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Abstract

The theory of regulatory competition in environmental policy predicts a 'race to the bottom' of standards. The article tests the theory for the first time directly using environmental output data for 24 countries over a period of 35 years. It finds a clear 'race to the top' which be partly explained by the search for international harmonisation when competition is imminent.

1 Introduction

The process of globalisation has raised the fear among social scientists and the public that tax revenue of states and regulatory protection standards are driven down in a process of competition among states. Such a process might threaten the provision of national public goods from two sides (Sinn 1997). First, tax revenues would go down and leave less room for public spending. Second, regulatory competition would lead to lower regulatory levels of labour, health, environmental or product security standards leading to less protection for workers, consumers, and citizens.

Empirical evidence so far shows that capital tax competition works in fact as the theory predicts: it drives tax rates down (Winner 2005; Ganghof 2006; Swank 2006; Franzese/Hays 2007; Genschel/Ganghof 2008). The empirical picture for regulatory competition, however, is mixed. In the environmental field various approaches to measure regulatory competition have not lead to the one clear result, but rather to a complex empirical picture and to modifications of the theory. There is no support for the hypothesis that regulatory competition necessarily leads to convergence 'at the bottom' (Berger and Dore 1996: vii; Drezner 2001: 75; Hoberg 2001b: 194; Bernauer and Caduff 2004: 100), however, there are some indications, that regulatory competition might have an effect on the competitiveness of industries (Gray/Shadbegian 1993, 1997; Beers/Bergh 1999; Greenstone 2001; Xing/Kolstad 2002). Moreover, there is case study evidence for ‘races to the top’ (Vogel 1997; Jänicke 1998; Kern 2000).

Why do we, in contrast to the theory, not find a general race to the bottom? A whole number of hypotheses have been forwarded to explain the mixed evidence in the environmental field. Vogel (2000) and Jänicke (1998) have argued that environmental costs are not significant enough to cause regulatory competition. Jänicke and Jakob (2004) have pointed to the fact that political demand for strict environmental policies may outweigh economic pressures. Scharpf (1996,

1997) and Holzinger (2003) emphasize that context conditions, such as the trade regime, relative market size, or the type of standard, product or process, may account for the variance in empirical results.

In this article, a further hypothesis shall be explored. Given the existence of international cooperation and supra-national institutions in the environmental field, and in particular the European Union (EU), it might be profitable both for firms and for states not to engage in competition but instead to search for international harmonisation, i.e. 'to race to Brussels'. For business, harmonized environmental standards have the same effect as a cartel, potentially harmful competition is avoided. For governments exposed to voters' demand for high environmental quality, harmonisation serves to provide the public good at a higher level of governance. Moreover, in the case of transboundary environmental problems, providing the good at a supra-national level is more adequate. Finally, if voters or industry judge the harmonized standard as too strict or too lax, governments can shift responsibility to the supra-national institution. With international harmonisation they incur a lesser risk of loosing voter or industry support.

It is the aim of this article to develop this hypothesis and to provide empirical support for it. Our data set includes information on the development of 17 environmental policies in 24, mostly European, countries over a period from 1970 to 2005. We use this data first to show whether there was in fact a 'race to the top' or 'to the bottom' of environmental regulation in this period, and second to provide indications of an active search for European environmental harmonisation.

The paper is organized as follows. Section 2 introduces the theory of regulatory competition in the environmental field and some modifications. Section 3 gives a brief account of the empirical evidence so far. Section 4 presents the findings from our own data with respect to basic and modified hypotheses of regulatory competition theory. Section 5 develops the ‘race to Brussels’ hypothesis and provides some evidence for it.

2 The Theory of Regulatory Competition in the Field of the Environment

The concept of regulatory competition is based on economic theories of systems competition and regulatory competition (Tiebout 1956; Oates/Schwab 1988; Long/Siebert 1991; Sinn 1997). It was first used to explain the American experience with corporate chartering. The model rapidly flourished because it provides an explanation of how regulators respond to the demands of mobile factors (Barbou des Places 2004: 75). While the economic literature focuses on normative questions, such as the effects on efficiency or democracy, political science literature has concentrated on the question whether regulatory competition actually works and whether it induces races to the top or to the bottom.

The theory of environmental competition

The basic theory of environmental regulatory competition suggests that the presence of competition leads to a race to the bottom of environmental standards. This thesis is based on the assumption that the increasing integration of European and global markets, the abolition of national trade barriers, the international mobility of goods, workers and capital pressures nation states to redesign domestic market regulations in order to avoid regulatory burdens restricting the competitiveness of domestic industries (Goodman/Pauly 1993; Keohane/Nye 2000; Holzinger/Knill 2004: 27f).

At the micro-level, causality is assumed to work through three mechanisms: First, the presence of mobile capital can induce governments to attract capital from elsewhere by lowering environmental standards. Second, domestic capital can exit, because strict environmental standards impose high costs on polluters in high-income economies. To remain competitive, these firms relocate to low-income countries. Rising capital outflow forces governments in high-income countries to lower the level of regulation (Wheeler 2000: 2). Third, industry may lobby governments to introduce laxer regulation, using the threat of exit. This way, regulatory competition among governments may lead to a 'race to the bottom' in environmental policy, implying policy convergence at a low level of regulation (Drezner 2001: 57-59; Hoberg 2001a: 127; Simmons/Elkins 2003).

