

'Race to the Bottom' or 'Race to Brussels'? Environmental Competition in Europe

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Abstract

The theory of regulatory competition in environmental policy predicts a 'race to the bottom' of standards. This article tests the theory using environmental output data for 24 countries from 1970 to 2005. It finds a clear 'race to the top' and a search for international harmonization when competition is imminent.

Introduction

The process of globalization 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 and Hays, 2007; Genschel and Ganghof, 2008). The empirical picture for regulatory competition, however, is mixed. In the environmental field, various approaches to measure regulatory competition have not led to 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, p. vii; Drezner, 2001, p. 75; Hoberg, 2001b, p. 194; Bernauer and Caduff, 2004, p. 100); however, there are some indications that regulatory competition might have an effect on the competitiveness of industries (Gray and Shadbegian, 1993, 1997; Beers and Van der Bergh, 1999; Greenstone, 2001; Xing and 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 put forward 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 Jacob (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 will be explored. Given the existence of international co-operation and supranational 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 harmonization – that is, '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, harmonization serves to provide the public good at a higher level of government. Moreover, in the case of trans-boundary environmental problems, providing the good at a supranational 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 supranational institution. With international harmonization they incur a lesser risk of losing voter or industry support.

It is the aim of this article to develop this hypothesis and 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 these 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 harmonization.

The article is organized as follows. Section I introduces the theory of regulatory competition in the environmental field and some of its modifications. Section II gives a brief account of the empirical evidence so far. Section

III presents the findings from our own data with respect to basic and modified hypotheses of regulatory competition theory. Section IV develops the 'race to Brussels' hypothesis and provides some evidence for it.

I. 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 and Schwab, 1988; Long and 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, p. 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 of 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 pressurizes nation-states to redesign domestic market regulations in order to avoid regulatory burdens restricting the competitiveness of domestic industries (Goodman and Pauly, 1993; Keohane and Nye, 2000; Holzinger and Knill, 2004, pp. 27ff.).

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, p. 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, pp. 57–9; Hoberg, 2001a, p. 127; Simmons and 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 and Jacob, 2004, p. 32). Fifth, Chua (1999, p. 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, as well as from the positive economic feedback effects of a cleaner environment: firms may also be seeking clean environmental resources as factor inputs. Finally, the result of regulatory competition depends on contextual factors such as relative market size or the number of competing countries (Oates, 1998; Apolte, 2002; Holzinger, 2003).

These observations lead to some modifications of the theory. Vogel (2000, pp. 365ff.; 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 and Jacob, 2004, p. 33). Vogel (2000, p. 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, pp. 206–7) 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,

pp. 389ff.) 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 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 harmonization 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 (for example, for health or environmental reasons under EU and WTO rules) convergence at a high level of regulation is likely (Vogel, 1995; Scharpf, 1997, p. 523). If such exceptional trade barriers are not permitted, by contrast, competitive pressure is expected to induce governments to lower their environmental standards (Holzinger, 2003, p. 192).

The classical example of a 'race to the top' with product standards relates to car emissions. When California raised its emission standards, most American states followed quickly (Vogel, 1995). California was permitted to apply its standards to foreign car producers. The harmonization 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.

If we assume environmental costs are not of much relevance for location decisions of firms, or if we assume firms are in fact seeking a clean environment as a production factor, the general hypothesis would be that 'races to the top' are prevalent, irrespective of type of standard or type of trade regime. Given environmental costs are significant and firms are not in general relocating to clean countries for reasons of their production function, the differentiations of the theory lead to the modified hypotheses on environmental regulatory competition presented in Table 1.

II. Empirical Studies

This section gives a brief overview of empirical studies on environmental competition. We refer first to studies that present evidence seemingly

Table 1: Hypotheses on Environmental Regulatory Competition

	<i>Product standards</i>	<i>Process standards</i>	<i>Trade-irrelevant standards</i>
<i>Environmental trade barriers permitted</i>	'Race to the top' or 'race to the bottom'	No 'races', multiple standards coexist	No 'races', multiple standards coexist
<i>Mutual recognition</i>	'Race to the bottom'	'Race to the bottom'	No 'races', multiple standards coexist

Source: Authors.

confirming the predicted 'race to the bottom', and second 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, strict environmental regulation leads to high compliance costs which lead in turn to reduced growth in productivity, job losses, reduced competitiveness and decisions to relocate into less regulated jurisdictions (cf. Jenkins, 1998, p. 3). There are studies that find evidence at the firm level that more stringent pollution regulation deters new firms' entry into pollution-intensive sectors (Becker and Henderson, 1997; List and 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 United States (1972–87), 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 American imports increased relative to its exports between the early 1970s and the early 1980s. Sorsa (1994, pp. 29ff.) 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, p. 1) present a statistical test of the impact of environmental regulations on capital movement from the United States. 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, p. 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. Levinson (1996) could not find a systematic effect between inter-state 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 (2000, p. 6) study strongly contradict the 'race to the bottom' model. Instead of racing downward, major urban areas in China, Brazil, Mexico and the United States 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, pp. 99ff.) 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 American federalism (List and 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 shows that states strengthen their environmental programme in response to citizens' demands rather than weaken their programmes 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 that show a relationship between environmental costs and competitiveness or location decisions, or they use environmental indicators that 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 are 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 – that is, the laws and decrees that will be changed by governments as a result of the causal mechanism. Therefore, environmental output data are the best indicator for the dependent variable. So far, there are no encompassing studies using output data for the test of environmental regulatory competition.

