Senior Project

Department of Economics

Clearing the Way for Renewable Energy: The Impact of the Clean Power Plan on Fossil Fuel Markets

Jonathan Clemente

Spring 2025

Advisor: *Dr. Ali Enami*

I. Abstract

Reducing carbon emissions has been a central objective of federal energy policy, leading to efforts aimed at transitioning the United States toward cleaner energy sources. One of the most ambitious attempts to achieve this goal was the Clean Power Plan (CPP), introduced in 2015, which set state-specific emissions reduction targets to encourage investment in renewable energy and reduce dependence on fossil fuels. However, not all states responded uniformly—while some embraced the policy's objectives, others actively opposed it and challenged its implementation through legal action. This divergence in state-level responses created varied policy signals for energy markets, shaping investment and consumption patterns across fossil fuel and renewable energy sectors. While prior research has explored how regulatory uncertainty influences energy investment decisions, there is limited empirical analysis on how state-level policy signals, rather than federal mandates, affect fossil fuel consumption. This study contributes to the existing literature by analyzing whether states that complied with the CPP experienced greater reductions in fossil fuel consumption compared to those that opposed it. The results demonstrate statistically and economically significant declines in per capita petroleum and distillate fuel consumption in states that supported the CPP, indicating that policy expectations influenced market behavior even in the absence of formal federal enforcement. These findings highlight the broader impact of environmental policy signals on energy markets and provide insights into the role of regulatory expectations in shaping industry responses to climate policy.

II. Table of Contents

III. Introduction

Climate change concerns, fluctuating energy prices, and geopolitical uncertainties have contributed to an increasing emphasis on transitioning away from fossil fuels. Regulatory policies aimed at curbing greenhouse gas emissions have historically influenced investment in energy markets, and while some policies have been successfully implemented, others have faced political and legal challenges that have prevented full enforcement. Even in cases where policies are blocked or repealed, the regulatory uncertainty they generate can shape market expectations, influencing private-sector decision-making in ways that resemble the effects of actual policy implementation.

One of the most ambitious federal attempts to limit carbon emissions was the Clean Power Plan (CPP), introduced in 2015. Unlike prior environmental regulations, which largely focused on industry-specific emissions caps, the CPP set state-specific reduction targets and allowed states flexibility in determining how they would meet these goals. This approach sparked intense political and legal opposition, leading to a lawsuit from multiple states seeking to block the policy. While the CPP was never fully implemented, its introduction and subsequent legal battles created a clear divide among states—those that aligned with its objectives by not suing the federal government and those that resisted it by joining the lawsuit. This study leverages this division to analyze how state-level responses to the CPP influenced fossil fuel consumption, offering insight into whether policy signals alone can drive shifts in energy consumption patterns.

The central question of this research is whether states that aligned with the CPP, as indicated by their decision not to sue the federal government, experienced greater reductions in per capita fossil fuel consumption compared to states that actively opposed the policy. Even though the CPP did not take full legal effect, states that expected stricter environmental regulations in the future may have begun shifting away from fossil fuels in anticipation of these policy changes. In contrast, states that resisted the CPP may have interpreted the legal challenges as a sign that no significant regulatory changes were imminent, thereby maintaining their existing fossil fuel consumption levels.

This study contributes to the broader literature on regulatory expectations, policy signaling, and energy market behavior. Prior research has extensively examined how enacted policies affect energy consumption and investment in renewables, but there is limited empirical analysis on how the anticipation of policy changes influences market outcomes. By analyzing state-level differences in fossil fuel consumption following the introduction of the CPP, this research provides new evidence on the power of policy signals in shaping energy transitions. The findings have important implications for policymakers, demonstrating whether regulatory expectations alone can influence investment and consumption decisions in energy markets, even in the absence of federal enforcement.

IV. Literature Review

The role of policy signals in influencing market behavior has been widely studied in the literature, particularly in relation to energy transitions and investment in fossil fuel reduction. Government policies that regulate emissions and promote cleaner energy alternatives often create market expectations that influence investment and consumption decisions well before any formal policy enforcement takes place. Carley et al. (2018) analyze how regulatory uncertainty affects investment in the energy sector, finding that even in the absence of federal policy enforcement, state-level policies and mandates influence long-term energy investment trends. Similarly, Aldy (2017) highlights that the mere proposal of environmental regulations can lead to anticipatory changes in industry behavior, as firms seek to mitigate potential regulatory risks. These findings suggest that policy signals alone—without full implementation—can shape market decisions by altering industry expectations about future costs and benefits. While much of the existing literature has focused on renewable energy investment, the same mechanisms likely apply to fossil fuel consumption, where firms and consumers adjust their usage patterns based on their expectations about future regulation. However, in the case of the Clean Power Plan (CPP), the key variation in policy signals came from state-level political responses rather than direct federal enforcement, creating a natural divide between states that aligned with the CPP's objectives and those that opposed it.

State-level politics play a crucial role in shaping responses to federal environmental initiatives, thereby influencing the policy signals that energy markets receive. Stokes (2020) explores how partisan alignment affects state compliance with federal climate policies, demonstrating that conservative-leaning states are significantly more likely to resist federal environmental regulations, whereas progressive-leaning states proactively pursue policies favoring emissions reductions. Similarly, Mildenberger (2021) examines the political economy of climate policy and argues that ideological divides, rather than purely economic considerations, often shape regulatory outcomes. These studies provide insight into why certain states resisted the CPP through legal challenges while others actively supported or implemented its provisions despite the lack of federal enforcement. This divergence in state responses resulted in different expectations for energy markets, making the CPP an instructive case for analyzing how political factors shape policy signaling and, in turn, fossil fuel consumption decisions.

Economic considerations also play a fundamental role in determining state responses to environmental regulation, particularly regarding fossil fuel dependency. Gillingham and Stock (2018) investigate how economic reliance on fossil fuels affects the likelihood of adopting clean energy policies, demonstrating that states with significant coal and natural gas industries are less inclined to transition toward renewable energy. Similarly, Greenstone and Looney (2012) assess the economic trade-offs of environmental regulations, showing that while such policies reduce emissions, they may also impose short-term economic costs on industries heavily reliant on fossil fuels. These economic constraints likely contributed to the variation in state responses to the CPP, with states dependent on fossil fuel production having stronger incentives to resist policies that signaled a shift toward renewables. Conversely, states with emerging clean energy industries had economic motivations to align with the CPP's objectives, expecting long-term economic benefits from a transition away from fossil fuels.

Regulatory uncertainty is another key factor influencing market behavior in the energy sector. Linn et al. (2014) find that when firms anticipate stricter environmental policies, they often preemptively adjust their investment strategies, shifting toward lower-carbon alternatives even before regulations take effect. Similarly, Bistline et al. (2019) argue that policy uncertainty creates volatility in energy markets, leading to mixed effects on investment in low-carbon technologies. In the case of the CPP, the key source of uncertainty was whether the policy would ultimately be enforced at the federal level. However, because some states signaled strong alignment with the CPP while others actively resisted it, firms operating in these states likely received different policy signals, leading to varying degrees of investment in fossil fuel consumption or reduction. This suggests that even without federal enforcement, regulatory expectations at the state level could influence fossil fuel consumption patterns.

The relationship between regulatory signals and fossil fuel consumption has also been explored through studies on state energy policies. Wiser et al. (2017) examine how state renewable portfolio standards (RPS) interact with federal policies, finding that states with stronger RPS commitments exhibit greater resilience to shifts in federal regulation. Similarly, Hitaj and Sarmiento (2017) analyze how federal incentives and regulatory uncertainty impact wind and solar energy expansion, concluding that policy stability is a key driver of energy investment. While these studies focus primarily on renewable energy adoption, their findings have broader implications for fossil fuel markets as well. If states with strong renewable mandates are more resilient to changes in federal regulation, then states with high fossil fuel dependency may also be more vulnerable to policy shifts, leading to different consumption patterns depending on how the state responded to the CPP.

Despite the extensive literature on environmental policy and market responses, a gap remains in understanding the specific effects of **state responses to the CPP as policy signals**

rather than an enacted regulation. Most prior studies have examined how regulatory uncertainty influences investment and state energy policies (Carley et al., 2018; Bistline et al., 2019), but little empirical analysis exists on how **state-level responses to an anticipated policy shaped fossil fuel consumption trends**. This study builds upon existing research by offering a quantitative assessment of how energy markets evolved in response to the CPP's introduction and subsequent legal challenges. Unlike prior studies that focus on enacted policies, this research evaluates the role of **policy signals in shaping fossil fuel consumption patterns**, providing new insight into the extent to which firms and consumers adjust their energy decisions based on expectations rather than formal regulatory action. By addressing this gap, the findings contribute to the broader discourse on environmental policy and regulatory uncertainty, offering valuable insights for policymakers, economists, and industry stakeholders navigating future climate policy developments.

V. Data

This study examines fossil fuel consumption trends using state-level energy data from the U.S. Energy Information Administration (EIA), specifically the State Energy Data System (SEDS), covering the years 1960 to 2022. The dataset provides a comprehensive historical account of fossil fuel usage across states, allowing for an analysis of long-term trends in total consumption and end-use consumption.

The analysis focuses on four key outcome variables, each measured in thousand barrels per capita. **Distillate fuel oil total consumption** represents the total amount of distillate fuel oil used, including both direct use and intermediary consumption in processes like power generation. **Distillate fuel oil total end-use consumption** captures the portion of distillate fuel oil directly consumed by businesses and consumers without further processing. **Petroleum total consumption** reflects the total consumption of all petroleum products, including gasoline, diesel, jet fuel, and heating oil, while **petroleum total end-use consumption** measures the direct consumption of petroleum products by end users, such as transportation, heating, and industrial use.

The distinction between total consumption and end-use consumption is essential to understanding whether reductions in fossil fuel use were driven by decreasing consumer demand or shifts in how fuels were processed and distributed. By leveraging the SEDS dataset, this study provides empirical insights into how regulatory expectations influenced fossil fuel consumption patterns over time. While prior research has primarily focused on renewable energy adoption, this analysis shifts the focus to fossil fuel markets, offering a new perspective on the effects of policy signaling on traditional energy consumption.

To clearly illustrate how states responded to the Clean Power Plan, **Figure 1** presents a map showing which states legally challenged the CPP (i.e., those that sued the federal government) and which did not. This visual distinction defines the treatment and control groups used throughout the analysis.

Following the map, **Tables 1a-1d** provides summary statistics for each outcome variable across all states, as well as separately for the states that sued and those that did not. This table reports the mean, standard deviation, minimum, and maximum values for each group, offering an overview of fossil fuel consumption patterns prior to any regression analysis. Together, the map and summary statistics provide important descriptive context for understanding the empirical approach used in this study.

Figure 1:

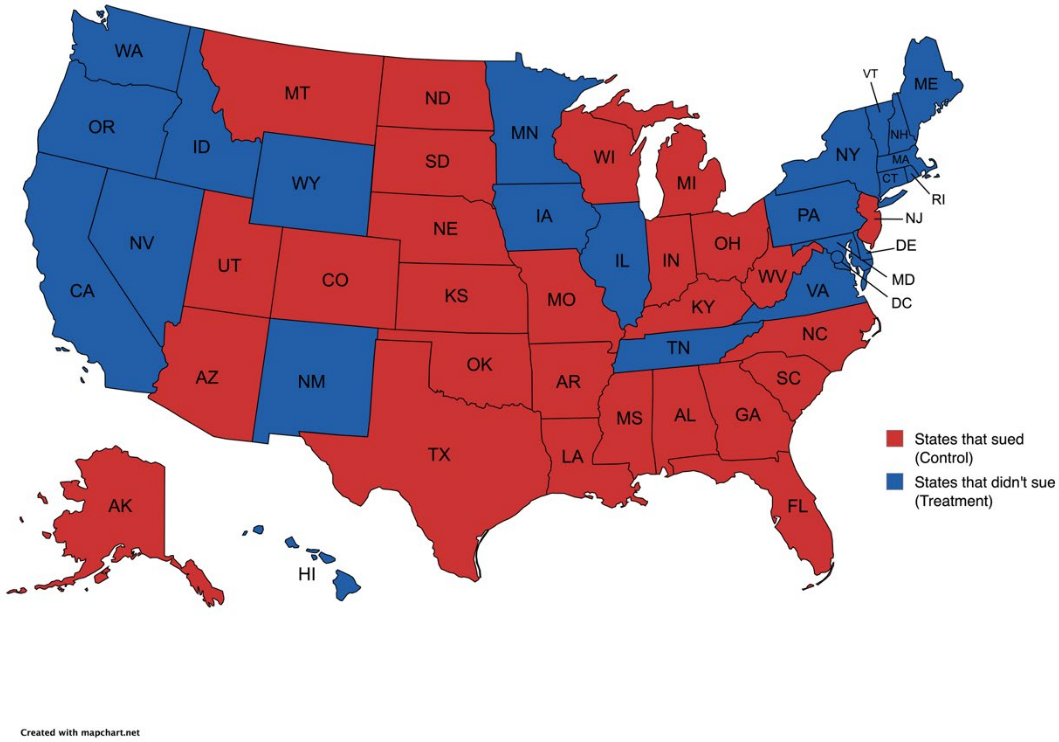

Table 1a. Summary Statistics – Distillate Fuel Oil Total Consumption (Barrels Per Capita)

