

Carbon Markets and Innovation

Evidence from Interviewing Managers in Europe

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Motivation

- The EU ETS is the world's biggest carbon trading experiment so far.
- Regulation of not only power plants but also manufacturing firms.
- Emission permit price is so far rather low, but implies higher carbon price than in most other regions.
- Will this lead to
 - Loss of competitiveness?
 - Carbon Leakage?
 - Loss of employment and economic activity in Europe?
- What's the point if climate policy remains focused on Europe only?
- Potential answer? Innovation - "Europe can punch above it's Carbon Weight"

Challenge for Empirical work

- So far EU ETS has not been very stringent
- Concern is mainly about future effects
- Lack of representative data on outcomes such as innovation

Our approach:

- Interviewing managers about current activities and expectations related to Climate Change (Policies)



Interviewing Managers

Issues:

- Subjective or strategic responses
- Interviews not representative (Small samples)

Solution:

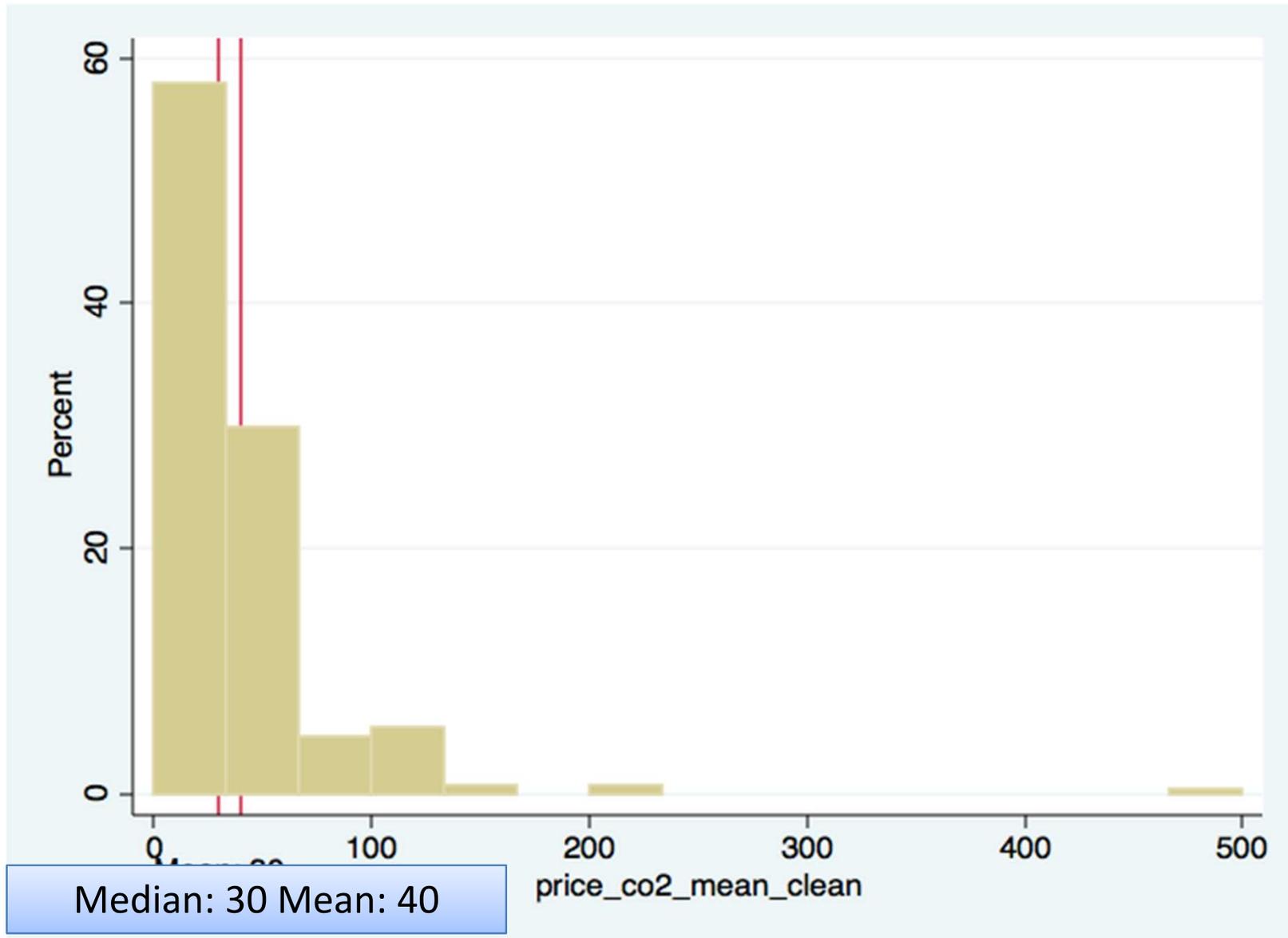
- Team with trained analysts
- Open dialog with open questions
- Scoring of answers according to clear criteria (Scale 1-5)
- Interviewees are not aware of scoring
- Double Scoring
- Control variables: Time, day, ease of availability for interviews, interviewer fixed effects
- Overlapping scores allow internal cross check
- Matching of "soft" interview data with independent "hard" performance data.

