



INDICATORS OF ENVIRONMENTAL POLICY STRINGENCY AND “BURDENS”

Some (very) preliminary results

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Outline

- Environmental policy stringency
 - Why measure?
 - Challenges
 - How is it done?
 - A composite index - some preliminary work
- “Burdens” of environmental policies
 - Barriers to entry and competition





Why measure environmental policy stringency?

- Empirical investigations
 - Policy assessments, reviews, effects etc.
 - policy design, market-based instrument claims etc.
 - Pollution Haven Hypothesis/leakage vs. first-mover advantage;
 - Porter Hypothesis vs. burdens of env. policy;
 - Lobbying/political economy questions;





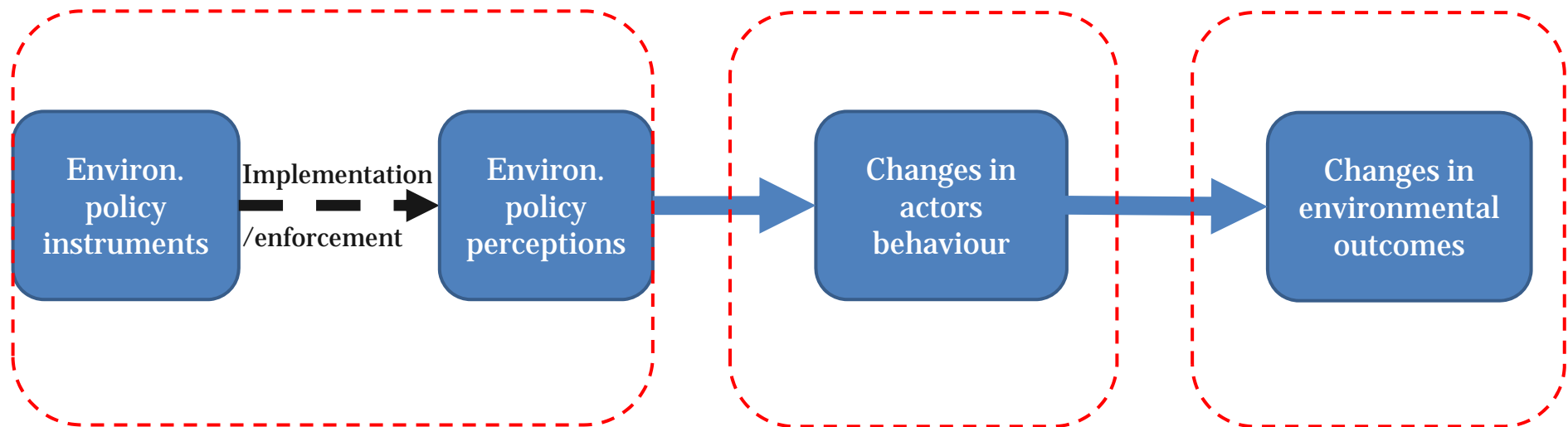
How are these addressed these?

- Case studies, diff-in-diff, reg. discontinuity
 - May work well with info on a single event
 - But lack conclusion generality
- Exploiting cross-country dimension
 - Can help answer these questions, but...
 - ... requires EPS variable, with sufficient time series.





Measures of EPS/EP - framework



Environmental laws are designed and implemented...

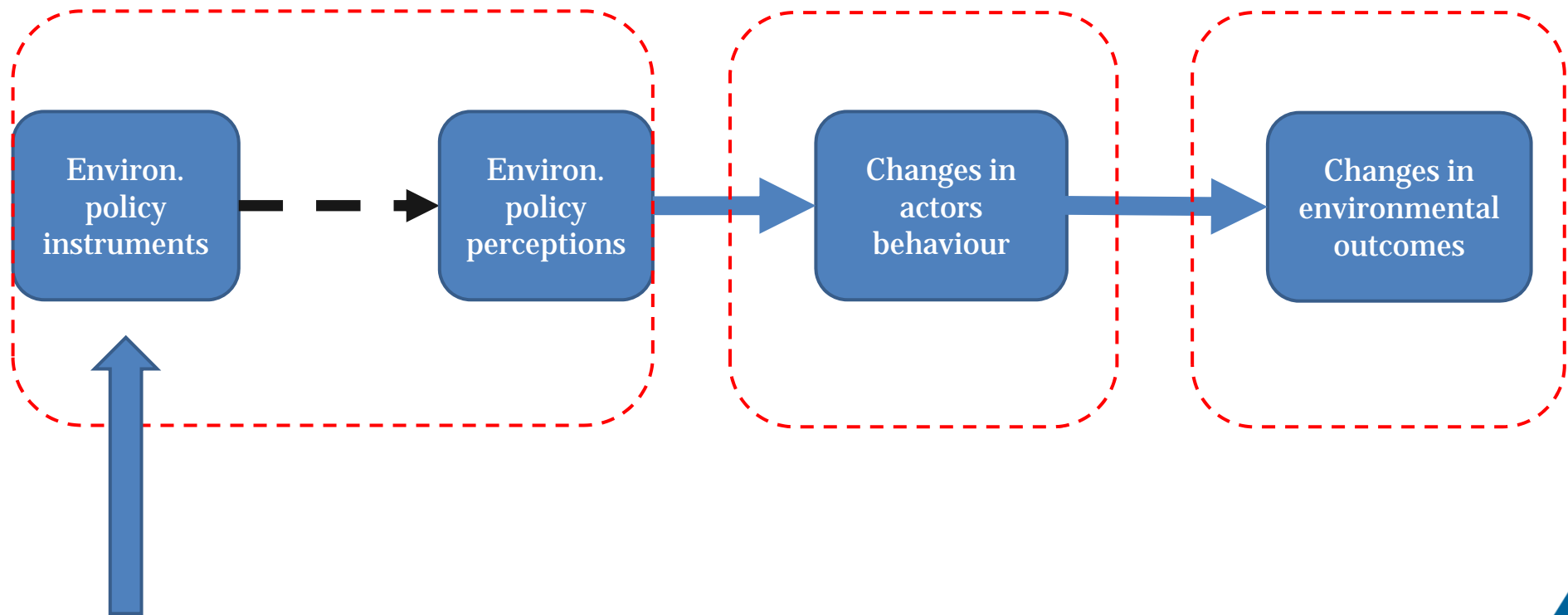
... to alter firms' (and consumers') behaviour...

