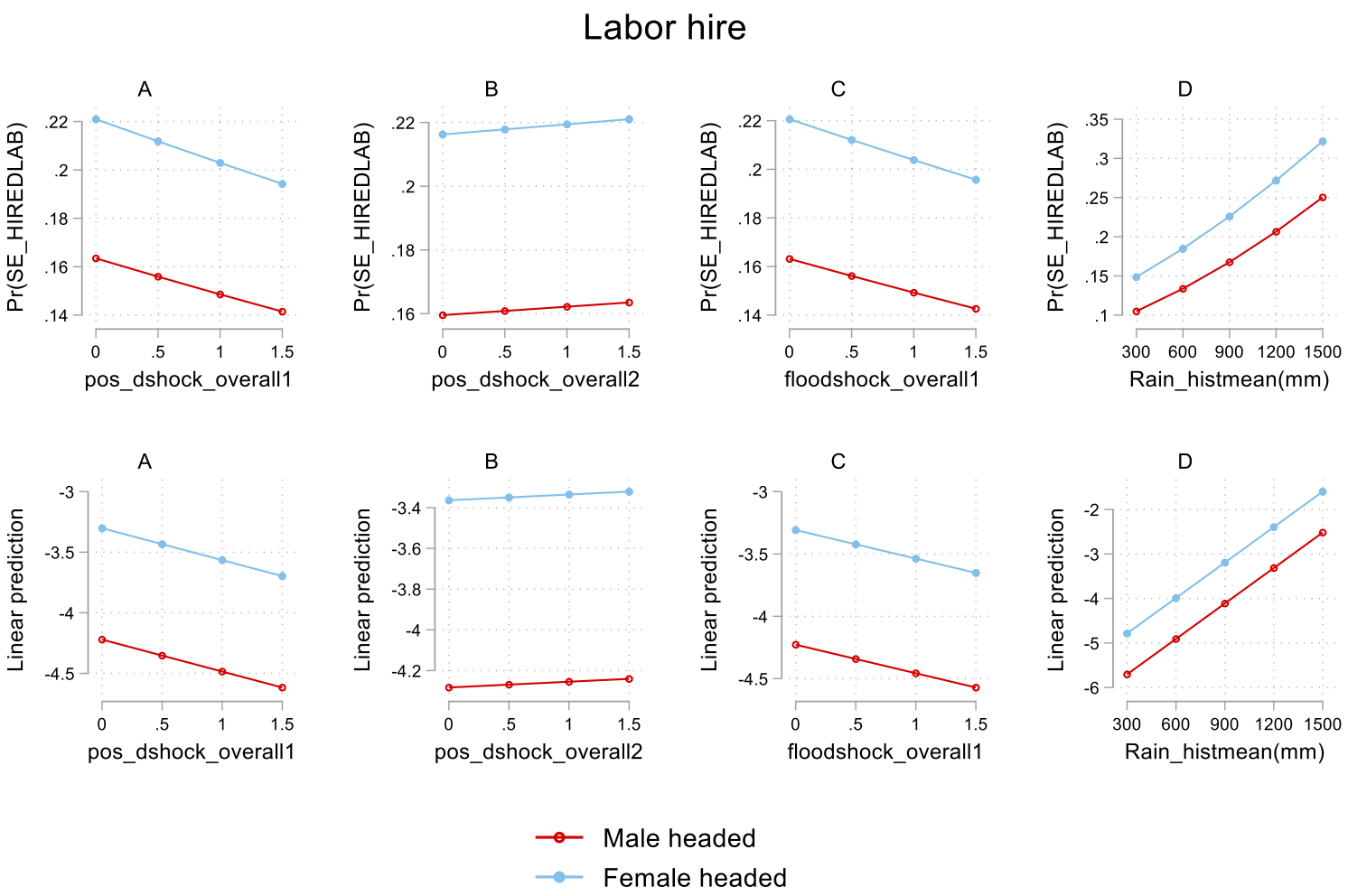


*Figure S30: Plotting marginal effects of changes in 1-year lag drought shocks(pos_dshock_overall1), 2-year lag drought shock(pos_dshock_overall2), 1-year lag flood shock(floodshock_overall1), and historical mean rainfall(Rain_histmean(mm)) on the probability (top panel), and intensity of input purchase (bottom panel) by gender.*

***Do rainfall shocks prompt commercial input purchase amongst smallholder farmers in diverse regions and environments in Malawi? Lessons for adaptation***

- **Examining the role of shocks in shaping the demand for purchased inputs using shock perception data**