Basic Statistics

- Approximately 800 interviews
- ETS and non ETS manufacturing firms
- 6 European countries

	# of Interviews	# of Firms Interviewed	# of ETS Firms Interviewed	# of Non ETS Firms Interviewed	Total Firms Contacted	Refused	Response Rate
Belgium	139	136	97	39	185	49	0.74
France	141	141	91	50	240	99	0.59
Germany	139	139	96	43	362	223	0.38
Hungary	75	75	43	32	96	21	0.78
Poland	81	81	58	23	143	62	0.57
UK	212	207	61	146	513	306	0.40
Total	787	779	446	333	1539	760	0.51

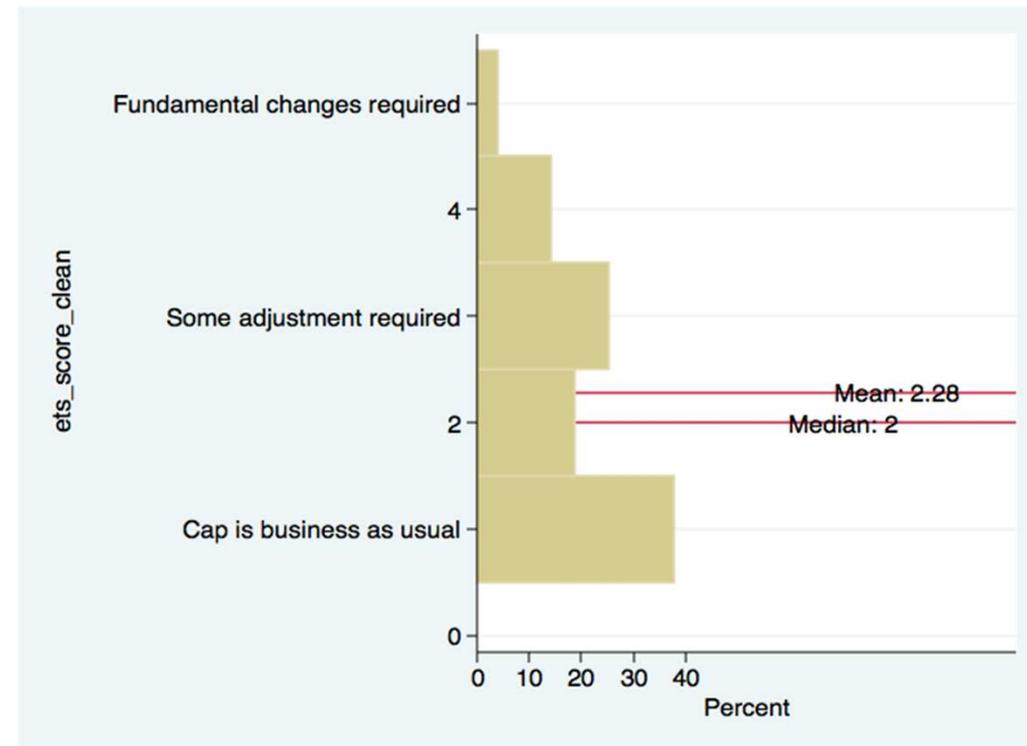
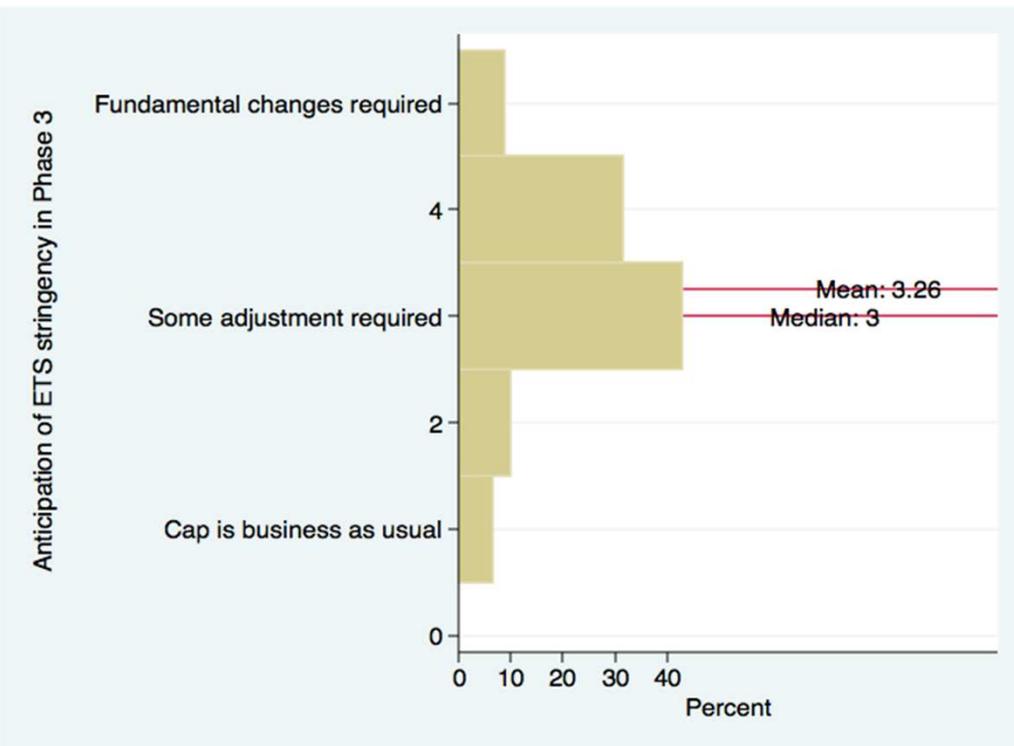
What are managers expecting? Carbon Prices



How easy it is to cover emissions with free permits?

