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KLIMABERICHTERSTATTUNG
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ZUR CO₂-REDUKTION (CRED)

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Under Pressure: The link between mandatory climate reporting and firms' carbon performance



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Motivation

In the absence of firms' responsible behavior regarding climate change, regulators can step in.

- It is important for these policy makers to have information on the effectiveness of regulation.
- The topic has a clear relevance for climate policy, yet little research has been conducted on the issue.
- Empirical studies investigating the effects of **voluntary** environmental and climate reporting find little evidence of an effect.



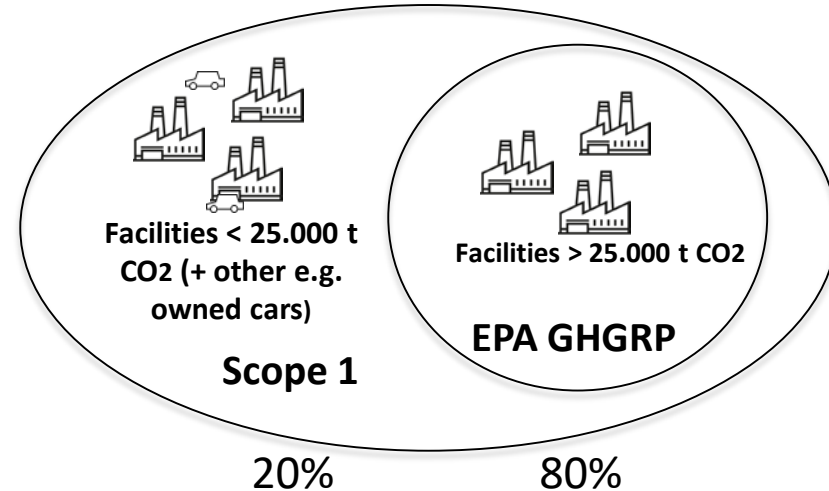
Research Question

- The Toxics Release Inventory (TRI) in the US is an example of a **mandatory** reporting regulation for toxic emissions that was successful.
- Mandatory GHG disclosure regulation: Greenhouse Gas Reporting Program (GHGRP)
- **Hypothesis:** US firms directly affected by the GHGRP will improve their carbon performance subsequent to the introduction of the reporting regime to a greater extent than unaffected US firms.



What is the Greenhouse Gas Reporting Program of the Environmental Protection Agency?

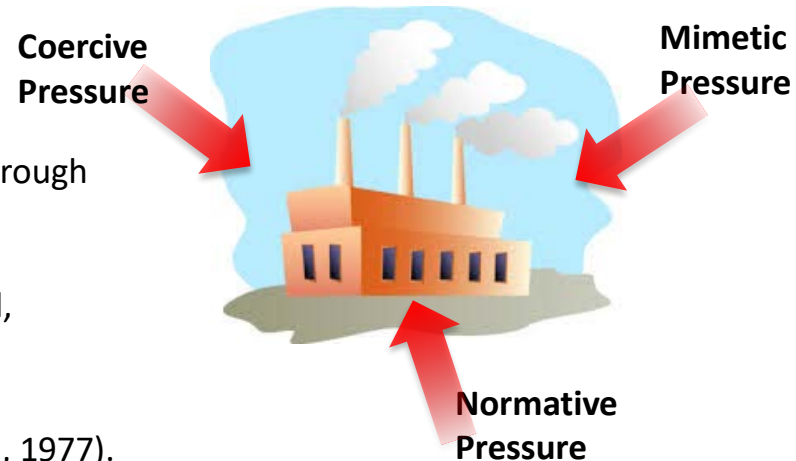
- Firms must report CO₂-emissions of their facilities above a threshold of 25,000t annually.
- Covers ~ 8,000 facilities in the US.
- Closely related to Scope 1 Emissions.
- Reported since **2010** with an initial disclosure **2012**.





Theoretical Background

- Institutional and legitimacy theory
 - Coercive pressure directly through regulation and indirectly through societal expectations; mimetic pressure through uncertainty; normative pressure through institutions (DiMaggio and Powell, 1983).
 - Reaction to pressures maintains legitimacy (Meyer and Rowan, 1977).
 - Legitimacy-seeking behavior can be substantive or symbolic (Ashforth and Gibbs, 1990).
 - Different forms of regulation have been shown to influence the degree to which firms engage in CSR activities (Campbell, 2007).





