

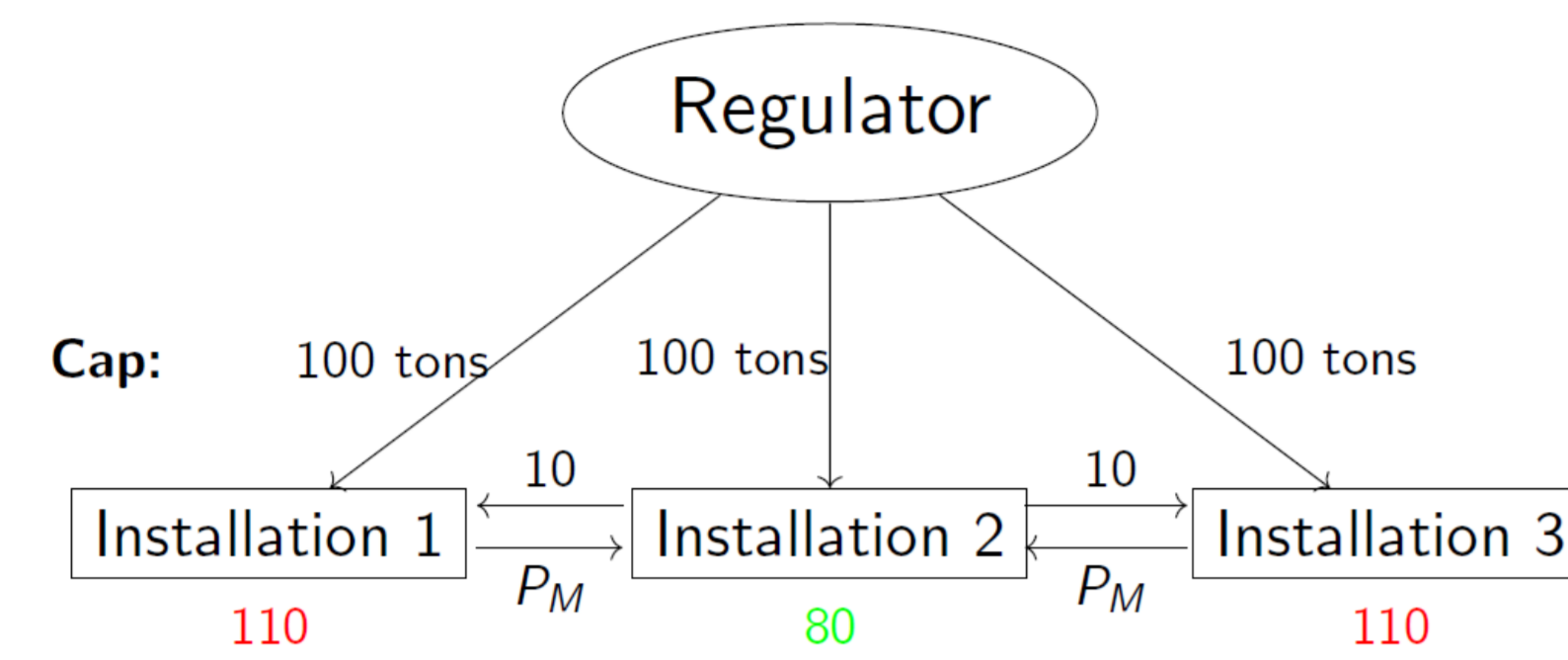
Internal Carbon Markets

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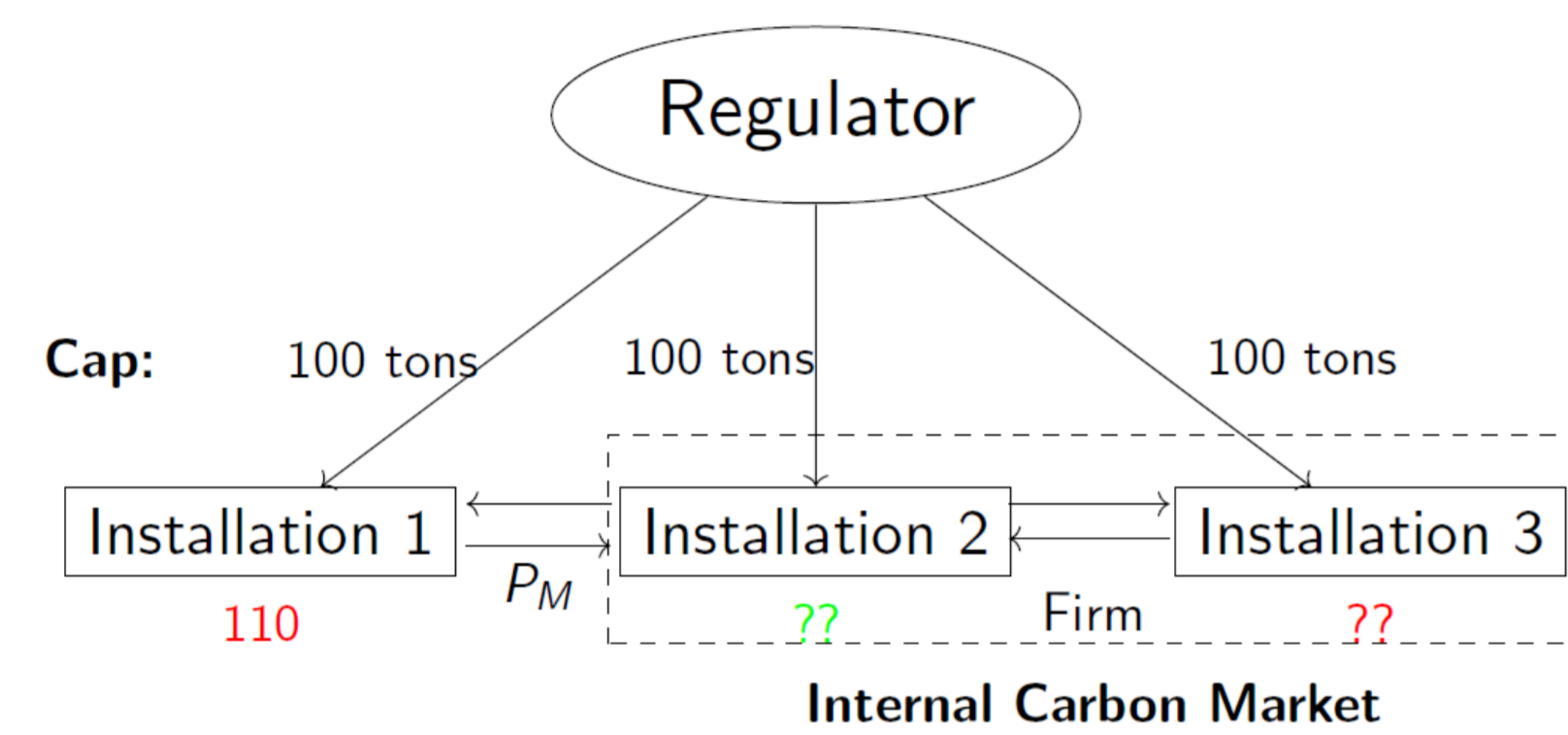


Emissions Trading Systems

Simple graphical example of an ETS:



What happens if..



Research Questions

Novel Idea: Internal Carbon Markets (ICO₂M)

- Are ICO₂Ms actively used?
- What is the effect of ICO₂M on firms?

I answer these questions using data from world's largest carbon trading system, the EU ETS.