Modifications of the theory

The theory rests on a number of implicit assumptions. Most importantly, it is assumed that the costs of stricter environmental standards are high enough to cause severe competitive disadvantages to firms exposed to these standards and to lead firms to change their investment locations. Second, the model is based on the idea of competition among firms within a common market or a free trade regime. Third, the theory does not differentiate between product standards and process standards. Fourth, it is assumed that governments react exclusively to the preferences of international capital, ignoring the preferences of voters or interest groups (Jänicke/Jacob 2004: 32). Fifth, Chua (1999: 423) concludes in her study that the ambiguity of empirical results arises partly from the role of innovation and the international diffusion of environmental technologies, and the positive economic feedback effects of a cleaner environment. Finally, the result of regulatory competition depends on contextual factors, such as relative market size or number of competing countries (Oates 1998; Apolte 2002; Holzinger 2003).

These observations lead to some modifications of the theory. Vogel (2000: 365f; cf. Revesz 1992) stresses that for all but a handful of industries, the costs of compliance with stricter regulatory standards have not been sufficiently high to force relatively affluent nations to choose between competitiveness and environmental protection. In marked contrast to labour costs, the overall costs of compliance with environmental regulations have to date been modest. The national levels of pollution control expenditures have had little effect on economic growth (cf. Vogel 1997; Jänicke 1998; Jänicke/Jacob 2004: 33). Vogel (2000: 267) argues that environmental standards are primarily determined by domestic political preferences and interests. They tend to be stronger and better enforced in affluent nations with influential green pressure groups. They also tend to be strengthened during periods of economic prosperity and stabilized or weakened during periods of slower growth.

Moreover, in reality it is often permitted to wall off a country against foreign products on the basis of health and environmental reasons. In this case, competitive disadvantages of an industry in a high standard country might not be very serious. Holzinger (2003: 206-207) shows that the result of regulatory competition -a 'race to the top', 'to the bottom', or to neither one- varies with several factors; in particular with the type of trade regime (barriers to trade permitted or mutual recognition), the heterogeneity of actors preferences, relative size of market shares and the exact object of the regulation – namely products or production processes. Under recognition of these factors no general 'race to the bottom' can be predicted. Apolte (2002: 389f) argues that a 'race to the bottom' does not necessarily need to follow from competition. If not a large number of small jurisdictions but a small number of large jurisdictions compete for quality standards, then the resulting quality standards will end up above the minimum level.

The distinction between product and production process standards is of particular relevance. Whereas for product standards, several factors might inhibit a 'race to the bottom' and even trigger a 'race to the top', a widely shared expectation in the literature is that policy convergence will occur at the lowest common denominator in the case of process standards (Scharpf 1996, 1997; Drezner 2001; Holzinger 2002, 2003). Industries in both low-regulating and high-regulating countries have a common interest in harmonizing product standards to avoid market segmentation. Whether harmonisation occurs at the level of high-regulating or low-regulating countries depends on a number of additional factors, most importantly the extent to which high-regulating countries are able to factually enforce stricter standards. If it is possible to erect exceptional trade barriers (e.g. for health or environmental reasons under EU and WTO rules) convergence at a high level of regulation is likely (Vogel 1995; Scharpf 1997: 523). If such exceptional trade bar-

riers are not permitted, by contrast, competitive pressure is expected to induce governments to lower their environmental standards (Holzinger 2003: 192).

The classical example of a 'race to the top' with product standards relates to car emissions. When California raised its emission standards, most US states followed quickly (Vogel 1995). California was permitted to apply its standards to foreign car producers. The harmonisation advantage is large for technology avoiding exhaust emissions. The most important reason for this is that licensing procedures for cars are very expensive and firms thus want to avoid multiple licensing procedures.

Given environmental costs are significant, the differentiations of the theory lead to the following modified hypotheses on environmental regulatory competition:

Table 1 Hypotheses on Environmental Regulatory Competition

	product standards	*process standards*	*trade-irrelevant standards*
environmental trade barriers permitted	'race to the top' or race to the bottom'	no 'races', multiple standards co-exist	no 'races', multiple standards co-exist
mutual recognition	'race to the bottom'	'race to the bottom'	no 'races', multiple standards co-exist

3 Empirical Studies

This section gives a brief overview of empirical studies on environmental competition. We refer firstly to studies that present evidence seemingly confirming the predicted 'race to the bottom', and secondly to studies that do not confirm 'races to the bottom' or even find 'races to the top'.

Evidence for competition in laxity

There are a few studies confirming some of the basic assumptions of the theory, for example, that strict environmental regulation leads to high compliance costs which leads in turn to reduced growth in productivity, job losses, reduced competitiveness, and to decisions to relocate into less regulated jurisdictions (cf. Jenkins 1998: 3). There are studies which find evidence at the firm level that more stringent pollution regulation deters new firms entry into pollution-intensive sectors (Becker/Henderson 1997, 2000; List/Co 2000). Gray and Shadbegian (1993, 1997) show a

negative relationship between environmental compliance costs and the level and productivity growth for the pulp and paper, oil refining and steel industries. Greenstone (2001) finds that in the first 15 years after the Clean Air Act Amendments became law in the US (1972-1987), non-attainment counties lost jobs, capital stock, and output in pollution intensive industries (in comparison to attainment counties).

