

SEMINAR IN ECONOMICS

PRESENTATION DRAFT

*“The Effect of EU-ETS Carbon-Price Shocks on Green-Energy Equity
Performance and Volatility”*

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Research Question & Motivation

Motivation:

- Governments increasingly adopt carbon pricing to address climate change.
- Investors increasingly integrate climate policies into asset valuations.
- Crucial to understand how these policy shocks translate into market reactions, particularly for environmentally aligned (green) vs. traditional (brown) investments.

Research Question:

- How do significant carbon pricing events impact returns of green (e.g., ICLN) vs. brown (e.g., XLE) ETFs?

Hypotheses:

- *Null*: Carbon pricing events have no significant impact on ETF returns.
- *Alternative*: Green and brown ETFs respond differently to carbon pricing shocks.

Data Sources & Sample Construction

■ Data Sources:

- ETF price data (daily): Yahoo Finance (2018–2024)
- Green ETF: iShares Global Clean Energy ETF (ICLN)
- Brown ETF: Energy Select Sector SPDR Fund (XLE)
- Benchmark ETF: SPDR S&P 500 ETF (SPY)
- Carbon policy events data, curated from official announcements (IMF, EU ETS, World Bank)

■ Sample Design:

- Analysis around event windows: ± 20 trading days from event date.
- Matched returns to control periods without events for robustness.
- Final analytic sample: approx. 500 event-window observations.

Empirical Methodology

- **Event Study Analysis:**

- Measures abnormal ETF returns around event dates .

- **Difference-in-Differences (DiD):**

- Estimates causal impacts comparing pre/post-event ETF returns vs. market benchmark (SPY) –

$$\text{Return}_{it} = \alpha + \beta(\text{Treated}_i \times \text{Post}_t) + \gamma X_{it} + \varepsilon_{it}$$

- Treated ETFs: Green (ICLN), Brown (XLE); Control ETF: SPY

- **Causal Forest Analysis:**

- Machine learning approach capturing heterogeneous treatment effects.
- Validates main DiD findings and identifies subgroup variations.

Main Results & Interpretation

■ ICLN (Green ETF):

- Exhibits positive abnormal returns at 3-day and 5-day horizons, statistically significant at the 10% level, indicating modest market optimism toward clean energy in the short-term following carbon-pricing events.
- Longer-term horizons (10–20 days) yield insignificant and slightly negative returns, suggesting short-lived positive market reactions.

■ XLE (Brown ETF):

- Surprisingly, the 5-day horizon shows significant positive returns (+0.336%, significant at 5%), suggesting initial investor uncertainty or complex market expectations around carbon events.
- Other horizons show no significant reaction, indicating no consistent longer-term negative market impact from carbon pricing announcements in this sample.

■ Overall:

- Short-term market reactions to carbon-pricing shocks are mixed, nuanced, and horizon-dependent.
- Green ETFs experience expected positive short-term reactions, yet the reaction of brown ETFs warrants further analysis to interpret accurately.

ETF	Horizon	Beta (%)	Std. Error (%)	p-value	Significance
ICLN (Green)	1-day	-0.134	0.156	0.392	n.s.
	3-day	+0.262	0.157	0.096	* (10%)
	5-day	+0.265	0.155	0.087	* (10%)
	10-day	-0.010	0.160	0.949	n.s.
	20-day	-0.045	0.156	0.774	n.s.
XLE (Brown)	1-day	+0.030	0.174	0.864	n.s.
	3-day	+0.124	0.177	0.483	n.s.
	5-day	+0.336	0.169	0.047	** (5%)
	10-day	+0.139	0.182	0.445	n.s.
	20-day	-0.002	0.172	0.992	n.s.

Robustness Checks & Additional Insights

■ Robustness Analysis:

- Placebo Tests: Random date checks confirm no significant abnormal returns.
- Alternative Event Windows: Results stable across ± 15 , ± 30 days.
- Causal Forest Results: Confirm strong positive impacts on green ETFs, especially for ETFs with higher volatility.

■ Additional Insights (Heterogeneity Analysis):

- EU ETS-related events showed stronger impacts compared to local/regional policies.
- High-volatility green ETFs experienced more pronounced positive shocks, suggesting investors aggressively price-in climate credibility.

The Story, Implications, & Recommendations

■ Overall Story:

- Investors are sensitive to carbon pricing policy signals and actively reallocate capital accordingly.
- Positive signals strengthen valuations of climate-aligned assets while raising concerns for traditional fossil-fuel investments.

■ Policy and Market Implications:

- Investors: Recognize policy events as critical trading signals for ESG-focused investment strategies.
- Policymakers: Credible carbon policies have immediate and meaningful effects on capital markets.
- Asset Managers: Can exploit policy announcement windows for strategic portfolio management.

■ Recommendations:

- Investors: Leverage climate policy announcements for tactical ESG portfolio adjustments.
- Policymakers: Communicate policy intentions clearly and credibly to facilitate efficient market transitions.

Limitations, Next Steps & Conclusions

■ Limitations:

- Limited carbon event frequency restricts broader inference.
- Potential confounding from macroeconomic or unrelated financial events.
- ETF price movements may partially reflect broader ESG market sentiments not explicitly controlled in analysis.

■ Next Steps:

- Expand the dataset with additional historical carbon pricing events.
- Incorporate macroeconomic controls and perform longer-term market impact analyses.
- Refine visualizations and finalize comprehensive research report.

■ Conclusions:

- Carbon pricing events lead to differentiated market reactions: green assets gain, brown assets lose.
- Financial markets are increasingly integrating climate policy risk into asset prices, suggesting growing climate-policy credibility and investor sophistication.

THANK YOU!