... and achieve "cleaner" outcomes





Examples of measures of EPS/EP





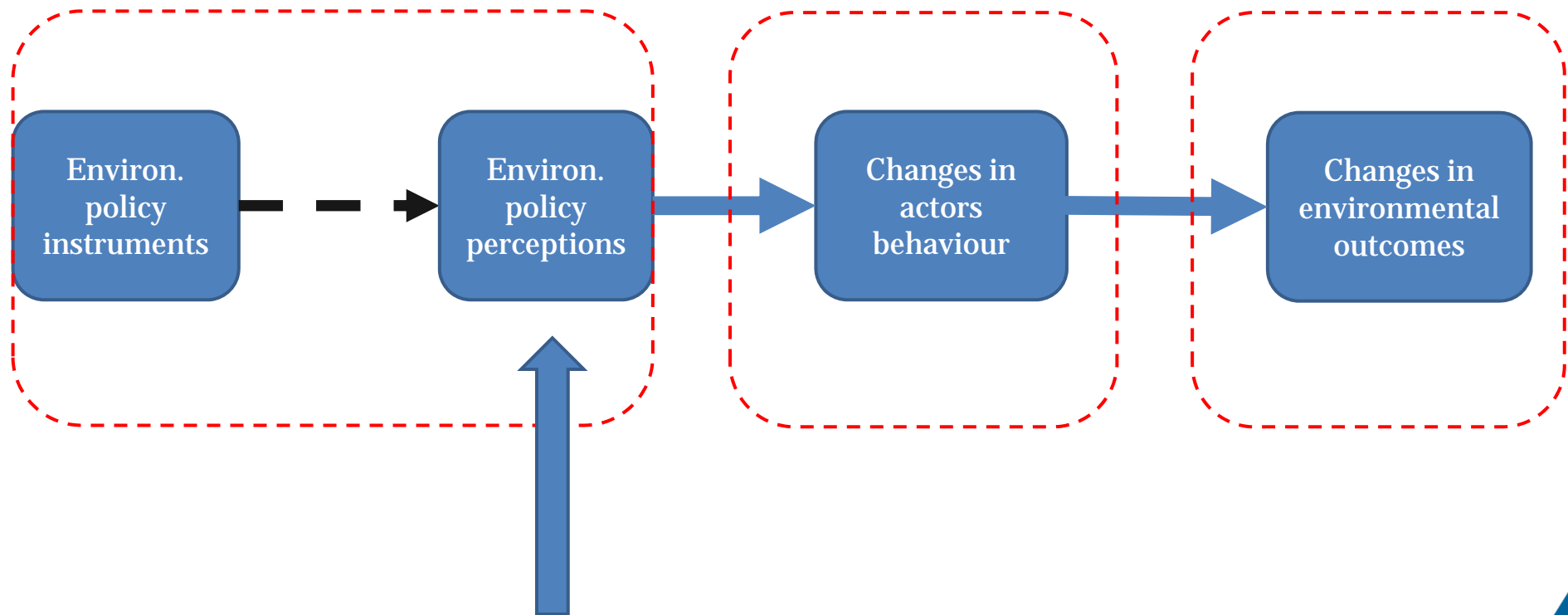
Examples of measures of EPS/EP

- **Single policy events**
 - Introduction of a policy, change in a policy, EU ETS price changes, etc.
- **Composite index**
 - Various aggregation of dummies of selected policy changes
 - Dasgupta (2001) – UN questionnaire, 25 questions – survey, 1 year only, 31 count.
 - CLIMI (EBRD, 2011) – climate policies, 1 year, 95 countries





Examples of measures of EPS/EP





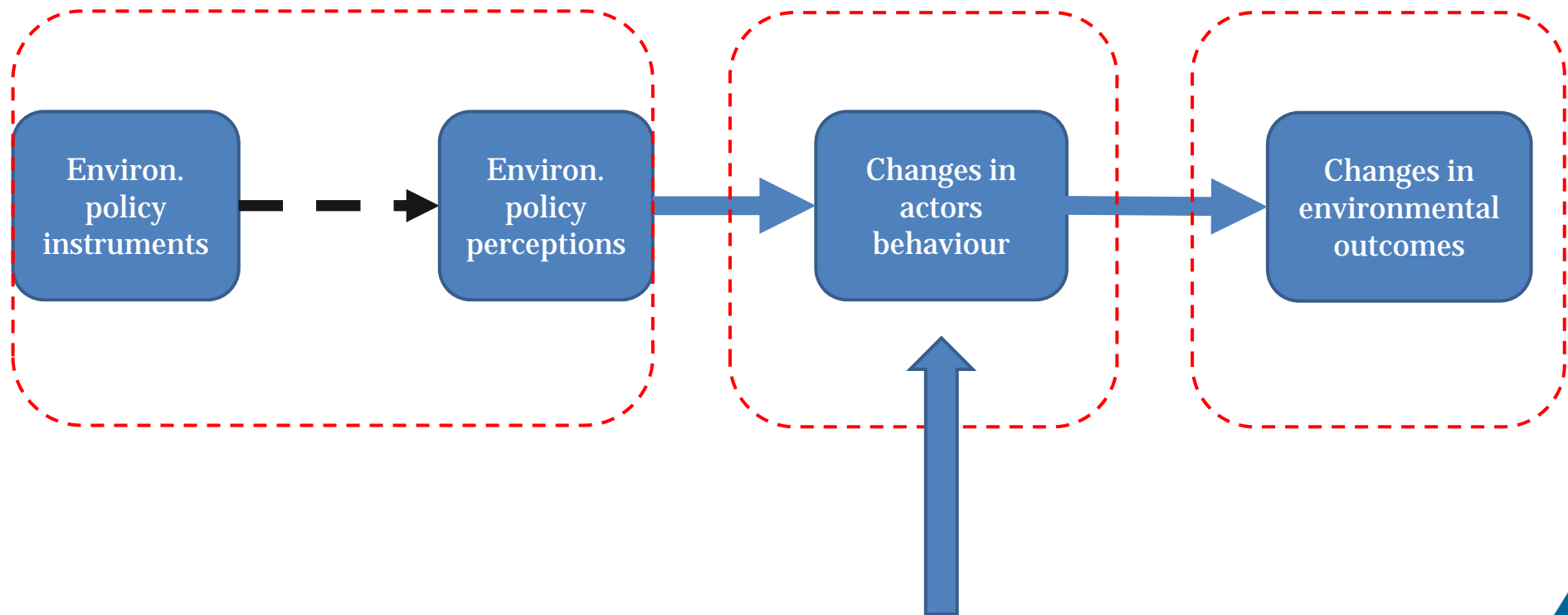
Examples of measures of EPS/EP

- Perception surveys
 - WEF Executive opinion survey 2004+, ~all countries
 - OECD company survey 2003, 7 countries
 - De facto
 - But well known issues





