Does Environmental Policy Affect Income Inequality? Evidence from The Clean Air Act.

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Online Appendix.

Appendix A

Table A.1: Outcome = Ozone

Dep. Var.	(1) Log of Gini Coefficient	(2) Log of Mean	(3) Log of $90^{th}/50^{th}$	(4) Log of $90^{th}/10^{th}$
8-Hr Ozone (2008)	-0.016	0.007*	0.030	0.001
	(0.020)	(0.004)	(0.023)	(0.020)
8-Hr Ozone (1997)	0.021	0.016***	-0.009	0.050*
	(0.028)	(0.005)	(0.033)	(0.028)
Constant	-5.140***	3.866***	-0.519***	0.243***
	(0.014)	(0.002)	(0.017)	(0.014)
Number of Obs.	27,225	27,225	27,224	27,225
R-squared	0.723	0.738	0.641	0.703

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.2: Outcome = $PM_{2.5}$

Dep. Var.	(1) Log of Gini Coefficient	(2) Log of Mean	(3) Log of $90^{th}/50^{th}$	(4) Log of $90^{th}/10^{th}$
PM-2.5 (2006)	-0.067***	-0.023***	-0.129***	-0.082***
	(0.014)	(0.008)	(0.021)	(0.015)
PM-2.5 (1997)	0.006	0.055***	0.128***	0.053***
	(0.015)	(0.007)	(0.025)	(0.018)
Constant	-3.080***	2.296***	-0.121***	0.749***
	(0.004)	(0.003)	(0.009)	(0.005)
Number of Obs.	13,200	13,200	13,200	13,200
R-squared	0.864	0.895	0.722	0.822

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.3: Outcome = Market Income

Dep. Var.	(1) Log of Gini Coefficient	(2) Log of Mean	(3) Log of $90^{th}/50^{th}$	(4) Log of $90^{th}/10^{th}$
8-Hr Ozone (2008)	0.055***	0.030***	0.075***	0.040***
	(0.006)	(0.010)	(0.019)	(0.015)
8-Hr Ozone (1997)	-0.016	0.025*	0.071***	0.067***
	(0.011)	(0.015)	(0.027)	(0.021)
Constant	-0.787***	11.62***	11.85***	12.23***
	(0.005)	(0.008)	(0.014)	(0.011)
Number of Obs.	23,336	23,595	23,595	23,595
R-squared	0.682	0.895	0.832	0.851

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.4: Outcome = Market Income

Dep. Var.	(1) Log of Gini Coefficient	(2) Log of Mean	(3) Log of $90^{th}/50^{th}$	(4) Log of $90^{th}/10^{th}$
PM-2.5 (2006)	0.044***	0.010	0.002	0.002
	(0.011)	(0.016)	(0.028)	(0.019)
PM-2.5 (1997)	-0.101***	0.013	-0.037	-0.005
	(0.014)	(0.022)	(0.036)	(0.029)
Constant	-0.754***	11.49***	11.74***	12.13***
	(0.004)	(0.008)	(0.015)	(0.012)
Number of Obs.	11,575	11,660	11,660	11,660
R-squared	0.752	0.898	0.843	0.856

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.5: Outcome = Pollution-Adjusted Income

Dep. Var.	(1) Log of Gini Coefficient	(2) Log of Mean	(3) Log of $90^{th}/50^{th}$	(4) Log of $90^{th}/10^{th}$
8-Hr Ozone (2008)	0.171***	0.033***	0.010***	0.079***
	(0.010)	(0.010)	(0.021)	(0.017)
8-Hr Ozone (1997)	-0.021	0.025*	0.069**	0.047*
	(0.014)	(0.015)	(0.033)	(0.025)
Constant	-0.919***	11.58***	11.70***	12.11***
	(0.007)	(0.008)	(0.016)	(0.013)
Number of Obs.	23,558	23,558	23,573	23,573
R-squared	0.853	0.879	0.800	0.808

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.6: Outcome = Pollution-Adjusted Income