Anticipation of Phase 3

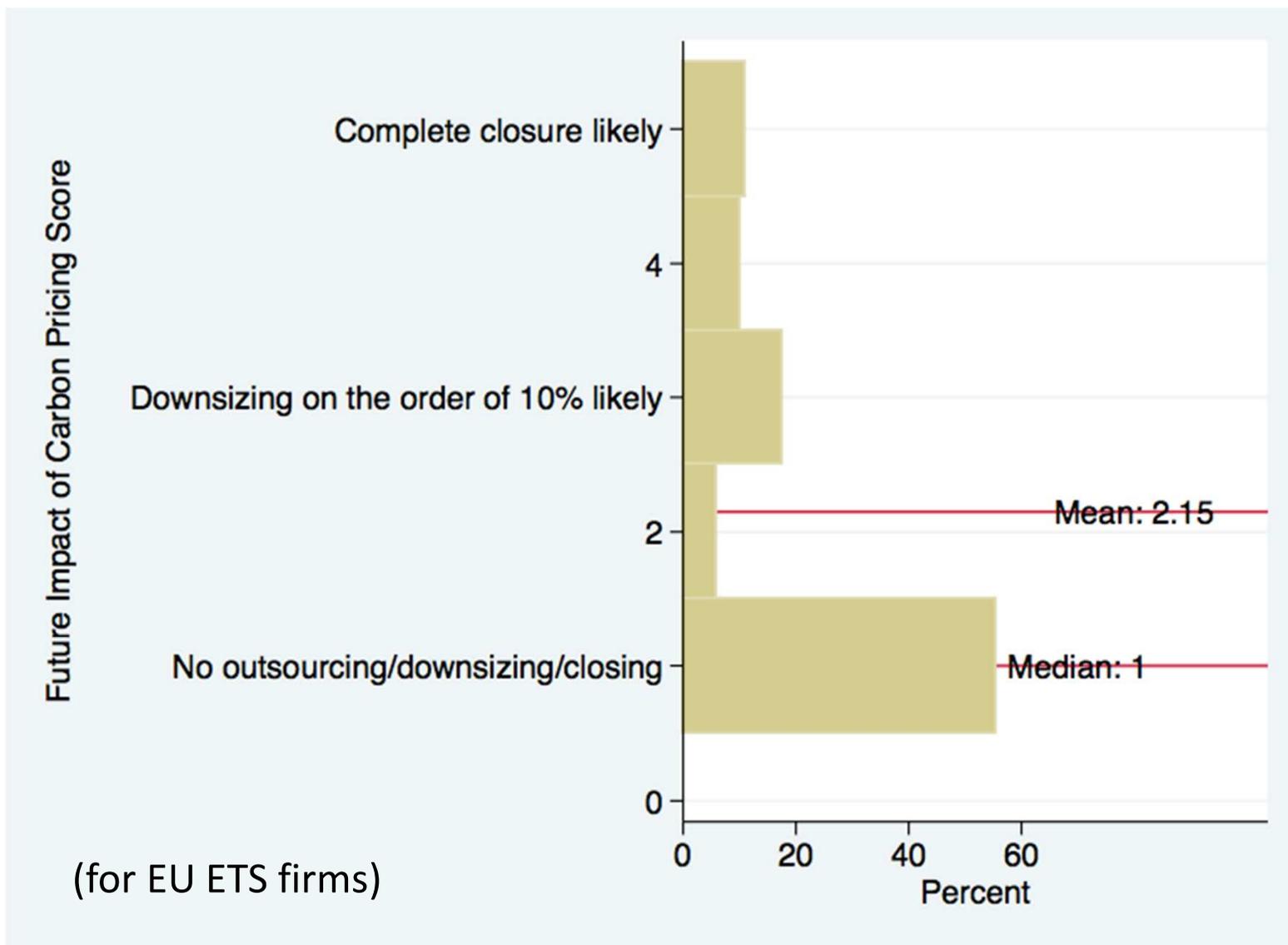
Phase 2



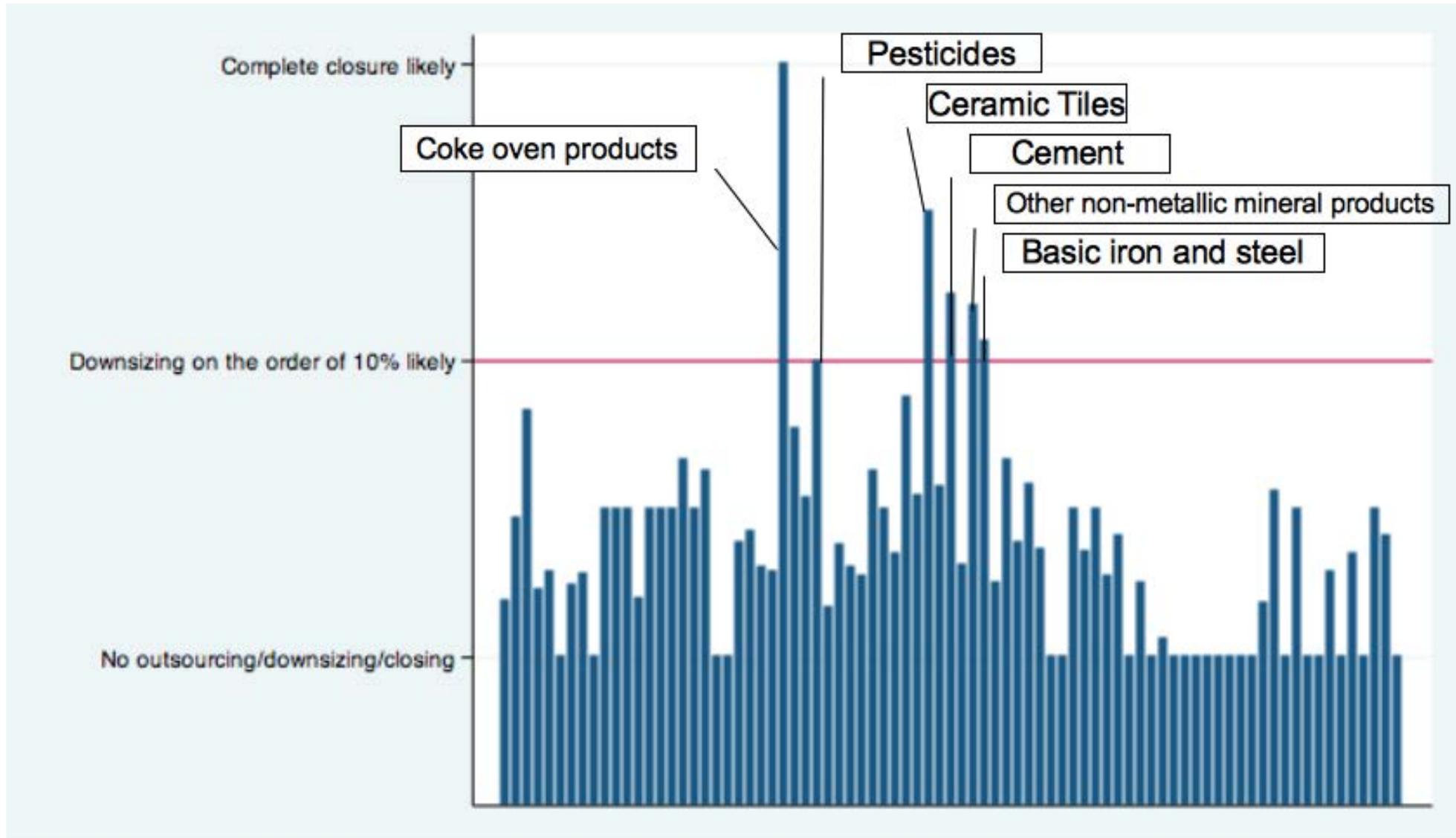