Examples of measures of EPS/EP





Examples of measures of EPS/EP

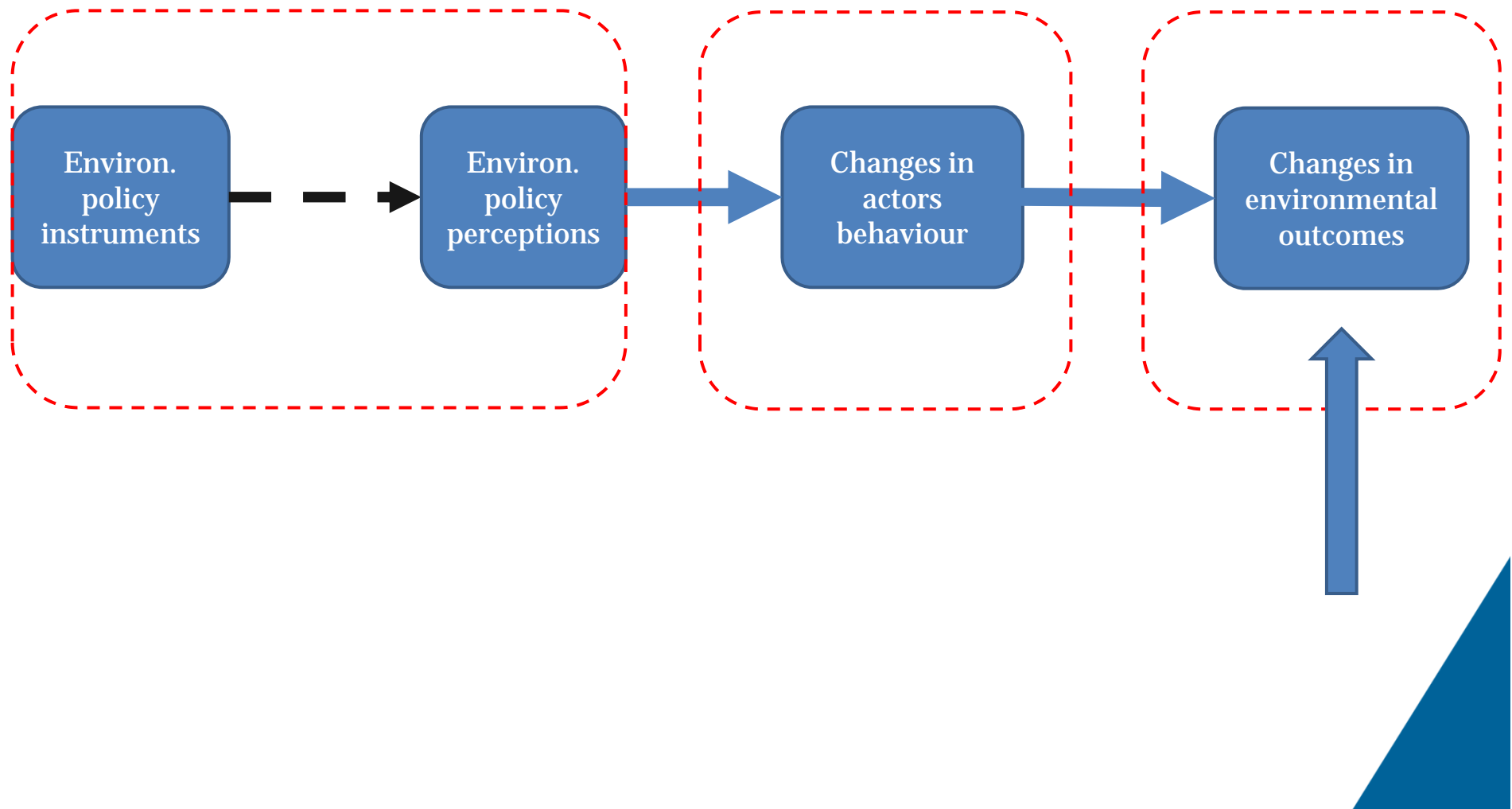
- **Pollution Abatement and Control Expenditures**
 - firm surveys (US, EU, Canada, Australia)

- **Shadow cost estimates**
 - EP's put an implicit price on pollution – hence idea to estimate this price from the production/input choices,





Examples of measures of EPS/EP





Examples of measures of EPS/EP

- Environmental-performance based measures:
 - Brunel and Levinson (2013) – countries relative emission intensity, conditional on industrial structure,
 - landfilling rates (OECD, 2014*),
 - Energy use, ambient pollution...





Examples of measures of EPS/EP

- Other proxies
 - number of environmentally-related inspections (Alpay *et al.*, 2002; Testa *et al.*, 2011; Brunnermeier and Cohen, 2003),
 - environmental treaties signed/ratified (Smarzynska and Wei, 2004; Yörük and Zaim, 2005 or Wu and Wang, 2008).
 - Environmental voting records (Gray, 1997)