Competitiveness of an industry is usually related to performance in international trade. Robison (1988) suggests a relative loss of competitiveness in more polluting industries on the basis of his finding that the average pollution-intensity of US imports increased relative to its exports between the early 1970s and the early 1980s. Sorsa (1994: 29f) shows that Japan is the clearest case of lost comparative advantage in sensitive goods. At the same time, she stresses that Austria and Finland, with high shares of environmentally sensitive goods in their exports and very high environmental expenditures, have increased their world market shares in these goods.

Xing and Kolstad (2002: 1) present a statistical test of the impact of environmental regulations on capital movement from the US. They examine the foreign direct investment (FDI) of a number of industries and show that the laxity of environmental regulations in a host country is a significant determinant of FDI in heavily polluting industries and is insignificant in less polluting industries.

Although the claim is still made that economic investment does, all else equal, move to jurisdiction with less stringent environmental regulatory requirements (cf. Konisky 2007: 856), none of the above studies confirms a clear trend towards systematic relaxation of state environmental regulation (cf. Drezner 2001). This is due to the fact that the cited studies do not measure directly the change in regulations but rather estimate the effects of stringent regulation on various economic indicators.

Evidence for competition in stringency

A number of studies relying on the same indirect economic indicators find no 'races to the bottom'. List et al. (2003) examine the location decisions of domestic and foreign firms. They find that domestic firms are influenced by environmental regulation, whereas foreign firms are not. This implies that countries can introduce more stringent environmental regulations without risking the loss of substantial foreign capital. Levinsion (1996) could not find a systematic effect between interstate differences in environmental regulation and location choices of manufacturing plants. Unlike previous work in this area, this study explores the relationship between site choice and environmental regulations using a broad range of industries and measures of stringency.

Another group of studies uses data on the development of environmental quality to evaluate whether there have been any 'races'. Most of this work finds 'races to the top'. The results of Wheeler's study (2000: 6) strongly contradict the 'race to the bottom' model. Instead of racing downward, major urban areas in China, Brazil, Mexico and the US have all experienced significant improvements in air quality. The improvements in Los Angeles and Mexico City are particularly noteworthy, since they are the dominant industrial centres in the region most strongly affected by NAFTA. For Mexico, neither Gallagher (1999) nor Rabindran (2001) find empirical evidence for a 'race to the bottom'. Bernauer and Caduff (2004: 99f) also observe that in most areas of environmental and consumer policy in advanced industrialized countries regulation has become much stricter since the 1970s (cf. Princen 2004). Some studies examine regulatory competition within the US federalism (List/Gerking 2000; Potoski 2001; List et al. 2003; Konisky 2007). All of them find no evidence for 'races to the bottom' but evidence for an improvement of several environmental quality indicators indications that states strengthen their environmental program in response to citizens' demands rather than weaken their programs in defence of economic pressures.

In sum, there is some evidence for a negative effect of stringent environmental regulation on economic factors, such as productivity growth and other indicators of competitiveness, as well as capital relocation as a result of environmental costs. The evidence is not particularly strong, however, as there are other studies showing that capital relocation is not caused by environmental regulation. Moreover, studies analysing the change in environmental quality find no 'races to the bottom', but 'races to the top' instead.

None of the studies reviewed above, measure 'regulatory races' directly. They use economic indicators which show a relationship between environmental costs and competitiveness or location decisions, or they use environmental indicators which measure the development of the quality of the environment. The first approach relates only to the 'independents' in the causal chain of the theory (environmental regulation costs - capital relocation) and does not show that there is actually a regulatory race at the 'dependent' side (relaxation of environmental regulation in many countries). The second approach includes the 'dependent' variables in a very indirect way: environmental outcome data is affected by many intermediate variables, such as bad implementation of the law or an increase or decrease of pollution activities. The theory of regulatory competition, however, is a micro-theory, that focuses on governmental behaviour. It is the regulatory output, i.e., the laws and decrees that will be changed by governments as a result of the causal mechanism. Therefore, environmental output data is the best indicator for the dependent variable. So

far, there are no encompassing studies using output data for the test of environmental regulatory competition.

4 No 'Race to the Bottom' in Europe

In this section we present data on the development of environmental regulation in 24 countries over a period of 35 years. After a brief description of the database we present findings on upward and downward 'moves' for 17 prominent environmental regulations. Finally, we introduce a simple statistical model to explain the changes in regulations.

Database

In the project "Environmental Governance in Europe" (ENVIPOLCON),[1] data on 40 environmental policies including all environmental media in 24 countries[2] over the period from 1970 to 2000 have been collected. Investigation of regulatory competition is only possible when up- or downward movements in the level of regulation can be clearly identified. This is easiest when limit values for emissions or tax rates or similar metrical values are set in the regulation. For the following analysis we selected therefore 17 environmental measures which allow for metrical comparison. For these standards we have expanded the data to a time series until the year 2005.[3] Fourteen out of the 17 environmental standards are directly trade related and are thus prone to regulatory competition, three are not. Out of the 14 trade related policies eight are process and six are product standards.

Continuous improvement in the level of protection

We first address the question how environmental policy change at the national level occurs: Are there in fact 'races to the bottom' or do we rather find evidence for a tightening of environmental standards?

