

Supplementary Materials

Table S1. The Results of the ADF and PP Unit Root Tests.

| Variable | Difference | Test Type | Test Statistic | <i>p</i> -Value | Unit Root |
|----------|----------------|-----------|----------------|-----------------|-----------|
| CE_t | Level | ADF | 1.7884 | 0.9799 | Yes |
| | Level | PP | 5.106 | 1.0000 | Yes |
| | 1st Difference | ADF | 5.1063 | 0.1398 | Yes |
| | 1st Difference | PP | -2.9581 ** | 0.0496 | No |
| | 2nd Difference | ADF | -6.0321 ** | <0.0001 | No |
| | 2nd Difference | PP | -5.9938 ** | <0.0001 | No |
| EC_t | Level | ADF | 2.2007 | 0.9919 | Yes |
| | Level | PP | 6.0094 | 1.0000 | Yes |
| | 1st Difference | ADF | -2.6899 | 0.0868 | Yes |
| | 1st Difference | PP | -2.7983 | 0.0694 | Yes |
| | 2nd Difference | ADF | -4.7189 | <0.0001 ** | No |
| | 2nd Difference | PP | -4.8227 | <0.0001 ** | No |
| GDP_t | Level | ADF | -4.6337 | 0.0043 ** | No |
| | Level | PP | 17.5476 | 1.0000 | Yes |
| | 1st Difference | ADF | -4.2926 | 0.0020 ** | No |
| | 1st Difference | PP | -3.4069 | 0.0179 ** | No |
| UR_t | Level | ADF | 1.2044 | 0.9382 | Yes |
| | Level | PP | -1.9441 | 0.3091 | Yes |
| | 1st Difference | ADF | -1.6131 | 0.0996 | Yes |
| | 1st Difference | PP | -1.5427 | 0.1137 | Yes |
| | 2nd Difference | ADF | -4.6672 | <0.0001 ** | No |
| | 2nd Difference | PP | -4.6672 | <0.0001 ** | No |

Note: ** denotes statistical significance at the 5% level.

Table S2. The Results of the DF-GLS Unit Root Tests.

| Variable | Form | DF-GLS statistic | 5% Critical Value | Unit Root |
|----------|----------------|------------------|-------------------|-----------|
| CE_t | Level | -2.6326 | -3.1900 | Yes |
| | 1st Difference | -2.5635 | -3.1900 | Yes |
| | 2nd Difference | -4.8469 | -3.1900 | No |
| EC_t | Level | -2.8369 | -3.1900 | Yes |
| | 1st Difference | -2.6474 | -3.1900 | Yes |
| | 2nd Difference | -4.1626 | -3.1900 | No |
| GDP_t | Level | -4.7775 | -3.1900 | No |
| | 1st Difference | -3.9797 | -3.1900 | No |
| UR_t | Level | -2.3689 | -3.1900 | Yes |
| | 1st Difference | -2.2271 | -3.1900 | Yes |
| | 2nd Difference | -4.9200 | -3.1900 | No |

Table S3. The P-values of the White and Breusch-Godfrey LM Tests.

| Test | $\Delta^2 CE_t$ | $\Delta^2 EC_t$ | ΔGDP_t |
|--------------------|-----------------|-----------------|----------------|
| White | 0.8423 | 0.9971 | 0.4102 |
| Breusch-Godfrey LM | 0.2377 | 0.7495 | 0.0803 |

Table S4. The VIF Scores of the ARDL Models.

