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Institutional quality, trust, environmental policy and productivity in EU

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Motivation (i)

- The EC has established at the end of 2014 the toughest climate change target of any region in the world: greenhouse gas emission has to be cut by 40% and 27% of total energy production has to be from renewable sources before 2030.

- The EU is well on track towards meeting its targets for cutting greenhouse gas emissions both under its own internal target in the Europe 2020 Strategy and under the Kyoto Protocol's second commitment period (2013-2020).

- What is the effect of tight environmental legislation on competitiveness?

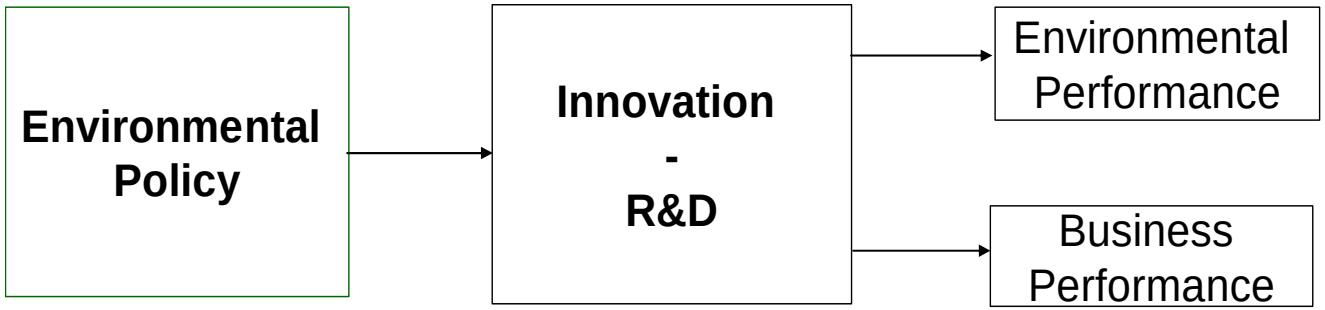
Motivation (ii)

- The conventional perception about environmental protection is that it imposes additional costs on firms, which may reduce their global competitiveness with negative effects on growth and employment.

- But Porter and Van der Linde (1995) found that more stringent environmental policies can stimulate innovations that may over-compensate for the costs of complying with these policies.

- The Porter hypothesis suggests that "*clean air*" and competition are not incompatible since properly designed environmental regulation can stimulate innovation which in turn will increase competitiveness.

The «Porter hypothesis»



Three variants of the PH (Jaffe et al, 2005):

- "*weak*": environmental regulation will stimulate certain kinds of environmental innovations, although there is no claim that the direction or rate of this increased innovation is socially beneficial.

- "*narrow*": flexible environmental policy regimes give firms greater incentive to innovate than prescriptive regulations, such as technology-based standards.

- "*strong*": more stringent environmental policy may induce innovation that may compensate (or more than compensate) for the cost of complying with it.

Motivation (iii)

- Pollution is a negative environmental externality, while innovation is a positive externality.

- Therefore, without a public intervention to manage these two market failures, firms pollute too much and innovate too little compared with the social optimum.

- As such, investments and thus, innovation to develop “green” technology are likely to be below the social optimum because, for them, the two market failures are mutually reinforcing. (Jaffe et al 2014)

Motivation (iv)

- Thus the big challenge for the policymakers is to stimulate environmental innovation to enhance productivity growth.

- As environment is often described as a collective good, the problem of maintaining a sustainable environment (tight environmental regulation) can be interpreted as a problem of collective action due to the conflict between individuals (firms) and collective rationality (institutions).

- We assume that high-quality institutions and trust in Institution and public policies make firms and institutions cooperate more effectively

Literature (i)

- This paper relates to at least two literatures: the one related to the "Porter hypothesis" and the other on the influence of institutional quality and trust on environmental policy.

- Empirical investigation of the consequences of environmental regulation on productivity at the macroeconomic level is rather scant, heterogeneous and mostly developed in the context of international trade (Lanjouw and Mody, 1996; Popp, 2006; De Vries and Withagen, 2005).

- In a very recent paper, Albrizio et al (2014) look at the effects of environmental stringency policy changes on productivity growth in the OECD countries.