Group	N	Mean	Std Dev	Min	Max
All States	3276	5.98	3.83	.45	34.57
States That Didn't Sue	1764	5.73	3.18	.45	26.71
States That Sued	1512	6.27	4.45	.89	34.57

Table 1b. Summary Statistics – Distillate Fuel Oil End-Use Consumption (Barrels Per Capita)

Group	N	Mean	Std Dev	Min	Max
All States	3276	5.87	3.77	.45	34.50
States That Didn't Sue	1764	5.58	3.06	.45	24.51
States That Sued	1512	6.21	4.44	.89	34.50

Table 1c. Summary Statistics – Petroleum Total Consumption (Barrels Per Capita)

Group	N	Mean	Std Dev	Min	Max
All States	3276	25.37	11.68	4.58	96.04
States That Didn't Sue	1764	23.73	9.55	4.58	87.46
States That Sued	1512	27.27	13.51	12.32	96.04

Table 1d. Summary Statistics – Petroleum End-Use Consumption (Barrels Per Capita)

Group	N	Mean	Std Dev	Min	Max
All States	3276	26.29	12.05	4.58	96.93
States That Didn't Sue	1764	25.09	10.35	4.58	89.34
States That Sued	1512	27.70	13.63	12.33	96.93

VI. Theory and Methodology

Economic theory suggests that government intervention in energy markets can directly influence fossil fuel consumption by altering regulatory incentives, costs, and expected future policy environments. Policies aimed at reducing carbon emissions, such as the Clean Power Plan (CPP), create market signals that can lead to reductions in fossil fuel demand even in the absence of full policy implementation. When firms and consumers anticipate stricter environmental regulations, they may adjust their energy consumption patterns, either by reducing reliance on fossil fuels or shifting toward alternative energy sources. Conversely, states that actively opposed the CPP may have interpreted its legal challenges as an indication that no significant regulatory shifts were imminent, thereby maintaining or even expanding fossil fuel use.

The primary expectation of this study is that states that supported the CPP—defined as those that did not sue the federal government over its provisions—experienced greater reductions in fossil fuel consumption compared to states that legally challenged it. This hypothesis aligns with economic theory, which posits that regulatory expectations influence market behavior. In particular, states anticipating stricter carbon regulations would have had greater incentives to reduce consumption of petroleum-based fuels and distillate fuel oil. Market participants in these states may have adopted energy efficiency measures, invested in cleaner technologies, or substituted fossil fuel consumption with alternative energy sources in response to expected policy changes.

To empirically assess this relationship, this study employs a two-way fixed effects difference-in-differences model to estimate the causal impact of the CPP policy signals on fossil fuel consumption. The analysis focuses on four key outcome variables: distillate fuel oil total consumption, distillate fuel oil total end-use consumption, petroleum total consumption, and petroleum total end-use consumption. Each of these measures provides insight into different aspects of fossil fuel demand, with total consumption capturing overall fossil fuel use, while end-use consumption isolates the portion of fossil fuels directly used by businesses and consumers without further processing.

$$\textbf{Model: } FFC_{st} = \beta_0 + \beta_1 Signal_{st} + \alpha_s + \gamma_t + \epsilon_{st}$$

Where:

- **FFC_{st}:** Represents per-capita fossil fuel consumption in state ***s*** and year ***t***.
- **$\beta_1 Signal_{st}$:** The main variable of interest, an indicator variable equal to 1 if state ***s*** signaled support for the Clean Power Plan (i.e., **did not file a lawsuit against the CPP**) after its announcement in 2015, and 0 otherwise.
- **α_s**: State fixed effects, controlling for time-invariant characteristics like geography, political ideology, or energy infrastructure.
- **γ_t:** Year fixed effects, controlling for nationwide trends and shocks, such as changes in global oil prices or economic recessions.
- **ϵ_{st}:** Error term, or white noise.

In addition to the baseline model, alternative specifications were estimated to test the robustness of the results. These extended models include additional control variables capturing natural heating and cooling needs across states. A log-linear model was also estimated using the natural logarithm of the dependent variable to allow for interpretation in percentage terms and to address any concerns related to skewness in the fossil fuel consumption data. These results are presented in the appendix and serve as an additional robustness check, confirming that the direction and significance of the effects are consistent with the baseline findings.

The identification strategy of this difference-in-differences model rests on the assumption that, in the absence of the CPP, the treatment and control groups would have followed parallel trends in fossil fuel consumption. To verify this assumption, visual parallel trends tests were conducted for each outcome variable. These tests indicate that, prior to 2016, both treatment and control states exhibited similar trajectories in fossil fuel consumption, supporting the validity of the causal estimates. To strengthen the identification strategy, parallel trends tests were conducted and presented in the appendix. These tests found no statistically significant differences in pre-treatment trends between compliant and non-compliant states, supporting the validity of the DiD approach. The study's empirical findings thus provide evidence on the extent to which regulatory expectations alone influenced fossil fuel market behavior.

VII. Results

The results from the Two-Way Fixed Effects Difference-in-Differences (TWFE DID) model provide strong evidence that the Clean Power Plan (CPP) led to **statistically significant reductions in fossil fuel consumption** per capita in the states that complied with the policy—those that did not sue the federal government. Table 2 reports the main results for the four key outcome variables: distillate fuel oil total consumption (end use), distillate fuel oil total consumption (total), petroleum total consumption (end use), and petroleum total consumption (total).

Across all four measures, the estimated coefficient on the treatment indicator (DID) is negative and statistically significant, suggesting that compliance with the CPP was associated with meaningful declines in per capita fossil fuel consumption. The declines are consistent in both magnitude and significance for total and end-use categories of each fuel type. Notably, the reductions in end-use consumption and total consumption are very similar, which implies that the **policy's impact was broad-based**, affecting not only industrial processing or upstream fuel activities but also final consumption by households, businesses, and institutions.

Table 2: Impact of Clean Power Plan on Fossil Fuel Consumption

Regressors	Distillate Total Consumption (end use)	Distillate Total Consumption	Petroleum Total Consumption	Petroleum Total Consumption (end use)
DID	-1.52*** (0.54)	-1.51*** (0.55)	-3.10** (1.22)	-2.25** (1.06)
Intercept	14.93*** (0.37)	15.93*** (0.38)	58.57*** (1.19)	57.57*** (1.19)
State and Year Fixed Effects?	Yes	Yes	Yes	Yes
Adjusted R-Square	0.7761	0.7777	0.8545	0.8642
Number of Observations	3,276	3,276	3,276	3,276
Overall Significance	2.1E+29***	3.4E+27***	3.0E+29***	2.3E+30***

"Sources: Fossil fuel data sourced from the State Energy Data System. Policy data on Clean Power Plan compliance sourced from EPA and state-level policy databases.
Notes: Robust standard errors are in parentheses and clustered at the state level. *,**, and *** indicate 10%, 5%, and 1% significance levels, respectively."

To better understand the scale of the reductions, consider the summary statistics reported in Table 1. On average, states that sued the federal government over the CPP consumed more fossil fuel per capita across all four outcome variables than non-suing states. For instance, **states that sued consumed over 6.27 barrels per capita of distillate fuel (total)** compared to **5.73 barrels in non-suing states**, and **over 27 barrels of petroleum (end use)** compared to **23.7 barrels** in non-suing states. These descriptive differences highlight the **higher baseline**

consumption in non-compliant states, reinforcing the importance of the CPP's effect in shifting consumption trends in the opposite direction for states that chose to comply.

The results for **distillate fuel oil** are particularly noteworthy. The TWFE DID model estimates a decline of **1.52 barrels per capita** in end-use consumption and **1.51 barrels** in total consumption. Given that the average state consumed just over **6 barrels per capita** of distillate fuel oil, this represents a **substantial relative reduction**. The near-equal drops in both total and end-use categories suggest that the policy's effect was widespread, influencing direct consumer use as well as industrial or intermediary sectors. This reinforces the interpretation that the **Clean Power Plan meaningfully curbed distillate fuel demand across the energy supply chain** in compliant states.

Petroleum consumption also declined significantly, with **total petroleum consumption** falling by **3.10 barrels per capita** and **end-use petroleum consumption** dropping by **2.25 barrels**. However, since baseline petroleum consumption was much higher—averaging between 23 to 27 barrels per capita depending on the state—the relative magnitude of these reductions, while still meaningful, is somewhat smaller than for distillate fuels. Still, the difference between total and end-use petroleum reductions suggests that some of the change occurred in upstream sectors like refining, in addition to reduced final demand.

To further validate these findings, robustness checks were performed by introducing **control variables for states' natural climate conditions**. Table 3 adds a control for **heating degree days**—a variable that captures how many days per year a state requires heating, and therefore proxies for inherent heating energy demand. With this control added, the DID coefficients remain **virtually unchanged**, with only minor differences in magnitude and sustained statistical significance. This suggests that the observed effects of the CPP are not being driven by colder states inherently using more or less fuel, but rather by the policy's implementation itself.

Table 3: Impact of Clean Power Plan on Fossil Fuel Consumption (with Controls for Heating Needs)

Regressors	Distillate Total Consumption (end use)	Distillate Total Consumption	Petroleum Total Consumption	Petroleum Total Consumption (end use)
DID	-1.49*** (0.53)	-1.48*** (0.54)	-3.04** (1.20)	-2.20** (1.04)
Intercept	6.97*** (2.00)	7.63*** (2.09)	42.80*** (6.16)	43.00*** (5.73)
State and Year Fixed Effects?	Yes	Yes	Yes	Yes
Control for Natural Heating Needs?	Yes	Yes	Yes	Yes
Adjusted R-Square	0.7789	0.7807	0.8555	0.8651
Number of Observations	3276	3276	3276	3276
Overall Significance	6.0E+03***	2.3E+02***	9.1E+06***	2.7E+07***

“”

Table 4 introduces a second robustness check using **cooling degree days** to capture states' need for air conditioning. Again, the treatment effects remain stable and statistically significant across all fuel types. These results confirm that **climate-related demand for energy services does not explain the CPP's observed effect on fossil fuel consumption**. The policy's impact holds even after controlling for both heating and cooling needs, increasing confidence that the main findings are not due to omitted variable bias.

Table 4: Impact of Clean Power Plan on Fossil Fuel Consumption (with Controls for Cooling Needs)

Regressors	**Distillate Total Consumption (end use)**	**Distillate Total Consumption**	**Petroleum Total Consumption**	**Petroleum Total Consumption (end use)**
DID	-1.53*** (0.55)	-1.52*** (0.55)	-3.12** (1.21)	-2.27** (1.05)
Intercept	14.86*** (0.39)	15.87*** (0.39)	58.43*** (1.13)	57.46*** (1.14)
State and Year Fixed Effects?	Yes	Yes	Yes	Yes
Control for Natural Cooling Needs?	Yes	Yes	Yes	Yes
Adjusted R-Square	0.7768	0.7784	0.8549	0.8644
Number of Observations	3276	3276	3276	3276
Overall Significance	2.4E+03***	2.8E+05***	2.8E+05***	5.2E+05***

“”

Overall, the robustness checks demonstrate that the estimated reductions in fossil fuel consumption remain significant and economically meaningful even when accounting for geographic and climatic variation. The consistency across total and end-use measures further suggests that the reductions were broad and systematic, affecting energy use across multiple sectors of the economy.

Additional robustness analysis was conducted using a **log-linear model** for all four outcome variables. These results are provided in Appendix Tables A2–A4. In that specification, the dependent variables were transformed using the natural logarithm to allow for interpretation in terms of **percentage changes**, and to address potential skewness in the distribution of energy consumption. The findings are broadly consistent with the main results: states that complied with the CPP experienced statistically significant reductions in all four outcome variables, confirming the direction and strength of the original estimates. However, given the difficulty of directly comparing the magnitude of log-transformed coefficients with those in level form, these models are primarily used to confirm robustness rather than to reinterpret the primary economic implications.

Taken together, the results offer strong evidence that the Clean Power Plan significantly reduced fossil fuel consumption in compliant states, with estimated reductions that are both statistically and economically substantial. The effects persist across multiple specifications and controls, supporting the conclusion that the CPP's policy signal had a measurable impact on the energy consumption behavior of U.S. states.

VIII. Conclusion

The findings of this study highlight the significant impact of policy signals on fossil fuel consumption patterns, even when regulations are not fully implemented. The Clean Power Plan (CPP) created divergent state-level regulatory expectations, leading to measurable reductions in per capita fossil fuel consumption in states that complied with the policy by not suing the federal government. The statistically significant declines across all four outcome variables suggest that regulatory signals alone influenced energy market behavior, affecting both direct consumer use and broader supply chain processes.

These results align with economic theory on regulatory expectations, demonstrating that firms and consumers adjust their energy consumption in anticipation of future policies. The most economically significant reduction, observed in petroleum total consumption, indicates a broader shift away from fossil fuel dependence in CPP-compliant states. The distinction between total and end-use consumption further suggests that these shifts were not limited to final consumer use but also reflected changes in upstream energy processing.