| Dependent | Independent | Uncentered VIF |
|-----------------|---------------------|----------------|
| $\Delta^2 CE_t$ | $\Delta^2 CE_{t-1}$ | 2.1935 |
| | $\Delta^2 EC_t$ | 1.5042 |
| | $\Delta^2 EC_{t-1}$ | 1.4716 |
| | ΔGDP_t | 1.8013 |
| | $\Delta^2 UR_t$ | 1.5188 |
| $\Delta^2 EC_t$ | $\Delta^2 EC_{t-1}$ | 1.9360 |
| | $\Delta^2 CE_t$ | 2.2258 |
| | $\Delta^2 CE_{t-1}$ | 2.7091 |
| | ΔGDP_t | 2.2458 |
| | $\Delta^2 UR_t$ | 1.8326 |
| ΔGDP_t | ΔGDP_{t-1} | 37.5551 |
| | ΔGDP_{t-2} | 46.8721 |
| | ΔCE_t | 44.5444 |
| | ΔEC_t | 52.9756 |
| | ΔUR_t | 37.0162 |

Table S5. The Results of the Jarque-Bera Normality Tests.

| Dependent Variable | $\Delta^2 CE_t$ | ΔGDP_t |
|--------------------|-----------------|----------------|
| <i>p</i> -values | 0.6161 | 0.3687 |

Table S6. The Sensitivity Analysis of the Urbanisation Impacts on the 1% Carbon Tax in 2015.

| Parametric Change | -50% | -20% | -10% | 10% | 20% | 50% |
|-------------------|---------|---------|--------|--------|--------|---------|
| Carbon Emissions | 21.01% | 7.15% | 3.41% | -3.12% | -5.98% | -13.33% |
| Carbon Intensity | 0.92% | 0.34% | 0.17% | -0.16% | -0.31% | -0.71% |
| GDP Loss | -35.16% | -11.98% | -5.71% | 5.23% | 10.05% | 22.46% |
| Welfare Loss | -35.30% | -12.02% | -5.73% | 5.24% | 10.05% | 22.42% |
| ASCC | 1.15% | 0.54% | 0.28% | -0.29% | -0.59% | -1.51% |

Table S7. The Sensitivity Analysis of the Urbanisation Impacts on the 1% Carbon Tax in 2030.

| Parametric Change | -50% | -20% | -10% | 10% | 20% | 50% |
|-------------------|---------|---------|--------|--------|--------|---------|
| Carbon Emissions | 14.46% | 5.16% | 2.49% | -2.33% | -4.52% | -10.33% |
| Carbon Intensity | 0.76% | 0.30% | 0.15% | -0.15% | -0.29% | -0.72% |
| GDP Loss | -36.38% | -12.96% | -6.25% | 5.85% | 11.33% | 25.91% |
| Welfare Loss | -36.60% | -13.06% | -6.31% | 5.90% | 11.43% | 26.16% |
| ASCC | 0.31% | 0.11% | 0.05% | -0.05% | -0.09% | -0.19% |

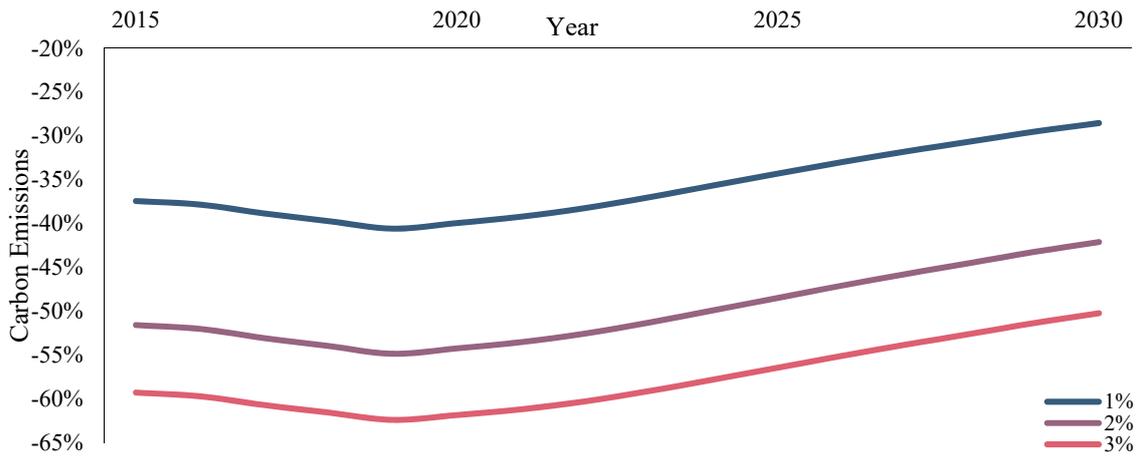


Figure S1. The Tax Effect on the Carbon Emissions Compared to the Baseline Scenario.