Examples of Internal Carbon Market Transactions

Transferring Registry	Transferring Account Holder	Acquiring Registry	Acquiring Account Holder	NO of units
Spain	Iberdrola Clientes España, S.A.U.	Spain	ENERGYWORKS VIT-VALL, S.L.	136766
Italy	ILV INDUSTRIA LATERIZI VOGHERESE S.r.l.	Italy	I.C.A.S.CO. S.p.A	14000
Spain	Iberdrola Clientes España, S.A.U.	Spain	Iberdrola Generación Térmica, S.L.	1117083
Estonia	Strolia Arturas	Slovenia	BELEKTRON EKOTRADING d.o.o.	5000
Spain	Iberdrola Clientes España, S.A.U.	Spain	Iberdrola Generación Térmica, S.L.	199066
Spain	Iberdrola Clientes España, S.A.U.	Spain	Iberdrola Generación Térmica, S.L.	347802
Spain	Iberdrola Clientes España, S.A.U.	Spain	Iberdrola Generación Térmica, S.L.	564118
Spain	Iberdrola Clientes España, S.A.U.	Spain	Energyworks Monzón, S.L.	56126
Spain	Iberdrola Clientes España, S.A.U.	Spain	Iberdrola Generación Térmica, S.L.	141282
Belgium	Exxonmobil Petroleum & Chemical	France	ESSO RAFFINAGE	88000

Empirical Evidence of Internal Carbon Markets (1)

Dep. Variable:	TRFICM (Transfer of Carbon Allowances as a %-age of yearly Emissions)			
	Panel A: Absolute Relocation of Allowances Internally			
$OEMIT_D$	-0.016*** (-3.890)	-0.015*** (-3.412)	-0.015*** (-3.042)	-0.027*** (-3.448)
	Panel B: Relative Relocation of Allowances Internally			
$OEMIT_D$	-0.019*** (-2.755)	-0.019** (-2.419)	-0.020** (-2.420)	-0.042*** (-3.280)
	For Both Panels			
Observations	15641	15444	12721	8984
Sub-FE	Yes	Yes	Yes	Yes
Parent Firm FE	No	Yes	Yes	No
Country×Ind FE	Yes	Yes	Yes	Yes
Parent Firm×Year FE	No	No	No	Yes
Year FE	Yes	Yes	Yes	No

- Subsidiaries emitting above their initial limit, **receive** carbon allowances equivalent to 2.7% of their yearly emissions from other subsidiaries of the same parent firm

Empirical Evidence of Internal Carbon Markets (2)