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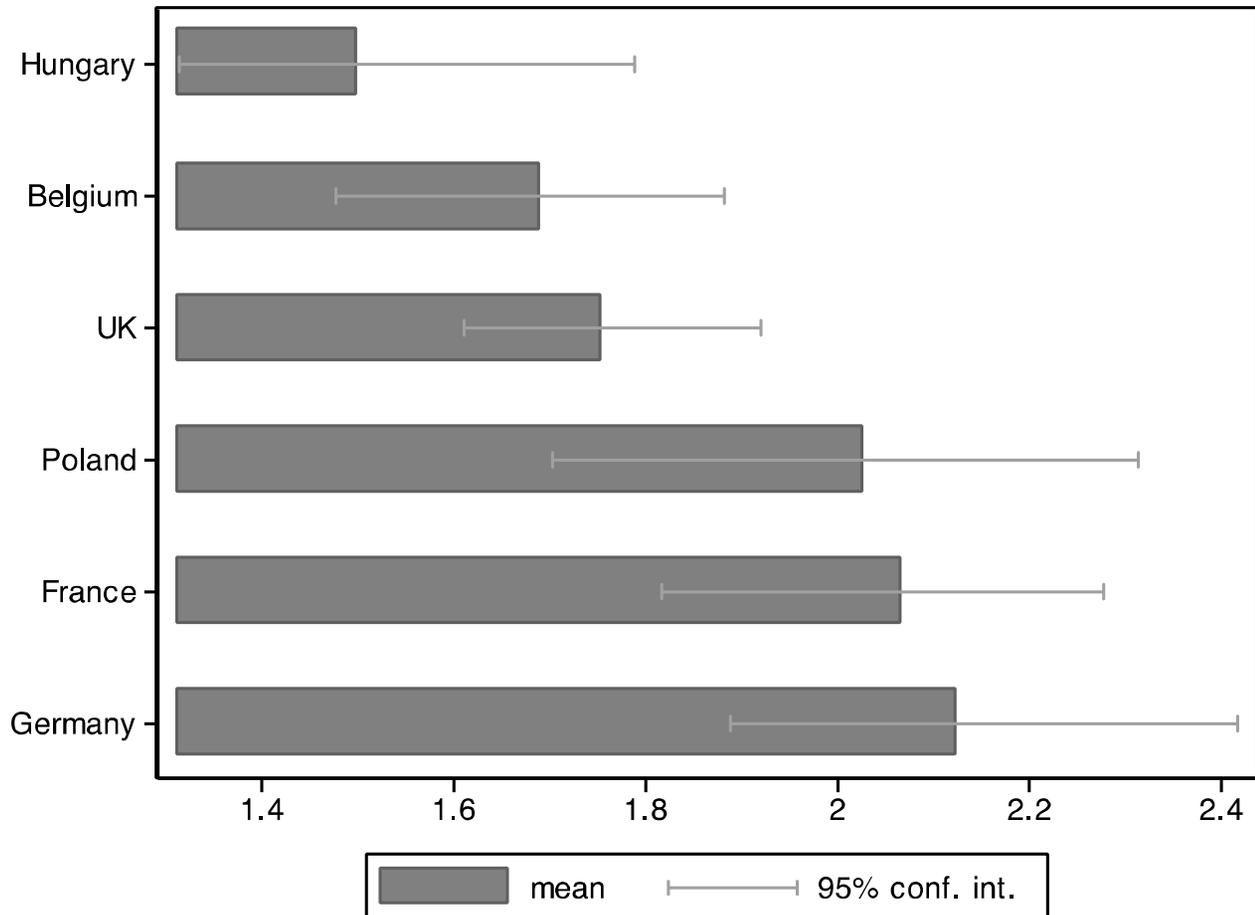
What do managers (say they) expect? Downsizing due to climate policies