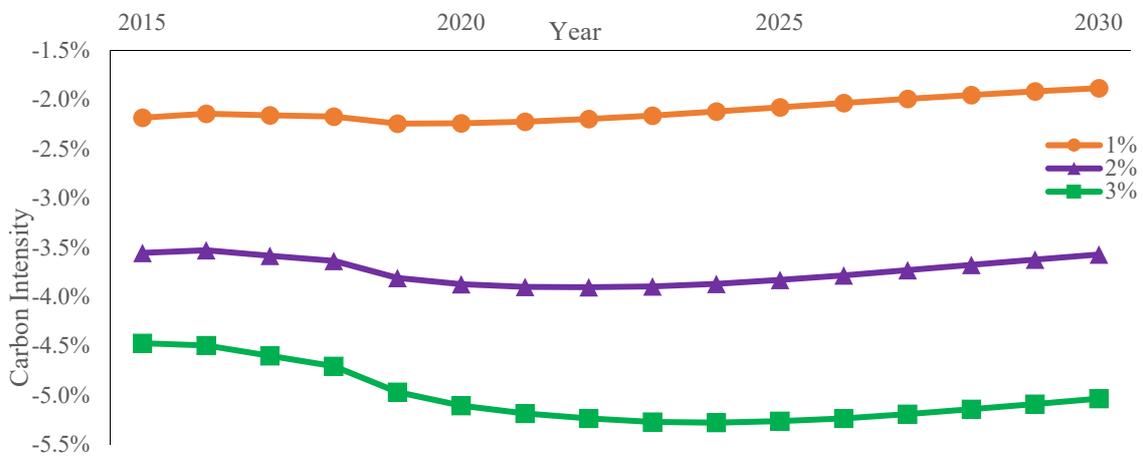


Figure S2. The Tax Effect on the Carbon Intensity Compared to the Baseline Scenario.

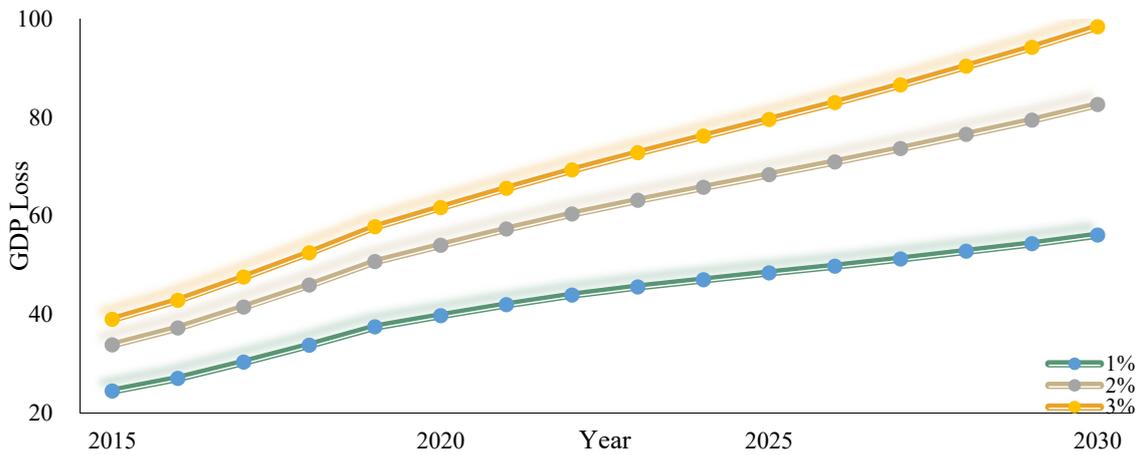


Figure S3. The Policy Effect of the Carbon Tax on the GDP Loss (Unit: 10¹² CNY).