Literature (ii)

- The effect and importance of institutional quality for environmental sustainability has been discussed in many empirical and theoretical papers (i.e. Pellegrini 2006, Etsy et al 2005)

- The literature on the relationship between institutional quality, trust and growth is broad (i.e. Uslaner 2001, 2010, 2012)

- The Literature on the role of Institutional quality and trust in the Porter hypothesis….

- …..to the best of our knowledge this is the first paper addressing this issue.

Assumptions

- i) that there is a positive relationship between social trust and institutional quality (i.e. Acemoglu 2005, Robbins 2012).

- ii) that institutional quality can be presented as a solution for solving collective action problems and make the environmental policy more effective (Gärling et. al. 2002).

- iii) that the environmental policy might improve productivity through technological innovation.

What is new?

- We investigate the impact of environmental policy stringency indicators on productivity and innovation adopting a cross-country perspective.

- Country level studies are more suitable for international policy-making compared to industry or firm level studies as they usually provide very context-specific conclusions

- We test the PH looking at the impact of both “command and control” and “market based” environmental policy instruments on productivity and innovation (ICT and R&D).

- To the best of our knowledge, this is the first work investigating the interplay between environmental regulation, institutional quality and trust in determining the economics performance of regulated countries.

The data (i)

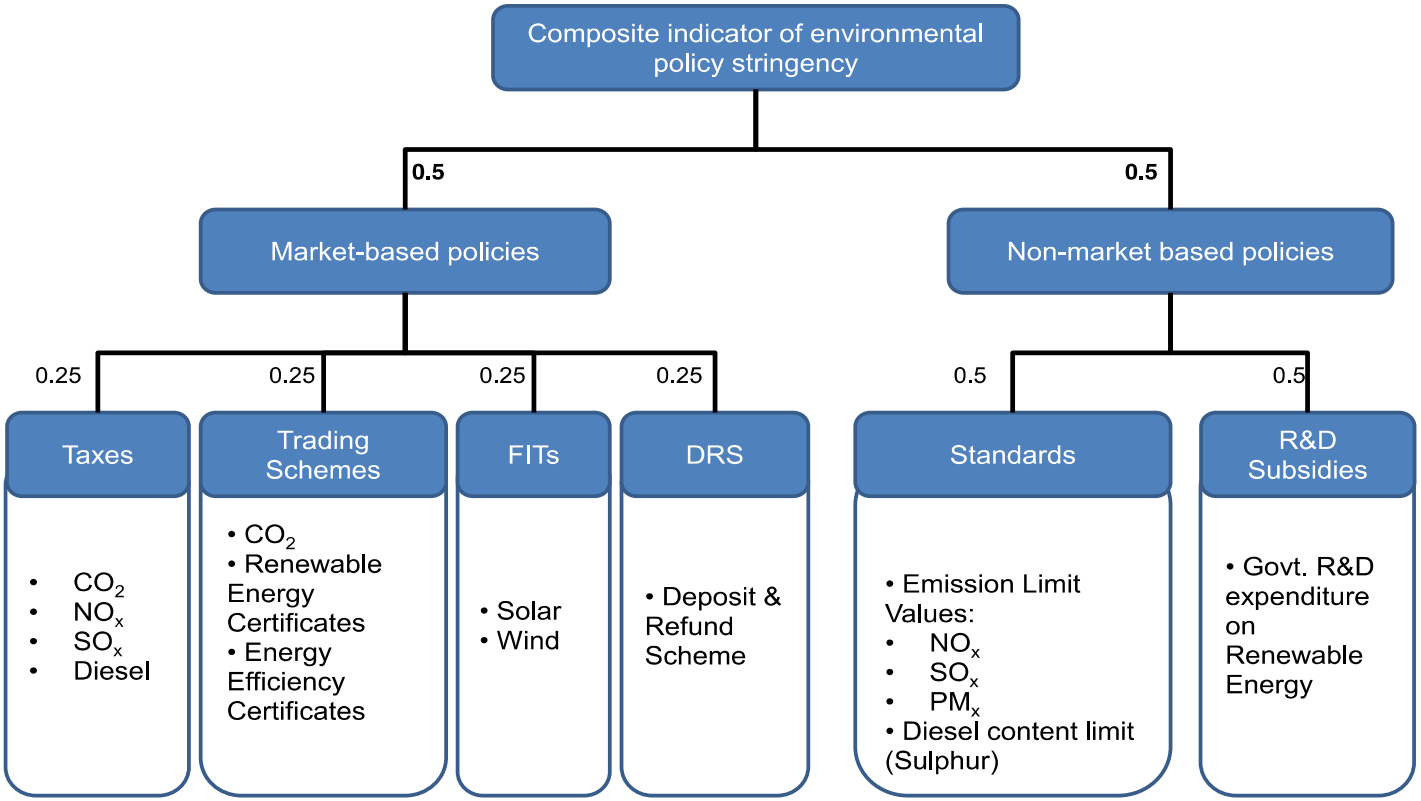
- Our analysis covers 10 EU countries (Austria, Belgium, Germany,, Spain, Finland, France, Italy, The Netherlands, Sweden, UK) over the period 1995-2008. Annual data are from OECD and EUKLEMS.