The broader implications of these findings suggest that environmental policy signals can drive meaningful changes in energy markets, even in the absence of full regulatory enforcement. The differences in fossil fuel consumption trends between compliant and opposing states emphasize the role of state-level policy certainty in shaping market expectations. Policymakers should consider how regulatory clarity and stability influence investment and consumption decisions, as even proposed policies can create incentives for firms and consumers to adjust their energy use.

This study contributes to the literature on regulatory uncertainty and energy transitions by providing empirical evidence of how policy signals affect fossil fuel consumption. Future research could explore how similar signals impact other aspects of the energy transition, such as investment in infrastructure and technological innovation. The results underscore the importance of policy design in shaping energy markets and demonstrate that even anticipated regulations can have a lasting influence on consumption patterns. Future research could further examine the effects of state-level policy signals on private-sector investment in renewable energy infrastructure, or explore whether similar trends emerge in sectors like transportation electrification or industrial emissions. Additionally, disaggregating fossil fuel reductions by sector or firm-level behavior could reveal how specific industries respond to regulatory expectations. Understanding these dynamics would provide more targeted insights for policymakers seeking to accelerate the energy transition.

IX. Appendix

Appendix Table 1: Main TWFE DID Model Parallel Trends Test Results

Regressors	**Distillate Total Consumption (end use)**	**Distillate Total Consumption**	**Petroleum Total Consumption**	**Petroleum Total Consumption (end use)**
Intercept	8.21***	8.30***	29.41***	28.94***
	(1.34)	(1.36)	(3.22)	(3.18)
Relative Year (Linear)	0.12	0.12*	0.16	0.1
	(0.07)	(0.07)	(0.15)	(0.14)
Relative Year Squared	0	0	0.01***	0.01**
	(0.00)	(0.00)	(0.01)	(0.01)
Treatment x Relative Year (Linear)	-0.11	-0.12	0.09	0.06
	(0.08)	(0.08)	(0.16)	(0.16)
Treatment x Relative Year Squared	0	0	0.01	0
	(0.00)	(0.00)	(0.01)	(0.01)
Treatment x Relative Year Cubed	0	0	0	0
	(0.00)	(0.00)	(0.00)	(0.00)

"Note: Table reports pre-treatment interaction term coefficients from TWFE models using relative year indicators.
Treatment x Relative Year terms test for differential trends between suing and non-suing states before policy announcement."

Appendix Table 2: Log-Linear Parallel Trends Test Results

Regressors	Distillate Total Consumption (end use)	Distillate Total Consumption	Petroleum Total Consumption	Petroleum Total Consumption (end use)
Intercept	1.75***	1.76***	3.16***	3.15***
	(0.08)	(0.08)	(0.06)	(0.06)
Relative Year (Linear)	0.01	0.01	0	0
	(0.00)	(0.00)	(0.00)	(0.00)
Relative Year Squared	0.00***	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
Relative Year Cubed	0.00***	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
Treatment x Relative Year (Linear)	0.02	0.02	0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.02)
Treatment x Relative Year Squared	0	0	0	0
	(0.00)	(0.00)	(0.00)	(0.00)
Treatment x Relative Year Cubed	0	0	0	0
	(0.00)	(0.00)	(0.00)	(0.00)

“”

Appendix Table 3: TWFE Log-Linear per-capita Estimates for CPP and Fossil Fuel Use

Regressors	Distillate Total Consumption (end use)	Distillate Total Consumption	Petroleum Total Consumption	Petroleum Total Consumption (end use)
DID Intercept	-0.23765** (0.098989) 2.436005*** (0.073179)	-0.22098** (0.100312) 2.486309*** (0.073515)	-0.1104** (0.05174) 3.958913*** (0.035575)	-0.08349* (0.045395) 3.950292*** (0.036412)
State and Year Fixed Effects?	Yes	Yes	Yes	Yes
Adjusted R-Square Number of Observations Overall Significance	0.7052 3,276 1.1E+27***	0.6956 3,276 1.4E+26***	0.8384 3,276 1.3E+28***	0.8531 3,276 4.6E+26***

“”

Appendix Table 4: Log-Linear Estimates of CPP Impact on Fossil Fuel Consumption with Heating Needs Control

Regressors	Distillate Total Consumption (end use)	Distillate Total Consumption	Petroleum Total Consumption	Petroleum Total Consumption (end use)
DID	-0.2325**	-0.21543**	-0.10874**	-0.08199*
	(0.097256)	(0.098082)	(0.051162)	(0.045066)
Intercept	0.891652**	0.821803**	3.462071***	3.499993***
	(0.381131)	(0.408665)	(0.170838)	(0.154105)
State and Year Fixed Effects?	Yes	Yes	Yes	Yes
Control for Natural Heating Needs?	Yes	Yes	Yes	Yes
Adjusted R-Square	0.7108	0.7022	0.8395	0.8541
Number of Observations	3276	3276	3276	3276
Overall Significance	8.8E+03***	7.5E+03***	7.4E+05***	1.2E+14***

“”

Appendix Table 5: Log-Linear Estimates of CPP Impact on Fossil Fuel Consumption with Cooling Needs Control

Regressors	Distillate Total Consumption (end use)	Distillate Total Consumption	Petroleum Total Consumption	Petroleum Total Consumption (end use)
DID	-0.23886**	-0.22207**	-0.11182**	-0.08466*
	(0.098392)	(0.099821)	(0.050735)	(0.044743)
Intercept	2.42934***	2.480327***	3.951095***	3.943895***
	(0.072217)	(0.072575)	(0.033666)	(0.034626)
State and Year Fixed Effects?	Yes	Yes	Yes	Yes
Control for Natural Cooling Needs?	Yes	Yes	Yes	Yes
Adjusted R-Square	0.7056	0.6959	0.8398	0.854
Number of Observations	3276	3276	3276	3276
Overall Significance	1.3E+03***	5.9E+03***	3.7E+04***	2.3E+04***

“”

X. References

Aldy, J. E. (2017). Frameworks for evaluating policy approaches to address the social cost of greenhouse gases. *Review of Environmental Economics and Policy, 11*(2), 275-293. https://doi.org/10.1093/reep/rex014

Auffhammer, M., & Mansur, E. T. (2014). Measuring climatic impacts on energy consumption: A review of the empirical literature. *Energy Economics, 46*, 522-530. https://doi.org/10.1016/j.eneco.2014.04.017

Bistline, J. E., Blanford, G. J., & Young, D. T. (2019). The role of uncertainty in U.S. power sector investments: A multi-model comparison. *Energy Economics, 81*, 1022-1037. https://doi.org/10.1016/j.eneco.2019.05.013

Borenstein, S., & Bushnell, J. (2015). The U.S. electricity industry after 20 years of restructuring. *Annual Review of Economics, 7*, 437-463. https://doi.org/10.1146/annurev-economics-080614-115630

Burtraw, D., & Woerman, M. (2013). State policy options to price carbon emissions. *Journal of the Association of Environmental and Resource Economists, 1*(1/2), 273-298. https://doi.org/10.1086/676033

Carley, S., Evans, T. P., Graff, M., & Konisky, D. M. (2018). A framework for evaluating geographic disparities in energy transition vulnerability. *Nature Energy, 3*(8), 621-627. https://doi.org/10.1038/s41560-018-0158-2

Carley, S., & Konisky, D. M. (2020). The justice and equity implications of the clean energy transition. *Nature Energy, 5*(8), 569-577. https://doi.org/10.1038/s41560-020-0641-6

Chan, G., Stavins, R. N., Stowe, R. C., & Sweeney, R. L. (2018). The political economy of state and local climate policy in the United States. *Review of Environmental Economics and Policy, 12*(1), 44-62. https://doi.org/10.1093/reep/rex023

Cicala, S. (2021). Imperfect markets versus imperfect regulation in U.S. electricity generation. *American Economic Review, 111*(1), 21-53. https://doi.org/10.1257/aer.20181149

Craig, R. K. (2016). Learning from California's climate policy. *Environmental Law, 46*(4), 1017-1050. https://doi.org/10.15779/Z38ZP3W

Davis, L. W., & Hausman, C. (2016). Market impacts of a nuclear power plant closure. *American Economic Journal: Applied Economics, 8*(2), 92-122. https://doi.org/10.1257/app.20150037

Fowlie, M., Reguant, M., & Ryan, S. P. (2016). Market-based emissions regulation and industry dynamics. *Journal of Political Economy, 124*(1), 249-302. https://doi.org/10.1086/684484

Fried, S., & Novan, K. (2022). The impact of renewables on electricity prices: Evidence from the U.S. *Journal of Environmental Economics and Management, 114*, 102668. https://doi.org/10.1016/j.jeem.2022.102668

Gillingham, K., & Stock, J. H. (2018). The cost of reducing greenhouse gas emissions. *Journal of Economic Perspectives, 32*(4), 53-72. https://doi.org/10.1257/jep.32.4.53

Graff, M., Carley, S., & Konisky, D. M. (2021). Policy conflict and support for renewable energy. *Energy Policy, 156*, 112437. https://doi.org/10.1016/j.enpol.2021.112437

Greenstone, M., List, J. A., & Syverson, C. (2012). The effects of environmental regulation on the competitiveness of U.S. manufacturing. *Journal of Economic Perspectives, 26*(1), 67-90. https://doi.org/10.1257/jep.26.1.67

Holland, S. P., Mansur, E. T., Muller, N. Z., & Yates, A. J. (2016). Are there environmental benefits from driving electric vehicles? The importance of local factors. *American Economic Review, 106*(12), 3700-3729. https://doi.org/10.1257/aer.20150897

Joskow, P. L. (2019). Challenges for wholesale electricity markets with intermittent renewable generation at scale: The U.S. experience. *Oxford Review of Economic Policy, 35*(2), 291-331. https://doi.org/10.1093/oxrep/grz007

Knittel, C. R. (2017). Automobiles on steroids: Product attribute trade-offs and technological progress in the automobile sector. *American Economic Review, 107*(7), 1970-1998. https://doi.org/10.1257/aer.20141407

Metcalf, G. E. (2019). On the economics of a carbon tax for the United States. *Brookings Papers on Economic Activity, 2019*(1), 1-63. https://doi.org/10.2139/ssrn.3398306

Newell, R. G., Raimi, D., & Aldana, G. (2019). U.S. state and local oil and gas revenue reliance. *Energy Policy, 132*, 1101-1113. https://doi.org/10.1016/j.enpol.2019.06.030

Stokes, L. C. (2020). *Short circuiting policy: Interest groups and the battle over clean energy and climate policy in the American states*. Oxford University Press. https://doi.org/10.1093/oso/9780190074259.001.0001

Sue Wing, I., & Cronin, J. A. (2016). Will the clean power plan harm the U.S. economy? *Economics of Energy & Environmental Policy, 5*(2), 35-53. https://doi.org/10.5547/2160-5890.5.2.iwin

Timilsina, G. R., & Shrestha, A. (2019). Carbon pricing and low-carbon investment: A review of theoretical and empirical evidence. *Climate Policy, 19*(2), 223-239. https://doi.org/10.1080/14693062.2018.1514483

U.S. Energy Information Administration (EIA). (n.d.). State Energy Data System (SEDS). *Retrieved from* https://www.eia.gov/state/seds/.

Vogt-Schilb, A., Meunier, G., & Hallegatte, S. (2018). When starting with the most expensive option makes sense: Use and misuse of marginal abatement cost curves. *World Bank Economic Review, 32*(2), 426-445. https://doi.org/10.1093/wber/lhw008

Zhang, X., Myhrvold, N. P., Hausfather, Z., & Caldeira, K. (2016). Climate benefits of natural gas as a bridge fuel depend on emissions reductions. *Environmental Research Letters, 11*(11), 114022. https://doi.org/10.1088/1748-9326/11/11/114022