Challenges in measuring EPS/EP

- **Multidimensionality**

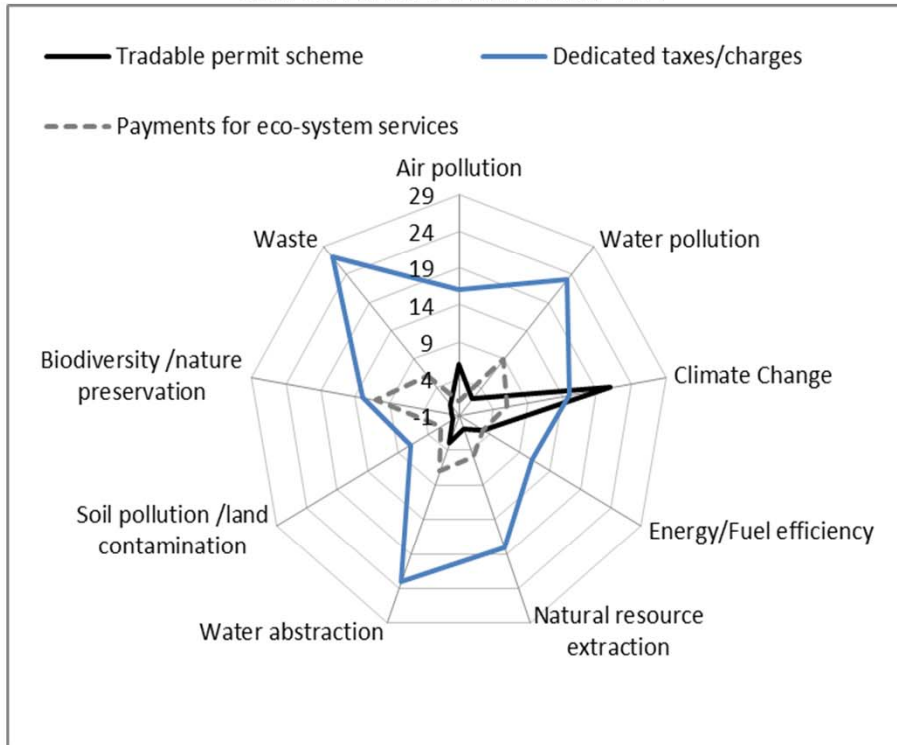




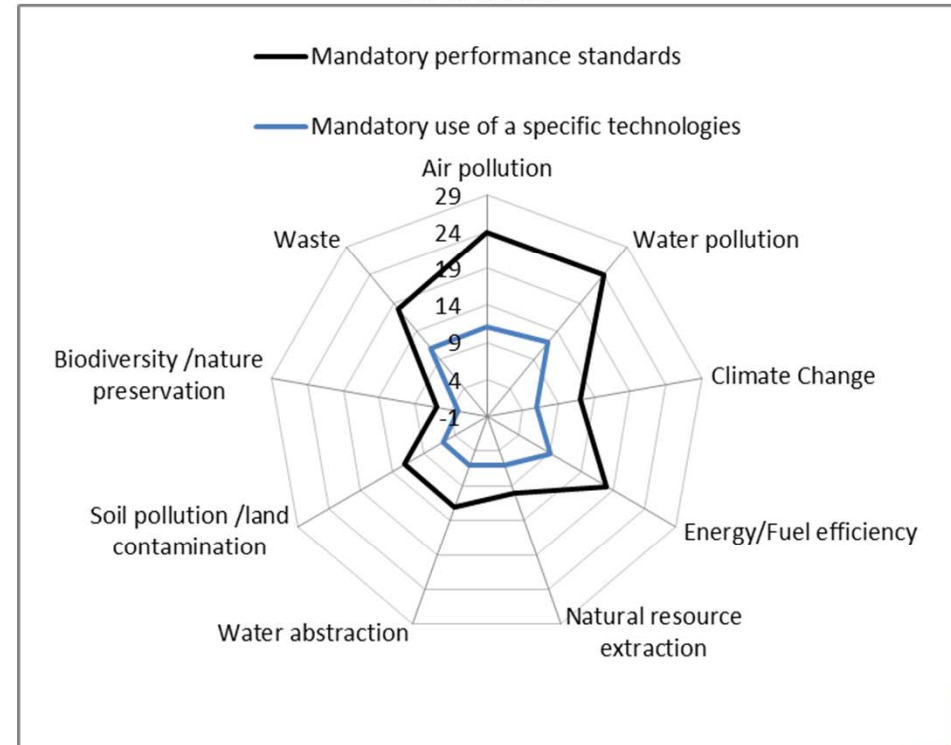
Multidimensionality (instruments)

No. of countries that apply the instrument in the given domain (across 29 OECD countries surveyed)

Market-based instruments



Standards





Challenges in measuring EPS/EP

- Multidimensionality
- Selection of respondents/sampling
- Simultaneity (B&L)
- identification of effects
- Law vs. enforcement
- Definitional issues & Data

Importance differs upon measure

-> selection, scoring, aggregation, use





No measure is ideal

- So what can we do?
 - Use most appropriate measure for each application
 - Corroborate results with other measures (if possible)
 - As an IO - put more effort into a series of policy measures (use experiences from PMR, EPL etc)





Composite index of environmental policies

- Aggregate (selected)
 - link to policies directly (identification!)
 - Respondent selection
- But
 - multidimensionality at its broadest (selection, weights, aggregation structure)
 - De iure -> enforcement issues
- Data?
 - OECD, 1990-2012,





Composite index of environmental policies – underlying assumptions

- If you care about a certain type of pollutant or environmental effect, from one industry – you will care about it in general,
- If you have stringent policy, a number of key instruments should also be relatively stringent (across pollutants, agents etc)
- Weak points:
 - International obligations
 - Instruments hard to cover (VAs, land use regulations, “soft” policies)
 - Covering countries with weak institutions, large grey economy etc.





Selection and scoring

- Focus – largely energy sector (and transport)
 - Data driven
 - Common importance across countries (though not the same)
 - Selected subset of instruments
 - Pollutants fairly common (some exceptions),
- In-sample scores (time-country).
- No a priori weighting method
- Aggregated by instrument types, then equal weights
- Some robustness checks (RW, PCs, correlations)





Selection and scoring - examples

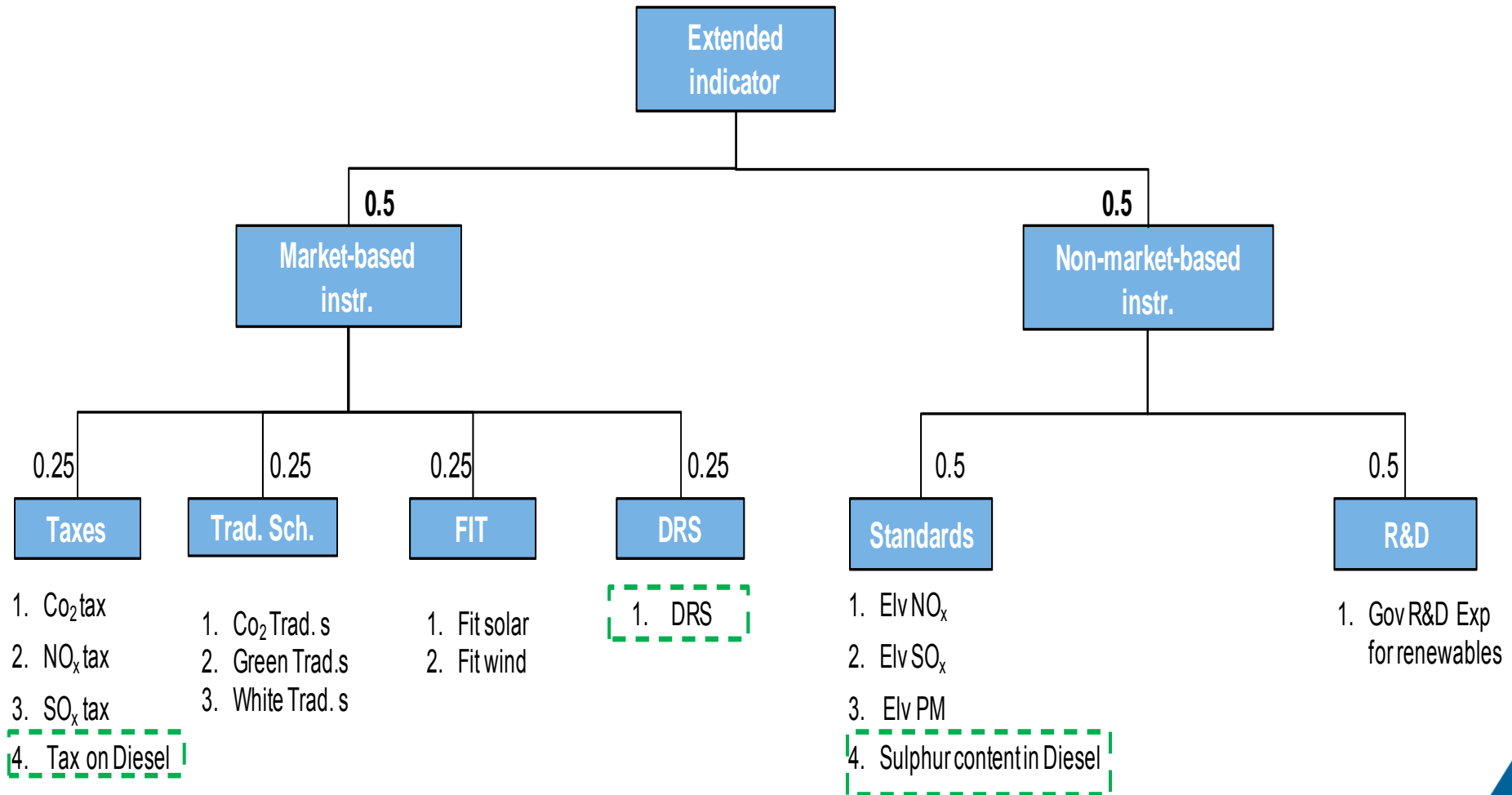
B. Categorical scoring for NO_x Emission Limit Value

