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Citation for final published version:

He, Pan , Liu, Pengfei, Qiu, Yueming (Lucy) and Liu, Lufan 2022. The weather affects air conditioner purchases to fill the energy efficiency gap. Nature Communications 13 (1) , 5772. 10.1038/s41467-022-33531-2

Publishers page: <https://doi.org/10.1038/s41467-022-33531-2>

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Supplementary Information

The weather affects air conditioner purchases to fill the energy efficiency gap

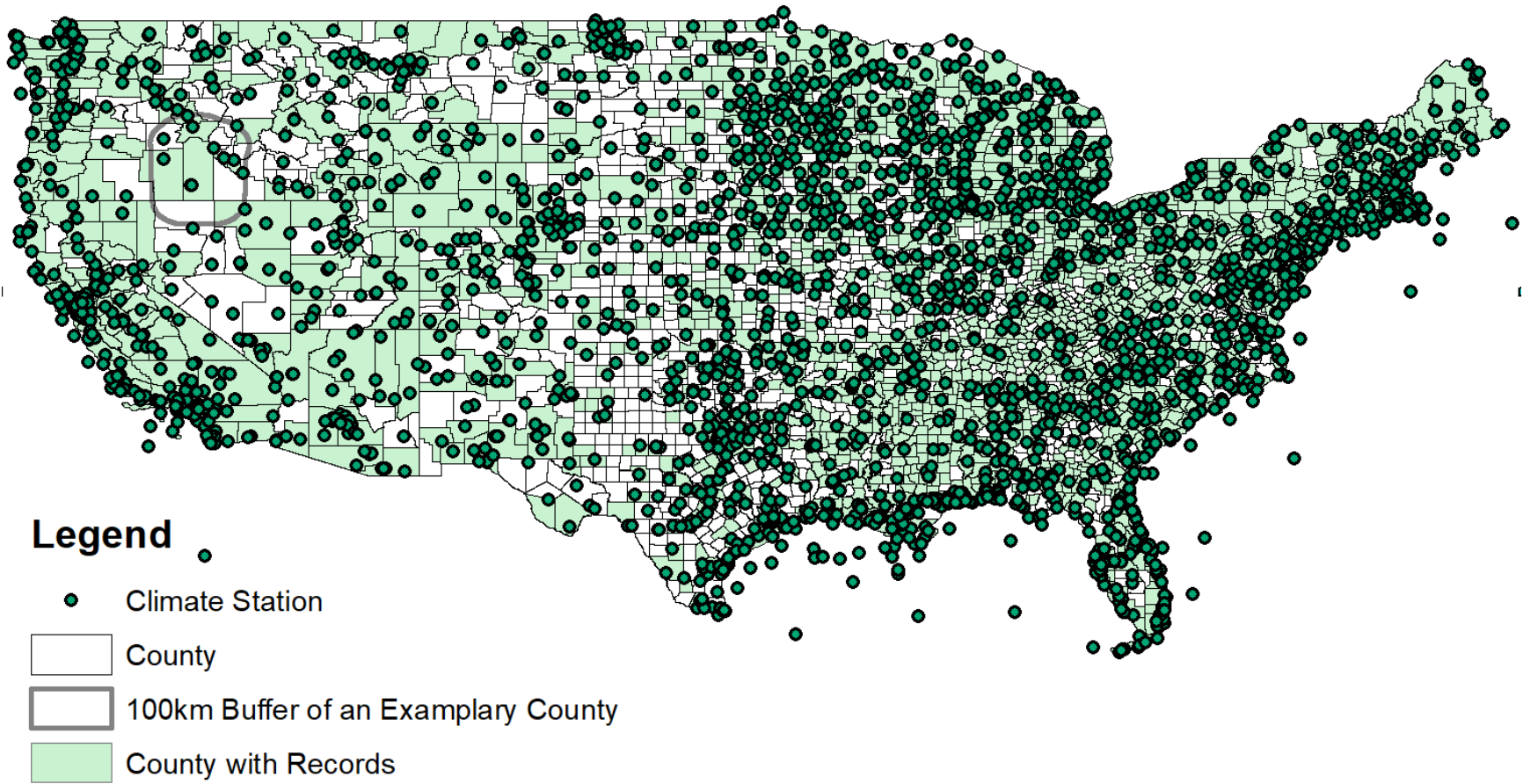
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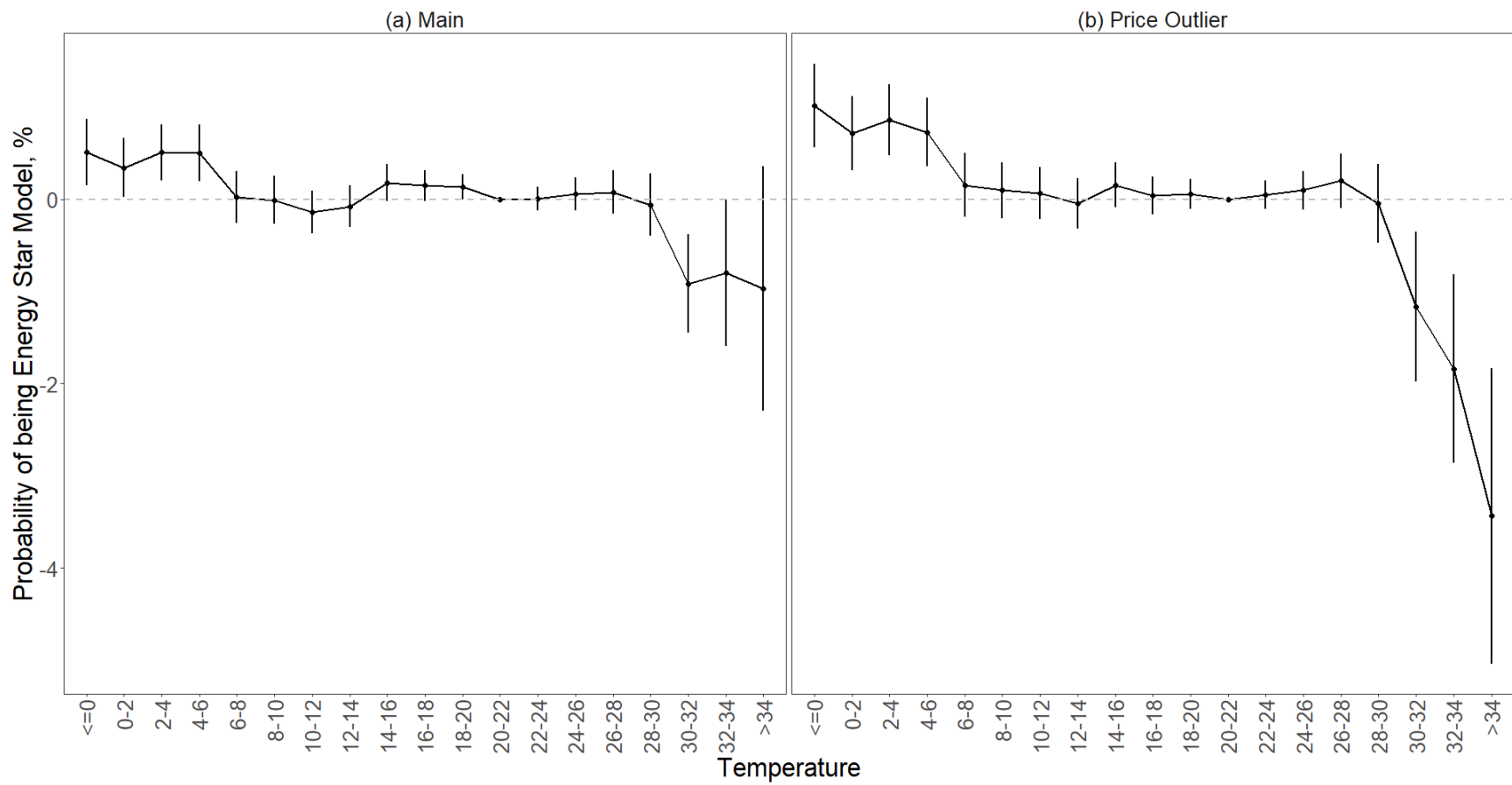
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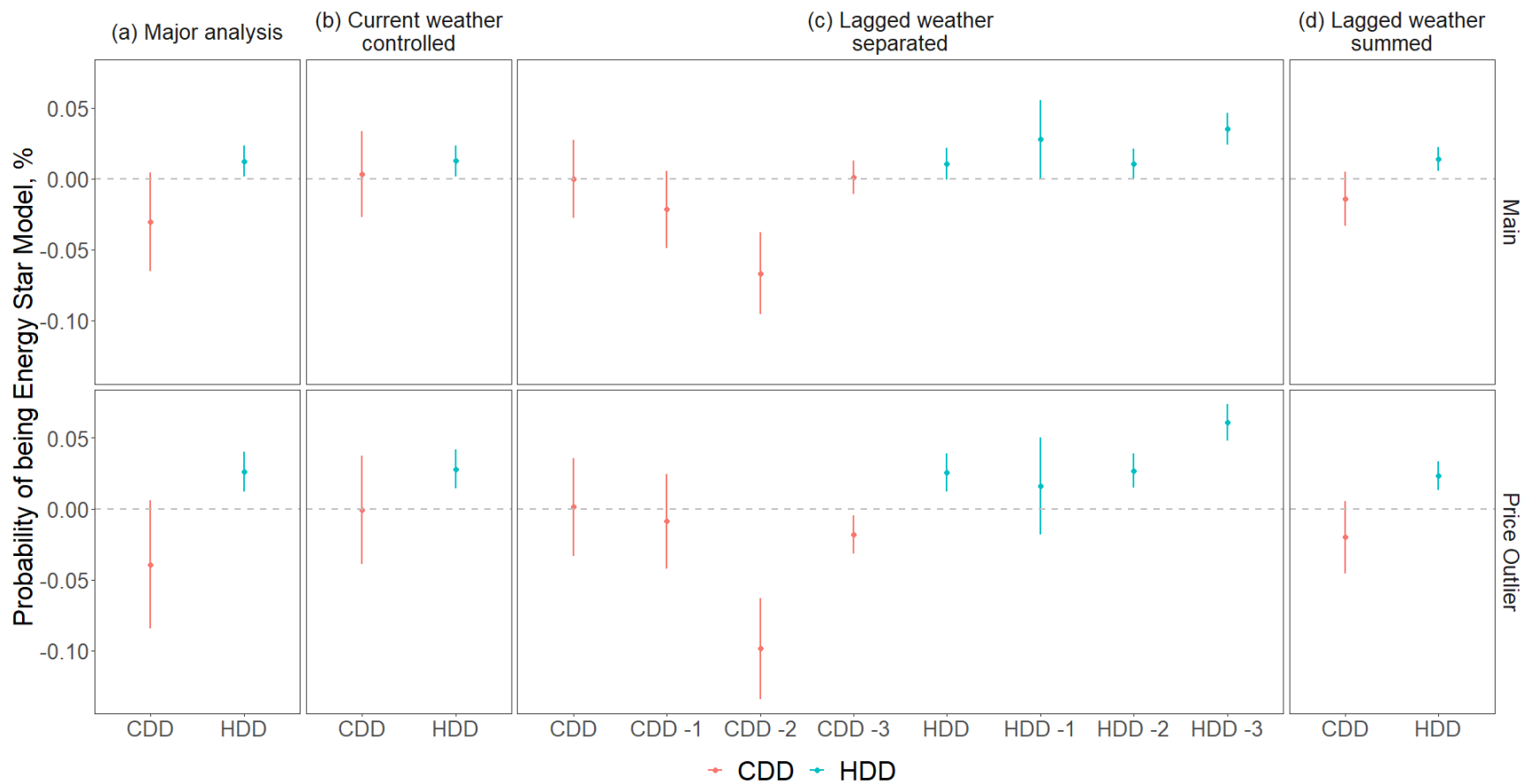
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Supplementary Figure 1 Climate stations and counties with records