**Figure on perceptions (drought and flood shock exposure)**

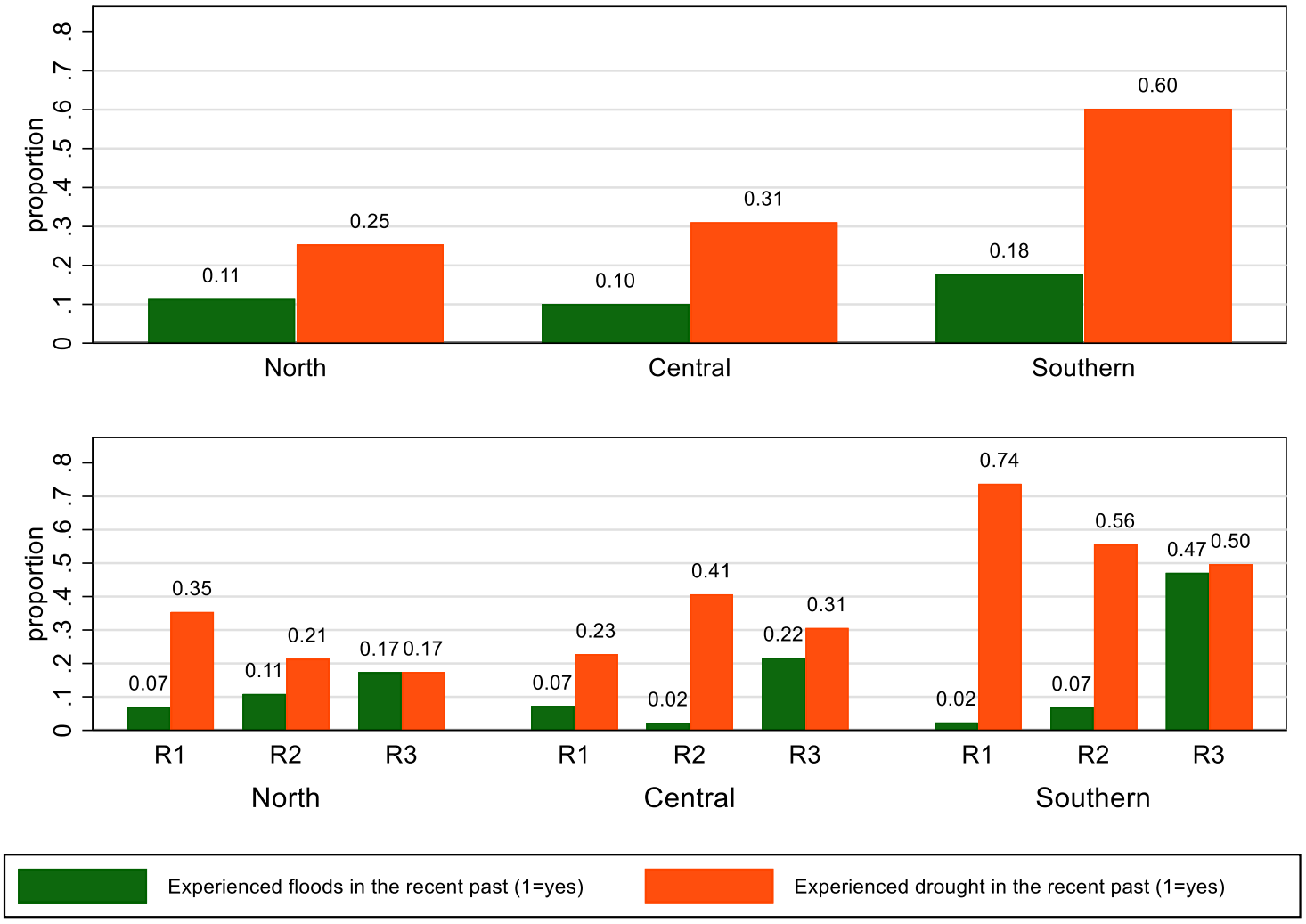


*Figure S31: Household perceptions on drought and flood shock exposure in the recent past by survey region (North, Central, and Southern regions) and survey round(IHS3, IHS4, and IHS5)*