ELV in mg/nm ³	Score assigned
=0	0
X>350	1
300<x<=350	2
250<x<=300	3
200<x<=250	4
150<x<=200	5
0<x<=150	6





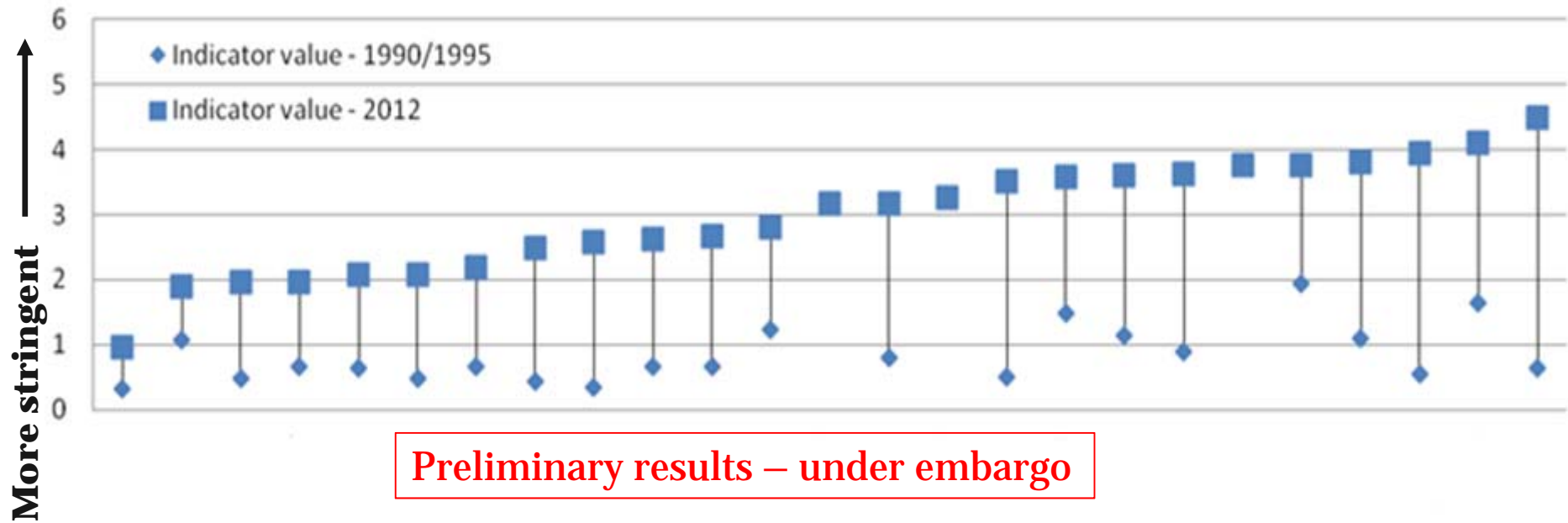
Aggregation structure and weights





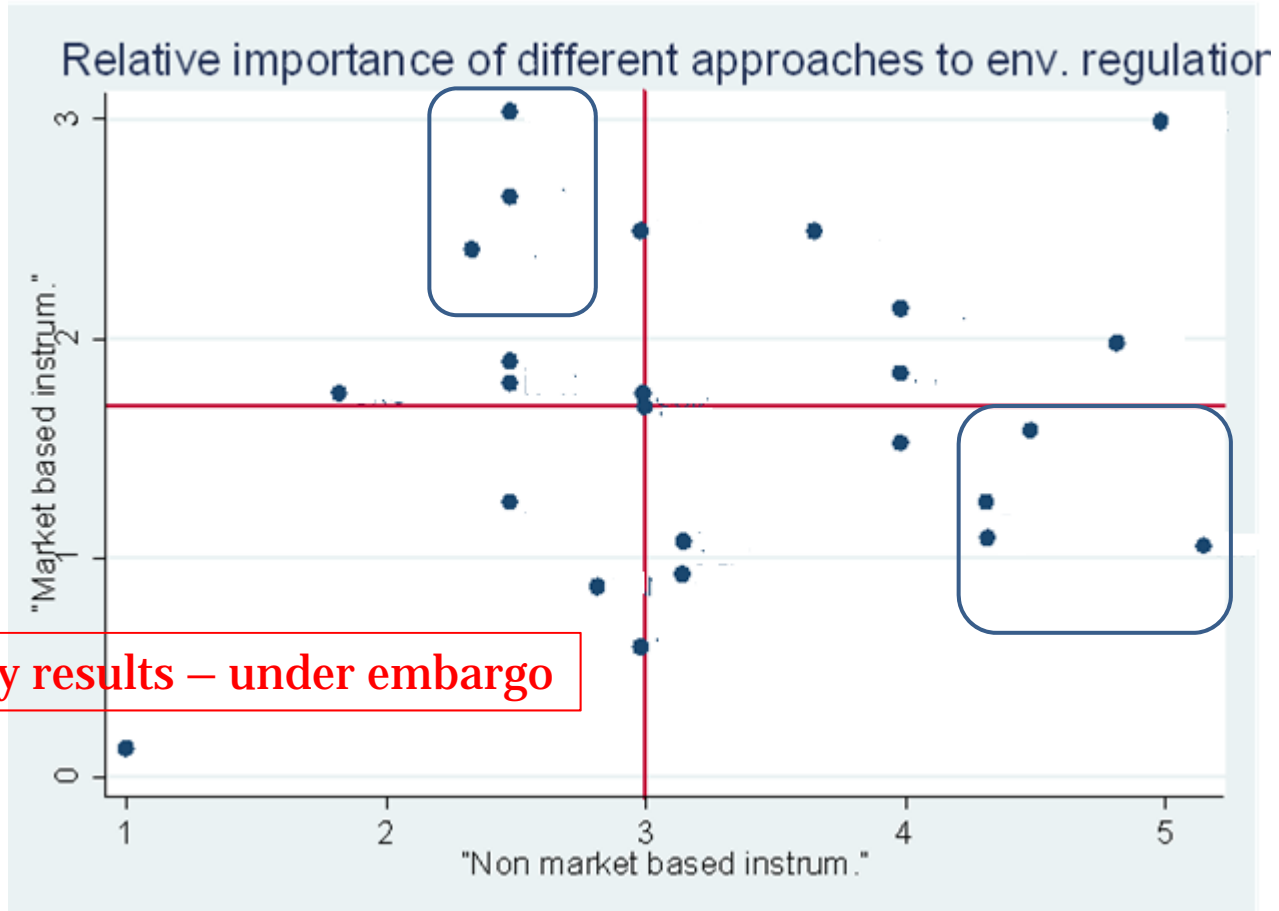
(preliminary) outcomes

Index of environmental regulation - extended indicator
2012





(preliminary) outcomes



Preliminary results – under embargo





(preliminary) outcomes

Correlation with other measures of stringency - Extended indicator

	2004	2005	2006	2007	2008	2009	2010	2011	Over the period
Perceived stringency (WEF)	.49 (0.01)	.42 (0.03)	.41 (0.04)	.43 (0.03)	.42 (0.03)	.50 (0.01)	.39 (0.05)	.34 (.10)	.39 (0.00)
CLIMI							.54 (.01)		





