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ERRATUM

Erratum to: Simulating the impacts of climate change, prices and population on California's residential electricity consumption

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Abstract We discovered an error in the computer code generating the simulation results in section 5 of Auffhammer and Aroonruengsawat (Clim Chang 109(Supplement 1):191–210, 2011). While four out of five main findings are unaffected, the simulated impacts of climate change on annual residential electricity consumption are an order of magnitude smaller, which is consistent with findings in the previous literature.

1 Corrected simulation results

The econometric model based on equation (1) in Auffhammer and Aroonruengsawat (2011) uses counts of days in 14 discrete weather bins during a billing period, which range from 25 to 35 days in length. The simulation exercise, inexcusably, did not scale the climate model output to the average billing period length of 30 days but used annual counts instead. As the estimated equation (1) is log linear in nature, the simulation results based on equation (2) in the paper are incorrect, as $\frac{e^{ax}}{e^{ay}} \neq \frac{e^{x}}{e^{y}}$. This error does not affect the econometric estimation results in section (4), yet significantly changes the results of the simulations conducted in section (5) of the paper.

We have posted a corrected manuscript of the entire paper at http://are.berkeley.edu/~auffham.

The online version of the original article can be found at http://dx.doi.org/10.1007/s10584-011-0299-y.

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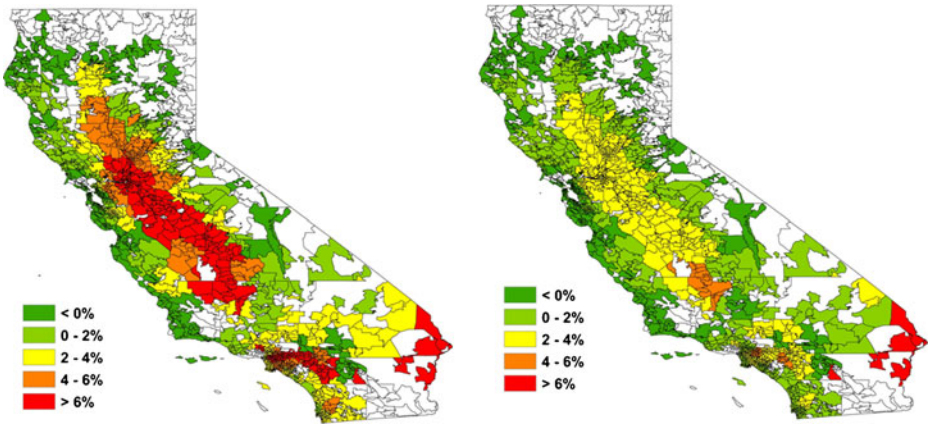

Fig. 1 Simulated increase in household electricity consumption by zip code for the period 2080–99 in percent over 1961–1990 simulated consumption. Model NCAR PCM forced by IPCC SRES A2 (*left*) and IPCC SRES B1 (*right*)

Figure 1 below displays the corrected versions of Figures (3d) and (4d) in the original paper. The spatial pattern of the corrected household level impacts is almost identical to the distribution shown in the paper, yet the scale is different by an order of magnitude. This change has implications for the predicted increases of aggregate residential electricity consumption for the state. Table 2 below shows the corrected table 2 in the paper. The predicted increases in residential electricity consumption by end of century - without

Table 2 Simulated percent increase in residential electricity consumption relative to 1961–1990 for the constant, low price and high price scenarios

Bin type downscaling	Price Increase (%)	Equidistant (%)				Percentile (%)			
		BCSD		CA		BCSD		CA	
IPCC scenario		A2	B1	A2	B1	A2	B1	A2	B1
2000–19	±0	1 %	0 %	1 %	0 %	1 %	0 %	1 %	0 %
2020–39	±0	0 %	1 %	0 %	1 %	1 %	1 %	1 %	1 %
2040–59	±0	1 %	1 %	1 %	1 %	1 %	1 %	1 %	1 %
2060–79	±0	2 %	1 %	2 %	1 %	2 %	1 %	2 %	1 %
2080–99	±0	3 %	1 %	3 %	1 %	3 %	1 %	3 %	1 %
2000–19	±0	1 %	0 %	1 %	0 %	1 %	0 %	1 %	0 %
1020–39	+30	−10 %	−10 %	−10 %	−10 %	−10 %	−10 %	−10 %	−10 %
2040−59	+30	−9 %	−10 %	−9 %	−10 %	−9 %	−9 %	−9 %	−9 %
2060–79	+30	−9 %	−9 %	−9 %	−9 %	−8 %	−9 %	−8 %	−9 %
2080–99	+30	−8 %	−9 %	−8 %	−9 %	−7 %	−9 %	−7 %	−9 %
2000–19	±0	1 %	0 %	1 %	0 %	1 %	0 %	1 %	0 %
1020–39	+30	−10 %	−10 %	−10 %	−10 %	−10 %	−10 %	−10 %	−10 %
2040–59	+60	−19 %	−20 %	−19 %	−20 %	−19 %	−20 %	−19 %	−20 %
2060–79	+60	−19 %	−20 %	−19 %	−20 %	−19 %	−19 %	−19 %	−19 %
2080–99	+60	−18 %	−19 %	−18 %	−19 %	−18 %	−19 %	−18 %	−19 %