Average downsizing risk across sectors



Downsizing risk across countries



Managing downsizing risk

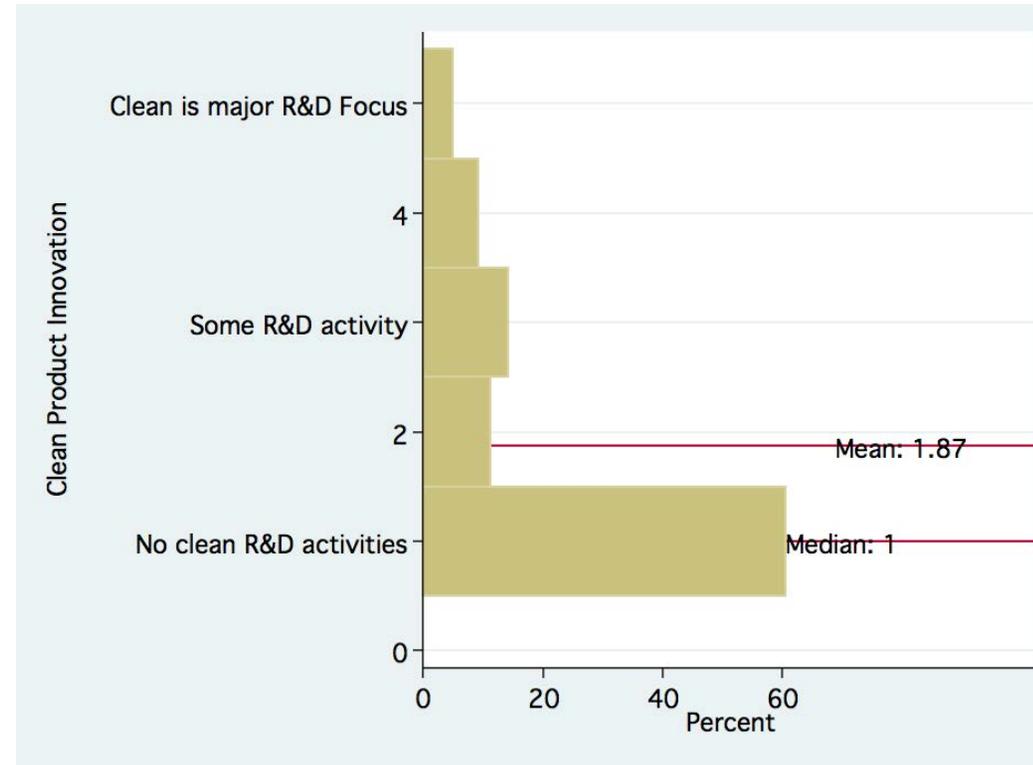
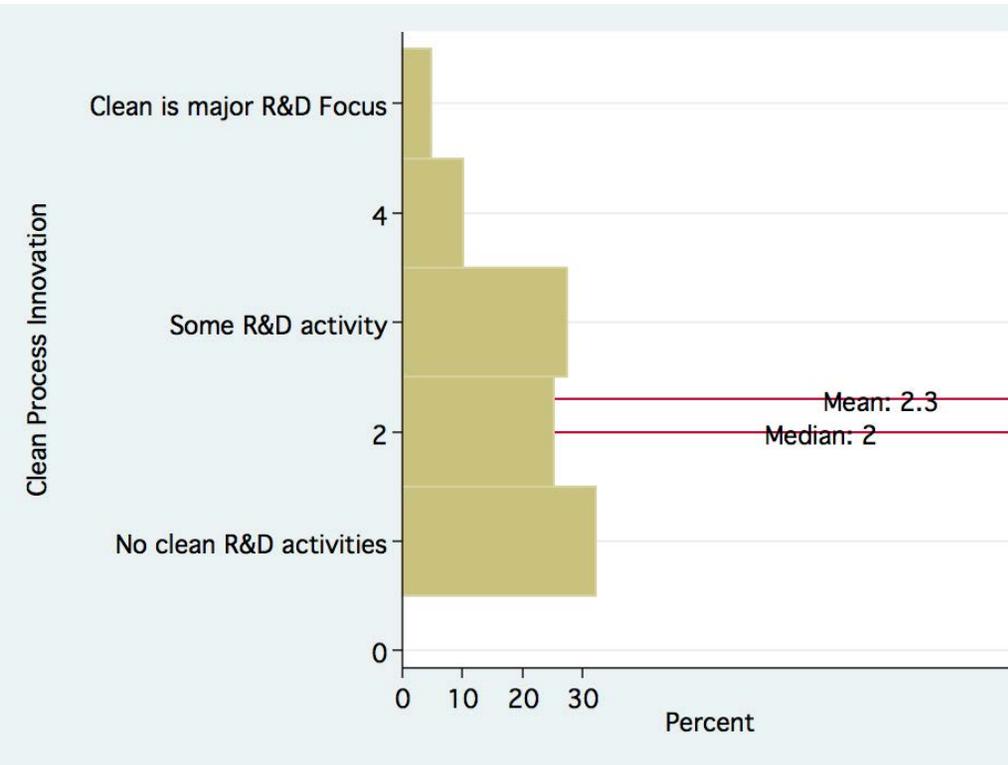
- Key instrument: Free allocation of Emission permits
- Plan for post 2012: Give free permits to sectors with high carbon or high trade intensity (or a bit of both)
- Using results from our survey we can show
 - Criteria are not very efficient
 - Firms that receive lots of free permits are not necessarily at risk while other don't receive enough
 - Total number of permits handed out could be reduced
 - Risk could be reduced further while handing out the same number of permits

Managing downsizing risk

- Simple formula reduces job risk by a factor of 3
- Allocate permits on the basis of the following index:

$$FreeAllocation_i \propto CO2_i^{80\%} \times Employment_i^{20\%}$$

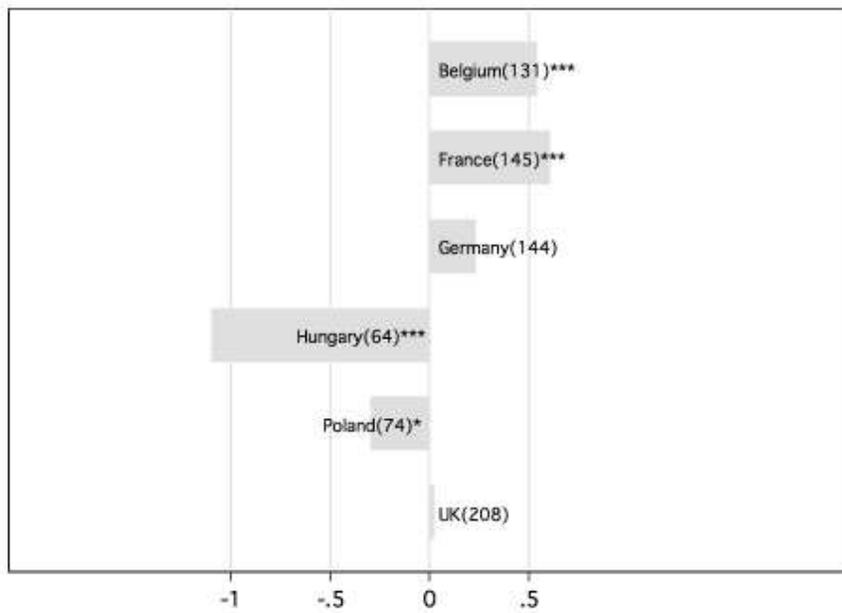
Is anybody innovating?