Supplementary Figure 2 The effect of temperature on Energy Star telephone purchase. a) Full sample (N=25395497). b) Records with price<\$10 dropped (N=19278726). All the sample sizes refer to transactions from the Nielsen Scanner Dataset. The vertical lines show the 95% confidence intervals (i.e. mean values +/- 2SEM).



Supplementary Figure 3 The effect of temperature on Energy Star telephone purchase in terms of CDDs and HDDs. a) major analysis using the CDDs and HDDs in the previous week of transaction ($N=25395497$ for the full sample, 19278726 for the records with price < \$10 dropped). b) controlling for the meteorological records in the week of transaction ($N=25226932$ for the full sample, 19157396 for the records with price < \$10 dropped), c) controlling for the meteorological records lagged for 1, 2, and 3 weeks ($N=24940700$ for the full sample, 18951915 for the records with price < \$10 dropped), d) impact of the summed CDDs and HDDs in the previous month of the transaction ($N=24940700$ for the full sample, 18951915 for the records with price < \$10 dropped). All the sample sizes refer to transactions from the Nielsen Scanner Dataset. The vertical lines show the 95% confidence intervals (i.e. mean values \pm 2SEM).

Supplementary Table 1 Descriptive statistics

| | N | Mean | SD | Min | Max |
|--|---------|----------|----------|----------|----------|
| Transaction level | | | | | |
| Price (\$) | 2154198 | 175.44 | 87.114 | 0.01 | 699.99 |
| Energy Star | 1608344 | 170.196 | 94.762 | 0.01 | 699.99 |
| Non- Energy Star | 545854 | 190.892 | 56.31 | 0.01 | 649.99 |
| County level | | | | | |
| Temperature (°C) | 1945092 | 19.841 | 5.011 | -21.036 | 40.5 |
| CDDs | 1945092 | 19.816 | 26.007 | 0 | 244.3 |
| HDDs | 1945092 | 35.818 | 45.042 | 0 | 531.05 |
| Wind speed (m/s) | 1920585 | 2.914 | 0.934 | 0 | 21.8 |
| Precipitation (mm) | 1944655 | 2.351 | 3.067 | 0 | 67.157 |
| Relative Humidity (%) | 1883615 | 66.267 | 11.458 | 0.3 | 100 |
| Residential electricity price (\$/kwh) | 2154197 | 12.456 | 2.786 | 6.88 | 15.803 |
| CDDs, 1996-2005 | 2151620 | 8.753 | 8.337 | 0 | 70.325 |
| HDDs, 1996-2005 | 2151620 | 125.552 | 34.171 | 9.454 | 216.324 |
| Median annual household income (\$) | 1674221 | 6.70E+04 | 1.90E+04 | 2.00E+04 | 1.40E+05 |
| Population with bachelors above 25 (%) | 1674221 | 0.338 | 0.109 | 0.054 | 0.753 |
| Population of white (%) | 1674221 | 0.733 | 0.179 | 0.155 | 0.998 |
| Median age (Years) | 1674221 | 39.041 | 3.776 | 22.7 | 59.1 |
| Median number of rooms | 1674221 | 5.557 | 0.696 | 3.3 | 7.7 |
| Owner : Renter (Ratio) | 1674221 | 2.04 | 0.998 | 0.236 | 8.599 |
| Electricity as the heating fuel (%) | 1674221 | 0.234 | 0.197 | 0.012 | 0.975 |
| Population believing climate change happening | 2151765 | 66.258 | 5.807 | 43.9 | 80 |
| Population believing climate change will harm the US (%) | 2151765 | 55.176 | 4.979 | 41.6 | 64.8 |
| Population worried about climate change (%) | 2151765 | 55.597 | 6.694 | 37.9 | 70.3 |
| Population supporting renewable energy standards (%) | 2151765 | 57.659 | 4.387 | 40.1 | 66.2 |
| Population supporting regulation of CO ₂ as a | 2151765 | 69.246 | 3.836 | 49.8 | 77.9 |

| | | | | | |
|-----------------------------------|---------|-------|-------|-------|-------|
| pollutant (%) | | | | | |
| Support Democrats in election (%) | 2151143 | 0.551 | 0.158 | 0.048 | 0.925 |

Supplementary Table 2 The effect of weather on Energy Star air conditioner and telephone purchase

| | Air conditioner | | | | Telephone | |
|---|----------------------|----------------------|------------|------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | EnergyStar | EnergyStar | EnergyStar | EnergyStar | EnergyStar | EnergyStar |
| Temperature interval (20-22°C by default) | | | | | | |
| <0°C | -0.168*** (0.041) | -0.145*** (0.053) | | | 0.005*** (0.002) | 0.010*** (0.002) |
| 0-2°C | -0.022 (0.020) | -0.008 (0.022) | | | 0.003** (0.002) | 0.007*** (0.002) |
| 2-4°C | -0.012 (0.016) | -0.000 (0.017) | | | 0.005*** (0.002) | 0.009*** (0.002) |
| 4-6°C | 0.014 (0.011) | 0.025** (0.012) | | | 0.005*** (0.002) | 0.007*** (0.002) |
| 6-8°C | 0.030*** (0.010) | 0.040*** (0.011) | | | 0.000 (0.001) | 0.002 (0.002) |
| 8-10°C | 0.004 (0.007) | 0.008 (0.008) | | | -0.000 (0.001) | 0.001 (0.002) |
| 10-12°C | 0.017*** (0.005) | 0.023*** (0.006) | | | -0.001 (0.001) | 0.001 (0.001) |
| 12-14°C | 0.012** (0.005) | 0.017*** (0.005) | | | -0.001 (0.001) | -0.000 (0.001) |
| 14-16°C | 0.006 (0.004) | 0.001 (0.005) | | | 0.002* (0.001) | 0.002 (0.001) |
| 16-18°C | 0.007** (0.003) | 0.009** (0.004) | | | 0.001* (0.001) | 0.000 (0.001) |
| 18-20°C | 0.007** (0.003) | 0.009** (0.004) | | | 0.001* (0.001) | 0.001 (0.001) |
| 22-24°C | -0.001 | 0.005 | | | 0.000 | 0.000 |

| | | | | | | |
|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| | (0.003) | (0.003) | | | (0.001) | (0.001) |
| 24-26°C | 0.025*** | 0.028*** | | | 0.001 | 0.001 |
| | (0.004) | (0.005) | | | (0.001) | (0.001) |
| 26-28°C | 0.025*** | 0.027*** | | | 0.001 | 0.002 |
| | (0.005) | (0.006) | | | (0.001) | (0.001) |
| 28-30°C | 0.027*** | 0.031*** | | | -0.001 | -0.000 |
| | (0.006) | (0.007) | | | (0.002) | (0.002) |
| 30-32°C | 0.022*** | 0.029*** | | | -0.009*** | -0.012*** |
| | (0.008) | (0.010) | | | (0.003) | (0.004) |
| 32-34°C | 0.057*** | 0.072*** | | | -0.008** | -0.018*** |
| | (0.014) | (0.018) | | | (0.004) | (0.005) |
| >34°C | 0.055*** | 0.071*** | | | -0.010 | -0.034*** |
| | (0.019) | (0.021) | | | (0.007) | (0.008) |
| Temperature-21°C | | | 0.004*** | 0.005*** | | |
| | | | (0.001) | (0.001) | | |
| 21°C-Temperature | | | 0.002*** | 0.002*** | | |
| | | | (0.001) | (0.001) | | |
| Wind speed | -0.002 | -0.002 | -0.002 | -0.002 | 0.000 | 0.002*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.000) | (0.001) |
| Precipitation | -0.001*** | -0.002*** | -0.001*** | -0.002*** | -0.000 | 0.000* |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Relative humidity | -0.006 | -0.011* | -0.005 | -0.010 | -0.002* | -0.001 |
| | (0.005) | (0.006) | (0.005) | (0.006) | (0.001) | (0.002) |
| Relative humidity ² | 0.001* | 0.001*** | 0.001 | 0.001*** | 0.000** | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Inprice | 0.097*** | 0.006 | 0.097*** | 0.006 | 0.238*** | 0.226*** |
| | (0.005) | (0.016) | (0.005) | (0.016) | (0.001) | (0.002) |
| Fixed effects | | | | | | |
| County*week | Y | Y | Y | Y | Y | Y |
| State*year*month | Y | Y | Y | Y | Y | Y |
| N | 1871472 | 1564506 | 1871472 | 1564506 | 25395497 | 19278726 |
| R ² | 0.187 | 0.196 | 0.187 | 0.196 | 0.453 | 0.383 |

Notes: Standard errors in parentheses are clustered to store level. Results weighted by the units sold per transaction. * p<0.1, ** p<0.05, *** p<0.01. The relative humidity multiplied by 10.