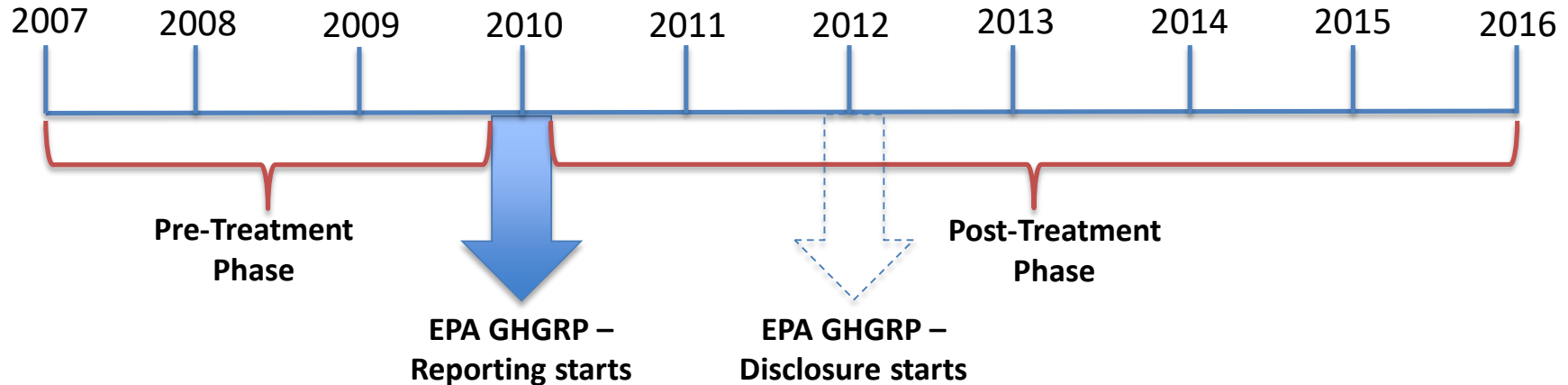
Data and Methods

- Paneldata of all US firms for which Scope 1 data is available in TruCost
 - 1,454 firms over 10 years (2007-2016) with 7,961 firm-year observations.
- Combined with additional firm-level information from Datastream.
- Method 1: Propensity Score Matching (PSM)
- Method 2: Difference in Differences Estimation
- Dependent Variable: Scope 1 emission intensity (Scope 1 Emissions / Total Assets)
- Control Variables: firm size (*Total Assets*), risk (*Leverage*), level of industrialization (*Plant Property & Equipment Intensity*) and profitability (*Return on Assets*).



Data and Methods

- Two dummy variables *POST* with a value of 0 before and 1 after the treatment and *TREAT* with a value of 0 for untreated and 1 for treated firms.



$$\text{Carb.Perf.} = \beta_0 + \beta_1 \text{Post} + \beta_2 \text{Treat} + \beta_3 \text{Post} * \text{Treat} + \beta_n (\text{Controls}) + \varepsilon$$



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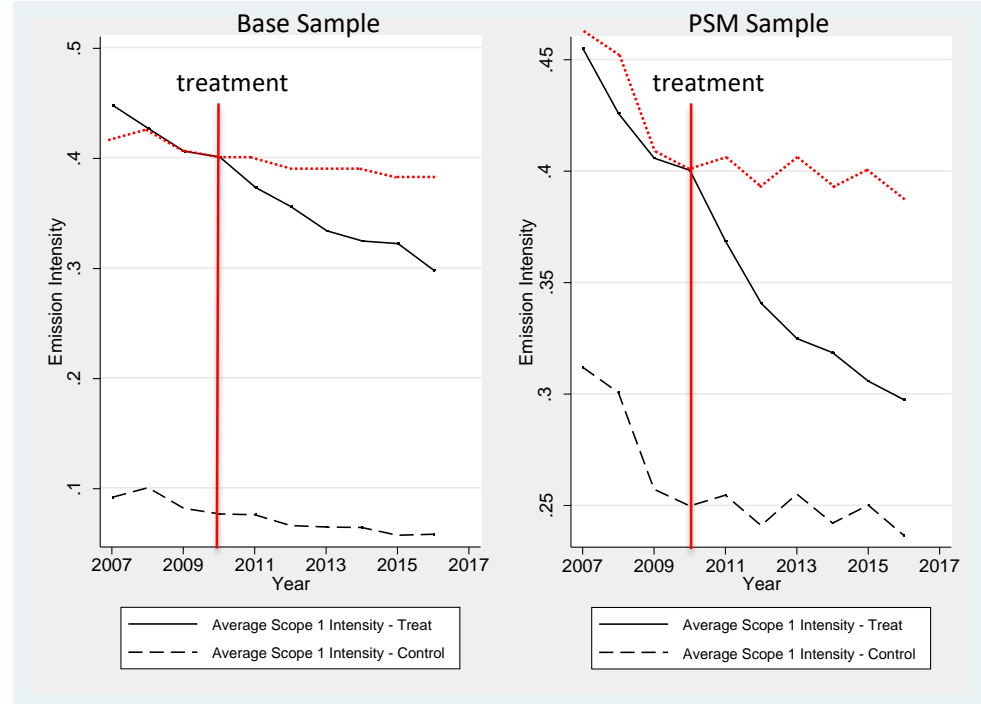
Results I