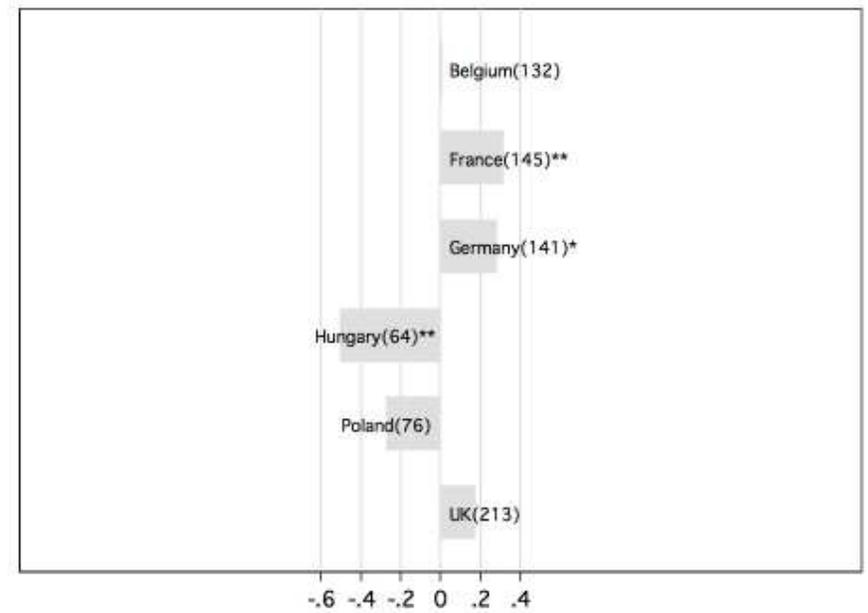
- *Most firms do some form of Climate Change Process R&D*
- *Most firm **don't** do Climate Change Product R&D*

Clean innovation across countries

3-digit industry controls

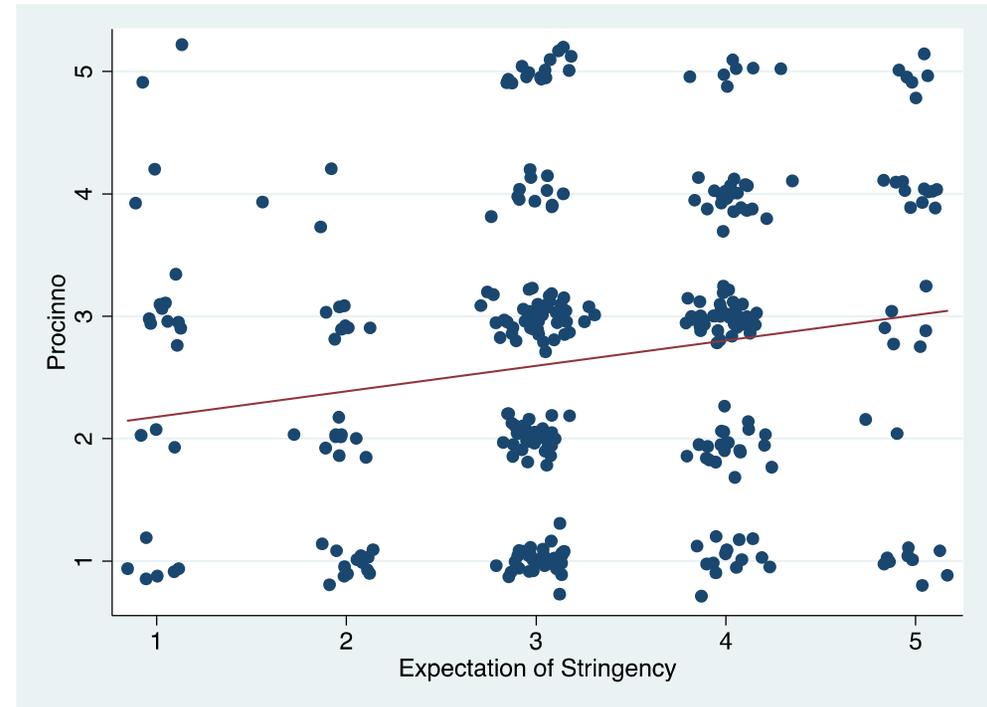
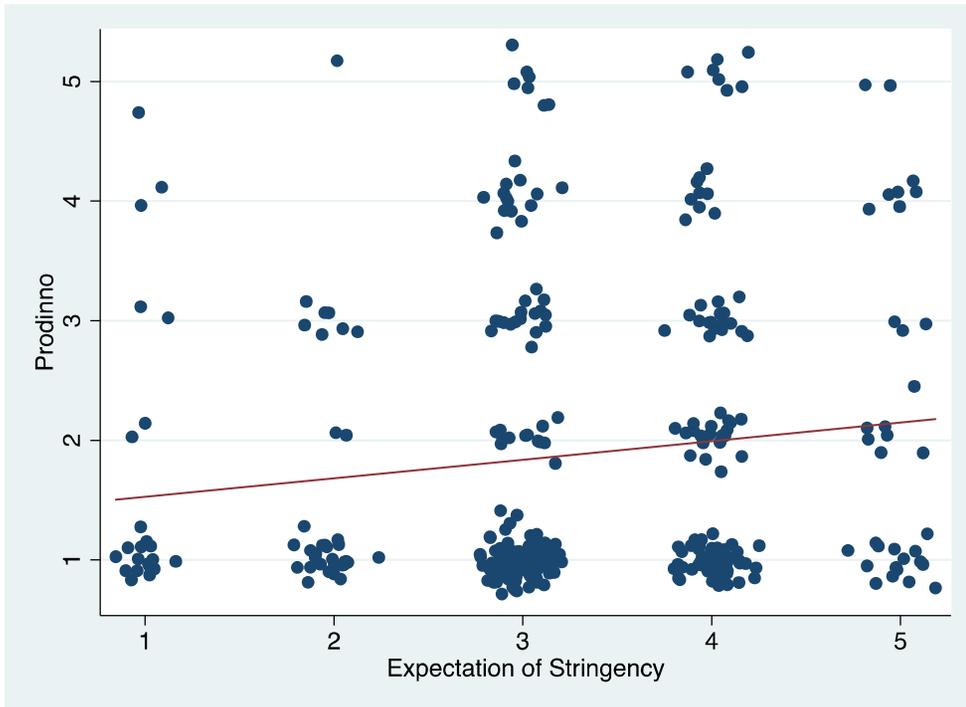


(c) Process Innovation



(d) Product innovation

What explains innovation?