accounting for population growth or price increases - range from 1 to 3 % using the NCAR PCM model, which is slightly lower than the 3 to 5 % range for all sectors using aggregate load in CalISO suggested by Franco and Sanstad (2008). The price simulations using the corrected climate simulations suggest that, subject to the caveats in the paper, the aggressive price scenario is consistent with an 18–19 % decrease in electricity consumption over baseline, which is significant. Table 3 corrects the consumption estimates taking into account population growth and climate change. For the medium population growth scenario, aggregate consumption is consistent with 133–139 % increase in consumption. The high population growth scenario suggests increases in consumption by between 272 and 280 %.

2 Implications

There were five main conclusions in the paper. The first four findings are unaffected by our coding error. First, the econometrically estimated response of residential electricity consumption to temperature is spatially heterogeneous. Second, the simulated impacts of climate change on household level electricity consumption are also spatially heterogeneous, with the Central Valley and South Eastern parts of the state predicted to experience the largest increases. Third, two sequential 30 % increases in electricity price are simulated to significantly decrease electricity consumption from this sector. Fourth, increases in

Table 3 Simulated percent increase in residential electricity consumption relative to 1961–1990 for the low, medium and high population growth scenarios

Bin type downscaling IPCC scenario	Price Increase (%)	Equidistant (%)				Percentile (%)			
		BCSD		CA		BCSD		CA	
		A2	B1	A2	B1	A2	B1	A2	B1
Low Population Growth Scenario									
2000–19	±0	12 %	11 %	12 %	11 %	12 %	11 %	12 %	11 %
2020–39	±0	25 %	25 %	25 %	25 %	25 %	25 %	25 %	25 %
2040–59	±0	29 %	28 %	29 %	28 %	29 %	28 %	29 %	28 %
2060–79	±0	31 %	30 %	31 %	30 %	32 %	31 %	32 %	31 %
2080–99	±0	39 %	37 %	39 %	37 %	40 %	37 %	40 %	37 %
Medium Population Growth Scenario									
2000–19	±0	13 %	13 %	13 %	13 %	13 %	13 %	13 %	13 %
1020–39	±0	42 %	42 %	42 %	42 %	42 %	42 %	42 %	42 %
2040–59	±0	72 %	72 %	72 %	72 %	73 %	72 %	73 %	72 %
2060–79	±0	103 %	101 %	103 %	101 %	103 %	102 %	103 %	102 %
2080–99	±0	138 %	133 %	138 %	133 %	139 %	134 %	139 %	134 %
High Population Growth Scenario									
2000–19	±0	17 %	17 %	17 %	17 %	17 %	17 %	17 %	17 %
1020–39	±0	57 %	57 %	57 %	57 %	57 %	57 %	57 %	57 %
2040–59	±0	105 %	104 %	105 %	104 %	105 %	104 %	105 %	104 %
2060–79	±0	173 %	171 %	173 %	171 %	173 %	171 %	173 %	171 %
2080–99	±0	278 %	272 %	278 %	272 %	280 %	273 %	280 %	273 %

population will have significantly larger impacts on increases in consumption than climate change, and these increases are likely much larger than the aggressive price scenario can offset.

The finding that has changed significantly is the magnitude of the impacts of climate change at the household and aggregate level. They are an order of magnitude smaller than previously stated, which means that for annual consumption based on our simulation without adaptation, climate change is predicted to have minor effects on annual electricity consumption. This does not rule out significant impacts during peak times.

References

Auffhammer M, Aroonruengsawat A (2011) Simulating California's future residential electricity consumption under different scenarios of climate change. Clim Chang 109(Supplement 1):191–210

Franco G, Sanstad A (2008) Climate change and electricity demand in California. Clim Chang 87:139–151