(preliminary) outcomes

Correlation with GDP, emission intensity and EPI index

	GDP per Capita	CO ₂ /GDP	CO ₂ /GDP (PPP)	CO ₂ /KWh	EPI
Energy Index	.35 (0.00)	-0.22 (0.00)	-0.31 (0.00)	-0.15 (0.00)	.36 (0.00)
Extended Index	.46 (.00)	-.19 (0.00)	-.25 (0.00)	-.20 (0.00)	.42 (0.00)





(preliminary) outcomes

Correlation with (environmental) inventing activity proxies

	Green Patents Index	Green Patents Index (t+2)	Patents (RE)	Patents (RE) (t+2)
Total Index	.17 (0.00)	.15 (.01)	.23 (0.00)	.23 (0.00)
Mkt based instr	.18 (0.00)	.18 (0.00)	.26 (0.00)	.24 (0.00)
Non-mkt based instr.	.14 (0.01)	.09 (0.10)	.12 (0.02)	.11 (0.03)





Indicators of “economic burdens of environmental policies”





Indicators of “economic burdens of environmental policies” - Motivation

- Longer-term effects of environmental policy stringency on longer-term productivity growth?
 - Little evidence (e.g. Kozluk and Zipperer, 2013, and OECD, 2014*)
- ...but environmental policies may also affect competition/entry hence innovation, adoption of cleaner technologies, business models,
 - Competition -> potentially important determinant of productivity growth (l.t.)
 - The competition-friendliness of environmental policies may matter more than stringency





Why?

OECD's Product Market Regulation Indicators



Economic outcomes
(investment,
innovation,
productivity, GDP)

- Covers a wide range of anti-competition regulations, administrative burdens, state control, etc.
- 1400+ questions, every 5 years since 1998.
- Exclude any environment related procedures, laws and permits.





Environmental Policy Annex to the PMR

- **Idea: How does the design of environmental policies impose administrative barriers & impede entry & competition?**
- **Questionnaire:**
 - Replies from 29+ countries (2 non-OECD)
 - 4 domains, ~12 question per domain





What aspects are we capturing?

- Administrative burdens of permit /license procedures
 - Integrated permits, single contact points, legal time limits on approval, silence-is-consent rule.

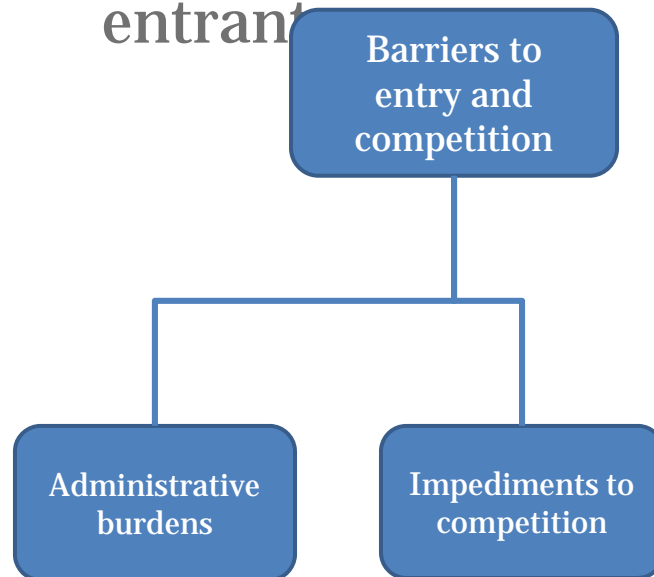
Administrative
burdens





What aspects are we capturing?

- Direct impediments to competition
 - Vintage Differentiated Regulations (eg ELVs), taxes/subsidies that discriminate against new entrants





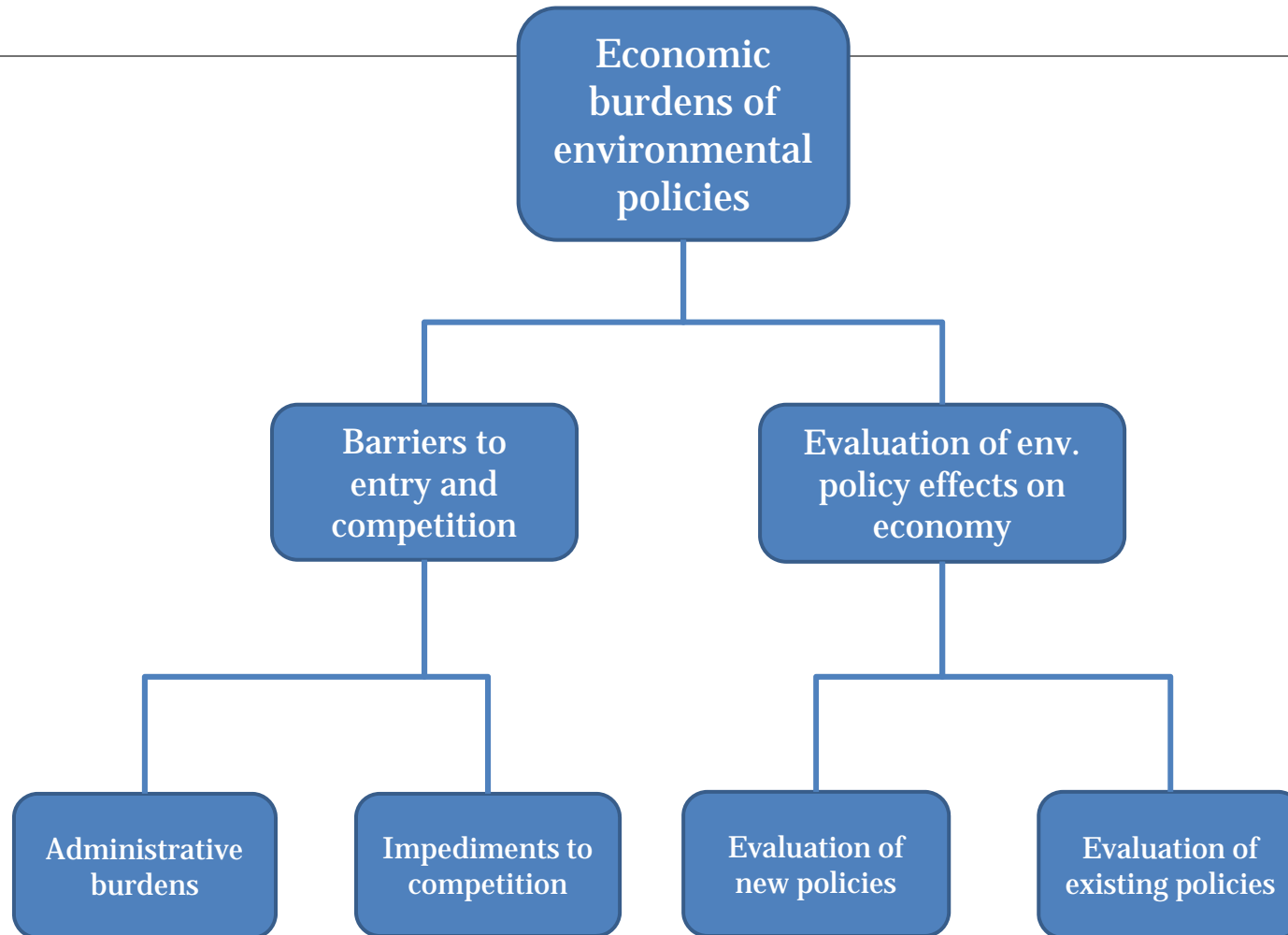
What aspects are we capturing?