XI. SAS Codes

```
proc import datafile="/home/u63723000/MySAS/Energy_Data_USA.xlsx"
   out=work.Data
   dbms=xlsx
   replace;
sheet="Data";
getnames=yes;
run;
proc transpose data=work.Data out=work.LongData(rename=(col1=Value));
   by State MSN;
   var _NUMERIC_;
run;
data work.LongData;
   set work.LongData;
   Year = input(_NAME_, 8.);
   drop _NAME_;
run;

proc sort data=work.LongData;
   by State Year;
run;

proc transpose data=work.LongData out=work.WideData (drop=_NAME_);
   by State Year;
   id MSN;
   var Value;
run;

data work.All_PerCapita;
   set work.WideData;
   if TPOPP > 0 then do;
      DFTXP_per_capita = DFTXP / TPOPP;
      DFTCP_per_capita = DFTCP / TPOPP;
```

```
        PATCP_per_capita = PATCP / TPOPP;
        PATXP_per_capita = PATXP / TPOPP;
    end;
    else do;
        DFTXP_per_capita = .;
        DFTCP_per_capita = .;
        PATCP_per_capita = .;
        PATXP_per_capita = .;
    end;
run;

proc import datafile="/home/u63723000/MySAS/Energy_Data_USA.xlsx"
    out=work.Policy
    dbms=xlsx
    replace;
sheet="Policy";
getnames=yes;
run;


proc sort data=work.All_PerCapita;
    by State Year;
run;

proc sort data=work.Policy;
    by State;
run;

data work.Combined;
    merge work.All_PerCapita work.Policy;
    by State;
    if FirstEffectiveYear="-" then DID = 0;
    else if Year >= FirstEffectiveYear then DID = 1;
```

```
    else DID = 0;
    keep State Year DFTXP_per_capita DFTCP_per_capita PATCP_per_capita PATXP_per_capita DID;
run;

ods output ParameterEstimates=PE_DFTXP DataSummary=Obs_DFTXP FitStatistics=AdjRsq_DFTXP
Effects=OverallSig_DFTXP;
proc surveyreg data=work.Combined;
    class State Year / ref=first;
    cluster State;
    model DFTXP_per_capita = DID State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_DFTCP DataSummary=Obs_DFTCP FitStatistics=AdjRsq_DFTCP
Effects=OverallSig_DFTCP;
proc surveyreg data=work.Combined;
    class State Year / ref=first;
    cluster State;
    model DFTCP_per_capita = DID State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_PATCP DataSummary=Obs_PATCP FitStatistics=AdjRsq_PATCP
Effects=OverallSig_PATCP;
proc surveyreg data=work.Combined;
    class State Year / ref=first;
    cluster State;
    model PATCP_per_capita = DID State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_PATXP DataSummary=Obs_PATXP FitStatistics=AdjRsq_PATXP
Effects=OverallSig_PATXP;
proc surveyreg data=work.Combined;
    class State Year / ref=first;
    cluster State;
    model PATXP_per_capita = DID State Year / solution adjrsq;
run;
```

```
data CleanResults;
   length Regressors $50 Model_DFTXP $30 Model_DFTCP $30 Model_PATCP $30 Model_PATXP $30;
   retain Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP SortOrder;

   array estimates{4} Est_DFTXP Est_DFTCP Est_PATCP Est_PATXP;
   array std_errors{4} SE_DFTXP SE_DFTCP SE_PATCP SE_PATXP;
   array probs{4} Prob_DFTXP Prob_DFTCP Prob_PATCP Prob_PATXP;
   array models{4} Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;
   merge
      PE_DFTXP (rename=(Estimate=Est_DFTXP StdErr=SE_DFTXP Probt=Prob_DFTXP) where=(Parameter in
("DID", "Intercept")))
      PE_DFTCP (rename=(Estimate=Est_DFTCP StdErr=SE_DFTCP Probt=Prob_DFTCP) where=(Parameter in
("DID", "Intercept")))
      PE_PATCP (rename=(Estimate=Est_PATCP StdErr=SE_PATCP Probt=Prob_PATCP) where=(Parameter in
("DID", "Intercept")))
      PE_PATXP (rename=(Estimate=Est_PATXP StdErr=SE_PATXP Probt=Prob_PATXP) where=(Parameter in
("DID", "Intercept")));

   if Parameter = "DID" then do;
      Regressors = "DID";
      SortOrder = 1;
   end;
   else if Parameter = "Intercept" then do;
      Regressors = "Intercept";
      SortOrder = 2;
   end;

   do i = 1 to 4;
      if probs{i} le 0.01 then Star = "***";
      else if probs{i} le 0.05 then Star = "**";
      else if probs{i} le 0.1 then Star = "*";
      else Star = "";
      models{i} = cats(put(estimates{i}, 8.2), Star); /* <-- changed from best8.3 to 8.2 for two decimals */
   end;
   output;
```

```
    Regressors = "";
    SortOrder + 0.5;
    Model_DFTXP = cats("(", put(SE_DFTXP, 8.2), ")");
    Model_DFTCP = cats("(", put(SE_DFTCP, 8.2), ")");
    Model_PATCP = cats("(", put(SE_PATCP, 8.2), ")");
    Model_PATXP = cats("(", put(SE_PATXP, 8.2), ")");
    output;
    keep Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP SortOrder;
run;

data ModelStats;
    length Regressors $50 Model_DFTXP $30 Model_DFTCP $30 Model_PATCP $30 Model_PATXP $30
SortOrder 8;

    if _n_ = 1 then do;
        Regressors = "State and Year Fixed Effects?";
        SortOrder = 3;
        Model_DFTXP = "Yes";
        Model_DFTCP = "Yes";
        Model_PATCP = "Yes";
        Model_PATXP = "Yes";
        output;
    end;

    merge
        AdjRsq_DFTXP (rename=(CValue1=Adj_DFTXP) where=(Label1="Adjusted R-Square"))
        AdjRsq_DFTCP (rename=(CValue1=Adj_DFTCP) where=(Label1="Adjusted R-Square"))
        AdjRsq_PATCP (rename=(CValue1=Adj_PATCP) where=(Label1="Adjusted R-Square"))
        AdjRsq_PATXP (rename=(CValue1=Adj_PATXP) where=(Label1="Adjusted R-Square"));
    Regressors = "Adjusted R-Square";
    SortOrder = 4;
    Model_DFTXP = put(Adj_DFTXP, best8.3);
    Model_DFTCP = put(Adj_DFTCP, best8.3);
```

```
    Model_PATCP = put(Adj_PATCP, best8.3);
    Model_PATXP = put(Adj_PATXP, best8.3);
    output;

    merge
      Obs_DFTXP (rename=(NValue1=Obs_DFTXP) where=(Label1="Number of Observations"))
      Obs_DFTCP (rename=(NValue1=Obs_DFTCP) where=(Label1="Number of Observations"))
      Obs_PATCP (rename=(NValue1=Obs_PATCP) where=(Label1="Number of Observations"))
      Obs_PATXP (rename=(NValue1=Obs_PATXP) where=(Label1="Number of Observations"));
    Regressors = "Number of Observations";
    SortOrder = 5;
    Model_DFTXP = put(Obs_DFTXP, comma8.);
    Model_DFTCP = put(Obs_DFTCP, comma8.);
    Model_PATCP = put(Obs_PATCP, comma8.);
    Model_PATXP = put(Obs_PATXP, comma8.);
    output;

    merge
      OverallSig_DFTXP (rename=(FValue=Sig_DFTXP) where=(Effect="Model"))
      OverallSig_DFTCP (rename=(FValue=Sig_DFTCP) where=(Effect="Model"))
      OverallSig_PATCP (rename=(FValue=Sig_PATCP) where=(Effect="Model"))
      OverallSig_PATXP (rename=(FValue=Sig_PATXP) where=(Effect="Model"));
    Regressors = "Overall Significance";
    SortOrder = 6;

    Model_DFTXP = cats(put(Sig_DFTXP, e8.2), "***");
    Model_DFTCP = cats(put(Sig_DFTCP, e8.2), "***");
    Model_PATCP = cats(put(Sig_PATCP, e8.2), "***");
    Model_PATXP = cats(put(Sig_PATXP, e8.2), "***");
    output;
run;

data FinalResultsTable;
```

```
    set CleanResults ModelStats;
run;
proc sort data=FinalResultsTable;
    by SortOrder;
run;


ods excel file = "~/MySAS/1AAMainResults.xlsx" options(Embedded_Titles = "ON" Embedded_Footnotes =
"ON");
title "Table 2: Impact of Clean Power Plan on Fossil Fuel Consumption";
footnote1 justify=left "Sources: Fossil fuel data sourced from the State Energy Data System. Policy data on Clean
Power Plan compliance sourced from EPA and state-level policy databases.";
footnote2 justify=left "Notes: Robust standard errors are in parentheses and clustered at the state level. *,**, and ***
indicate 10%, 5%, and 1% significance levels, respectively.";


proc print data=FinalResultsTable noobs label;
    var Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;
    format Regressors $50. Model_DFTXP $30. Model_DFTCP $30. Model_PATCP $30. Model_PATXP $30.;
    label
        Model_DFTXP = "Distillate Total Consumption (end use)"
        Model_DFTCP = "Distillate Total Consumption"
        Model_PATCP = "Petroleum Total Consumption"
        Model_PATXP = "Petroleum Total Consumption (end use)";
run;


ods excel close;


data work.Combined;
    merge work.All_PerCapita work.Policy;
    by State;
    if FirstEffectiveYear="-" then DID = 0;
    else if Year >= FirstEffectiveYear then DID = 1;
    else DID = 0;
    if FirstEffectiveYear="-" then Treatment=0; else Treatment=1;
    keep State Treatment Year DFTXP_per_capita DFTCP_per_capita PATCP_per_capita PATXP_per_capita
FirstEffectiveYear DID;
```

```
run;

data work.Combined_Pre;
    set work.Combined;
    where Year < 2016;

    RT = Year - 2015;
    RT2 = RT**2;
    RT3 = RT**3;
    TreatRT = Treatment * RT;
    TreatRT2 = Treatment * RT2;
    TreatRT3 = Treatment * RT3;
run;

ods output ParameterEstimates=PE_PT_DFTXP;
proc surveyreg data=work.Combined_Pre;
    class State;
    cluster State;
    model DFTXP_per_capita = RT RT2 RT3 Treatment TreatRT TreatRT2 TreatRT3 / solution;
run;

ods output ParameterEstimates=PE_PT_DFTCP;
proc surveyreg data=work.Combined_Pre;
    class State;
    cluster State;
    model DFTCP_per_capita = RT RT2 RT3 Treatment TreatRT TreatRT2 TreatRT3 / solution;
run;

ods output ParameterEstimates=PE_PT_PATCP;
proc surveyreg data=work.Combined_Pre;
    class State;
    cluster State;
    model PATCP_per_capita = RT RT2 RT3 Treatment TreatRT TreatRT2 TreatRT3 / solution;
```

```
run;

ods output ParameterEstimates=PE_PT_PATXP;
proc surveyreg data=work.Combined_Pre;
   class State;
   cluster State;
   model PATXP_per_capita = RT RT2 RT3 Treatment TreatRT TreatRT2 TreatRT3 / solution;
run;

proc sort data=PE_PT_DFTXP; by Parameter; run;
proc sort data=PE_PT_DFTCP; by Parameter; run;
proc sort data=PE_PT_PATCP; by Parameter; run;
proc sort data=PE_PT_PATXP; by Parameter; run;

data ParallelTrendsResults;
  length Regressors $50 Model_DFTXP $30 Model_DFTCP $30
         Model_PATCP $30 Model_PATXP $30 Star $3;
  retain SortOrder;

  merge
    PE_PT_DFTXP(rename=(Estimate=Est_DFTXP StdErr=SE_DFTXP Probt=Prob_DFTXP))
    PE_PT_DFTCP(rename=(Estimate=Est_DFTCP StdErr=SE_DFTCP Probt=Prob_DFTCP))
    PE_PT_PATCP(rename=(Estimate=Est_PATCP StdErr=SE_PATCP Probt=Prob_PATCP))
    PE_PT_PATXP(rename=(Estimate=Est_PATXP StdErr=SE_PATXP Probt=Prob_PATXP));
  by Parameter;

  select (Parameter);
    when ("Intercept")  do; Regressors="Intercept";                              SortOrder=1; end;
    when ("RT")         do; Regressors="Relative Year (Linear)";                 SortOrder=2; end;
    when ("RT2")        do; Regressors="Relative Year Squared";                  SortOrder=3; end;
    when ("TreatRT")    do; Regressors="Treatment x Relative Year (Linear)";     SortOrder=4; end;
    when ("TreatRT2")   do; Regressors="Treatment x Relative Year Squared";      SortOrder=5; end;
    when ("TreatRT3")   do; Regressors="Treatment x Relative Year Cubed";        SortOrder=6; end;
```

```
    otherwise delete;
  end;

  array ests{4} Est_DFTXP Est_DFTCP Est_PATCP Est_PATXP;
  array pvals{4} Prob_DFTXP Prob_DFTCP Prob_PATCP Prob_PATXP;
  array mods{4}  Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;

  do i = 1 to 4;
    if pvals{i} <= 0.01 then Star="***";
    else if pvals{i} <= 0.05 then Star="**";
    else if pvals{i} <= 0.10 then Star="*";
    else Star="";
    mods{i} = cats( put(ests{i}, 8.2), Star );
  end;
  output;
  array ses{4} SE_DFTXP SE_DFTCP SE_PATCP SE_PATXP;
  do i = 1 to 4;