Supplementary Table 3 The effect of temperature on Energy Star air conditioner purchase in terms of CDDs and HDDs

| | Major analysis | | Current climate controlled | | Lagged climate separated | | Lagged climate summed | |
|--------------------|---------------------|---------------------|----------------------------|----------------------|--------------------------|----------------------|-----------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | Main | Price Outlier | Main | Price Outlier | Main | Price Outlier | Main | Price Outlier |
| CDD | 0.004*** (0.001) | 0.005*** (0.001) | 0.004*** (0.001) | 0.004*** (0.001) | 0.005*** (0.001) | 0.005*** (0.001) | | |
| CDD, current week | | | -0.001 (0.001) | -0.001 (0.001) | | | | |
| CDD, lagged 1 week | | | | | -0.000 (0.001) | -0.003*** (0.001) | | |
| CDD, lagged 2 week | | | | | -0.001 (0.001) | 0.001 (0.001) | | |
| CDD, lagged 3 week | | | | | 0.001* (0.001) | 0.003*** (0.001) | | |
| CDD, 1 month | | | | | | | 0.001*** (0.000) | 0.001*** (0.000) |
| HDD | 0.002*** (0.000) | 0.002*** (0.000) | 0.001*** (0.000) | 0.001** (0.000) | 0.002*** (0.000) | 0.002*** (0.000) | | |
| HDD, current week | | | -0.003*** (0.000) | -0.003*** (0.001) | | | | |
| HDD, lagged 1 week | | | | | -0.000 (0.000) | -0.001*** (0.000) | | |
| HDD, lagged 2 week | | | | | 0.001*** (0.000) | 0.000 (0.000) | | |
| HDD, lagged 3 week | | | | | -0.000 (0.000) | -0.001** (0.000) | | |
| HDD, 1 month | | | | | | | 0.001*** | -0.000** |

| | | | | | | | | |
|------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|---------|---------|
| Wind speed | -0.003* | -0.002 | -0.001 | -0.000 | -0.002* | -0.002* | (0.000) | (0.000) |
| | (0.002) | (0.002) | (0.001) | (0.002) | (0.001) | (0.001) | | |
| Wind speed, current week | | | -0.002 | -0.004** | | | | |
| | | | (0.001) | (0.002) | | | | |
| Wind speed, lagged 1 week | | | | | 0.003*** | 0.007*** | | |
| | | | | | (0.001) | (0.001) | | |
| Wind speed, lagged 2 week | | | | | 0.001 | 0.004*** | | |
| | | | | | (0.001) | (0.001) | | |
| Wind speed, lagged 3 week | | | | | -0.004*** | -0.008*** | | |
| | | | | | (0.001) | (0.002) | | |
| Wind speed, 1 month | | | | | | | -0.002 | 0.000 |
| | | | | | | | (0.003) | (0.003) |
| Precipitation | -0.001*** | -0.002*** | -0.001*** | -0.002*** | -0.001*** | -0.002*** | | |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | | |
| Precipitation, current week | | | -0.000 | 0.001 | | | | |
| | | | (0.000) | (0.000) | | | | |
| Precipitation, lagged 1 week | | | | | 0.001** | 0.000 | | |
| | | | | | (0.000) | (0.000) | | |
| Precipitation, lagged 2 week | | | | | -0.000 | 0.000 | | |
| | | | | | (0.000) | (0.000) | | |
| Precipitation, lagged 3 week | | | | | -0.001** | -0.000 | | |
| | | | | | (0.000) | (0.000) | | |
| Precipitation, 1 month | | | | | | | -0.001 | -0.001* |
| | | | | | | | (0.001) | (0.001) |
| Relative humidity | -0.005 | -0.011* | -0.007 | -0.012* | -0.014*** | -0.015** | | |

| | | | | | | | | |
|--|-------------------|---------------------|----------------------|----------------------|----------------------|----------------------|-------------------|-------------------|
| | (0.005) | (0.006) | (0.005) | (0.006) | (0.005) | (0.006) | | |
| Relative humidity, current week | | | 0.022*** (0.005) | 0.028*** (0.007) | | | | |
| Relative humidity, lagged 1 week | | | | | -0.011* (0.006) | -0.008 (0.007) | | |
| Relative humidity, lagged 2 week | | | | | 0.035*** (0.006) | 0.032*** (0.007) | | |
| Relative humidity, lagged 3 week | | | | | 0.016*** (0.005) | 0.029*** (0.007) | | |
| Relative humidity, 1 month | | | | | | | 0.005 (0.010) | 0.021* (0.013) |
| Relative humidity ² | 0.001* (0.000) | 0.002*** (0.000) | 0.001** (0.000) | 0.002*** (0.000) | 0.001*** (0.000) | 0.002*** (0.000) | | |
| Relative humidity ² , current week | | | -0.002*** (0.000) | -0.003*** (0.001) | | | | |
| Relative humidity ² , lagged 1 week | | | | | 0.001** (0.001) | 0.001 (0.001) | | |
| Relative humidity ² , lagged 2 week | | | | | -0.003*** (0.000) | -0.003*** (0.001) | | |
| Relative humidity ² , lagged 3 week | | | | | -0.001** (0.000) | -0.002*** (0.001) | | |
| Relative humidity ² , 1 month | | | | | | | -0.000 (0.001) | -0.001 (0.001) |

| | | | | | | | | |
|------------------|---------------------|------------------|---------------------|------------------|---------------------|------------------|---------------------|------------------|
| Inprice | 0.097*** (0.005) | 0.006 (0.016) | 0.097*** (0.005) | 0.006 (0.016) | 0.097*** (0.005) | 0.005 (0.016) | 0.097*** (0.005) | 0.005 (0.016) |
| Fixed effects | | | | | | | | |
| County*week | Y | Y | Y | Y | Y | Y | Y | Y |
| State*year*month | Y | Y | Y | Y | Y | Y | Y | Y |
| N | 1871472 | 1564506 | 1868326 | 1561994 | 1862247 | 1557351 | 1862247 | 1557351 |
| R ² | 0.187 | 0.196 | 0.188 | 0.196 | 0.188 | 0.196 | 0.187 | 0.196 |

Notes: Standard errors in parentheses are clustered to store level. Results weighted by the units sold per transaction. * p<0.1, ** p<0.05, *** p<0.01. The CDD, HDD, and relative humidity multiplied by 10.