- Evaluation of new policies & of existing policies
 - Are policy makers are obliged to evaluate:
 - effects on competition, entry, administrative burdens, statistics and reporting burdens etc.
 - the possibility, costs and benefits of using alternative tools (e.g. a tax versus an emission limit).
 - Possibilities for streamlining obligations imposed.
 - Evaluation guidelines, stakeholder consultations,
 - Transparency & communication,



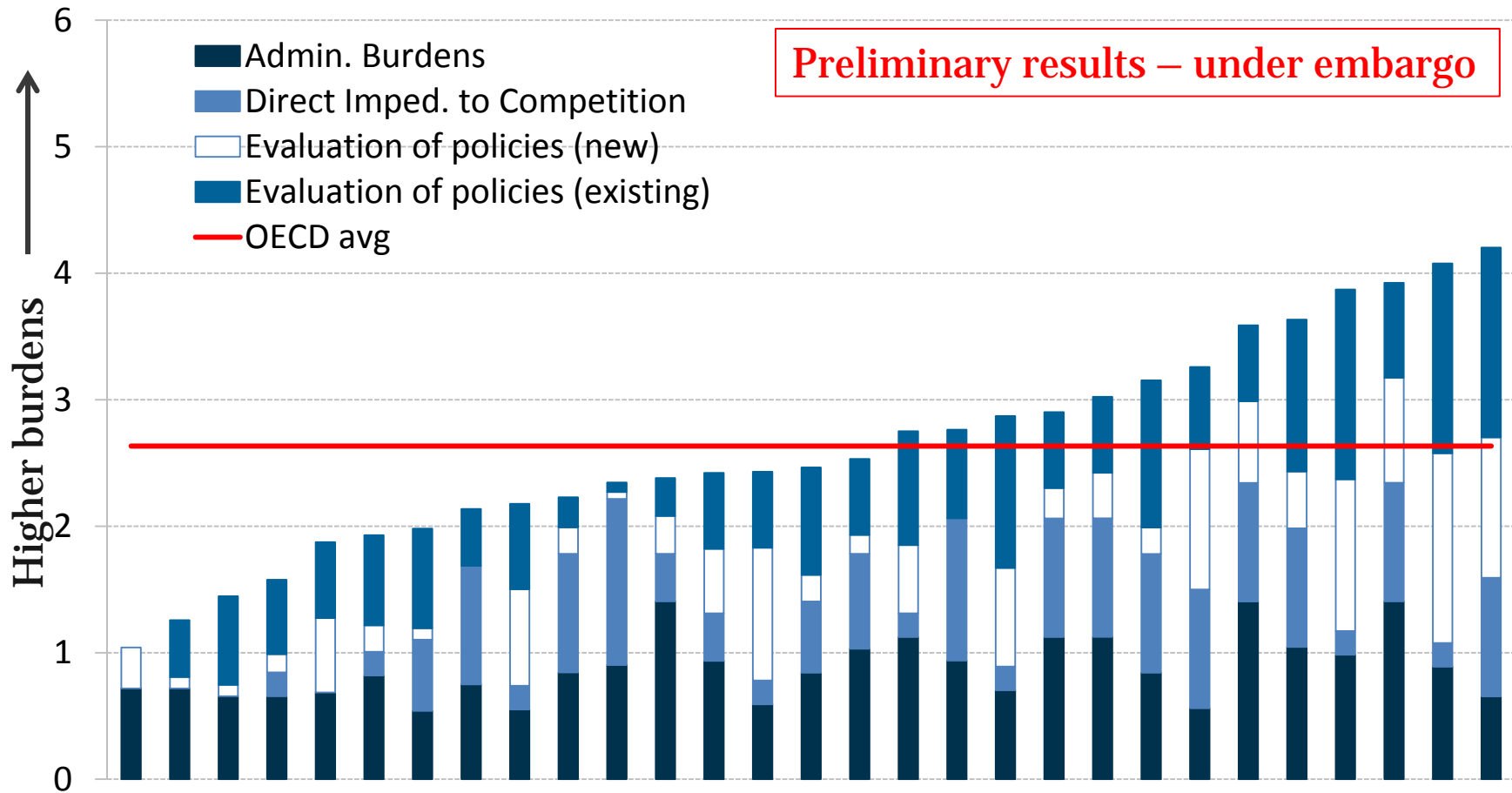


Index structure





(Very) preliminary results





Correlations with PMR,...