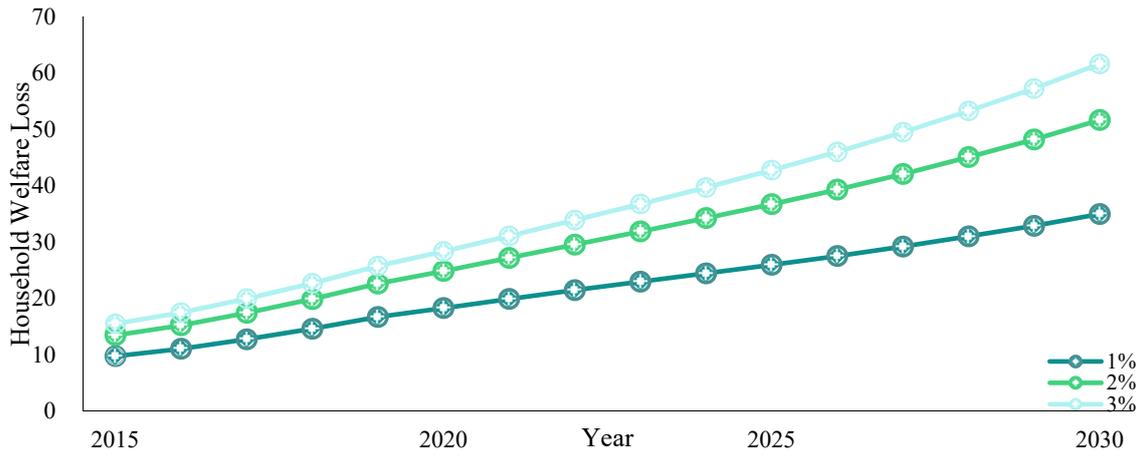


Figure S4. The Policy Effect of the Carbon Tax on the Household Welfare Loss (Unit: 10¹²CNY).

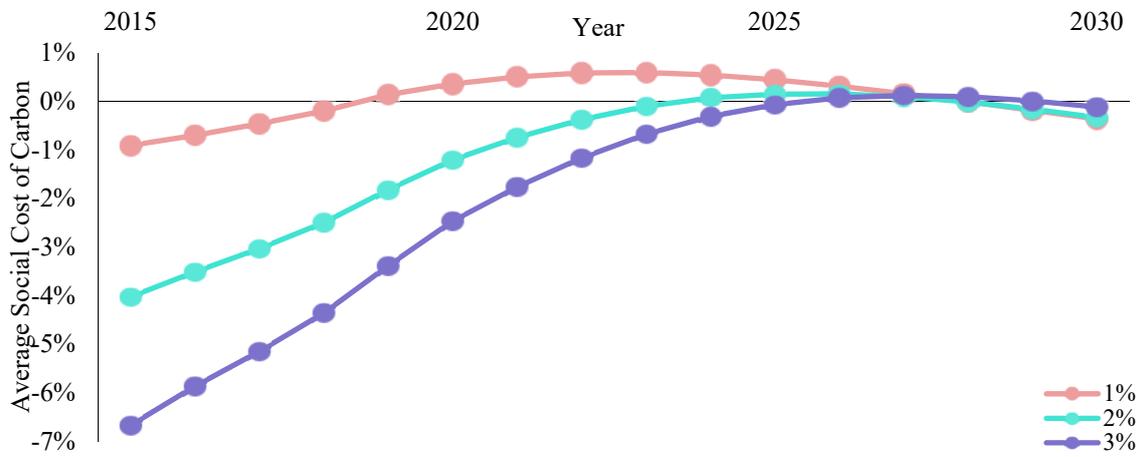


Figure S5. The Policy Effect of the Carbon Tax on the ASCC Compared to the Baseline Scenario.