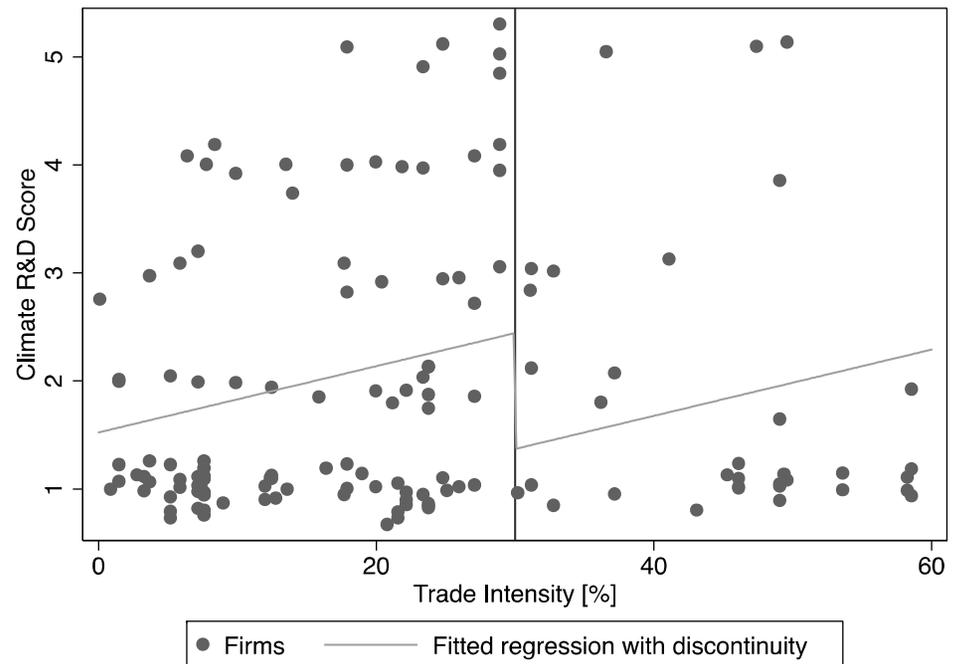
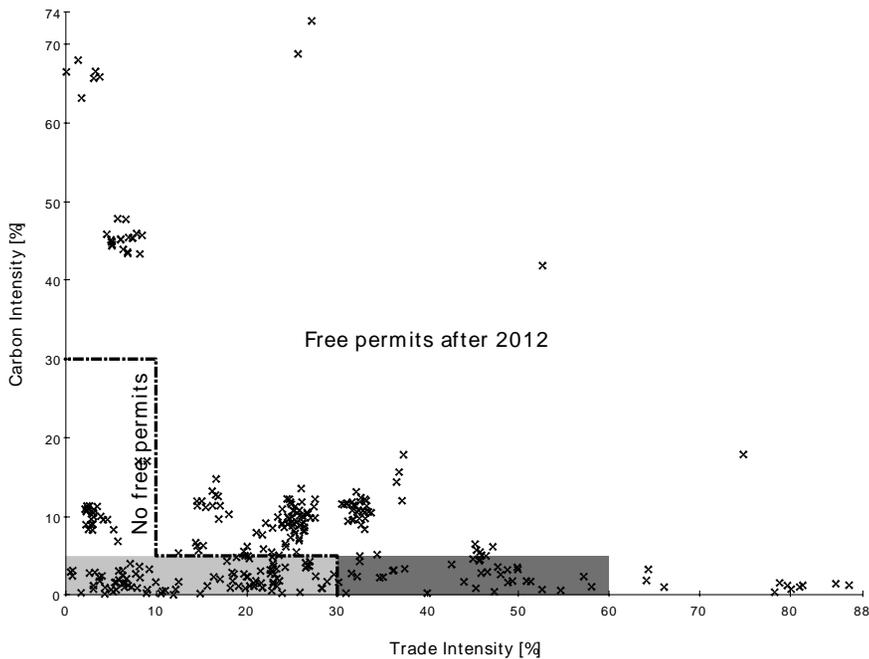


→ *Expectations of tighter targets are correlated with more innovation*

Direction of causation?

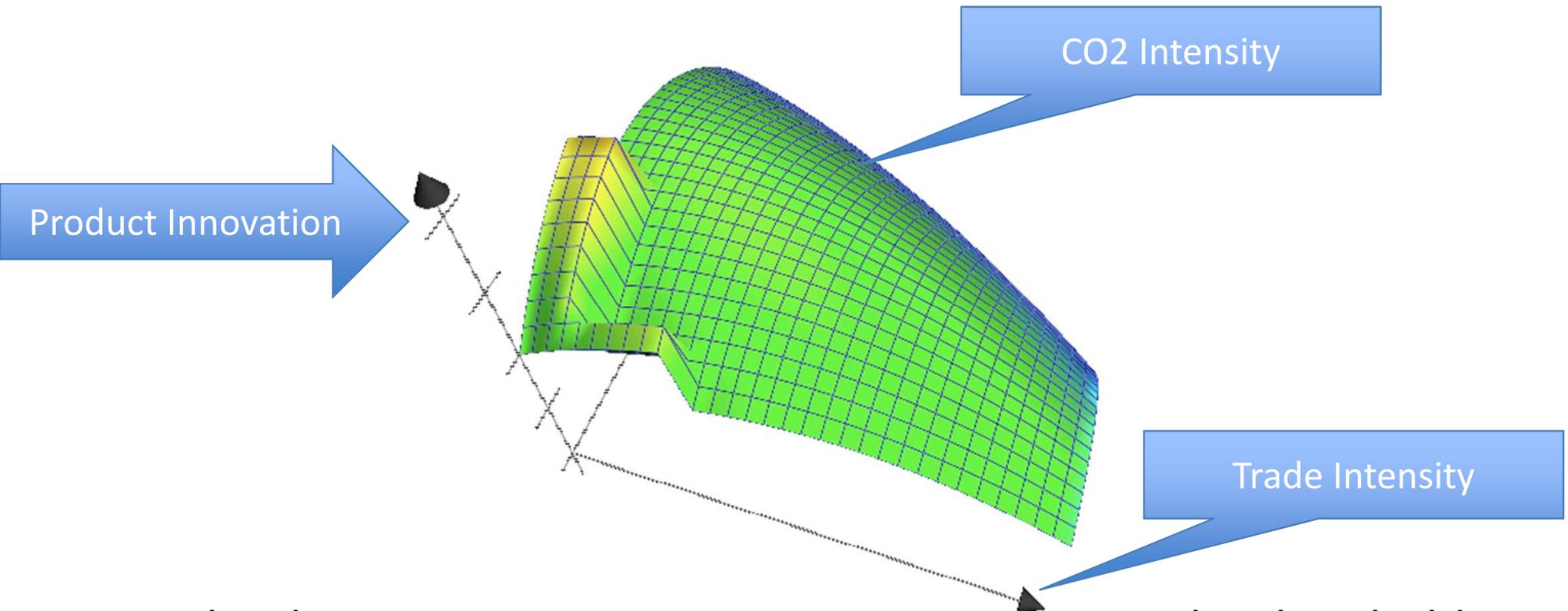
Tight targets \Leftrightarrow Innovation