Preliminary results – under embargo

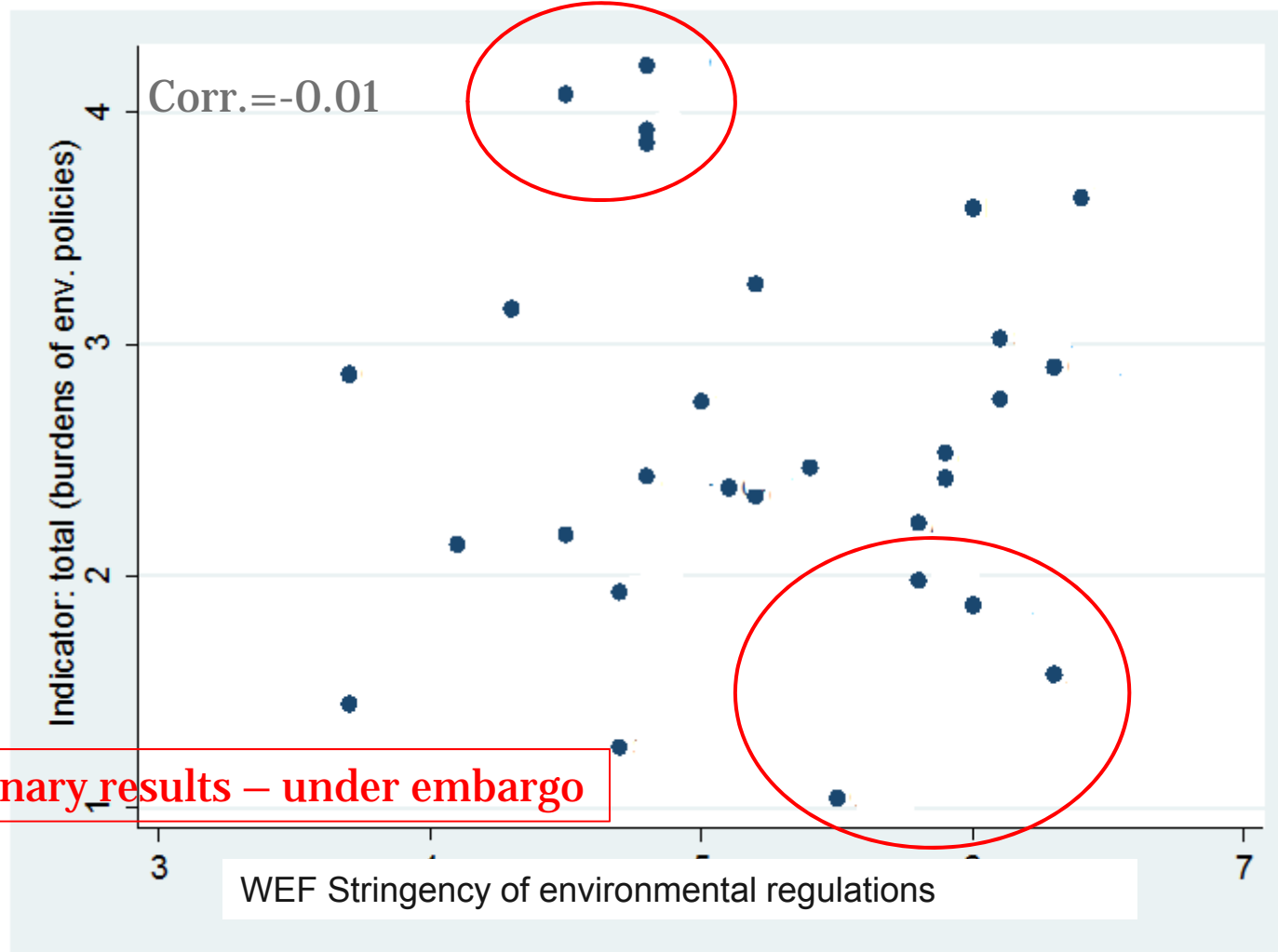
Corr.= -0.07

Corr.= 0.01





...with environmental policy stringency,...

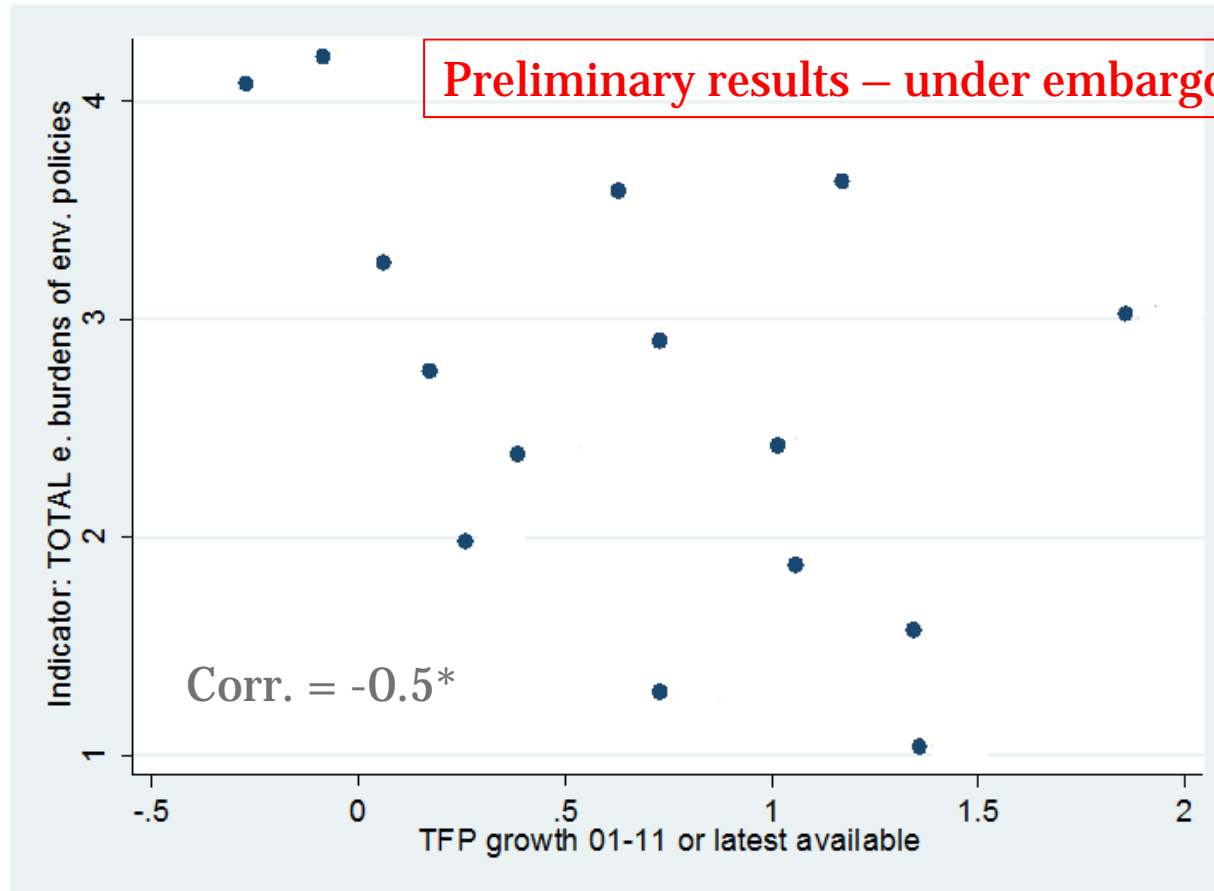


Preliminary results – under embargo





...with (past) economic performance





Further work/potential extensions

- Improve coverage in terms of instruments/media, years and countries (costs vs. benefits)
- Corroborate with existing measures
- Use subcomponents
- Inquire deeper into anti-competition design features (industrial survey?)





Thank you/Grazie!

Further info, comments:

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