Table 2 offers a clear indication for the absence of a 'race to the bottom' in national environmental policies. The table displays every up- and downward movement of standards for the 17 policies over the full period analysed. There is a clear pattern of a general upward development: out of all 918 movements occurring, 865 represent upward moves and only 53 downward moves.

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1 The research was supported by the EU, RTD program "Improving the human research potential and the socio-economic knowledge base", contract no. HPSE-CT-2002-00103. The database can be found at http://www.uni-konstanz.de/FuF/Verwiss/knill/projekte/envipolcon/project-homepage.php.

2 The sample includes member states of the old EU-15 (excluding Luxembourg), plus Switzerland, Norway, Hungary, Poland, Bulgaria, Romania, Slovakia, the United States, Mexico, and Japan.

3 The research project "Factors of Policy Change" is supported by the German Research Foundation (DFG).

This includes the cases of newly introduced norms, as the shift from no standard to the setting of a standard (no matter on which level) must be considered an improvement of environmental policies.

Table 2 Frequency of changes in regulations, 17 limit values

	All changes	*Upward changes*		*Downward changes*	
All standards	918	865	94%	53	6%
1970-80	200	198	99%	2	1%
1980-90	238	238	100%	0	0%
1990-00	321	284	88%	37	12%
2000-05	159	145	91%	14	9%
Product Standards					
Sulphur Content Gas Oil (vol%)	71	71	100%	0	0%
Lead Content in Petrol (g/l)	82	82	100%	0	0%
Passenger Car Emissions CO (g/km)	122	121	99%	1	1%
Passenger Car Emissions HC (g/km)	117	116	99%	1	1%
Passenger Car Emissions NOx (g/km)	104	88	85%	16	15%
Noise Emissions from Lorries (dB)	73	72	99%	1	1%
Process Standards					
Large Combustion Plants SO2 (mg/m)³	42	42	100%	0	0%
Large Combustion Plants NOx mg/m³)	39	38	97%	1	3%
Large Combustion Plants Dust (mg/m³)	39	39	100%	0	0%
Lead in Industrial Discharges (mg/l)	29	25	86%	4	14%
Copper in Industrial Discharges (mg/l)	27	23	85%	4	15%
Zinc in Industrial Discharges (mg/l)	27	21	78%	6	22%
Chromium in Industrial Discharges (mg/l)	27	23	85%	4	15%
BOD in Industrial Discharges (mg/l)	23	18	78%	5	22%
Trade-irrelevant Standards					
Motorway Noise Emissions (dB)	19	19	100%	0	0%
Glass Recycling Target (per cent)	38	34	89%	4	11%
Paper Recycling Target (per cent)	39	33	85%	6	15%

The table shows that most downward moves happened after 1990, although they still account only for about 10 percent of all changes in regulations. In terms of individual policies, most downward moves occurred for NO_x emission of passenger cars and for zinc and BOD standards for industrial discharges into water. In the case of NO_x emissions all 16 downward moves are of a pure technical nature that did not imply any relaxation in substance. The EU had changed its

measurement procedure for car emissions, the so-called Euro-test. At the same time five countries switched from the US-test to the Euro-test. This leads to an increase of the metrical NO_x value. This nominal change cannot be interpreted as a 'race to the bottom'.

For zinc emissions in industrial discharges the downward development can to a large degree be explained by Mexico and changes in Eastern European countries which for the first time introduced 'realistic' standards during the 1990s. Most Eastern European countries had – for reputational reasons – extremely strict legal standards for some environmental media, but did not implement them. The story is similar for BOD and the other industrial emissions.

Figure 1 Upward and downward changes for all countries, 17 limit values, 1970-2005