Supplementary Table 4 Robustness check, 18°C as reference point

| | (1) Main | (2) Price Outlier | (1) Main | (2) Price Outlier |
|---------|----------------------|----------------------|-------------|----------------------|
| <0°C | -0.007** (0.003) | -0.009** (0.004) | | |
| 0-2°C | -0.175*** (0.041) | -0.154*** (0.053) | | |
| 2-4°C | -0.029 (0.019) | -0.016 (0.021) | | |
| 4-6°C | -0.018 (0.015) | -0.009 (0.016) | | |
| 6-8°C | 0.007 (0.010) | 0.017 (0.011) | | |
| 8-10°C | 0.023*** (0.009) | 0.031*** (0.010) | | |
| 10-12°C | -0.003 (0.006) | -0.001 (0.007) | | |
| 12-14°C | 0.011** (0.004) | 0.015*** (0.005) | | |
| 14-16°C | 0.005 (0.004) | 0.008** (0.004) | | |
| 18-20°C | -0.001 | -0.008** | | |

| | | | | |
|--------------------------------|-----------|-----------|-----------|-----------|
| | (0.003) | (0.004) | | |
| 20-22°C | -0.000 | 0.000 | | |
| | (0.003) | (0.003) | | |
| 22-24°C | -0.008** | -0.003 | | |
| | (0.004) | (0.005) | | |
| 24-26°C | 0.018*** | 0.019*** | | |
| | (0.005) | (0.006) | | |
| 26-28°C | 0.018*** | 0.018*** | | |
| | (0.006) | (0.007) | | |
| 28-30°C | 0.020*** | 0.022*** | | |
| | (0.006) | (0.007) | | |
| 30-32°C | 0.015* | 0.020* | | |
| | (0.009) | (0.010) | | |
| 32-34°C | 0.050*** | 0.063*** | | |
| | (0.014) | (0.018) | | |
| >34°C | 0.048** | 0.063*** | | |
| | (0.019) | (0.021) | | |
| CDD, 65 °F | | | 0.002*** | 0.003*** |
| | | | (0.000) | (0.001) |
| HDD, 65 °F | | | 0.002*** | 0.003*** |
| | | | (0.000) | (0.001) |
| Wind speed | -0.002 | -0.002 | -0.002 | -0.002 |
| | (0.002) | (0.002) | (0.002) | (0.002) |
| Precipitation | -0.001*** | -0.002*** | -0.001*** | -0.002*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Relative humidity | -0.006 | -0.011* | -0.008 | -0.012* |
| | (0.005) | (0.006) | (0.005) | (0.006) |
| Relative humidity ² | 0.001* | 0.001*** | 0.001** | 0.002*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| lnprice | 0.097*** | 0.006 | 0.097*** | 0.006 |
| | (0.005) | (0.016) | (0.005) | (0.016) |

| Fixed effects | | | | |
|------------------|---------|---------|---------|---------|
| County*week | Y | Y | Y | Y |
| State*year*month | Y | Y | Y | Y |
| N | 1871472 | 1564506 | 1871472 | 1564506 |
| R ² | 0.187 | 0.196 | 0.187 | 0.196 |

Notes: Standard errors in parentheses are clustered to store level. Results weighted by the units sold per transaction. * p<0.1, ** p<0.05, *** p<0.01. The CDD, HDD, and relative humidity multiplied by 10.

Supplementary Table 5 Robustness check, nonlinear effect of meteorological indicators

| | (1) | (2) | (3) | (4) |
|--------------------------------------|----------------------|----------------------|----------------------|----------------------|
| | Main | Price Outlier | Main | Price Outlier |
| (Temperature-21°C)/10 | 0.050*** (0.013) | 0.052*** (0.016) | 0.050*** (0.013) | 0.052*** (0.016) |
| (Temperature-21°C) ² /100 | -0.005 (0.014) | -0.002 (0.017) | -0.005 (0.014) | -0.002 (0.017) |
| (21°C-Temperature)/10 | 0.040*** (0.010) | 0.027** (0.011) | 0.040*** (0.010) | 0.027** (0.012) |
| (21°C-Temperature) ² /100 | -0.021*** (0.007) | -0.009 (0.008) | -0.021*** (0.007) | -0.009 (0.008) |
| Wind speed | -0.002 (0.002) | -0.002 (0.002) | -0.003 (0.005) | -0.001 (0.005) |
| Wind speed ² | | | 0.000 (0.001) | -0.000 (0.001) |
| Precipitation | -0.001*** (0.000) | -0.002*** (0.000) | -0.001** (0.001) | -0.002*** (0.001) |
| Precipitation ² | | | 0.000 (0.000) | 0.000 (0.000) |
| Relative humidity | -0.005 (0.005) | -0.010 (0.006) | -0.005 (0.005) | -0.010 (0.006) |
| Relative humidity ² | 0.001 (0.000) | 0.001*** (0.000) | 0.001 (0.000) | 0.001*** (0.000) |

| | | | | |
|------------------|---------------------|------------------|---------------------|------------------|
| Inprice | 0.097*** (0.005) | 0.006 (0.016) | 0.097*** (0.005) | 0.006 (0.016) |
| Fixed effects | | | | |
| County*week | Y | Y | Y | Y |
| State*year*month | Y | Y | Y | Y |
| N | 1871472 | 1564506 | 1871472 | 1564506 |
| R-sq | 0.187 | 0.196 | 0.187 | 0.196 |

Notes: Standard errors in parentheses are clustered to store level. Results weighted by the units sold per transaction. * p<0.1, ** p<0.05, *** p<0.01. The relative humidity multiplied by 10.