Graphical representation of results for the 2010 introduction of the GHGRP:

..... Indicates the expected development of emission intensity without the GHGRP.

———— Indicates the development of firms affected by the GHGRP.

----- Indicates the development of firms unaffected by the GHGRP.





Results II

- Average carbon intensity in the pre-treatment period is 0.427. A reduction in intensity of -0.079 (-0.05) translates to a 15% (12%) improvement in carbon performance.

Treatment Year	Full Sample				PSM Sample			
	2010 (1)	(2)	2012 (3)	(4)	2010 (5)	(6)	2012 (7)	(8)
Post*Treat	-0.079*** (0.028)		-0.080*** (0.029)		-0.050* (0.027)		-0.007 (0.035)	
Year-1*Treat		0.050 (0.034)		0.009 (0.034)		0.0505 (0.085)		-0.010 (0.085)
Year+1*Treat		0.018 (0.034)		-0.032 (0.028)		0.016 (0.086)		-0.004 (0.085)
Post	-0.017* (0.009)		-0.015 (0.009)		-0.042** (0.020)		-0.091*** (0.029)	
Treat	0.248*** (0.054)	0.185*** (0.011)	0.235*** (0.051)	0.194*** (0.012)	0.139 (0.089)	0.098*** (0.029)	0.067 (0.089)	0.065** (0.029)
Year-1		0.004 (0.018)		0.003 (0.018)		-0.003 (0.070)		0.016 (0.069)
Year+1		0.004 (0.018)		-0.003 (0.013)		-0.006 (0.070)		-0.036 (0.069)
Controls	Yes	Yes	Yes	Yes	No	No	No	No
Constant	-0.010 (0.013)	-0.024*** (0.007)	-0.013 (0.013)	-0.023*** (0.007)	0.289*** (0.070)	0.260*** (0.023)	0.347*** (0.073)	0.303*** (0.023)
Observations	7,961	7,961	7,961	7,961	2,311	2,311	2,386	2,386
R-squared	0.166	0.165	0.166	0.163	0.011	0.008	0.009	0.003
Firms	1,454	1,454	1,454	1,454	235	235	244	244
Cluster	Firm	-	Firm	-	Firm	-	Firm	-



Results III – Additional Analyses

- The comparison between US firms and EU firms covered by the EU ETS shows a significant effect of the regulation.
- A significant effect is also found in the comparison of firms in the US and in the rest of the world (excluding EU).

	US - EU		US – Rest of the World	
	(1)	(2)	(3)	(4)
Post*Treat	-0.141*** (0.041)		-0.062* (0.033)	
Year-1*Treat		0.118*** (0.030)		0.069*** (0.027)
Year+1*Treat		-0.037 (0.040)		0.015 (0.025)
Post	0.047 (0.031)		-0.041** (0.019)	
Treat	-0.022 (0.080)	-0.167** (0.077)	-0.202*** (0.060)	-0.256*** (0.047)
Year-1		-0.062*** (0.022)		0.000 (0.016)
Year+1		0.047 (0.036)		-0.018 (0.015)
ETS Allowance Price	0.001 (0.002)	-0.002 (0.002)		
Controls	Yes	Yes	Yes	Yes
Observations	2,908	2,908	7,710	7,710
R-squared	0.111	0.108	0.144	0.143
Firms	371	371	1,096	1,096
CLUSTER	Firm	Firm	Firm	Firm



Discussion

- Our empirical results confirm our hypothesis, that firms directly affected by the GHGRP improve their carbon performance more than unaffected firms.
- Firms respond to the combination of regulatory and societal coercive pressure. For societal coercive pressure alone (in 2012), the evidence is not as clear.
- The comparison between US and EU firms is counter-intuitive at first: the addition of a carbon price to a reporting scheme should increase the effect.
 - Mixed signals from regulatory (political) entities
 - Reporting is mandatory and we (the EU) are committed to reducing emissions.
 - Meanwhile markets are oversupplied with allowances as a result of political decisions.

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Thank you very much for your attention. Are there any questions?



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