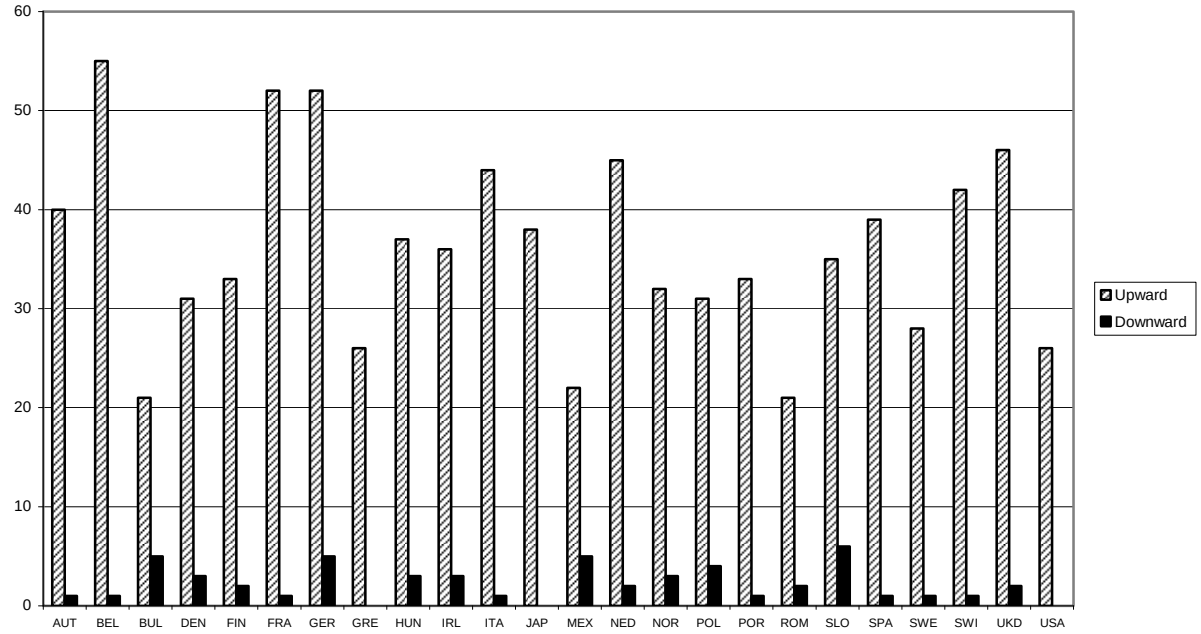

Figure 1 shows how downward moves are distributed over the countries in the sample. Only for the US and Japan no downward changes are reported, whereas most European countries experience at least one instance. This is due to the above described technical change of measuring procedures for car emission standards. Higher numbers of downward changes are only found in Mexico and Eastern European countries for the reasons given above. The only Western country with more than two downward changes is Germany; here some ambitious recycling quotas have been relaxed later on.

Explanation of regulatory changes

The descriptive analysis does not tell us, however, why we find such an overwhelming increase in regulatory stringency and such a large number of upward moves. The hypotheses from table 1 have been confirmed only partially, and two questions are raised by the descriptive analysis of our data: Is the 'race to the top' for product standards a consequence of regulatory competition or of other factors? The upward movement in the case of process standards is surely not the result of competition - what is it then? Therefore we proceed to an explanation of the observed changes in regulation.

The descriptive analysis of downward changes showed that these are obviously not the result of competitive pressures. The relative number of downward movements is low (6%) and linked to two singular events. Thus, a systematic causal analysis of regulatory downward changes is not promising.

The theory rests on two assumptions which are briefly discussed before we turn to a regression model. First, a perfect free trade regime with regard to environmental standards does not exist. In the EU and the World Trade Organisation trade barriers can be justified with reference to the protection of health and the environment in many cases (Epiney 2000). Countries with high levels of protection will therefore be able to retain those standards against competition from countries with lower standards. Thus, only the upper cells of table 1 are relevant in practice.

Second, there is already a whole lot of international cooperation for the protection of transnational environmental goods. On the one hand there is a large number of specific environmental regimes safeguarded by international law. On the other hand there are many binding rules set up by the EU by which national norms are being harmonised. Nation states no longer act in an anarchic international system with independent mutual recognition. Through international cooperation, minimum harmonisation levels are set against 'races to the bottom' and in the (rare) case of total harmonisation there is even complete convergence of national norms. Whenever there are binding international rules we will thus not expect regulatory competition to work.

On the basis of our descriptive data we cannot tell whether the upward movement is due to international harmonisation or whether regulatory competition is at least partly responsible (for 'races to the top' in the case of product standards). All product standards in the data set are harmonised in Europe. This counts also for some process standards but not for industrial discharges. Therefore, in the next step we will try to explain the observed pattern of upward change. Is it a result of international competition, or of international cooperation, or of other factors?

Empirical tests on regulatory competition usually use openness to trade, i.e. the relation between the sum of export and import of a country and the size of its economy (Li und Reuveny 2003) as a means of operationalisation. The basic version of the theory of regulatory competition assumes that countries are likely to be prone to economic and thus regulatory competition, if their trade volume's share of their GDP is large. We will therefore use trade openness as one measure for competition. Our second measure is foreign direct investment (FDI) as a proxy for capital relocations which are seen as the main mechanism driving regulatory races. Finally, economic openness cannot only be operationalised in trade figures, but also in regulatory barriers to trade. We therefore include the Fraser Economic Freedom Index which contains institutional data (e.g. trade barriers, taxes on trade, capital market controls) as an indicator for the openness of an economy and hence its vulnerability to foreign competitors.

Second, we want to investigate the impact of international, and in particular, European, harmonisation. Such harmonisation prevents downwards regulatory competition. The indicators used here are first a country's membership in the European Union and second a country's accession to a set of 35 international environmental regimes and organisations.

For control we test some other variables that may lead to changes in national environmental policies. For example, the level of economic development (income per capita) and political mobilisation may bring forth more strict environmental policies. The latter is measured by the presence of an environmental ministry, the presence of a Greenpeace national Bureau, and the role and influence of Green parties in a country. Energy use per capita is taken as a general proxy for the salience of environmental problems which should be a precondition for the introduction of regulations. Finally, as an indicator for domestic political constraints to policy change we use the number of veto players in a country.

We test the influence of these potential explanatory variables on upward movements for all 17 environmental standards and for the subgroups of product and process standards. In addition, regressions have been run separately for the period before 1990 and after 1990, when harmonisation increased at the international level and the far-reaching transformations in Eastern European countries took place. With the aggregation across 17 standards, dichotomous data on policy change is transformed to count data. With mean values lower than the standard deviation for all types of the dependent variable, we applied a negative binomial regression model with random effects. We compare the effects of the first three variables representing effects of economic competition with models that include the whole set of control variables. Table 3 gives the results.