    mods{i} = cats( "(", put(ses{i}, 8.2), ")" );
  end;
  Regressors = "";
  SortOrder + 0.5;
  output;

  keep SortOrder Regressors Model: ;
run;

proc sort data=ParallelTrendsResults; by SortOrder; run;
ods excel file="~/MySAS/A1ParallelTrends_Complete.xlsx" options(Embedded_Titles="ON"
Embedded_Footnotes="ON");

title "Appendix Table A1. Parallel Trends Test Results";
footnote1 "Note: Table reports pre-treatment interaction term coefficients from TWFE models using relative year
indicators.";
```

```
footnote2 "Treatment x Relative Year terms test for differential trends between suing and non-suing states before policy announcement.";


proc print data=ParallelTrendsResults noobs label;
    var Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;
    label
        Model_DFTXP = "Distillate Total Consumption (end use)"
        Model_DFTCP = "Distillate Total Consumption"
        Model_PATCP = "Petroleum Total Consumption"
        Model_PATXP = "Petroleum Total Consumption (end use)";
run;


title;
footnote;
ods excel close;



proc import datafile="/home/u63723000/MySAS/Energy_Data_USA.xlsx"
    out=work.Data
    dbms=xlsx
    replace;
sheet="Data";
getnames=yes;
run;


proc transpose data=work.Data out=work.LongData(rename=(col1=Value));
    by State MSN;
    var _NUMERIC_;
run;



data work.LongData;
    set work.LongData;
    Year = input(_NAME_, 8.);
```

```
    drop _NAME_;
run;


proc sort data=work.LongData;
    by State Year;
run;


proc transpose data=work.LongData out=work.WideData (drop=_NAME_);
    by State Year;
    id MSN;
    var Value;
run;


data work.All_PerCapita;
    set work.WideData;
    if TPOPP > 0 then do;
        DFTXP_per_capita = DFTXP / TPOPP;
        DFTCP_per_capita = DFTCP / TPOPP;
        PATCP_per_capita = PATCP / TPOPP;
        PATXP_per_capita = PATXP / TPOPP;
    end;
    else do;
        DFTXP_per_capita = .;
        DFTCP_per_capita = .;
        PATCP_per_capita = .;
        PATXP_per_capita = .;
    end;
run;
```

```
proc import datafile="/home/u63723000/MySAS/Energy_Data_USA.xlsx"
    out=work.Policy
    dbms=xlsx
    replace;
sheet="Policy";
getnames=yes;
run;


proc sort data=work.All_PerCapita;
    by State Year;
run;

proc sort data=work.Policy;
    by State;
run;
data work.Combined;
    merge work.All_PerCapita work.Policy;
    by State;
    if FirstEffectiveYear="-" then DID = 0;
    else if Year >= FirstEffectiveYear then DID = 1;
    else DID = 0;
    keep State Year DFTXP_per_capita DFTCP_per_capita PATCP_per_capita PATXP_per_capita ZWHDP DID;
run;
ods output ParameterEstimates=PE_DFTXP DataSummary=Obs_DFTXP FitStatistics=AdjRsq_DFTXP
Effects=OverallSig_DFTXP;
proc surveyreg data=work.Combined;
    class State Year / ref=first;
    cluster State;
    model DFTXP_per_capita = DID ZWHDP State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_DFTCP DataSummary=Obs_DFTCP FitStatistics=AdjRsq_DFTCP
Effects=OverallSig_DFTCP;
```

```
proc surveyreg data=work.Combined;
    class State Year / ref=first;
    cluster State;
    model DFTCP_per_capita = DID ZWHDP State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_PATCP DataSummary=Obs_PATCP FitStatistics=AdjRsq_PATCP
Effects=OverallSig_PATCP;
proc surveyreg data=work.Combined;
    class State Year / ref=first;
    cluster State;
    model PATCP_per_capita = DID ZWHDP State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_PATXP DataSummary=Obs_PATXP FitStatistics=AdjRsq_PATXP
Effects=OverallSig_PATXP;
proc surveyreg data=work.Combined;
    class State Year / ref=first;
    cluster State;
    model PATXP_per_capita = DID ZWHDP State Year / solution adjrsq;
run;
data CleanResults;
    length Regressors $50 Model_DFTXP $30 Model_DFTCP $30 Model_PATCP $30 Model_PATXP $30;
    retain Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP SortOrder;

    array estimates{4} Est_DFTXP Est_DFTCP Est_PATCP Est_PATXP;
    array std_errors{4} SE_DFTXP SE_DFTCP SE_PATCP SE_PATXP;
    array probs{4} Prob_DFTXP Prob_DFTCP Prob_PATCP Prob_PATXP;
    array models{4} Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;

    merge
        PE_DFTXP (rename=(Estimate=Est_DFTXP StdErr=SE_DFTXP Probt=Prob_DFTXP) where=(Parameter in
("DID", "Intercept")))
        PE_DFTCP (rename=(Estimate=Est_DFTCP StdErr=SE_DFTCP Probt=Prob_DFTCP) where=(Parameter in
("DID", "Intercept")))
```

```
    PE_PATCP (rename=(Estimate=Est_PATCP StdErr=SE_PATCP Probt=Prob_PATCP) where=(Parameter in
("DID", "Intercept")))
    PE_PATXP (rename=(Estimate=Est_PATXP StdErr=SE_PATXP Probt=Prob_PATXP) where=(Parameter in
("DID", "Intercept")));

  if Parameter = "DID" then do;
    Regressors = "DID";
    SortOrder = 1;
  end;
  else if Parameter = "Intercept" then do;
    Regressors = "Intercept";
    SortOrder = 2;
  end;
  do i = 1 to 4;
    if probs{i} le 0.01 then Star = "***";
    else if probs{i} le 0.05 then Star = "**";
    else if probs{i} le 0.1 then Star = "*";
    else Star = "";
    models{i} = cats(put(estimates{i}, 8.2), Star);
  end;
  output;
  Regressors = "";
  SortOrder + 0.5;
  Model_DFTXP = cats("(", put(SE_DFTXP, 8.2), ")");
  Model_DFTCP = cats("(", put(SE_DFTCP, 8.2), ")");
  Model_PATCP = cats("(", put(SE_PATCP, 8.2), ")");
  Model_PATXP = cats("(", put(SE_PATXP, 8.2), ")");
  output;

  keep Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP SortOrder;
run;
data ModelStats;
  length Regressors $50 Model_DFTXP $30 Model_DFTCP $30 Model_PATCP $30 Model_PATXP $30
SortOrder 8;
```

```
if _n_ = 1 then do;
   Regressors = "State and Year Fixed Effects?";
   SortOrder = 3;
   Model_DFTXP = "Yes";
   Model_DFTCP = "Yes";
   Model_PATCP = "Yes";
   Model_PATXP = "Yes";
   output;
end;

Regressors = "Control for Natural Heating Needs?";
SortOrder = 3.5;
Model_DFTXP = "Yes";
Model_DFTCP = "Yes";
Model_PATCP = "Yes";
Model_PATXP = "Yes";
output;

merge
   AdjRsq_DFTXP (rename=(CValue1=Adj_DFTXP) where=(Label1="Adjusted R-Square"))
   AdjRsq_DFTCP (rename=(CValue1=Adj_DFTCP) where=(Label1="Adjusted R-Square"))
   AdjRsq_PATCP (rename=(CValue1=Adj_PATCP) where=(Label1="Adjusted R-Square"))
   AdjRsq_PATXP (rename=(CValue1=Adj_PATXP) where=(Label1="Adjusted R-Square"));
Regressors = "Adjusted R-Square";
SortOrder = 4;
Model_DFTXP = put(Adj_DFTXP, best8.3);
Model_DFTCP = put(Adj_DFTCP, best8.3);
Model_PATCP = put(Adj_PATCP, best8.3);
Model_PATXP = put(Adj_PATXP, best8.3);
output;

merge
```

```
        Obs_DFTXP (rename=(NValue1=Obs_DFTXP) where=(Label1="Number of Observations"))
        Obs_DFTCP (rename=(NValue1=Obs_DFTCP) where=(Label1="Number of Observations"))
        Obs_PATCP (rename=(NValue1=Obs_PATCP) where=(Label1="Number of Observations"))
        Obs_PATXP (rename=(NValue1=Obs_PATXP) where=(Label1="Number of Observations"));
    Regressors = "Number of Observations";
    SortOrder = 5;
    Model_DFTXP = put(Obs_DFTXP, comma8.);
    Model_DFTCP = put(Obs_DFTCP, comma8.);
    Model_PATCP = put(Obs_PATCP, comma8.);
    Model_PATXP = put(Obs_PATXP, comma8.);
    output;

    merge
        OverallSig_DFTXP (rename=(FValue=Sig_DFTXP) where=(Effect="Model"))
        OverallSig_DFTCP (rename=(FValue=Sig_DFTCP) where=(Effect="Model"))
        OverallSig_PATCP (rename=(FValue=Sig_PATCP) where=(Effect="Model"))
        OverallSig_PATXP (rename=(FValue=Sig_PATXP) where=(Effect="Model"));
    Regressors = "Overall Significance";
    SortOrder = 6;
    Model_DFTXP = cats(put(Sig_DFTXP, e8.2), "***");
    Model_DFTCP = cats(put(Sig_DFTCP, e8.2), "***");
    Model_PATCP = cats(put(Sig_PATCP, e8.2), "***");
    Model_PATXP = cats(put(Sig_PATXP, e8.2), "***");
    output;
run;
data FinalResultsTable;
    set CleanResults ModelStats;
run;
proc sort data=FinalResultsTable;
    by SortOrder;
run;
ods excel file = "~/MySAS/1AAHeatControl.xlsx" options(Embedded_Titles="ON" Embedded_Footnotes="ON");
title "Table 3: Impact of Clean Power Plan on Fossil Fuel Consumption (with Controls for Heating Needs)";
```

```
footnote1 justify=left "Sources: Fossil fuel data sourced from the State Energy Data System (SEDS). Policy data on Clean Power Plan compliance sourced from EPA.";

footnote2 justify=left "Notes: Robust standard errors in parentheses, clustered at state level. *,**,*** denote 10%, 5%, and 1% significance levels.";


proc print data=FinalResultsTable noobs label;
    var Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;
    label
        Model_DFTXP = "Distillate Total Consumption (end use)"
        Model_DFTCP = "Distillate Total Consumption"
        Model_PATCP = "Petroleum Total Consumption"
        Model_PATXP = "Petroleum Total Consumption (end use)";
run;


ods excel close;



proc import datafile="/home/u63723000/MySAS/Energy_Data_USA.xlsx"
    out=work.Data
    dbms=xlsx
    replace;
sheet="Data";
getnames=yes;
run;



proc transpose data=work.Data out=work.LongData(rename=(col1=Value));
    by State MSN;
    var _NUMERIC_;
run;


data work.LongData;
    set work.LongData;
    Year = input(_NAME_, 8.);
```

```
    drop _NAME_;
run;

proc sort data=work.LongData;
    by State Year;
run;

proc transpose data=work.LongData out=work.WideData (drop=_NAME_);
    by State Year;
    id MSN;
    var Value;
run;


data work.All_PerCapita;
    set work.WideData;
    if TPOPP > 0 then do;
        DFTXP_per_capita = DFTXP / TPOPP;
        DFTCP_per_capita = DFTCP / TPOPP;
        PATCP_per_capita = PATCP / TPOPP;
        PATXP_per_capita = PATXP / TPOPP;
    end;
    else do;
        DFTXP_per_capita = .;
        DFTCP_per_capita = .;
        PATCP_per_capita = .;
        PATXP_per_capita = .;
    end;
run;


proc import datafile="/home/u63723000/MySAS/Energy_Data_USA.xlsx"
    out=work.Policy
```

```
    dbms=xlsx
    replace;
sheet="Policy";
getnames=yes;
run;

proc sort data=work.All_PerCapita;
    by State Year;
run;

proc sort data=work.Policy;
    by State;
run;

data work.Combined;
    merge work.All_PerCapita work.Policy;
    by State;
    if FirstEffectiveYear="-" then DID = 0;
    else if Year >= FirstEffectiveYear then DID = 1;
    else DID = 0;
    keep State Year DFTXP_per_capita DFTCP_per_capita PATCP_per_capita PATXP_per_capita ZWCDP DID;
run;


ods output ParameterEstimates=PE_DFTXP DataSummary=Obs_DFTXP FitStatistics=AdjRsq_DFTXP
Effects=OverallSig_DFTXP;
proc surveyreg data=work.Combined;
    class State Year / ref=first;
    cluster State;
    model DFTXP_per_capita = DID ZWCDP State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_DFTCP DataSummary=Obs_DFTCP FitStatistics=AdjRsq_DFTCP
Effects=OverallSig_DFTCP;
```

```
proc surveyreg data=work.Combined;
   class State Year / ref=first;
   cluster State;
   model DFTCP_per_capita = DID ZWCDP State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_PATCP DataSummary=Obs_PATCP FitStatistics=AdjRsq_PATCP
Effects=OverallSig_PATCP;
proc surveyreg data=work.Combined;
   class State Year / ref=first;
   cluster State;
   model PATCP_per_capita = DID ZWCDP State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_PATXP DataSummary=Obs_PATXP FitStatistics=AdjRsq_PATXP