## Impact of climate perceptions on input purchases?

*Table S21: Influence of drought and flood shock exposure perceptions on input purchase across regions*

| *VARIABLES* | ***National*** | | ***Northern*** | | ***Central*** | | ***Southern*** | |
|---|---|---|---|---|---|---|---|---|
| | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 | Hurdle1 | Hurdle2 |
| *Climate risk variables* | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) | ME(se) |
| ***Input purchasing in general*** | | | | | | | | |
| Experienced drought in the recent past(1=yes) | 0.020*** | -0.156*** | 0.045** | -0.118* | -0.021* | -0.168*** | 0.039*** | -0.122*** |
| | (0.0077) | (0.0229) | (0.0215) | (0.0646) | (0.0124) | (0.0388) | (0.0105) | (0.0310) |
| Experienced floods in the recent past(1=yes) | 0.030*** | -0.120*** | -0.011 | -0.092 | 0.019 | -0.269*** | 0.036** | -0.095** |
| | (0.0113) | (0.0309) | (0.0294) | (0.0862) | (0.0204) | (0.0550) | (0.0156) | (0.0420) |
| *Observations* | 25631 | 15058 | 4123 | 2019 | 9001 | 5484 | 12507 | 7555 |
| ***Fertilizer*** | | | | | | | | |
| Experienced drought in the recent past(1=yes) | -0.024*** | -0.078*** | 0.014 | 0.013 | -0.056*** | -0.083*** | -0.004 | -0.100*** |
| | (0.0066) | (0.0204) | (0.0184) | (0.0505) | (0.0119) | (0.0319) | (0.0084) | (0.0311) |
| Experienced floods in the recent past(1=yes) | -0.017* | -0.058* | -0.032 | 0.010 | -0.051*** | -0.122*** | -0.028** | -0.024 |
| | (0.0098) | (0.0295) | (0.0268) | (0.0679) | (0.0182) | (0.0444) | (0.0124) | (0.0458) |
| *Observations* | 25631 | 8796 | 4123 | 1508 | 9001 | 3923 | 12507 | 3365 |
| ***Agrochemicals*** | | | | | | | | |
| Experienced drought in the recent past(1=yes) | 0.007*** | -0.028 | -0.005 | -0.111 | -0.003 | -0.089 | 0.017*** | 0.022 |
| | (0.0025) | (0.0589) | (0.0061) | (0.1693) | (0.0038) | (0.1038) | (0.0042) | (0.0846) |
| Experienced floods in the recent past(1=yes) | 0.002 | 0.019 | 0.011 | 0.128 | -0.005 | -0.114 | 0.008* | 0.072 |
| | (0.0033) | (0.0690) | (0.0081) | (0.1454) | (0.0052) | (0.1600) | (0.0048) | (0.0922) |
| *Observations* | 25585 | 906 | 4077 | 138 | 9001 | 290 | 12507 | 478 |
| ***Seed*** | | | | | | | | |
| Experienced drought in the recent past(1=yes) | 0.055*** | 0.027 | 0.061*** | 0.095* | 0.027** | -0.013 | 0.068*** | 0.038 |
| | (0.0073) | (0.0183) | (0.0182) | (0.0571) | (0.0120) | (0.0330) | (0.0107) | (0.0241) |
| Experienced floods in the recent past(1=yes) | 0.057*** | -0.003 | 0.005 | -0.006 | 0.059*** | 0.044 | 0.071*** | -0.022 |
| | (0.0107) | (0.0272) | (0.0282) | (0.0945) | (0.0184) | (0.0555) | (0.0155) | (0.0336) |
| *Observations* | 25631 | 11171 | 4123 | 1309 | 9001 | 3680 | 12507 | 6182 |
| ***Hired labor*** | | | | | | | | |
| Experienced drought in the recent past(1=yes) | -0.009* | -0.028 | -0.004 | 0.141 | -0.019** | -0.111** | 0.002 | 0.026 |
| | (0.0050) | (0.0311) | (0.0145) | (0.0876) | (0.0089) | (0.0517) | (0.0068) | (0.0435) |
| Experienced floods in the recent past(1=yes) | -0.004 | -0.140*** | -0.001 | -0.269** | -0.015 | 0.026 | -0.007 | -0.221*** |
| | (0.0078) | (0.0480) | (0.0212) | (0.1161) | (0.0152) | (0.0977) | (0.0101) | (0.0610) |
| *Observations* | 25631 | 4433 | 4123 | 706 | 9001 | 1678 | 12507 | 2049 |

*Standard errors in parentheses* $^{*}$ *p < 0.10,* $^{**}$ *p < 0.05,* $^{***}$ *p < 0.01; ME=Marginal Effects. Hurdle 1 is a probit regression for the probability of input purchase whilst Hurdle 2 is the model for intensity of purchase for purchasers (log value of purchased input (USD/ha),* $^{*}$ *p < 0.10,* $^{**}$ *p < 0.05,* $^{***}$ *p < 0.01. Control variables included in all specifications include Number of plots cultivated; Log farm size(ha); Household asset wealth index; Agricultural implement access score; Log Distance to ADMARC (km); Received fertilizer coupon(1=yes); Received seed coupon(1=yes); Age of household head(years); Household head attained at least JCE (1=yes); Male household head(1=yes); Household Size; Household dependency ratio (%); Survey year dummies; District fixed effects.*