First of all, trade openness does not seem to play a role for upward changes of environmental standards. No significant coefficients can be observed, not even for product standards. The same

holds for the influence of FDI, although the signs of these coefficients point in the expected – positive- direction (except for process standards). Finally, significant and positive coefficients are obtained for the influence of the 'Freedom of Trade" index on all 17 standards and on product standards. That is, competition effects, when operationalised as regulatory barriers to trade, can explain the upward trend at least for product standards – as predicted from theory. These effects seem to be higher before 1990. However, the coefficient gets insignificant when control variables enter the model.

Although there is some confirmation for the hypothesis that competition is responsible for upward shifts in environmental product standards, the upward trend in environmental policy can also be traced back to the influence of variables other than competition, as the more encompassing models show. As expected, harmonisation plays an important role. The models reveal a positive and strongly significant effect of EU-membership, except for process standards. Positive effects of the accession to international institutions can be found for the overall model and in particular for the period after 1990 as well as for process standards (note that most of our process standards are not regulated by the EU).

Turning to the explanatory relevance of the control variables, our findings show that some variables seem to contribute to the explanation of the upward move, at least for some subgroups of the dependent variable. This holds for the existence of a national Greenpeace office as one measure of the environmental movement and for energy use per capita as a proxy for problem pressure. No significant effects have been found for the presence of environmental ministries and the success of green parties, and for the level of income (the negative effect in some of the models is a consequence of the process of catching up of latecomer countries in the second half of the observation period). Finally, coefficients of the political constraint variable show the expected negative sign. The lower the number of veto players, the higher is the probability of upward shifts in environmental regulation.

Table 3 Regressions of Upward Movements in 17 Environmental Standards, 1970-20

	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10
	Upward Movements all 17 Standards						Upward Movements Product Standards		Upward Movements Process Standards	
	All Years		Before 1990		After 1990		All Years		All Years	
Trade Openness (Imp+Exp/GDP)	-0.052	-0.118	-0.027	0.089	-0.046	-0.213	-0.115	-0.013	0.136	-0.127
	[0.196]	[0.231]	[0.304]	[0.375]	[0.250]	[0.338]	[0.227]	[0.275]	[0.447]	[0.531]
FDI Net Inflows (% GDP)	0.348	0.133	15.552	10.191	0.701	0.798	0.374	0.412	-0.115	-0.353
	[0.831]	[0.882]	[10.466]	[10.805]	[0.904]	[0.868]	[1.021]	[1.039]	[2.105]	[2.291]
Fraser Index Freedom of Trade	0.147**	0.137**	0.122***	0.105	0.055	0.053	0.177**	0.133*	0.052	0.211
	[0.037]	[0.061]	[0.041]	[0.079]	[0.090]	[0.147]	[0.044]	[0.073]	[0.076]	[0.139]
Accession to International Institutions		17.542**		4.397		24.585***		13.239		31.359**
		[7.139]		[12.593]		[9.084]		[8.551]		[15.415]
EU Membership		0.332**		0.358*		0.628**		0.304*		0.305
		[0.160]		[0.205]		[0.307]		[0.187]		[0.365]
Environmental Ministry		0.034		0.07		-0.251		0.003		-0.239
		[0.147]		[0.190]		[0.347]		[0.172]		[0.344]
Political Constraints		-0.623		-1.585**		0.064		-0.709		-0.244
		[0.552]		[0.806]		[0.927]		[0.647]		[1.271]
Green Party Success		0.01		0.126		0.032		-0.08		-0.017
		[0.067]		[0.119]		[0.090]		[0.082]		[0.160]
Greenpeace National Bureau		0.310**		0.269		0.313		0.088		0.746**
		[0.151]		[0.195]		[0.305]		[0.172]		[0.355]
Energy Use per Capita (ln)		0.323*		0.604**		-0.119		0.361		0.497
		[0.197]		[0.247]		[0.325]		[0.230]		[0.471]
Income per Capita (ln)		-0.256**		-0.044		-0.22		-0.057		-0.799***
		[0.122]		[0.243]		[0.192]		[0.146]		[0.266]
Observations	743	685	437	379	306	306	743	685	743	685
N. of Countries	24	24	24	24	24	24	24	24	24	24
Wald Chi	31.11	45.76	29.95	44.79	1.41	18.43	24.85	24.76	5.40	22.55
P> Chi²	0.0000	0.0000	0.0000	0.0000	0.8431	0.1033	0.0004	0.0370	0.4937	0.0679

5 'Race to Brussels' instead

Two main conclusions can be derived from our empirical analysis. First, there are no 'races to the bottom' but evidence of a far-reaching upward trend in environmental regulation from the 1970s until today. Second, the main driving forces behind this pattern are EU-harmonisation and international cooperation. However, in the case of product standards regulatory trade barriers seem to also exert some influence.