Effects=OverallSig_PATXP;
proc surveyreg data=work.Combined;
   class State Year / ref=first;
   cluster State;
   model PATXP_per_capita = DID ZWCDP State Year / solution adjrsq;
run;


data CleanResults;
   length Regressors $50 Model_DFTXP $30 Model_DFTCP $30 Model_PATCP $30 Model_PATXP $30;
   retain Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP SortOrder;

   array estimates{4} Est_DFTXP Est_DFTCP Est_PATCP Est_PATXP;
   array std_errors{4} SE_DFTXP SE_DFTCP SE_PATCP SE_PATXP;
   array probs{4} Prob_DFTXP Prob_DFTCP Prob_PATCP Prob_PATXP;
   array models{4} Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;

   merge
```

```
    PE_DFTXP (rename=(Estimate=Est_DFTXP StdErr=SE_DFTXP Probt=Prob_DFTXP) where=(Parameter in
("DID", "Intercept")))
    PE_DFTCP (rename=(Estimate=Est_DFTCP StdErr=SE_DFTCP Probt=Prob_DFTCP) where=(Parameter in
("DID", "Intercept")))
    PE_PATCP (rename=(Estimate=Est_PATCP StdErr=SE_PATCP Probt=Prob_PATCP) where=(Parameter in
("DID", "Intercept")))
    PE_PATXP (rename=(Estimate=Est_PATXP StdErr=SE_PATXP Probt=Prob_PATXP) where=(Parameter in
("DID", "Intercept")));

  /* Main coefficients */
  if Parameter = "DID" then do;
    Regressors = "DID";
    SortOrder = 1;
  end;
  else if Parameter = "Intercept" then do;
    Regressors = "Intercept";
    SortOrder = 2;
  end;

  do i = 1 to 4;
    if probs{i} le 0.01 then Star = "***";
    else if probs{i} le 0.05 then Star = "**";
    else if probs{i} le 0.1 then Star = "*";
    else Star = "";
    models{i} = cats(put(estimates{i}, 8.2), Star);
  end;
  output;

  Regressors = "";
  SortOrder + 0.5;
  Model_DFTXP = cats("(", put(SE_DFTXP, 8.2), ")");
  Model_DFTCP = cats("(", put(SE_DFTCP, 8.2), ")");
  Model_PATCP = cats("(", put(SE_PATCP, 8.2), ")");
  Model_PATXP = cats("(", put(SE_PATXP, 8.2), ")");
  output;
```

```
    keep Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP SortOrder;
run;

data ModelStats;
    length Regressors $50 Model_DFTXP $30 Model_DFTCP $30 Model_PATCP $30 Model_PATXP $30
SortOrder 8;

    if _n_ = 1 then do;
        Regressors = "State and Year Fixed Effects?";
        SortOrder = 3;
        Model_DFTXP = "Yes";
        Model_DFTCP = "Yes";
        Model_PATCP = "Yes";
        Model_PATXP = "Yes";
        output;
    end;
    Regressors = "Control for Natural Cooling Needs?";
    SortOrder = 3.5;
    Model_DFTXP = "Yes";
    Model_DFTCP = "Yes";
    Model_PATCP = "Yes";
    Model_PATXP = "Yes";
    output;
    merge
        AdjRsq_DFTXP (rename=(CValue1=Adj_DFTXP) where=(Label1="Adjusted R-Square"))
        AdjRsq_DFTCP (rename=(CValue1=Adj_DFTCP) where=(Label1="Adjusted R-Square"))
        AdjRsq_PATCP (rename=(CValue1=Adj_PATCP) where=(Label1="Adjusted R-Square"))
        AdjRsq_PATXP (rename=(CValue1=Adj_PATXP) where=(Label1="Adjusted R-Square"));
    Regressors = "Adjusted R-Square";
    SortOrder = 4;
    Model_DFTXP = put(Adj_DFTXP, best8.3);
    Model_DFTCP = put(Adj_DFTCP, best8.3);
```

```
    Model_PATCP = put(Adj_PATCP, best8.3);
    Model_PATXP = put(Adj_PATXP, best8.3);
    output;

    merge
        Obs_DFTXP (rename=(NValue1=Obs_DFTXP) where=(Label1="Number of Observations"))
        Obs_DFTCP (rename=(NValue1=Obs_DFTCP) where=(Label1="Number of Observations"))
        Obs_PATCP (rename=(NValue1=Obs_PATCP) where=(Label1="Number of Observations"))
        Obs_PATXP (rename=(NValue1=Obs_PATXP) where=(Label1="Number of Observations"));
    Regressors = "Number of Observations";
    SortOrder = 5;
    Model_DFTXP = put(Obs_DFTXP, comma8.);
    Model_DFTCP = put(Obs_DFTCP, comma8.);
    Model_PATCP = put(Obs_PATCP, comma8.);
    Model_PATXP = put(Obs_PATXP, comma8.);
    output;
  merge
        OverallSig_DFTXP (rename=(FValue=Sig_DFTXP) where=(Effect="Model"))
        OverallSig_DFTCP (rename=(FValue=Sig_DFTCP) where=(Effect="Model"))
        OverallSig_PATCP (rename=(FValue=Sig_PATCP) where=(Effect="Model"))
        OverallSig_PATXP (rename=(FValue=Sig_PATXP) where=(Effect="Model"));
    Regressors = "Overall Significance";
    SortOrder = 6;
    Model_DFTXP = cats(put(Sig_DFTXP, e8.2), "***");
    Model_DFTCP = cats(put(Sig_DFTCP, e8.2), "***");
    Model_PATCP = cats(put(Sig_PATCP, e8.2), "***");
    Model_PATXP = cats(put(Sig_PATXP, e8.2), "***");
    output;
run;

data FinalResultsTable;
    set CleanResults ModelStats;
run;
```

```
proc sort data=FinalResultsTable;
   by SortOrder;
run;


ods excel file = "~/MySAS/1AACoolControls.xlsx" options(Embedded_Titles="ON" Embedded_Footnotes="ON");
title "Table 4: Impact of Clean Power Plan on Fossil Fuel Consumption (with Controls for Cooling Needs)";
footnote1 justify=left "Sources: Fossil fuel data sourced from the State Energy Data System (SEDS). Policy data on Clean Power Plan compliance sourced from EPA.";
footnote2 justify=left "Notes: Robust standard errors in parentheses, clustered at state level. *,**,*** denote 10%, 5%, and 1% significance levels.";


proc print data=FinalResultsTable noobs label;
   var Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;
   label
      Model_DFTXP = "Distillate Total Consumption (end use)"
      Model_DFTCP = "Distillate Total Consumption"
      Model_PATCP = "Petroleum Total Consumption"
      Model_PATXP = "Petroleum Total Consumption (end use)";
run;


ods excel close;


data work.Combined_Log;
   set work.Combined;
   if DFTXP_per_capita > 0 then log_DFTXP = log(DFTXP_per_capita);
   if DFTCP_per_capita > 0 then log_DFTCP = log(DFTCP_per_capita);
   if PATCP_per_capita > 0 then log_PATCP = log(PATCP_per_capita);
   if PATXP_per_capita > 0 then log_PATXP = log(PATXP_per_capita);
run;


ods output ParameterEstimates=PE_DFTXP DataSummary=Obs_DFTXP FitStatistics=AdjRsq_DFTXP
Effects=OverallSig_DFTXP;
proc surveyreg data=work.Combined_Log;
   class State Year / ref=first;
   cluster State;
   model log_DFTXP = DID State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_DFTCP DataSummary=Obs_DFTCP FitStatistics=AdjRsq_DFTCP
Effects=OverallSig_DFTCP;
```

```
proc surveyreg data=work.Combined_Log;
   class State Year / ref=first;
   cluster State;
   model log_DFTCP = DID State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_PATCP DataSummary=Obs_PATCP FitStatistics=AdjRsq_PATCP
Effects=OverallSig_PATCP;
proc surveyreg data=work.Combined_Log;
   class State Year / ref=first;
   cluster State;
   model log_PATCP = DID State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_PATXP DataSummary=Obs_PATXP FitStatistics=AdjRsq_PATXP
Effects=OverallSig_PATXP;
proc surveyreg data=work.Combined_Log;
   class State Year / ref=first;
   cluster State;
   model log_PATXP = DID State Year / solution adjrsq;
run;


data CleanResults;
   length Regressors $50 Model_DFTXP $30 Model_DFTCP $30 Model_PATCP $30 Model_PATXP $30;
   retain Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP SortOrder;

   array estimates{4} Est_DFTXP Est_DFTCP Est_PATCP Est_PATXP;
   array std_errors{4} SE_DFTXP SE_DFTCP SE_PATCP SE_PATXP;
   array probs{4} Prob_DFTXP Prob_DFTCP Prob_PATCP Prob_PATXP;
   array models{4} Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;

   merge
      PE_DFTXP (rename=(Estimate=Est_DFTXP StdErr=SE_DFTXP Probt=Prob_DFTXP) where=(Parameter in
("DID", "Intercept")))
      PE_DFTCP (rename=(Estimate=Est_DFTCP StdErr=SE_DFTCP Probt=Prob_DFTCP) where=(Parameter in
("DID", "Intercept")))
      PE_PATCP (rename=(Estimate=Est_PATCP StdErr=SE_PATCP Probt=Prob_PATCP) where=(Parameter in
("DID", "Intercept")))
      PE_PATXP (rename=(Estimate=Est_PATXP StdErr=SE_PATXP Probt=Prob_PATXP) where=(Parameter in
("DID", "Intercept")));

   if Parameter = "DID" then do;
      Regressors = "DID";
      SortOrder = 1;
   end;
   else if Parameter = "Intercept" then do;
      Regressors = "Intercept";
      SortOrder = 2;
   end;

   do i = 1 to 4;
      if probs{i} le 0.01 then Star = "***";
      else if probs{i} le 0.05 then Star = "**";
      else if probs{i} le 0.1 then Star = "*";
      else Star = "";
```

```
        models{i} = cats(put(estimates{i}, best8.2), Star);  /* 2 decimal places here */
    end;
    output;


    Regressors = "";
    SortOrder + 0.5;
    Model_DFTXP = cats("(", put(SE_DFTXP, best8.2), ")");  /* 2 decimal places here */
    Model_DFTCP = cats("(", put(SE_DFTCP, best8.2), ")");
    Model_PATCP = cats("(", put(SE_PATCP, best8.2), ")");
    Model_PATXP = cats("(", put(SE_PATXP, best8.2), ")");
    output;

    keep Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP SortOrder;
run;


data ModelStats;
    length Regressors $50 Model_DFTXP $30 Model_DFTCP $30 Model_PATCP $30 Model_PATXP $30
SortOrder 8;

    if _n_ = 1 then do;
        Regressors = "State and Year Fixed Effects?";
        SortOrder = 3;
        Model_DFTXP = "Yes";
        Model_DFTCP = "Yes";
        Model_PATCP = "Yes";
        Model_PATXP = "Yes";
        output;
    end;

    merge
        AdjRsq_DFTXP (rename=(CValue1=Adj_DFTXP) where=(Label1="Adjusted R-Square"))
        AdjRsq_DFTCP (rename=(CValue1=Adj_DFTCP) where=(Label1="Adjusted R-Square"))
        AdjRsq_PATCP (rename=(CValue1=Adj_PATCP) where=(Label1="Adjusted R-Square"))
        AdjRsq_PATXP (rename=(CValue1=Adj_PATXP) where=(Label1="Adjusted R-Square"));
    Regressors = "Adjusted R-Square";
    SortOrder = 4;
    Model_DFTXP = put(Adj_DFTXP, best8.3);
    Model_DFTCP = put(Adj_DFTCP, best8.3);
    Model_PATCP = put(Adj_PATCP, best8.3);
    Model_PATXP = put(Adj_PATXP, best8.3);
    output;


    merge
        Obs_DFTXP (rename=(NValue1=Obs_DFTXP) where=(Label1="Number of Observations"))
        Obs_DFTCP (rename=(NValue1=Obs_DFTCP) where=(Label1="Number of Observations"))
        Obs_PATCP (rename=(NValue1=Obs_PATCP) where=(Label1="Number of Observations"))
        Obs_PATXP (rename=(NValue1=Obs_PATXP) where=(Label1="Number of Observations"));
    Regressors = "Number of Observations";
    SortOrder = 5;
    Model_DFTXP = put(Obs_DFTXP, comma8.);
    Model_DFTCP = put(Obs_DFTCP, comma8.);
    Model_PATCP = put(Obs_PATCP, comma8.);
    Model_PATXP = put(Obs_PATXP, comma8.);
```

```
    output;


    merge
        OverallSig_DFTXP (rename=(FValue=Sig_DFTXP) where=(Effect="Model"))
        OverallSig_DFTCP (rename=(FValue=Sig_DFTCP) where=(Effect="Model"))
        OverallSig_PATCP (rename=(FValue=Sig_PATCP) where=(Effect="Model"))
        OverallSig_PATXP (rename=(FValue=Sig_PATXP) where=(Effect="Model"));
    Regressors = "Overall Significance";
    SortOrder = 6;
    Model_DFTXP = cats(put(Sig_DFTXP, e8.2), "***");
    Model_DFTCP = cats(put(Sig_DFTCP, e8.2), "***");
    Model_PATCP = cats(put(Sig_PATCP, e8.2), "***");
    Model_PATXP = cats(put(Sig_PATXP, e8.2), "***");
    output;
run;


data FinalResultsTable;
    set CleanResults ModelStats;
run;

proc sort data=FinalResultsTable;
    by SortOrder;
run;


ods excel file = "~/MySAS/AP3LOGCPP_Analysis.xlsx" options(Embedded_Titles = "ON" Embedded_Footnotes =
"ON");