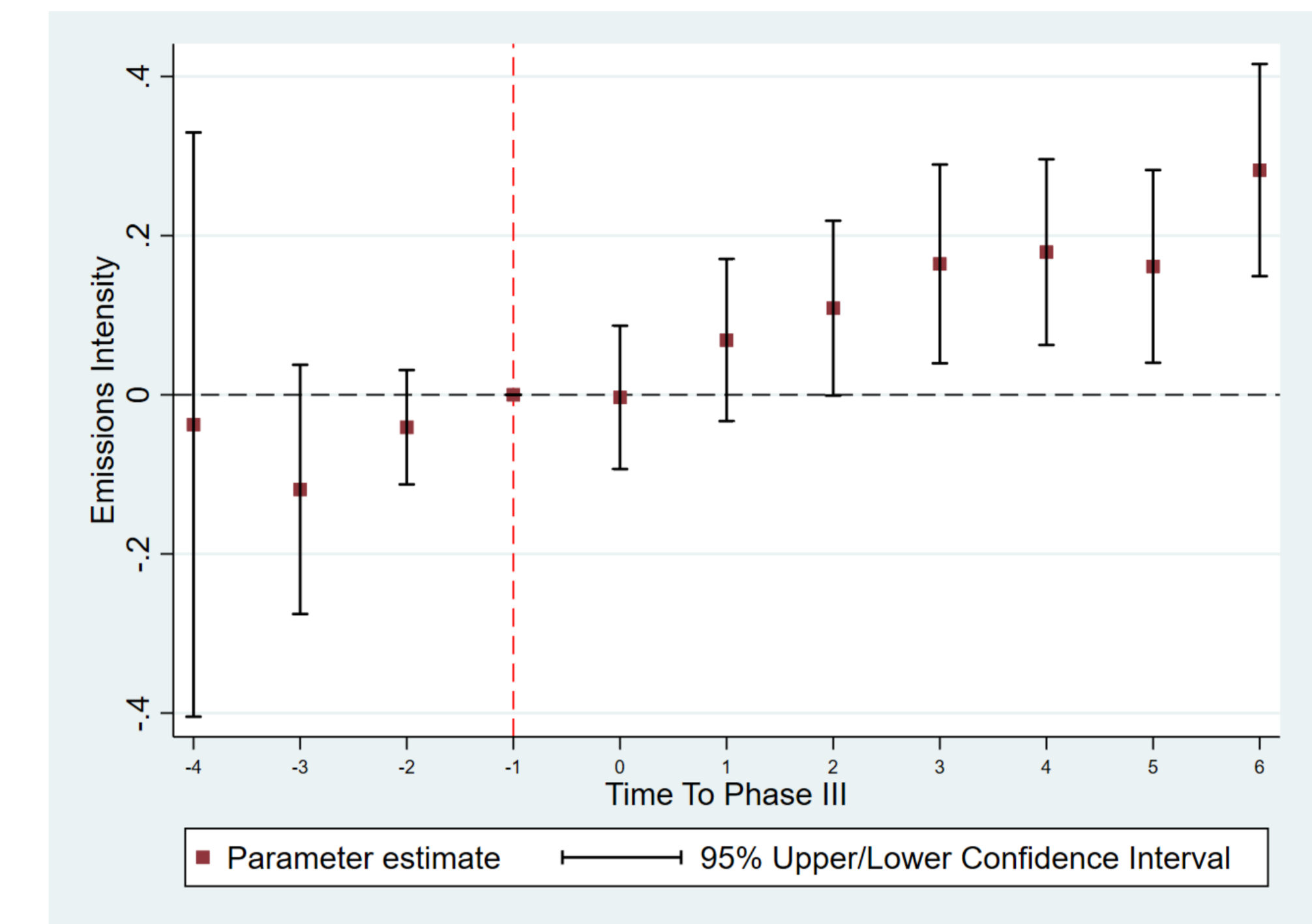
Dep. Variable:	Transfer of Carbon Allowances as a %-age of:			
	Yearly Emissions		External Transfers	
$CLEAK$	-0.040 (-0.224)	-0.000 (-0.002)		
$CLEAK \times POST$	0.082*** (3.741)	0.061** (2.466)		
$ELECT$			0.041 (1.441)	-0.048 (-1.434)
$ELECT \times POST$			-0.055* (-1.752)	-0.006 (-0.158)

- POST = 1 for 2013-2017 and zero for 2008-2012
- From 2013, **CLEAK** firms received more generous allowances and **ELECT** firms received **NO** free allowances
- CLEAK** firms **transferred** 8.2% of their yearly emissions to other group firms
- ELECT** firms **received** 5.5% of their yearly emissions from other group firms

Is there an Active Internal Carbon Market?

- Yes!
- Resource-constrained subsidiaries are supported by other divisions
- Works in a similar way to the internal capital markets!

Effect of Internal Carbon Markets



- ICO₂M firms become 19% more emission intensive after a policy change reducing the supply of carbon allowances

Why do Managers Expect Lower Transfer Price?

- Evidence consistent with internal transfer price of carbon allowances being **lower** than the external market price.
- WHAT frictions drive expectations of LOWER transfer price?
- HQs favoring connected divisions (Duchin and Sosyura, 2012) AND/OR
- Resource shifting by the HQs in order to maintain equal profitability across divisions (Rajan, Servaes, and Zingales, 2000)

Policy Implication

- One simple policy implication
- Ensure internal transfer price to be equal to the market price