- As for environmental policy indicators we use the new Environmental Policy Stringency (EPS) index, developed for the OECD countries by Botta and Koźluk (2014).

- The EPS is a composite indicator based on the aggregation of quantitative and qualitative information on selected environmental policy instruments into one comparable, country-specific proxy of environmental policy stringency.

- The EPS covers 24 OECD countries over the period 1990-2012.

Figure 1. Structure of the Environmental Policy Stringency (EPS) indicator



Source: Botta and Koźluk (2014)

The data (ii)

- Data for Institutional quality, control of corruption, regulatory quality, voice and accountability, are taken from the World Bank Worldwide Governance Indicators.

- To proxy the trust we use some qualitative indicators taken from the World Bank Worldwide Governance Indicators: government effectiveness, political stability.

- We also include in our estimates a tentative proxy of trust: an indicator taken from the EC surveys that shows the amount of financial limits borne by the productive sector (factors limiting production) .

Econometric strategy (i)

We start from a standard production function augmented with environmental policy, institutional quality and trust indicators to check for the direct impact of these factors on productivity growth:

$$DlnY = a_1 + a_2 DlnX + a_3 Z_1 + a_4 Z_2 \, e \qquad (1)$$

Where:

Y is an indicator of labor productivity (*LP, TFP)*,
X is a set of controls including measures of innovation and capital stock and $Z_1$is a vector including measures of environmental regulation, trust and institutional quality .
Z_2 is a vector of control variables including output gap, real oil price, trade openness, government balance, FDI inflows and a time trend.

If a_3 is positive then PH holds

Econometric strategy (ii)

- We test whether environmental regulation, institutional quality and trust have a positive direct impact on the accumulation of technological and innovation capital.

- Thus we investigate the correlations between a set of environmental stringency and institutional quality proxies and two measures of technological and innovation capital stock K^i (i.e. ICT, R&D) in equation 2 below.

$$DlnK^i = a_1 + a_2 lnZ_1 + a_3 Z_2 \, e \qquad (2)$$

- if a_2 is positive and significant we can take the results as an “indirect” test of PH.

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Econometric strategy (iii)

- Finally, we tested an equation including interaction terms to evaluate the differential impacts of the various environmental stringency, trust and institutional quality measures on productivity growth:

$$DlnY = a_1 + a_2 DlnK_i + a_3 lnK_i * Z_1 + a_4 lnZ_1 + u \qquad (3)$$

- If a_3 is positive then countries with tighter environmental regulation, higher institutional quality and trust experience faster productivity growth compared to other countries.

EPS, institutional quality, trust and labor Productivity

Table 1 Labor productivity, EPS, institutional quality, trust

GLS		
DlnH_k_nonict_klems	0.312***	0.307***
	(0.114)	(0.111)
DlnH_k_ict_klems	0.0919**	0.0834**
	(0.0376)	(0.0400)
L.eps_mb		0.00565***
		(0.00152)
L.eps_nmb		0.00523***
		(0.00183)
L.corr2	-0.0142**	-0.0130**
	(0.00637)	(0.00545)
L.factlim	-0.00112**	-0.000952*
	(0.000532)	(0.000556)
L.voiceacc	0.0239***	0.0211***
	(0.00857)	(0.00808)
L.polstab	-0.0109***	-0.0122***
	(0.00398)	(0.00461)
trend	-0.00224***	-0.00252***
	(0.000420)	(0.000621)
L.eps_fs	0.00988***	
	(0.00112)	
Constant	0.0702***	0.0807***
	(0.0173)	(0.0240)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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L.p., EPS, inst.quality , trust: interaction terms

Table 2 Labour productivity, EPS, institutional quality , trust: interaction terms.