Dep. Var.	(1) Log of Gini Coefficient	(2) Log of Mean	(3) Log of $90^{th}/50^{th}$	(4) Log of $90^{th}/10^{th}$
PM-2.5 (2006)	0.192***	0.067***	0.084***	0.080***
	(0.020)	(0.019)	(0.028)	(0.021)
PM-2.5 (1997)	-0.185***	-0.052**	-0.039	-0.062*
	(0.024)	(0.021)	(0.053)	(0.035)
Constant	-0.888***	11.49***	11.58***	12.03***
	(0.007)	(0.007)	(0.020)	(0.014)
Number of Obs.	11,637	11,620	11,650	11,640
R-squared	0.878	0.888	0.813	0.839

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix B: Plots of Trends in Average Outcome Over Time For Ever-Nonattainment versus Always-Attainment Counties

We consider four measures for each outcome. For all outcomes, the top left panel is log of the mean, the top right panel is the log of the gini coefficient, the bottom left panel is the log of the 90/50 ratio, and the bottom right panel of the log of the 90/10 ratio.

Figure B.1: Outcome: Ozone; Standard: 2008 O_3 NAAQS

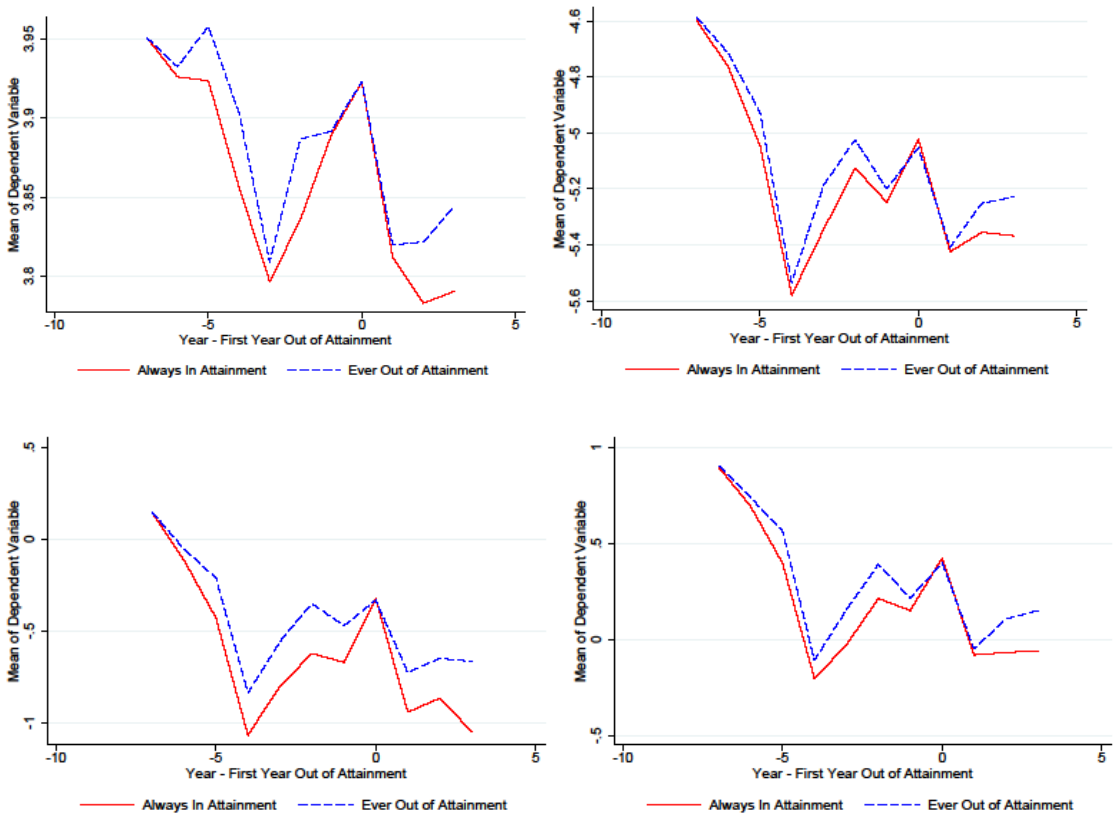


Figure B.2: Outcome: $PM_{2.5}$; Standard: 2006 $PM_{2.5}$ NAAQS

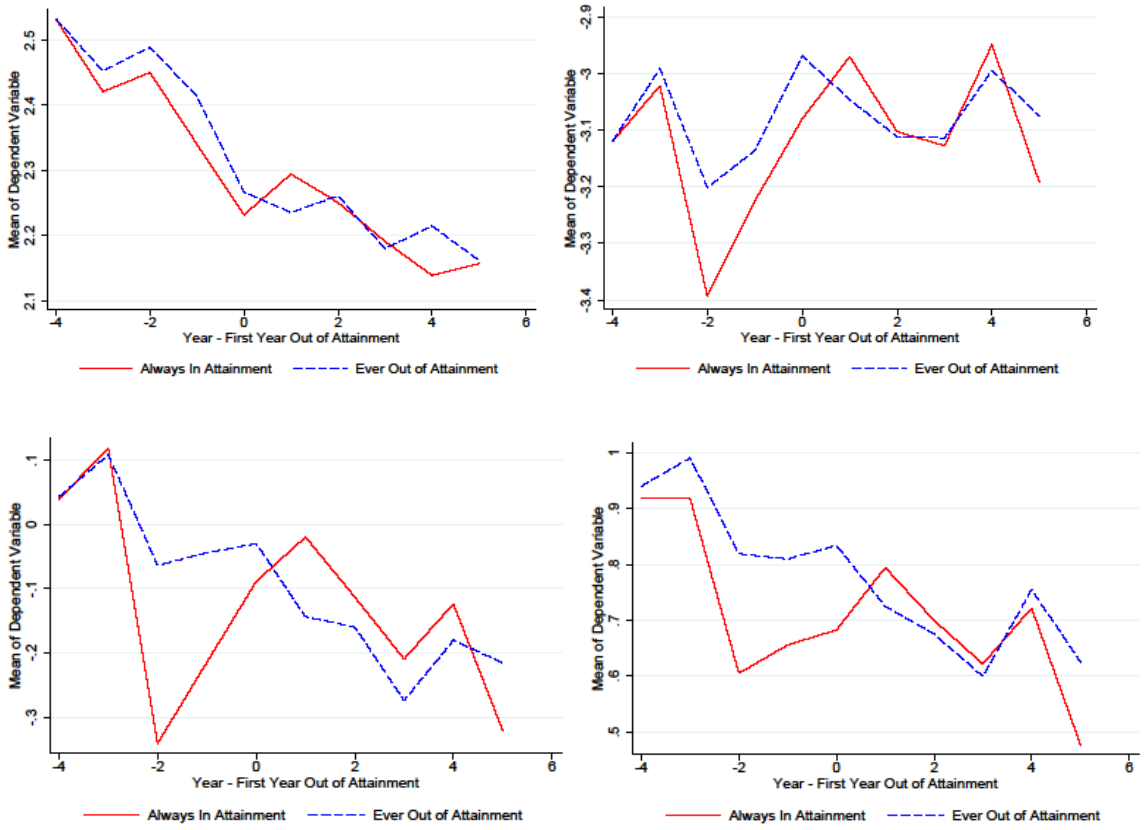


Figure B.3: Outcome: Market Income; Standard: 2008 O_3 NAAQS

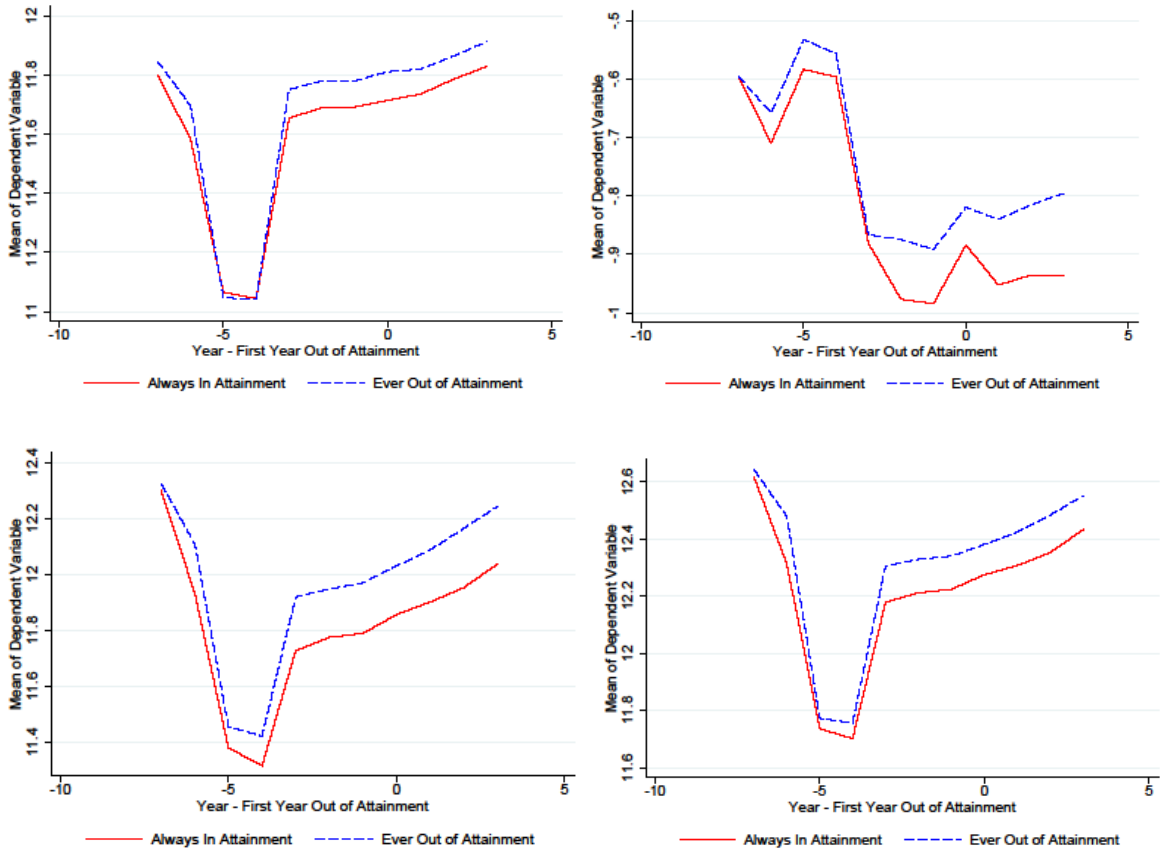