title "Appendix Table 3: TWFE Log-Linear per-capita Estimates for CPP and Fossil Fuel Use ";
footnote1 justify=left "Sources: Fossil fuel data sourced from the State Energy Data System. Policy data on Clean
Power Plan compliance sourced from EPA and state-level policy databases.";
footnote2 justify=left "Notes: Robust standard errors are in parentheses and clustered at the state level. *,**, and ***
indicate 10%, 5%, and 1% significance levels, respectively.";

proc print data=FinalResultsTable noobs label;
    var Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;
    format Regressors $50. Model_DFTXP $30. Model_DFTCP $30. Model_PATCP $30. Model_PATXP $30.;
    label
        Model_DFTXP = "Distillate Total Consumption (end use)"
        Model_DFTCP = "Distillate Total Consumption"
        Model_PATCP = "Petroleum Total Consumption"
        Model_PATXP = "Petroleum Total Consumption (end use)";
run;

ods excel close;

data work.Combined_Log_RT;
    set work.Combined_Log;
    RT = Year - 2015;
    RT2 = RT**2;
    RT3 = RT**3;
    TreatRT = DID * RT;
    TreatRT2 = DID * RT2;
    TreatRT3 = DID * RT3;
run;
```

```
ods output ParameterEstimates=PE_logDFTXP;
proc surveyreg data=work.Combined_Log_RT;
   class State;
   cluster State;
   model log_DFTXP = RT RT2 RT3 DID TreatRT TreatRT2 TreatRT3 / solution;
run;

ods output ParameterEstimates=PE_logDFTCP;
proc surveyreg data=work.Combined_Log_RT;
   class State;
   cluster State;
   model log_DFTCP = RT RT2 RT3 DID TreatRT TreatRT2 TreatRT3 / solution;
run;

ods output ParameterEstimates=PE_logPATCP;
proc surveyreg data=work.Combined_Log_RT;
   class State;
   cluster State;
   model log_PATCP = RT RT2 RT3 DID TreatRT TreatRT2 TreatRT3 / solution;
run;

ods output ParameterEstimates=PE_logPATXP;
proc surveyreg data=work.Combined_Log_RT;
   class State;
   cluster State;
   model log_PATXP = RT RT2 RT3 DID TreatRT TreatRT2 TreatRT3 / solution;
run;
data CleanResultsLog;
   length Regressors $50 Model_DFTXP $30 Model_DFTCP $30 Model_PATCP $30 Model_PATXP $30
SortOrder 8;

   merge
      PE_logDFTXP (rename=(Estimate=Est_DFTXP StdErr=SE_DFTXP Probt=Prob_DFTXP))
      PE_logDFTCP (rename=(Estimate=Est_DFTCP StdErr=SE_DFTCP Probt=Prob_DFTCP))
      PE_logPATCP (rename=(Estimate=Est_PATCP StdErr=SE_PATCP Probt=Prob_PATCP))
      PE_logPATXP (rename=(Estimate=Est_PATXP StdErr=SE_PATXP Probt=Prob_PATXP));


   select (Parameter);
      when ("Intercept")  do; Regressors="Intercept"; SortOrder=1; end;
      when ("RT")         do; Regressors="Relative Year (Linear)"; SortOrder=2; end;
      when ("RT2")        do; Regressors="Relative Year Squared"; SortOrder=3; end;
      when ("RT3")        do; Regressors="Relative Year Cubed"; SortOrder=4; end;
      when ("TreatRT")    do; Regressors="Treatment x Relative Year (Linear)"; SortOrder=5; end;
      when ("TreatRT2")   do; Regressors="Treatment x Relative Year Squared"; SortOrder=6; end;
      when ("TreatRT3")   do; Regressors="Treatment x Relative Year Cubed"; SortOrder=7; end;
      otherwise delete;
   end;
   array ests{4} Est_DFTXP Est_DFTCP Est_PATCP Est_PATXP;
   array pvals{4} Prob_DFTXP Prob_DFTCP Prob_PATCP Prob_PATXP;
   array mods{4}  Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;
   do i = 1 to 4;
      if pvals{i} <= 0.01 then Star="***";
      else if pvals{i} <= 0.05 then Star="**";
```

```
        else if pvals{i} <= 0.10 then Star="*";
        else Star="";
        mods{i} = cats(put(ests{i}, 8.2), Star);
    end;
    output;
    Regressors = "";
    SortOrder + 0.5;
    Model_DFTXP = cats("(", put(SE_DFTXP, 8.2), ")");
    Model_DFTCP = cats("(", put(SE_DFTCP, 8.2), ")");
    Model_PATCP = cats("(", put(SE_PATCP, 8.2), ")");
    Model_PATXP = cats("(", put(SE_PATXP, 8.2), ")");
    output;

    keep Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP SortOrder;
run;

proc sort data=CleanResultsLog;
    by SortOrder;
run;


ods excel file="~/MySAS/A2ParallelTrends_Complete.xlsx" options(Embedded_Titles="ON"
Embedded_Footnotes="ON");
title "Appendix Table A2: Log-Linear Parallel Trends Test Results";
footnote1 justify=left "Sources: SEDS, EPA, and state-level data.";
footnote2 justify=left "Notes: Clustered robust SEs in parentheses. *,**,*** = significance at 10%, 5%, 1%.";

proc print data=CleanResultsLog noobs label;
    var Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;
    label
        Model_DFTXP = "Distillate Total Consumption (end use)"
        Model_DFTCP = "Distillate Total Consumption"
        Model_PATCP = "Petroleum Total Consumption"
        Model_PATXP = "Petroleum Total Consumption (end use)";
run;

ods excel close;

data work.Combined_Log;
    set work.Combined;
    if DFTXP_per_capita > 0 then log_DFTXP = log(DFTXP_per_capita);
    if DFTCP_per_capita > 0 then log_DFTCP = log(DFTCP_per_capita);
    if PATCP_per_capita > 0 then log_PATCP = log(PATCP_per_capita);
    if PATXP_per_capita > 0 then log_PATXP = log(PATXP_per_capita);
run;


ods output ParameterEstimates=PE_DFTXP DataSummary=Obs_DFTXP FitStatistics=AdjRsq_DFTXP
Effects=OverallSig_DFTXP;
proc surveyreg data=work.Combined_Log;
    class State Year / ref=first;
    cluster State;
    model log_DFTXP = DID ZWHDP State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_DFTCP DataSummary=Obs_DFTCP FitStatistics=AdjRsq_DFTCP
```

```
Effects=OverallSig_DFTCP;
proc surveyreg data=work.Combined_Log;
   class State Year / ref=first;
   cluster State;
   model log_DFTCP = DID ZWHDP State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_PATCP DataSummary=Obs_PATCP FitStatistics=AdjRsq_PATCP
Effects=OverallSig_PATCP;
proc surveyreg data=work.Combined_Log;
   class State Year / ref=first;
   cluster State;
   model log_PATCP = DID ZWHDP State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_PATXP DataSummary=Obs_PATXP FitStatistics=AdjRsq_PATXP
Effects=OverallSig_PATXP;
proc surveyreg data=work.Combined_Log;
   class State Year / ref=first;
   cluster State;
   model log_PATXP = DID ZWHDP State Year / solution adjrsq;
run;


data CleanResults;
   length Regressors $50 Model_DFTXP $30 Model_DFTCP $30 Model_PATCP $30 Model_PATXP $30;
   retain Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP SortOrder;

   array estimates{4} Est_DFTXP Est_DFTCP Est_PATCP Est_PATXP;
   array std_errors{4} SE_DFTXP SE_DFTCP SE_PATCP SE_PATXP;
   array probs{4} Prob_DFTXP Prob_DFTCP Prob_PATCP Prob_PATXP;
   array models{4} Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;

   merge
      PE_DFTXP (rename=(Estimate=Est_DFTXP StdErr=SE_DFTXP Probt=Prob_DFTXP) where=(Parameter in
("DID", "Intercept")))
      PE_DFTCP (rename=(Estimate=Est_DFTCP StdErr=SE_DFTCP Probt=Prob_DFTCP) where=(Parameter in
("DID", "Intercept")))
      PE_PATCP (rename=(Estimate=Est_PATCP StdErr=SE_PATCP Probt=Prob_PATCP) where=(Parameter in
("DID", "Intercept")))
      PE_PATXP (rename=(Estimate=Est_PATXP StdErr=SE_PATXP Probt=Prob_PATXP) where=(Parameter in
("DID", "Intercept")));

   if Parameter = "DID" then do;
      Regressors = "DID";
      SortOrder = 1;
   end;
   else if Parameter = "Intercept" then do;
      Regressors = "Intercept";
      SortOrder = 2;
   end;

   do i = 1 to 4;
      if probs{i} le 0.01 then Star = "***";
      else if probs{i} le 0.05 then Star = "**";
      else if probs{i} le 0.1 then Star = "*";
```

```
      else Star = "";
      models{i} = cats(put(estimates{i}, best8.3), Star);
   end;
   output;

   /* Standard Errors */
   Regressors = "";
   SortOrder + 0.5;
   Model_DFTXP = cats("(", put(SE_DFTXP, best8.3), ")");
   Model_DFTCP = cats("(", put(SE_DFTCP, best8.3), ")");
   Model_PATCP = cats("(", put(SE_PATCP, best8.3), ")");
   Model_PATXP = cats("(", put(SE_PATXP, best8.3), ")");
   output;

   keep Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP SortOrder;
run;


data ModelStats;
   length Regressors $50 Model_DFTXP $30 Model_DFTCP $30 Model_PATCP $30 Model_PATXP $30
SortOrder 8;

   if _n_ = 1 then do;
      Regressors = "State and Year Fixed Effects?";
      SortOrder = 3;
      Model_DFTXP = "Yes";
      Model_DFTCP = "Yes";
      Model_PATCP = "Yes";
      Model_PATXP = "Yes";
      output;
   end;

   Regressors = "Control for Natural Heating Needs?";
   SortOrder = 3.5;
   Model_DFTXP = "Yes";
   Model_DFTCP = "Yes";
   Model_PATCP = "Yes";
   Model_PATXP = "Yes";
   output;

   merge
      AdjRsq_DFTXP (rename=(CValue1=Adj_DFTXP) where=(Label1="Adjusted R-Square"))
      AdjRsq_DFTCP (rename=(CValue1=Adj_DFTCP) where=(Label1="Adjusted R-Square"))
      AdjRsq_PATCP (rename=(CValue1=Adj_PATCP) where=(Label1="Adjusted R-Square"))
      AdjRsq_PATXP (rename=(CValue1=Adj_PATXP) where=(Label1="Adjusted R-Square"));
   Regressors = "Adjusted R-Square";
   SortOrder = 4;
   Model_DFTXP = put(Adj_DFTXP, best8.3);
   Model_DFTCP = put(Adj_DFTCP, best8.3);
   Model_PATCP = put(Adj_PATCP, best8.3);
   Model_PATXP = put(Adj_PATXP, best8.3);
   output;

   merge
      Obs_DFTXP (rename=(NValue1=Obs_DFTXP) where=(Label1="Number of Observations"))
      Obs_DFTCP (rename=(NValue1=Obs_DFTCP) where=(Label1="Number of Observations"))
```

```
      Obs_PATCP (rename=(NValue1=Obs_PATCP) where=(Label1="Number of Observations"))
      Obs_PATXP (rename=(NValue1=Obs_PATXP) where=(Label1="Number of Observations"));
   Regressors = "Number of Observations";
   SortOrder = 5;
   Model_DFTXP = put(Obs_DFTXP, comma8.);
   Model_DFTCP = put(Obs_DFTCP, comma8.);
   Model_PATCP = put(Obs_PATCP, comma8.);
   Model_PATXP = put(Obs_PATXP, comma8.);
   output;

   merge
      OverallSig_DFTXP (rename=(FValue=Sig_DFTXP) where=(Effect="Model"))
      OverallSig_DFTCP (rename=(FValue=Sig_DFTCP) where=(Effect="Model"))
      OverallSig_PATCP (rename=(FValue=Sig_PATCP) where=(Effect="Model"))
      OverallSig_PATXP (rename=(FValue=Sig_PATXP) where=(Effect="Model"));
   Regressors = "Overall Significance";
   SortOrder = 6;
   Model_DFTXP = cats(put(Sig_DFTXP, e8.2), "***");
   Model_DFTCP = cats(put(Sig_DFTCP, e8.2), "***");
   Model_PATCP = cats(put(Sig_PATCP, e8.2), "***");
   Model_PATXP = cats(put(Sig_PATXP, e8.2), "***");
   output;
run;


data FinalResultsTable;
   set CleanResults ModelStats;
run;

proc sort data=FinalResultsTable;
   by SortOrder;
run;
ods excel file="~/MySAS/AP4Heat.xlsx" options(Embedded_Titles="ON" Embedded_Footnotes="ON");
title "Appendix Table 4: Log-Linear Estimates of CPP Impact on Fossil Fuel Consumption with Heating Needs
Control";
footnote1 justify=left "Sources: Fossil fuel data sourced from the State Energy Data System (SEDS). Policy data on
Clean Power Plan compliance sourced from EPA.";
footnote2 justify=left "Notes: Robust standard errors are in parentheses and clustered at the state level. *,**, and ***
indicate 10%, 5%, and 1% significance levels, respectively.";

proc print data=FinalResultsTable noobs label;
   var Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;
   label
      Model_DFTXP = "Distillate Total Consumption (end use)"
      Model_DFTCP = "Distillate Total Consumption"