Searching for threshold effects



- *Threshold effect for innovation: firms which receive permits for free innovate less → suggests causal effect*

Permit Allocation & Innovation



- What happens to Innovation as we move over the threshold for free permit allocation?
- Product Innovation reduces by 1 score point
- Story: Paying for permits has important signaling function

Conclusions

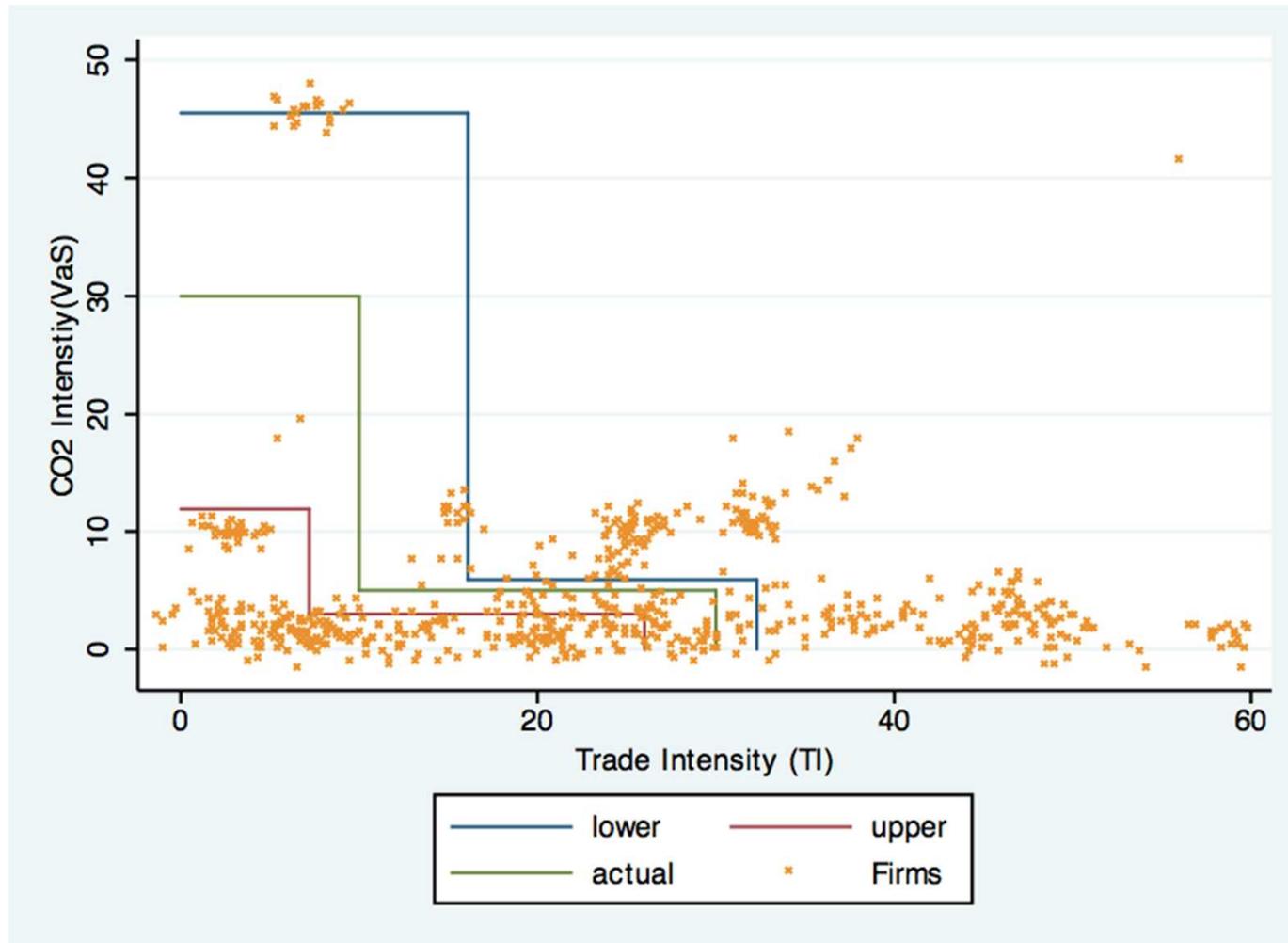
- Firms expect more stringent ETS
- No evidence that EU Climate Policy will lead to a mass exodus of firms
- There however some firms that are at risk
- EU rules for identifying these firms can be improved using simple indicators leading to substantial efficiency gains
- Overly generous free allocation of permits is likely to have a detrimental effect on innovation

Thanks

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Extra Slides

Permit Allocation & Innovation



- What happens to Innovation as we move over the threshold for free permit allocation?
- Moving over the threshold = exogenous variation in target stringency