GLS			
DlnH_k_nonict_klems	0.350***	0.368***	0.381***
	(0.135)	(0.130)	(0.139)
DlnH_k_ict_klems	0.134***	0.136***	0.133***
	(0.0276)	(0.0269)	(0.0304)
L.outputgap	-0.00427***	-0.00415***	-0.00448***
	(0.00123)	(0.00122)	(0.00121)
trend	-0.000190	-0.000226	0.000232
	(0.000726)	(0.000663)	(0.000519)
L.voiceacc	-0.0172***		
	(0.00367)		
L.voiceacc_eps_mb	0.00162*		
	(0.000861)		
L.voiceacc_eps_nmb	0.00409***		
	(0.000874)		
L.goveff		-0.0159***	
		(0.00433)	
L.goveff_eps_mb		0.00173**	
		(0.000727)	
L.goveff_eps_nmb		0.00341***	
		(0.000722)	
L.regqual			-0.0171***
			(0.00330)
L.regqual_eps_mb			0.00184*
			(0.000960)
L.regqual_eps_nmb			0.00276***
			(0.000962)
Constant	0.0211	0.0229	0.0106
	(0.0257)	(0.0232)	(0.0186)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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R&D, ICT, EPS, institutional quality, trust

Tab 3 R&D, ICT, EPS, institutional quality, trust

GLS	R&D	ICT
L.eps_nmb	0.000151	0.00295
	(0.00344)	(0.00513)
L.eps_mb	0.000571	0.000279
	(0.00322)	(0.00487)
L.goveff	0.0116	0.0491**
	(0.00931)	(0.0227)
L.factlim	-0.00198***	-0.00279***
	(0.000654)	(0.00103)
L.voiceacc		-0.0329
		(0.0261)
trend	-0.00109	-0.00739***
	(0.000949)	(0.00156)
Constant	0.0639*	0.318***
	(0.0329)	(0.0481)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Estimation results (i)

- EPS has a positive and statistically significant impact on labor productivity growth.

- We also find that the presence of corruption, financial factors limiting production and political instability have a negative impact on labour productivity.

- On the contrary voice and accountability has a positive relationship with labour productivity.

Estimation results (ii)

- With the inclusion of interaction terms, the estimated coefficients indicate the difference in the impact of the variable (EPS) on the dependent variable (labour productivity) whether the institutional quality/trust is “high” or “low”.

- Preliminary estimates show that on average the presence of greater voice and accountability, better government effectiveness and regulatory quality enhance the effectiveness of market based and command and control environmental policies in enhancing labour productivity.

Estimation results (iii)

- Eventually, we turn to the analysis of the influence of environmental regulation and institutional quality and trust on ICT capital accumulation and R&D expenditure to investigate for the presence of an indirect channel trough which might be affected productivity growth

- Estimates confirm partially previous results: α2 is positive but not significant for both R&D and ICT capital.

- As for institutional quality and trust variables government effectiveness seems to have a positive impact only on ICT capital accumulation while the financial factors limiting production have a negative relationships with both R&D and ICT.

- The other qualitative variables have the correct signs but are not statistically significant

Preliminary conclusions (i)

- In this paper we explore how the quality of institutions and the degree of trust in Institutions and public policies affect the effectiveness of public policies in enhancing productivity and innovation - with a specific focus on environmental policy.

- Our main assumption that trust and institutional quality might work as a catalyst for strengthening the effect of environmental policy on firms' productivity and propensity for innovation can not be rejected.

- These findings are preliminary and need further and deeper investigations.

- The empirical evidence seems to support the conjecture that the stringency of environmental policies can be increased without harming economy-wide productivity and that a deeper analysis of the mechanisms through which environmental policy influenced productivity and innovativeness has potentially relevant implication to develop further the European environmental policy agenda.

Next steps

- Test TFP instead of LP to get more insights on sectoral spillovers
- Introduce more «effective» trust indicators (i.e.World Value Survey)
- Test specific environmental policy measures (i.e. ETS, environmental taxes, emission targets)
- Expand the time span (new EUKLEMS data soon available)

Thank you for your attention

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