      Model_PATCP = "Petroleum Total Consumption"
      Model_PATXP = "Petroleum Total Consumption (end use)";
run;

ods excel close;


data work.Combined_Log;
   set work.Combined;
   if DFTXP_per_capita > 0 then log_DFTXP = log(DFTXP_per_capita);
   if DFTCP_per_capita > 0 then log_DFTCP = log(DFTCP_per_capita);
```

```
    if PATCP_per_capita > 0 then log_PATCP = log(PATCP_per_capita);
    if PATXP_per_capita > 0 then log_PATXP = log(PATXP_per_capita);
run;


ods output ParameterEstimates=PE_DFTXP DataSummary=Obs_DFTXP FitStatistics=AdjRsq_DFTXP
Effects=OverallSig_DFTXP;
proc surveyreg data=work.Combined_Log;
    class State Year / ref=first;
    cluster State;
    model log_DFTXP = DID ZWCDP State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_DFTCP DataSummary=Obs_DFTCP FitStatistics=AdjRsq_DFTCP
Effects=OverallSig_DFTCP;
proc surveyreg data=work.Combined_Log;
    class State Year / ref=first;
    cluster State;
    model log_DFTCP = DID ZWCDP State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_PATCP DataSummary=Obs_PATCP FitStatistics=AdjRsq_PATCP
Effects=OverallSig_PATCP;
proc surveyreg data=work.Combined_Log;
    class State Year / ref=first;
    cluster State;
    model log_PATCP = DID ZWCDP State Year / solution adjrsq;
run;

ods output ParameterEstimates=PE_PATXP DataSummary=Obs_PATXP FitStatistics=AdjRsq_PATXP
Effects=OverallSig_PATXP;
proc surveyreg data=work.Combined_Log;
    class State Year / ref=first;
    cluster State;
    model log_PATXP = DID ZWCDP State Year / solution adjrsq;
run;


data CleanResults;
    length Regressors $50 Model_DFTXP $30 Model_DFTCP $30 Model_PATCP $30 Model_PATXP $30;
    retain Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP SortOrder;

    array estimates{4} Est_DFTXP Est_DFTCP Est_PATCP Est_PATXP;
    array std_errors{4} SE_DFTXP SE_DFTCP SE_PATCP SE_PATXP;
    array probs{4} Prob_DFTXP Prob_DFTCP Prob_PATCP Prob_PATXP;
    array models{4} Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;

    merge
        PE_DFTXP (rename=(Estimate=Est_DFTXP StdErr=SE_DFTXP Probt=Prob_DFTXP) where=(Parameter in
("DID", "Intercept")))
        PE_DFTCP (rename=(Estimate=Est_DFTCP StdErr=SE_DFTCP Probt=Prob_DFTCP) where=(Parameter in
("DID", "Intercept")))
        PE_PATCP (rename=(Estimate=Est_PATCP StdErr=SE_PATCP Probt=Prob_PATCP) where=(Parameter in
("DID", "Intercept")))
        PE_PATXP (rename=(Estimate=Est_PATXP StdErr=SE_PATXP Probt=Prob_PATXP) where=(Parameter in
("DID", "Intercept")));
```

```
    if Parameter = "DID" then do;
        Regressors = "DID";
        SortOrder = 1;
    end;
    else if Parameter = "Intercept" then do;
        Regressors = "Intercept";
        SortOrder = 2;
    end;

    do i = 1 to 4;
        if probs{i} le 0.01 then Star = "***";
        else if probs{i} le 0.05 then Star = "**";
        else if probs{i} le 0.1 then Star = "*";
        else Star = "";
        models{i} = cats(put(estimates{i}, best8.3), Star);
    end;
    output;

    /* Standard Errors */
    Regressors = "";
    SortOrder + 0.5;
    Model_DFTXP = cats("(", put(SE_DFTXP, best8.3), ")");
    Model_DFTCP = cats("(", put(SE_DFTCP, best8.3), ")");
    Model_PATCP = cats("(", put(SE_PATCP, best8.3), ")");
    Model_PATXP = cats("(", put(SE_PATXP, best8.3), ")");
    output;

    keep Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP SortOrder;
run;


data ModelStats;
    length Regressors $50 Model_DFTXP $30 Model_DFTCP $30 Model_PATCP $30 Model_PATXP $30
SortOrder 8;

    if _n_ = 1 then do;
        Regressors = "State and Year Fixed Effects?";
        SortOrder = 3;
        Model_DFTXP = "Yes";
        Model_DFTCP = "Yes";
        Model_PATCP = "Yes";
        Model_PATXP = "Yes";
        output;
    end;

    Regressors = "Control for Natural Cooling Needs?";
    SortOrder = 3.5;
    Model_DFTXP = "Yes";
    Model_DFTCP = "Yes";
    Model_PATCP = "Yes";
    Model_PATXP = "Yes";
    output;

    merge
        AdjRsq_DFTXP (rename=(CValue1=Adj_DFTXP) where=(Label1="Adjusted R-Square"))
```

```
      AdjRsq_DFTCP (rename=(CValue1=Adj_DFTCP) where=(Label1="Adjusted R-Square"))
      AdjRsq_PATCP (rename=(CValue1=Adj_PATCP) where=(Label1="Adjusted R-Square"))
      AdjRsq_PATXP (rename=(CValue1=Adj_PATXP) where=(Label1="Adjusted R-Square"));
   Regressors = "Adjusted R-Square";
   SortOrder = 4;
   Model_DFTXP = put(Adj_DFTXP, best8.3);
   Model_DFTCP = put(Adj_DFTCP, best8.3);
   Model_PATCP = put(Adj_PATCP, best8.3);
   Model_PATXP = put(Adj_PATXP, best8.3);
   output;

   merge
      Obs_DFTXP (rename=(NValue1=Obs_DFTXP) where=(Label1="Number of Observations"))
      Obs_DFTCP (rename=(NValue1=Obs_DFTCP) where=(Label1="Number of Observations"))
      Obs_PATCP (rename=(NValue1=Obs_PATCP) where=(Label1="Number of Observations"))
      Obs_PATXP (rename=(NValue1=Obs_PATXP) where=(Label1="Number of Observations"));
   Regressors = "Number of Observations";
   SortOrder = 5;
   Model_DFTXP = put(Obs_DFTXP, comma8.);
   Model_DFTCP = put(Obs_DFTCP, comma8.);
   Model_PATCP = put(Obs_PATCP, comma8.);
   Model_PATXP = put(Obs_PATXP, comma8.);
   output;

   merge
      OverallSig_DFTXP (rename=(FValue=Sig_DFTXP) where=(Effect="Model"))
      OverallSig_DFTCP (rename=(FValue=Sig_DFTCP) where=(Effect="Model"))
      OverallSig_PATCP (rename=(FValue=Sig_PATCP) where=(Effect="Model"))
      OverallSig_PATXP (rename=(FValue=Sig_PATXP) where=(Effect="Model"));
   Regressors = "Overall Significance";
   SortOrder = 6;
   Model_DFTXP = cats(put(Sig_DFTXP, e8.2), "***");
   Model_DFTCP = cats(put(Sig_DFTCP, e8.2), "***");
   Model_PATCP = cats(put(Sig_PATCP, e8.2), "***");
   Model_PATXP = cats(put(Sig_PATXP, e8.2), "***");
   output;
run;


data FinalResultsTable;
   set CleanResults ModelStats;
run;

proc sort data=FinalResultsTable;
   by SortOrder;
run;


ods excel file="~/MySAS/AP5Cool.xlsx" options(Embedded_Titles="ON" Embedded_Footnotes="ON");
title "Appendix Table 5: Log-Linear Estimates of CPP Impact on Fossil Fuel Consumption with Cooling Needs
Control";
footnote1 justify=left "Sources: Fossil fuel data sourced from the State Energy Data System (SEDS). Policy data on
Clean Power Plan compliance sourced from EPA.";
footnote2 justify=left "Notes: Robust standard errors are in parentheses and clustered at the state level. *,**, and ***
indicate 10%, 5%, and 1% significance levels, respectively.";
```

```
proc print data=FinalResultsTable noobs label;
   var Regressors Model_DFTXP Model_DFTCP Model_PATCP Model_PATXP;
   label
      Model_DFTXP = "Distillate Total Consumption (end use)"
      Model_DFTCP = "Distillate Total Consumption"
      Model_PATCP = "Petroleum Total Consumption"
      Model_PATXP = "Petroleum Total Consumption (end use)";
run;

ods excel close;
proc means data=work.Combined_Sued n mean std min max nway;
   class Sued;
   var DFTCP_per_capita;
   output out=DFTCP_BySued(drop=_TYPE_)
      n=N mean=Mean std=Std min=Min max=Max;
run;

proc means data=work.Combined_Sued n mean std min max;
   var DFTCP_per_capita;
   output out=DFTCP_AllStates(drop=_TYPE_)
      n=N mean=Mean std=Std min=Min max=Max;
run;


data Table_DFTCP;
   length Group $30;
   set DFTCP_AllStates(in=a drop=_FREQ_)
      DFTCP_BySued(in=b drop=_FREQ_);

   if a then Group = "All States";
   else if Sued = 1 then Group = "States That Sued";
   else if Sued = 0 then Group = "States That Didn't Sue";

   drop Sued;
run;


ods excel file="~/MySAS/1ASummary.xlsx" options(sheet_name="Table 1a - Distillate Total"
embedded_titles="yes");


proc print data=Table_DFTCP noobs label;
   title "Table 1a. Summary Statistics – Distillate Fuel Oil Total Consumption (Barrels Per Capita)";
   label
      Group = "Group"
      N = "N"
      Mean = "Mean"
      Std = "Std Dev"
     Min = "Min"
      Max = "Max";
run;

ods excel close;


proc means data=work.Combined_Sued n mean std min max nway;
```

```
    class Sued;
    var DFTXP_per_capita;
    output out=DFTXP_BySued(drop=_TYPE_)
        n=N mean=Mean std=Std min=Min max=Max;
run;

proc means data=work.Combined_Sued n mean std min max;
    var DFTXP_per_capita;
    output out=DFTXP_AllStates(drop=_TYPE_)
        n=N mean=Mean std=Std min=Min max=Max;
run;

data Table_DFTXP;
    length Group $30;
    set DFTXP_AllStates(in=a drop=_FREQ_)
        DFTXP_BySued(in=b drop=_FREQ_);

    if a then Group = "All States";
    else if Sued = 1 then Group = "States That Sued";
    else if Sued = 0 then Group = "States That Didn't Sue";

    drop Sued;
ods excel file="~/MySAS/1BSummary.xlsx" options(embedded_titles="yes");

proc print data=Table_DFTXP noobs label;
    title "Table 1b. Summary Statistics – Distillate Fuel Oil End-Use Consumption (Barrels Per Capita)";
    label
        Group = "Group"
        N = "N"
        Mean = "Mean"
        Std = "Std Dev"
        Min = "Min"
        Max = "Max";
run;

ods excel close;
proc means data=work.Combined_Sued n mean std min max nway;
    class Sued;
    var PATXP_per_capita;
    output out=PATXP_BySued(drop=_TYPE_)
        n=N mean=Mean std=Std min=Min max=Max;
run;

proc means data=work.Combined_Sued n mean std min max;
    var PATXP_per_capita;
    output out=PATXP_AllStates(drop=_TYPE_)
        n=N mean=Mean std=Std min=Min max=Max;
run;

data Table_PATXP;
    length Group $30;
    set PATXP_AllStates(in=a drop=_FREQ_)
        PATXP_BySued(in=b drop=_FREQ_);

    if a then Group = "All States";
    else if Sued = 1 then Group = "States That Sued";
```

```
    else if Sued = 0 then Group = "States That Didn't Sue";

    drop Sued;
run;

ods excel file="~/MySAS/1CSummary.xlsx" options(embedded_titles="yes");

proc print data=Table_PATXP noobs label;
    title "Table 1c. Summary Statistics – Petroleum Total Consumption (Barrels Per Capita)";
    label
        Group = "Group"
        N = "N"
        Mean = "Mean"
        Std = "Std Dev"
        Min = "Min"
        Max = "Max";
run;

ods excel close;
proc means data=work.Combined_Sued n mean std min max nway;
    class Sued;
    var PATCP_per_capita;
    output out=PATCP_BySued(drop=_TYPE_)
        n=N mean=Mean std=Std min=Min max=Max;
run;

proc means data=work.Combined_Sued n mean std min max;
    var PATCP_per_capita;
    output out=PATCP_AllStates(drop=_TYPE_)
        n=N mean=Mean std=Std min=Min max=Max;
run;

data Table_PATCP;
    length Group $30;
    set PATCP_AllStates(in=a drop=_FREQ_)
        PATCP_BySued(in=b drop=_FREQ_);

    if a then Group = "All States";
    else if Sued = 1 then Group = "States That Sued";
    else if Sued = 0 then Group = "States That Didn't Sue";

    drop Sued;
run;
ods excel file="~/MySAS/1DSummary.xlsx" options(embedded_titles="yes");
proc print data=Table_PATCP noobs label;
    title "Table 1d. Summary Statistics – Petroleum End-Use Consumption (Barrels Per Capita)";
    label
        Group = "Group"
        N = "N"
        Mean = "Mean"
        Std = "Std Dev"
        Min = "Min"
        Max = "Max";
run;

ods excel close;
```