Supplementary Table 6 Robustness check, different levels of clustering

| | (1) County | (2) Zip Code, 3 digit | (3) Nielsen Designated Market Areas |
|--------------------------------|----------------------|--------------------------|---|
| CDD | 0.004*** (0.001) | 0.004*** (0.001) | 0.004*** (0.001) |
| HDD | 0.002*** (0.000) | 0.002*** (0.000) | 0.002*** (0.001) |
| Wind speed | -0.003 (0.002) | -0.003 (0.002) | -0.003 (0.003) |
| Precipitation | -0.001*** (0.000) | -0.001*** (0.000) | -0.001*** (0.000) |
| Relative humidity | -0.005 (0.007) | -0.005 (0.006) | -0.005 (0.011) |
| Relative humidity ² | 0.001 (0.001) | 0.001 (0.001) | 0.001 (0.001) |
| Inprice | 0.097*** (0.008) | 0.097*** (0.008) | 0.097*** (0.015) |
| Fixed effects | | | |
| County*week | Y | Y | Y |
| State*year*month | Y | Y | Y |

| | | | |
|----------------|---------|---------|---------|
| N | 1871472 | 1871472 | 1871472 |
| R ² | 0.187 | 0.187 | 0.187 |

Notes: Results weighted by the units sold per transaction. * p<0.1, ** p<0.05, *** p<0.01. The CDD, HDD, and relative humidity multiplied by 10.

Supplementary Table 7 Robustness check, alternative combinations of fixed effects

| | (1) | (2) | (3) | (4) | (5) |
|--------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | EnergyStar | EnergyStar | EnergyStar | EnergyStar | EnergyStar |
| CDD | 0.002*** (0.001) | 0.003*** (0.001) | 0.003*** (0.001) | 0.003*** (0.001) | 0.002*** (0.001) |
| HDD | 0.001*** (0.000) | 0.002*** (0.000) | 0.002*** (0.000) | 0.001*** (0.000) | 0.002*** (0.000) |
| Wind speed | 0.006*** (0.002) | 0.007*** (0.002) | 0.006*** (0.002) | 0.006*** (0.002) | 0.004** (0.002) |
| Precipitation | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) |
| Relative humidity | -0.014*** (0.005) | -0.015*** (0.005) | -0.015*** (0.005) | -0.013*** (0.005) | -0.010** (0.004) |
| Relative humidity ² | 0.002*** (0.000) | 0.002*** (0.000) | 0.002*** (0.000) | 0.002*** (0.000) | 0.001*** (0.000) |
| Inprice | 0.099*** (0.005) | 0.100*** (0.005) | 0.100*** (0.005) | 0.100*** (0.005) | 0.096*** (0.005) |
| Fixed effects | | | | | |
| County*week | | Y | Y | Y | Y |
| County*month | Y | | | | |
| State*year | | | | | Y |
| State*month | | | | Y | |
| State | Y | Y | Y | | |
| Year | Y | Y | Y | Y | |
| Month | | | Y | | Y |
| Week | Y | | | | |

| | | | | | |
|----------------|---------|---------|---------|---------|---------|
| N | 1879080 | 1871984 | 1871984 | 1871982 | 1871981 |
| R ² | 0.128 | 0.144 | 0.144 | 0.146 | 0.169 |

Notes: Standard errors in parentheses are clustered to store level. Results weighted by the units sold per transaction. * p<0.1, ** p<0.05, *** p<0.01. The CDD, HDD, and relative humidity multiplied by 10.

Supplementary Table 8 The effect of weather on air conditioner price

| | (1) | (2) |
|--------------------------------|----------------------|----------------------|
| | Main | Price Outlier |
| EnergyStar | 0.285*** (0.048) | 0.203*** (0.053) |
| CDD | -0.001 (0.001) | -0.004*** (0.001) |
| EnergyStar*CDD | -0.010*** (0.001) | 0.006*** (0.002) |
| HDD | 0.002*** (0.001) | 0.001*** (0.000) |
| EnergyStar*HDD | -0.008*** (0.001) | -0.003*** (0.001) |
| Wind speed | 0.004 (0.002) | 0.012*** (0.003) |
| EnergyStar*Wind speed | -0.016*** (0.005) | -0.039*** (0.007) |
| Precipitation | -0.000 (0.000) | -0.000 (0.001) |
| EnergyStar*Precipitation | 0.003*** (0.001) | 0.001 (0.001) |
| Relative humidity | -0.036*** (0.009) | -0.024*** (0.008) |
| EnergyStar*Relative humidity | -0.016 (0.014) | -0.012 (0.015) |
| Relative humidity ² | 0.003*** | 0.003*** |

| | | | | | | | | |
|------------------------------|-------------------|---------------------|--------------------|---------------------|---------------------|----------------------|---------------------|---------------------|
| HDD, current week | | | 0.000 (0.000) | -0.000 (0.000) | | | | |
| HDD, lagged 1 week | | | | | 0.000* (0.000) | 0.000*** (0.000) | | |
| HDD, lagged 2 week | | | | | 0.000 (0.000) | -0.000*** (0.000) | | |
| HDD, lagged 3 week | | | | | 0.000*** (0.000) | 0.001*** (0.000) | | |
| HDD, 1 month | | | | | | | 0.000*** (0.000) | 0.000*** (0.000) |
| Wind speed | -0.000 (0.000) | 0.002*** (0.001) | 0.000 (0.000) | 0.002*** (0.000) | -0.000 (0.000) | 0.001*** (0.000) | | |
| Wind speed, current week | | | -0.000 (0.000) | 0.000 (0.000) | | | | |
| Wind speed, lagged 1 week | | | | | 0.001*** (0.000) | 0.001*** (0.000) | | |
| Wind speed, lagged 2 week | | | | | 0.001** (0.000) | 0.001*** (0.000) | | |
| Wind speed, lagged 3 week | | | | | -0.000 (0.000) | -0.000 (0.000) | | |
| Wind speed, 1 month | | | | | | | 0.001 (0.001) | 0.003*** (0.001) |
| Precipitation | -0.000 (0.000) | 0.000* (0.000) | -0.000* (0.000) | 0.000* (0.000) | -0.000 (0.000) | 0.000** (0.000) | | |
| Precipitation, current week | | | 0.000 (0.000) | 0.000** (0.000) | | | | |
| Precipitation, lagged 1 week | | | | | 0.000 (0.000) | 0.000*** (0.000) | | |

| | | | | | | | | |
|--|--------------------|-------------------|---------------------|-------------------|----------------------|----------------------|--------------------|------------------|
| Precipitation, lagged 2 week | | | | | -0.000** (0.000) | -0.000** (0.000) | | |
| Precipitation, lagged 3 week | | | | | -0.000*** (0.000) | -0.000** (0.000) | | |
| Precipitation, 1 month | | | | | | | -0.000* (0.000) | 0.000 (0.000) |
| Relative humidity | -0.002 (0.001) | -0.000 (0.002) | -0.003** (0.001) | -0.001 (0.002) | -0.002** (0.001) | -0.001 (0.002) | | |
| Relative humidity, current week | | | -0.002* (0.001) | 0.001 (0.002) | | | | |
| Relative humidity, lagged 1 week | | | | | 0.006*** (0.001) | 0.009*** (0.001) | | |
| Relative humidity, lagged 2 week | | | | | -0.004*** (0.001) | -0.004*** (0.001) | | |
| Relative humidity, lagged 3 week | | | | | -0.003** (0.001) | -0.004** (0.001) | | |
| Relative humidity, 1 month | | | | | | | -0.002 (0.004) | 0.003 (0.005) |
| Relative humidity ² | 0.000** (0.000) | 0.000 (0.000) | 0.000*** (0.000) | 0.000 (0.000) | 0.000*** (0.000) | 0.000 (0.000) | | |
| Relative humidity ² , current week | | | 0.000 (0.000) | -0.000 (0.000) | | | | |
| Relative humidity ² , lagged 1 week | | | | | -0.000*** (0.000) | -0.001*** (0.000) | | |

