

## 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	$\Delta^2 CE_t$	$\Delta^2 EC_t$	$\Delta GDP_t$
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
	$\Delta GDP_t$	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
	$\Delta GDP_t$	2.2458
	$\Delta^2 UR_t$	1.8326
$\Delta GDP_t$	$\Delta GDP_{t-1}$	37.5551
	$\Delta GDP_{t-2}$	46.8721
	$\Delta CE_t$	44.5444
	$\Delta EC_t$	52.9756
	$\Delta UR_t$	37.0162

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

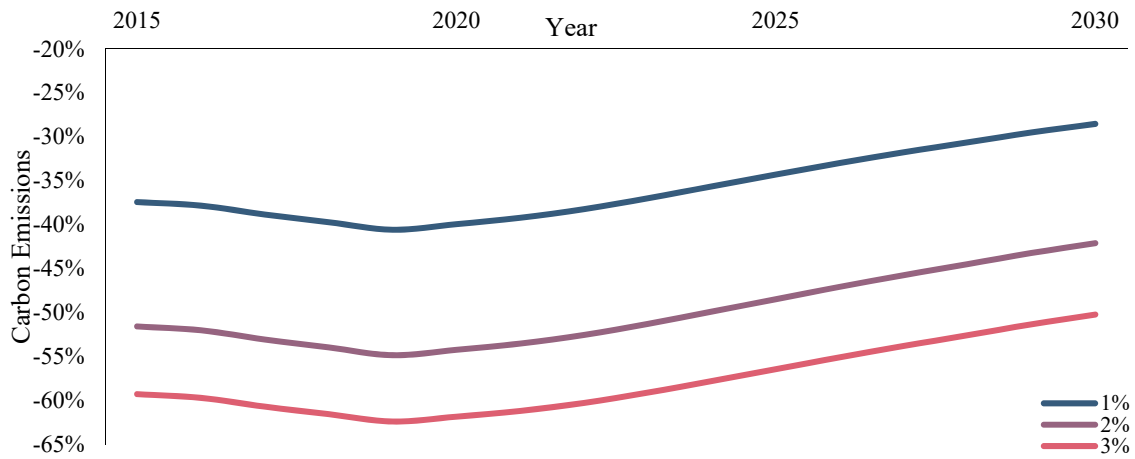
Dependent Variable	$\Delta^2 CE_t$	$\Delta GDP_t$
<i>p</i> -values	0.6161	0.3687

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

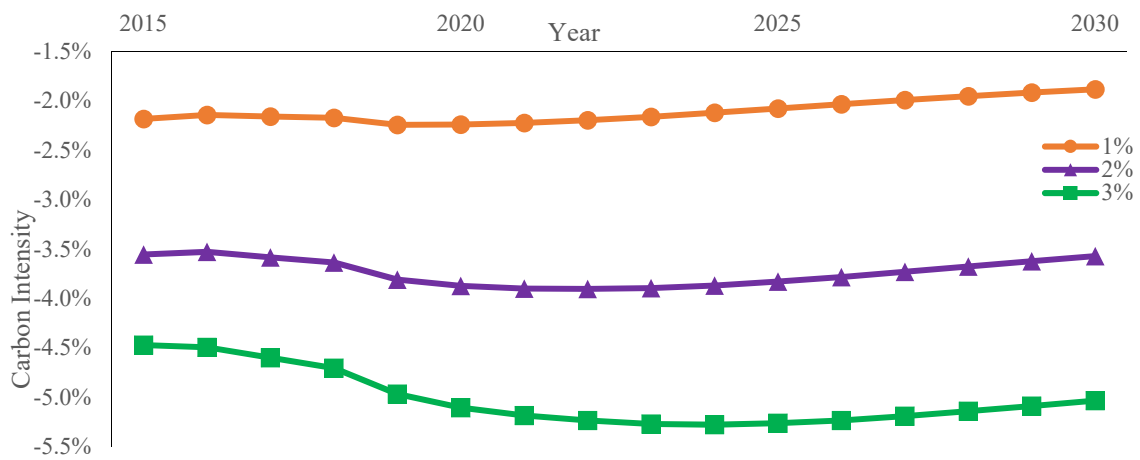
Parametric Change	−50%	−20%	−10%	10%	20%	50%
Carbon Emissions	21.01%	7.15%	3.41%	−3.12%	−5.98%	−13.33%
Carbon Intensity	0.92%	0.34%	0.17%	−0.16%	−0.31%	−0.71%
GDP Loss	−35.16%	−11.98%	−5.71%	5.23%	10.05%	22.46%
Welfare Loss	−35.30%	−12.02%	−5.73%	5.24%	10.05%	22.42%
ASCC	1.15%	0.54%	0.28%	−0.29%	−0.59%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