Figure B.4: Outcome: Market Income; Standard: 2006 $PM_{2.5}$ NAAQS

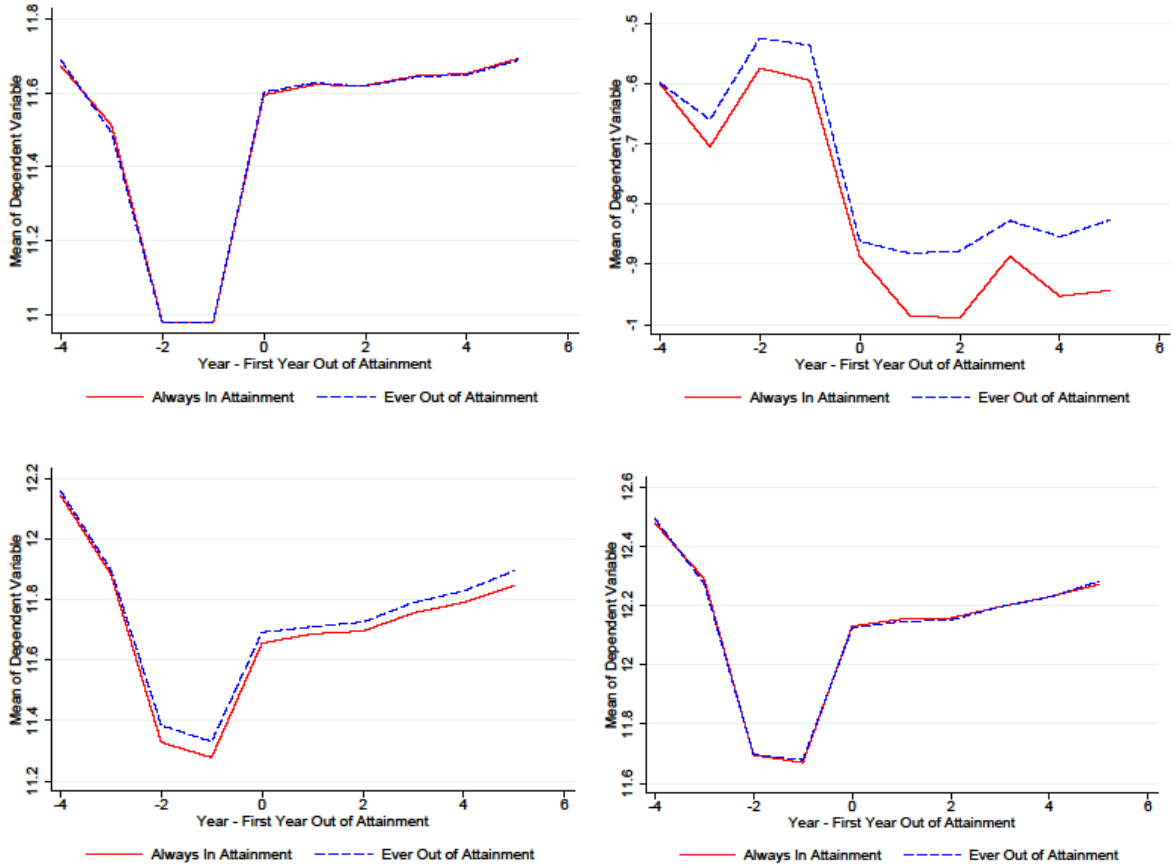


Figure B.5: Outcome: Pollution-Adjusted Income; Standard: 2008 O_3 NAAQS

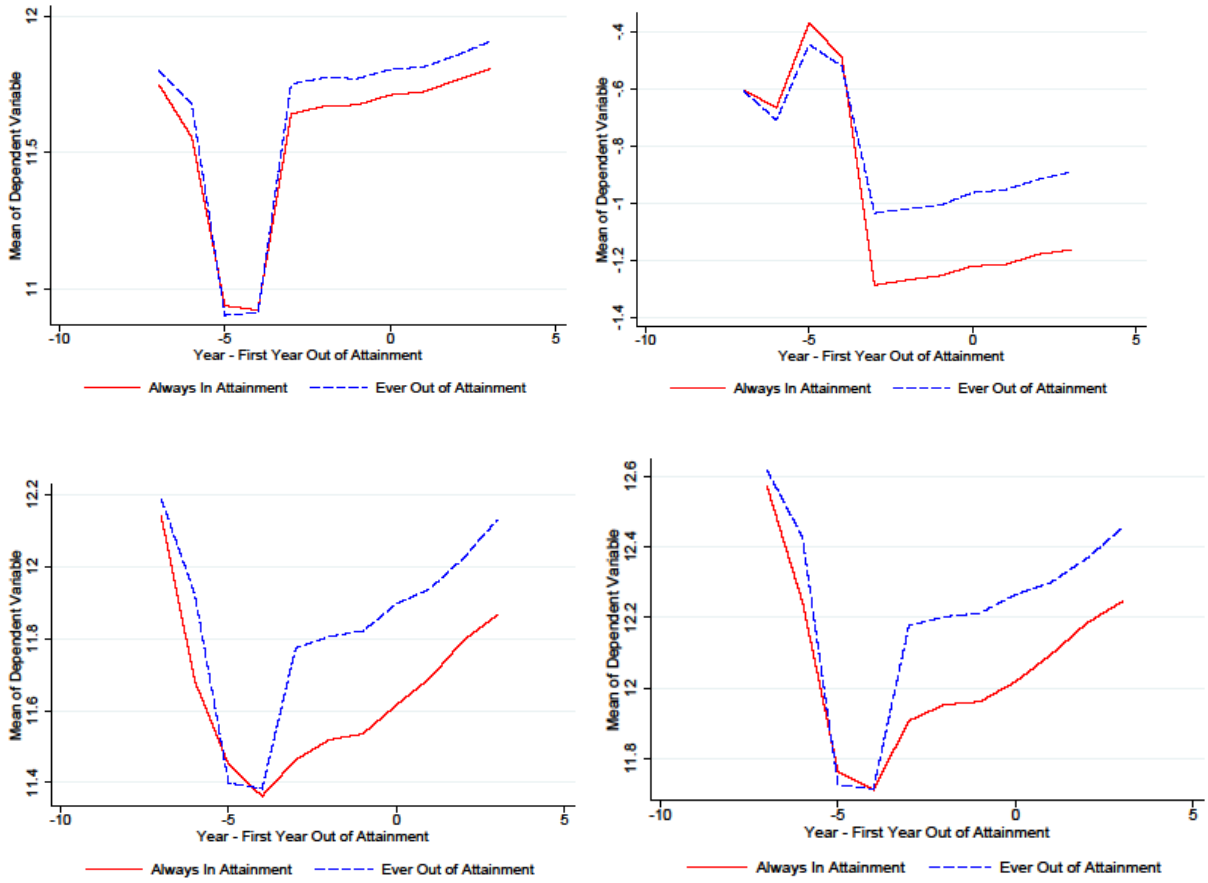
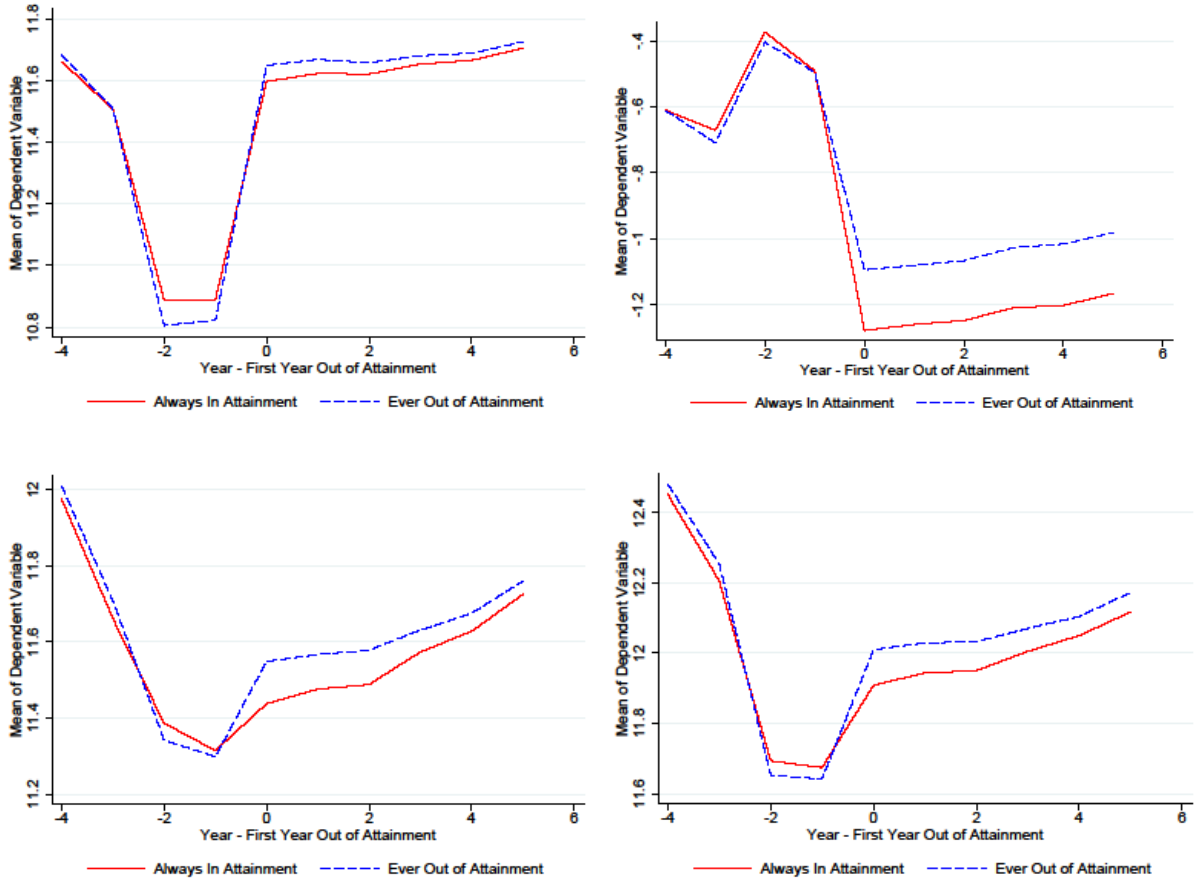