| | | | | | | | | |
|---|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Relative humidity ² , lagged 2 week | | | | | 0.000*** (0.000) | 0.000*** (0.000) | | |
| Relative humidity ² , lagged 3 week | | | | | 0.000** (0.000) | 0.000* (0.000) | | |
| Relative humidity ² , 1 month | | | | | | | 0.000 (0.000) | -0.000 (0.000) |
| Inprice | 0.238*** (0.001) | 0.226*** (0.002) | 0.238*** (0.001) | 0.226*** (0.002) | 0.238*** (0.001) | 0.226*** (0.002) | 0.238*** (0.001) | 0.226*** (0.002) |
| Fixed effects | | | | | | | | |
| County*week | Y | Y | Y | Y | Y | Y | Y | Y |
| State*year*month | Y | Y | Y | Y | Y | Y | Y | Y |
| N | 25395497 | 19278726 | 25226932 | 19157396 | 24940700 | 18951915 | 24940700 | 18951915 |
| R ² | 0.453 | 0.383 | 0.453 | 0.383 | 0.453 | 0.383 | 0.453 | 0.383 |

Notes: Standard errors in parentheses are clustered to store level. Results weighted by the units sold per transaction. * p<0.1, ** p<0.05, *** p<0.01. The CDD, HDD, and relative humidity multiplied by 10.

Supplementary Table 10 Heterogeneous effect, climate and electricity price

| | (1) Electricity price | (2) CDD | (3) HDD |
|-------------|--------------------------|----------------------|---------------------|
| CDD | 0.000 (0.001) | 0.008*** (0.002) | 0.001 (0.001) |
| CDD*group 2 | 0.002* (0.001) | -0.002 (0.002) | 0.008*** (0.001) |
| CDD*group 3 | 0.008*** (0.001) | -0.006*** (0.002) | 0.001 (0.002) |
| HDD | -0.001** (0.001) | 0.002*** (0.001) | 0.001** (0.001) |
| HDD*group 2 | 0.003*** | 0.001 | 0.001 |

| | | | |
|---|-----------|----------|-----------|
| | (0.001) | (0.001) | (0.001) |
| HDD*group 3 | 0.005*** | -0.001 | 0.001 |
| | (0.001) | (0.001) | (0.001) |
| Wind speed | -0.001 | -0.006** | 0.001 |
| | (0.002) | (0.003) | (0.002) |
| Wind speed*group 2 | 0.004 | 0.006 | -0.003 |
| | (0.003) | (0.004) | (0.003) |
| Wind speed*group 3 | -0.005 | 0.008** | -0.004 |
| | (0.003) | (0.003) | (0.003) |
| Precipitation | 0.000 | -0.001** | 0.000 |
| | (0.000) | (0.001) | (0.000) |
| Precipitation*group 2 | -0.001** | -0.001 | -0.002*** |
| | (0.001) | (0.001) | (0.001) |
| Precipitation*group 3 | -0.002*** | 0.002** | -0.001 |
| | (0.001) | (0.001) | (0.001) |
| Relative humidity | -0.018* | -0.002 | -0.002 |
| | (0.009) | (0.011) | (0.006) |
| Relative humidity*group 2 | 0.008 | -0.014 | -0.029** |
| | (0.014) | (0.014) | (0.014) |
| Relative humidity*group 3 | 0.031*** | -0.005 | -0.003 |
| | (0.012) | (0.013) | (0.012) |
| Relative humidity ² | 0.001* | -0.000 | 0.000 |
| | (0.001) | (0.001) | (0.000) |
| Relative humidity ² *group 2 | -0.001 | 0.002** | 0.003*** |
| | (0.001) | (0.001) | (0.001) |
| Relative humidity ² *group 3 | -0.002* | 0.001 | -0.000 |
| | (0.001) | (0.001) | (0.001) |
| lnprice | 0.097*** | 0.097*** | 0.097*** |
| | (0.005) | (0.005) | (0.005) |
| Fixed effects | | | |
| County*week | Y | Y | Y |

| State*year*month | Y | Y | Y |
|------------------|---------|---------|---------|
| N | 1871472 | 1871326 | 1871326 |
| R ² | 0.187 | 0.187 | 0.187 |

Notes: Standard errors in parentheses are clustered to store level. Results weighted by the units sold per transaction. * p<0.1, ** p<0.05, *** p<0.01. The CDD, HDD, and relative humidity multiplied by 10.

Supplementary Table 11 Heterogeneous effect, socio-economic characteristics

| | (1) Income | (2) Education | (3) Ethnic | (4) Age |
|--------------------|---------------------|---------------------|----------------------|--------------------|
| CDD | 0.002 (0.001) | 0.002* (0.001) | 0.004*** (0.001) | 0.003** (0.001) |
| CDD*group 2 | 0.001 (0.002) | 0.001 (0.002) | -0.002 (0.002) | 0.000 (0.002) |
| CDD*group 3 | 0.003* (0.002) | 0.003 (0.002) | 0.001 (0.002) | 0.003 (0.002) |
| HDD | -0.001 (0.001) | -0.001 (0.001) | 0.003*** (0.001) | 0.000 (0.001) |
| HDD*group 2 | 0.003*** (0.001) | 0.002** (0.001) | -0.001 (0.001) | 0.001 (0.001) |
| HDD*group 3 | 0.003*** (0.001) | 0.005*** (0.001) | -0.003*** (0.001) | 0.002 (0.001) |
| Wind speed | 0.002 (0.003) | -0.003 (0.003) | 0.005* (0.003) | 0.002 (0.003) |
| Wind speed*group 2 | -0.002 (0.004) | 0.006* (0.004) | -0.003 (0.004) | -0.001 (0.004) |
| Wind speed*group 3 | -0.002 (0.004) | 0.002 (0.004) | -0.013*** (0.004) | -0.004 (0.004) |
| Precipitation | -0.001 (0.001) | 0.000 (0.001) | -0.001 (0.001) | -0.000 (0.001) |