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

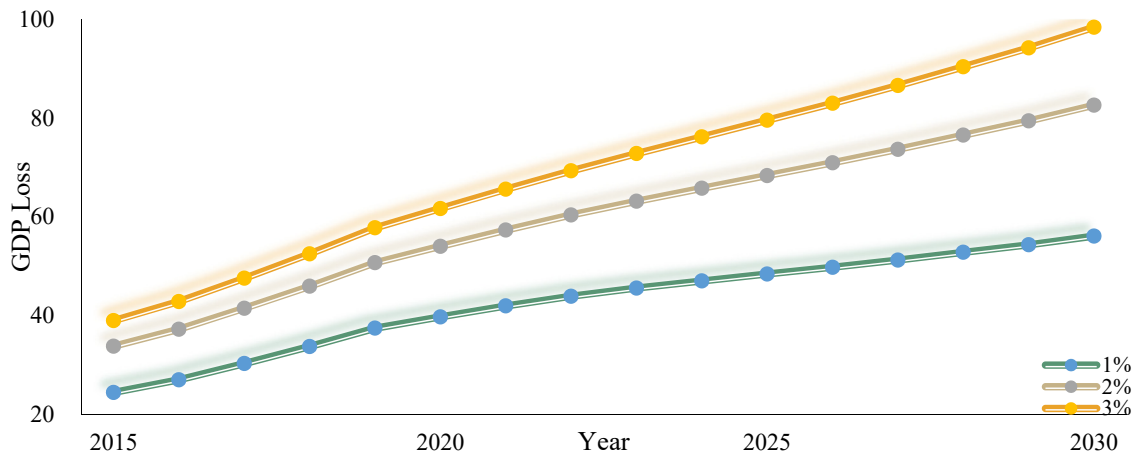
Parametric Change	−50%	−20%	−10%	10%	20%	50%
Carbon Emissions	14.46%	5.16%	2.49%	−2.33%	−4.52%	−10.33%
Carbon Intensity	0.76%	0.30%	0.15%	−0.15%	−0.29%	−0.72%
GDP Loss	−36.38%	−12.96%	−6.25%	5.85%	11.33%	25.91%
Welfare Loss	−36.60%	−13.06%	−6.31%	5.90%	11.43%	26.16%
ASCC	0.31%	0.11%	0.05%	−0.05%	−0.09%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



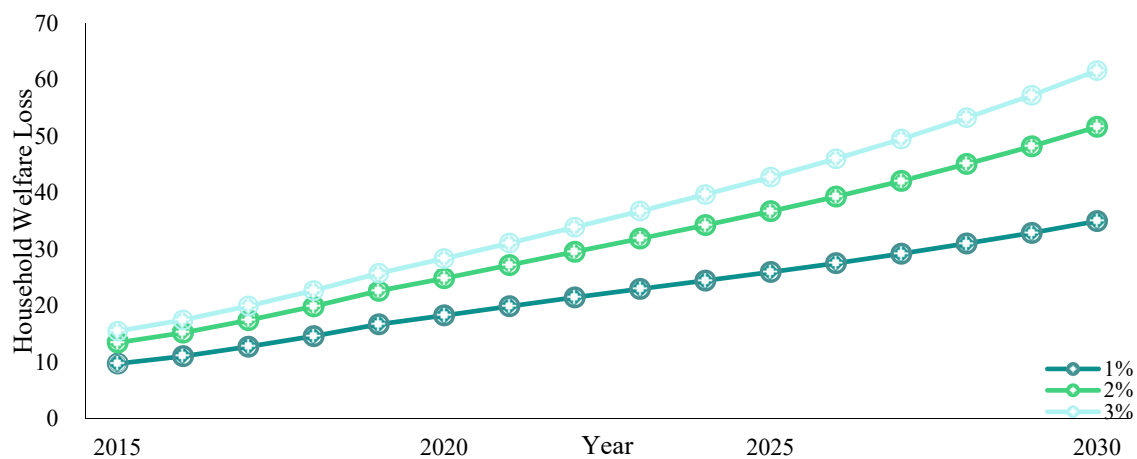
**Figure S1.** The Tax Effect on the Carbon Emissions Compared to the Baseline Scenario.



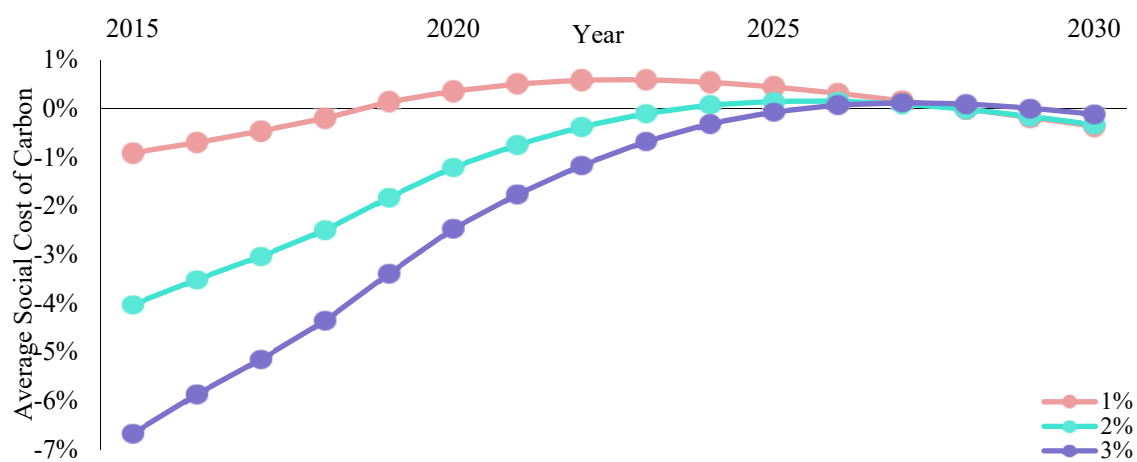
**Figure S2.** The Tax Effect on the Carbon Intensity Compared to the Baseline Scenario.



**Figure S3.** The Policy Effect of the Carbon Tax on the GDP Loss (Unit:  $10^{12}$  CNY).



**Figure S4.** The Policy Effect of the Carbon Tax on the Household Welfare Loss (Unit:  $10^{12}$  CNY).



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