It would thus be premature to conclude that regulatory competition has no influence at all. The predominant number of the policies analysed here is already subject to European harmonisation; a 'race to the bottom' is thus no longer possible. The question remains, why there is so much international harmonisation with product and process standards. In the following we first elaborate on potential motives for a 'race to Brussels' and then take another look at our data to find out about indications of avoidance of competition through international harmonisation

Incentives for international cooperation and EU harmonisation

There are many incentives for business and other political actors to cooperate at the international level. In some cases there are also incentives for cooperation on a high level of protection. First, in the case of transnational environmental goods there are environmentally justified incentives for international cooperation: due to externalities between the states those problems can only be efficiently solved together. Externalities furthermore lead to distributional effects that create incentives for international cooperation. Second, the advantages of harmonisation of product standards (cf. section 3) imply not only an economic incentive for the voluntary adoption of similar standards, but also an incentive for international cooperation if the necessary institutions are present. Game theoretic analysis shows that harmonisation on a high level of protection is beneficial for all states and can be achieved if communication is possible (Holzinger 2003). Third, in the case of product standards another incentive consists in the elimination of trade barriers through harmonisation. This is especially true for the European internal market. Fourth, distortion of competition due to different levels of regulation presents also an economic incentive in the case of process standards. Distortions of competition can be abolished by harmonisation which in this case has the effect of a cartel. This may be in the very interest of the industry and the governments.

Finally, there are also 'innovative races' (Jänicke 2005). Countries that are forerunners with respect to environmental legislation frequently want to make their rules obligatory at the international level. Those countries often have highly developed environmental industries that are able to offer innovative technology first. International harmonisation at the level of the best available technology gives those industries competitive advantages. In addition, a pioneer country avoids adoption costs if its

model of regulation becomes obligatory internationally. Environmental front-runner countries will normally plead for regulations on a high level of protection in international negotiations.

Table 4 gives an overview of the motives, the policy types, and the actors interested. It can be seen, that incentives for supranational harmonisation are biggest in the case of product standards. There are also substantial incentives for the harmonisation of process norms. For trade-irrelevant policies, incentives are lowest. As a matter of fact, all six product standards analysed here are harmonised, while this goes only for three out of eight process standards and for one out of three trade-irrelevant policies. The motivation for strict norms is biggest in the case of product standards, followed by process standards and trade-irrelevant policies. This corresponds with the data on upward movements in table 2.

Table 4 Incentives for international cooperation

	Motivation	*Policy type*	*Interested actors*
1	Transboundary environmental problem	Product, process, trade-irrelevant	Governments, EU Commission
2	Advantages of harmonisation	Product	Industry
3	Abolition of trade barriers	Product	Industry, EU Commission
4	Prevention of competition / cartel	Product, process	Industry, governments
5	Competitive advantage for environmental frontrunners	Product, process	Industry, governments

Cooperation as prevention of competition?

Finally, we take another look at our data to analyse whether environmental policies are harmonised in order to prevent regulatory competition. We restrict our analysis to those six of our policies that have been harmonised in the EU after 1970. As the number of cases is too low to get any significant result in a statistical model, we descriptively display the competitive situation in the years before the introduction of an EU directive.

Table 5 shows what happened for each policy 1, 3, and 5 years before a mandatory regulation at the EU level was adopted. As decision-making processes in the EU take up to five years, looking at this period of time seems justified. The first rows indicate whether a regulation in this area was present in some important non-EU states which are economically significant and/or environmental pioneers: Japan, the US and Sweden. Further down the data is given for the most important EU member states whose policies can be expected to have an effect on others as a consequence of market size or as a

political signal. The following rows give the overall number of countries and the number and share of EU members in our sample which already had adopted a regulation in this period. Finally, it is shown whether the regulatory mean in the respective years shifted upward or downward and whether the mean level of regulation was stricter or laxer among EU members compared to the whole group of countries having a regulation.

Table 5 Competitive situation before the introduction of EU regulation, six limit values

	Sulphur *EC 75/716*			*Lead* *EC 78/611*			*Car NO_X* *EC 77 /102*			*Plants SO_2* *EC 88 / 609*			*Plants NO_X* *EC 88/609*			*Plants Dust* *EC 88/609*		
	t-5	t-3	t-1	t-5	t-3	t-1	t-5	t-3	t-1	t-5	t-3	t-1	t-5	t-3	t-1	t-5	t-3	t-1
	1970	*1972*	*1974*	*1973*	*1975*	*1977*	*1972*	*1974*	*1976*	*1983*	*1985*	*1987*	*1983*	*1985*	*1987*	*1983*	*1985*	*1987*
Japan	X	X	X	X	X	X	0	0	0	X	X	X	X	X	X	X	X	X
United States	0	0	0	0	X	X	0	X	X	0	0	0	0	0	0	0	0	0
Sweden	X	X	X	X	X	X	0	X	X	X	X	X	X	X	X	X	X	X
Germany	0	0	0	X	X	X	0	0	0	X	X	X	X	X	X	X	X	X
France	X	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0
United King-dom	0	0	0	X	X	X	0	0	0	X	X	X	0	0	0	X	X	X
Number Adopters	3	6	8	9	10	12	0	2	2	9	10	14	5	6	12	7	8	12
Number EU Adopters	1	3	4	3	3	4	0	0	0	4	4	7	1	1	5	3	3	5
% of EU Members	20	60	50	37	37	50	0	0	0	44	44	64	11	11	46	33	33	45,5
Mean +/–	.	+	+	+	+	+	0	0	0	+	0	+	.	+	-	+	0	+
Mean, EU > All	+	+	+	–	–	+	.	.	.	+	+	–	.	+	+	0	–	0

X/0: present/absent;
Mean +/–/0: upward/downward/no move of mean level;
Mean EU > All +/–/0: mean level of EU members stricter/laxer/identical compared to all countries
. no data

First of all, in most cases there were in fact regulations present in two important non-EU members before the EU rule was introduced. Second, in most cases there was at least one big EU member state which had a regulation in place. Both observations are prerequisites for the presumed threat of regulatory competition. A notable exception are NO_x emissions from cars for which only the US and Sweden had a standard before the EU adopted one. With this exception, the number of adopters of national regulations obviously increases before the EU acts. There is definitely a diffusion process

starting before the EU joins in and harmonizes the regulation for its member states. Regulatory competition is imminent.