| | | | | |
|---|---------------------|---------------------|---------------------|---------------------|
| Precipitation*group 2 | 0.001 (0.001) | -0.002* (0.001) | -0.001 (0.001) | -0.001 (0.001) |
| Precipitation*group 3 | -0.002** (0.001) | -0.003** (0.001) | -0.002** (0.001) | -0.003** (0.001) |
| Relative humidity | 0.013 (0.012) | 0.002 (0.011) | -0.003 (0.008) | -0.001 (0.008) |
| Relative humidity*group 2 | -0.017 (0.017) | -0.001 (0.017) | 0.009 (0.012) | -0.008 (0.013) |
| Relative humidity*group 3 | -0.040** (0.016) | -0.026 (0.017) | -0.028* (0.014) | -0.020 (0.018) |
| Relative humidity ² | -0.001 (0.001) | 0.000 (0.001) | 0.001 (0.001) | 0.000 (0.001) |
| Relative humidity ² *group 2 | 0.002 (0.001) | 0.001 (0.001) | -0.001 (0.001) | 0.000 (0.001) |
| Relative humidity ² *group 3 | 0.003*** (0.001) | 0.002 (0.001) | 0.002 (0.001) | 0.002 (0.001) |
| lnprice | 0.080*** (0.005) | 0.080*** (0.005) | 0.080*** (0.005) | 0.080*** (0.005) |
| Fixed effects | | | | |
| County*week | Y | Y | Y | Y |
| State*year*month | Y | Y | Y | Y |
| N | 1474685 | 1474685 | 1474685 | 1474685 |
| R ² | 0.208 | 0.208 | 0.208 | 0.208 |

Notes: Standard errors in parentheses are clustered to store level. Results weighted by the units sold per transaction. * p<0.1, ** p<0.05, *** p<0.01. The CDD, HDD, and relative humidity multiplied by 10.

Supplementary Table 12 Heterogeneous effect, housing characteristics

| | (1) Rooms | (2) Owner | (3) Fuel |
|-------------|--------------------|--------------------|---------------------|
| CDD | 0.003** (0.001) | 0.003** (0.001) | 0.006*** (0.002) |
| CDD*group 2 | 0.002 | 0.000 | -0.003* |

| | | | |
|---|----------|-----------|-----------|
| | (0.002) | (0.002) | (0.002) |
| CDD*group 3 | 0.002 | 0.004* | -0.005*** |
| | (0.002) | (0.002) | (0.002) |
| HDD | 0.002* | 0.003*** | 0.002** |
| | (0.001) | (0.001) | (0.001) |
| HDD*group 2 | -0.001 | -0.001 | -0.000 |
| | (0.001) | (0.001) | (0.001) |
| HDD*group 3 | 0.000 | -0.003** | -0.001 |
| | (0.001) | (0.001) | (0.001) |
| Wind speed | 0.001 | 0.003 | -0.001 |
| | (0.002) | (0.003) | (0.003) |
| Wind speed*group 2 | -0.002 | -0.001 | 0.004 |
| | (0.004) | (0.003) | (0.004) |
| Wind speed*group 3 | -0.004 | -0.009** | 0.000 |
| | (0.004) | (0.004) | (0.003) |
| Precipitation | -0.000 | 0.000 | -0.002*** |
| | (0.001) | (0.001) | (0.001) |
| Precipitation*group 2 | -0.003** | -0.003*** | -0.000 |
| | (0.001) | (0.001) | (0.001) |
| Precipitation*group 3 | -0.001 | -0.002* | 0.003*** |
| | (0.001) | (0.001) | (0.001) |
| Relative humidity | 0.005 | 0.011 | -0.036*** |
| | (0.007) | (0.007) | (0.013) |
| Relative humidity*group 2 | -0.036** | -0.027** | 0.042*** |
| | (0.015) | (0.012) | (0.015) |
| Relative humidity*group 3 | -0.042** | -0.057*** | 0.043*** |
| | (0.017) | (0.014) | (0.017) |
| Relative humidity ² | -0.000 | -0.001 | 0.003*** |
| | (0.001) | (0.001) | (0.001) |
| Relative humidity ² *group 2 | 0.003** | 0.002** | -0.004*** |
| | (0.001) | (0.001) | (0.001) |
| Relative humidity ² *group 3 | 0.003** | 0.005*** | -0.004*** |

| | | | |
|------------------|----------|----------|----------|
| | (0.001) | (0.001) | (0.001) |
| Inprice | 0.081*** | 0.081*** | 0.081*** |
| | (0.005) | (0.005) | (0.005) |
| Fixed effects | | | |
| County*week | Y | Y | Y |
| State*year*month | Y | Y | Y |
| N | 1474685 | 1474685 | 1474685 |
| R ² | 0.208 | 0.208 | 0.208 |

Notes: Standard errors in parentheses are clustered to store level. Results weighted by the units sold per transaction. * p<0.1, ** p<0.05, *** p<0.01. The CDD, HDD, and relative humidity multiplied by 10.

Supplementary Table 13 Heterogeneous effect, climate attitude

| | (1) | (2) | (3) | (4) | (5) | (6) |
|-------------|---|---|----------------------------------|---|---|--------------------------------|
| | Believe climate change happening | Believe climate change harm US | Worry about climate change | Support renewable energy standards | Support regulation of CO ₂ | Support Democratic party |
| CDD | 0.003*** (0.001) | 0.001 (0.001) | 0.003*** (0.001) | 0.003*** (0.001) | 0.002** (0.001) | 0.002** (0.001) |
| CDD*group 2 | 0.002 (0.001) | 0.003** (0.001) | 0.000 (0.001) | 0.002 (0.001) | 0.001 (0.001) | 0.002* (0.001) |
| CDD*group 3 | 0.002 (0.001) | 0.004*** (0.001) | 0.004*** (0.001) | 0.002 (0.001) | 0.004*** (0.001) | 0.003** (0.001) |
| HDD | -0.000 (0.001) | -0.000 (0.001) | -0.001 (0.001) | -0.001 (0.001) | -0.001 (0.001) | 0.001 (0.001) |
| HDD*group 2 | 0.002*** (0.001) | 0.002*** (0.001) | 0.003*** (0.001) | 0.003*** (0.001) | 0.002*** (0.001) | 0.002*** (0.001) |
| HDD*group 3 | 0.004*** (0.001) | 0.004*** (0.001) | 0.004*** (0.001) | 0.004*** (0.001) | 0.004*** (0.001) | 0.001 (0.001) |
| Wind speed | -0.000 (0.002) | 0.000 (0.002) | -0.001 (0.002) | -0.001 (0.002) | 0.001 (0.002) | -0.001 (0.002) |

Notes: Standard errors in parentheses are clustered to store level. Results weighted by the units sold per transaction. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The CDD, HDD, and relative humidity multiplied by 10.