Figure B.6: Outcome: Pollution-Adjusted Income; Standard: 2006 $PM_{2.5}$ NAAQS



Appendix C: Empirical Results for Per-Capita Damages

Table C.1: Dependent Variable = Per-Capita Damages

Dep. Var.	(1) Log of Gini Coefficient	(2) Log of Mean	(3) Log of $90^{th}/50^{th}$	(4) Log of $90^{th}/10^{th}$
8-Hr Ozone (2008)	0.0003	-0.048***	-0.0002	0.001
	(0.004)	(0.006)	(0.008)	(0.007)
8-Hr Ozone (1997)	-0.001	0.031***	0.019**	0.023***
	(0.004)	(0.006)	(0.008)	(0.007)
Constant	-1.722***	8.484***	7.725***	8.179***
	(0.002)	(0.003)	(0.004)	(0.004)
Number of Obs.	23,353	23,338	23,317	23,353
R-squared	0.986	0.956	0.952	0.965

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table C.2: Dependent Variable = Per-Capita Damages

Dep. Var.	(1) Log of Gini Coefficient	(2) Log of Mean	(3) Log of $90^{th}/50^{th}$	(4) Log of $90^{th}/10^{th}$
PM-2.5 (2006)	-0.002	-0.057***	-0.024***	-0.029***
	(0.003)	(0.007)	(0.009)	(0.008)
PM-2.5 (1997)	0.005	0.097***	0.067***	0.073***
	(0.004)	(0.009)	(0.012)	(0.010)
Constant	-1.651***	8.564***	7.846***	8.310***
	(0.001)	(0.003)	(0.004)	(0.003)
Number of Obs.	11,550	11,541	11,545	11,550
R-squared	0.993	0.968	0.965	0.971

Standard errors clustered by county in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix D: Further Details regarding the Matching Estimator

This Appendix section provides further details on the matched difference-in-differences specification employed in the paper. Setting up terminology, "ever-non-attainment" counties were out of compliance with the relevant pollutant standard for at least one year in 2005-2015; "always-attainment" counties remained in compliance with the relevant standard throughout our 2005-2015 sample period. We match each ever-nonattainment county *m* to 10 always-attainment counties based on the 2005 values of the relevant dependent variable. In particular, for outcome variable $\log(Y_{i,t})$, we calculate $D_{m,r} = |\log(Y_{m,2005}) - \log(Y_{r,2005})|$ for each always-attainment county *r*; we pick the 10 always-attainment counties with the smallest distances $D_{m,r}$. For ease of exposition, we use the term "county group" for the 11 counties consisting of the ever-nonattainment county and its 10 matched always-attainment counties.

We stack the observations corresponding to each ever-nonattainment county and its matched always-attainment counties; each ever-nonattainment county *m* thus corresponds to 11 observations in year *t*: one for county *m* and 10 associated with its 10 matched always-attainment counties. As a result, each observation corresponding to county *m* is given sample weight 1 while each observation corresponding to its matched always-attainment counties is given sample weight 0.1.

Using this data-set, we estimate the following matched difference-in-differences (DD) framework:

$$\log(Y_{i,m,t}) = \alpha_{i,m} + \gamma_t + \beta NA_{i,m,t} + \theta PREVNA_{i,m,t} + \varepsilon_{i,m,t} \quad (1)$$

where: $Y_{i,m,t}$ = outcome of interest in county (i) in county group (m) in year (t).

$\alpha_{i,m}$= county-by-county-group fixed effects.

γ_t = year fixed effects.

$NA_{i,m,t}$= indicator that's one if and only if county (i) is out of attainment with the relevant NAAQS standard in year (t).

$PREVNA_{i,p,t}$= indicator that's one if and only if county (i) is out of attainment with the *previous* NAAQS standard for the same pollutant in year (t).

$\varepsilon_{i,p,t}$ = error term.

Standard errors are clustered by county group. Further details on this matching methodology are provided in Heckman, Ichimura, and Todd (1998) as well as Cicala (2015).