Furthermore, we see a movement towards a higher regulatory level, as in most instances the mean level of regulation has been strengthened in the respective years (again, with the exception of NO_x, as only two countries have just introduced a standard). The mean of the regulations of EU members is more stringent as the mean of all countries having adopted a regulation in about half of the cases. There is no clear pattern here that could tell us whether the EU harmonizes in order to enlarge the bloc of states using more stringent regulations and thus avoid potential competition for the pioneers. As the mean changes upward the 'contagious' effect might also be a consequence of the environmental pioneers' interest to 'upload' their regulations on the EU.

It is in general difficult to see from our data which of the discussed motives for EU harmonisation is in fact responsible for international cooperation. For all six standards pollution is potentially transboundary. The case is most severe for NO_x and SO_2 emissions, whether from cars or from power plants. Lead and Dust are not wide range air pollutants. The standards for gas oil, petrol and cars possess a harmonisation advantage, whereas this is not the case for large combustion plants. Harmonisation avoids barriers to trade for the car emission standards and to a lesser degree for gas oil and petrol limit values. As these products are manufactured by a small number of companies which trade worldwide, we can assume that these companies expressed their interest in harmonisation to several governments. A competitive advantage in environmental technology can be assumed to have been present for some pioneer countries, for example for car producers in Germany. In sum, for most standards several motives apply, most notably for NO_x emissions from cars. This corresponds with the data given in table 5 showing that NO_x harmonisation happened most quickly and without much preceding national regulation.

We cannot conclude, therefore, that the motive to avoid harmful competition within the European common market and among EU member states has been the only driving force for European harmonisation. Sorting out the role and contribution of the various motives for international cooperation can probably best be done by profound case study research on the introduction of these regulations. The motives of governments and economic actors can be reconstructed (at least to a certain extent) on the basis of document analysis or interviews.

One case in point is passenger car regulation. Car emissions have been harmonised on a voluntary basis from 1950 onward through the United Nations Economic Commission for Europe (ECE). The car industry actively participates in the setting of voluntary rules and harmonisation advantages play a great role. Car emissions provide also an example for prevention of competition through harmonisation. The introduction of the catalyst car during the 1980s started with a big German car company

proposing to the German minister for environmental affairs to make catalysts the norm. The precondition should, however, be the introduction of catalysts at an EU-wide level by means of a European directive. Obviously, this firm wanted to exploit a perceived competitive advantage in technology, but also wanted to avoid fierce competition in case of the introduction of a national German standard (Holzinger 1994: 199ff.).

This is anecdotal evidence that cannot be generalized. It is an indication, however, that the active search for international harmonisation in order to avoid regulatory competition by industry and governments is not uncommon. This implies that the threat of a regulatory competition would become effective through the back-door – by preventing competition using the means of international cooperation.

Conclusion

A review of the literature on regulatory competition in the environmental field shows that the basic prediction of a 'race to the bottom' of the regulatory level has meanwhile been changed into more differentiated hypotheses. Empirical evidence is mixed, with some evidence for the presence of competitive pressures on countries introducing strict environmental regulations, but more evidence for the non-existence of a general 'race to the bottom'. So far, empirical tests did not use data on the change in environmental regulations itself but used economic indicators or environmental quality data instead.

In this paper we analysed the development of 17 environmental regulations in 24 countries over a period of 35 years. These data show not only the absence of a 'race to the bottom', but a clear 'race to the top'. Ninety-four per cent of all changes in regulations are upward moves with only 6 per cent downward moves. A downwards competition can therefore be ruled out already on the basis of the descriptive data.

The regression analysis shows that the upward moves of product standards can be partially connected to the extent of trade barriers. However, the explanatory models display clearly that the overwhelming upward move of environmental regulation is mostly driven by supranational cooperation at EU level and the integration of countries into international environmental regimes.

For the policies under scrutiny here, it is basically EU harmonisation that can explain the upward movement. EU harmonisation may however be motivated by imminent regulatory competition. The data shows that EU regulation of a certain environmental problem seems to be preceded by national regulations in important EU and non-EU economies and/or environmental pioneer states. Usually, before the EU adopts a directive, a diffusion process has started and we observe the onset of a 'race to the top'.

On the basis of our data we cannot rule out other motivations for international harmonisation of environmental standards than the avoidance of competition. Candidates are the transboundary nature of the problem, economic harmonisation advantages in case of product standards, the abolition of trade barriers, and a desire to ‘upload’ their regulation to the supranational level on the side of pioneer countries. These are many good reasons 'to race to Brussels' and seek for international harmonisation of environmental regulation.

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