III. 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 statistical model to explain the changes in regulations.

Database

In the EU-funded research project ‘Environmental Governance in Europe’ (ENVIPLCON),¹ data have been collected on 40 environmental policies including all environmental media in 24 countries² over the period

¹ The research was supported by the EU, Contract HPSE-CT-2002-00103. Cf. Holzinger *et al.* (2008).

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.

1970–2000.³ Investigation of regulatory competition is only possible when upward 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 17 environmental measures that allow for metrical comparison. For these standards, we have collected additional data to create a full time-series from 1970 to 2005.⁴ A total of 14 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 of 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 upward 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. 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.

The table shows that most downward moves happened after 1990, although they still account only for about 10 per cent 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 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

³ The database can be found at <http://www.uni-konstanz.de/FuF/Verwiss/knill/projekte/envipolcon/project-homepage.php>.

⁴ The research project ‘Factors of Policy Change’ was supported by the German Research Foundation (DFG), Grant HO 1811/3.

Table 2: Frequency of Changes in Regulations, 17 Limit Values

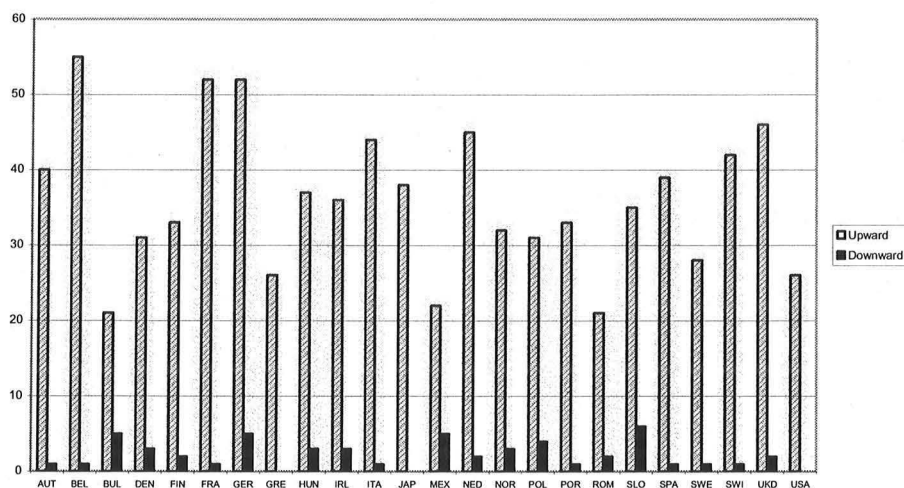
	<i>All changes</i>	<i>Upward changes</i>		<i>Downward changes</i>	
All standards	918	865	94%	53	6%
1970–80	200	198	99%	2	1%
1980–90	238	238	100%	0	0%
1990–00	321	284	88%	37	12%
2000–05	159	145	91%	14	9%
Product standards					
Sulphur content gas oil (vol%)	71	71	100%	0	0%
Lead content in petrol (g/l)	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 NO _x (g/km)	104	88	85%	16	15%
Noise emissions from lorries (dB)	73	72	99%	1	1%
Process standards					
Large combustion plants SO ₂ (mg/m ³)	42	42	100%	0	0%
Large combustion plants NO _x (mg/m ³)	39	38	97%	1	3%
Large combustion plants dust (mg/m ³)	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 (%)	38	34	89%	4	11%
Paper recycling target (%)	39	33	85%	6	15%

Source: Authors' own data.

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 shows how downward moves are distributed over the countries in the sample. Only for the United States and Japan are no downward changes 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.

Figure 1: Upward and Downward Changes for All Countries, 17 Limit Values, 1970–2005



Source: Authors' own data.

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 per cent) 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 Organization, 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 co-operation 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 harmonized. Nation-states no longer act in an anarchic international system with independent mutual recognition. Through international co-operation, minimum harmonization levels are set against 'races to the bottom' and in the (rare) case of total harmonization, 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 harmonization 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 harmonized 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 co-operation, or of other factors?

Empirical tests on regulatory competition usually use openness to trade – that is, the relation between the sum of export and import of a country and the size of its economy (Li and Reuveny, 2003) as a means of operationalization. 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 operationalized in trade figures, but also in regulatory barriers to trade. We therefore include the Fraser Economic Freedom Index, which contains institutional data (for example, 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, harmonization. Such harmonization prevents downwards regulatory competition. The indicators used here are, first, a country's membership of the EU and, second, a country's accession to a set of 35 international environmental regimes and organizations.

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 mobilization 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 harmonization 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 are 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 country random effects.⁵ 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.⁶ 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): the more FDI inflows, the easier a government can afford strict environmental standards, or, in line with the hypothesis presented above, the strict standards might attract firms seeking clean environments as production factor. 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 operationalized 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, harmonization plays an important role. The models reveal a positive

⁵ The Hausman test reveals an insignificant P-value, and a Breusch-Pagan test is positive for the use of country random effects.

⁶ Similarly, Holzinger et al. (2008) show that trade openness cannot explain the ever increasing similarity (convergence) of the environmental policies of the same countries.

Table 3: Regressions of Upward Movements in 17 Environmental Standards, 1970–2005

	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10
	<i>Upward movements all 17 standards</i>						<i>Upward movements product standards</i>		<i>Upward movements process standards</i>	
	<i>All years</i>		<i>Before 1990</i>		<i>After 1990</i>		<i>All years</i>		<i>All years</i>	
Trade openness (Imp + Exp/ GDP)	-0.052 [0.196]	-0.118 [0.231]	-0.027 [0.304]	0.089 [0.375]	-0.046 [0.250]	-0.213 [0.338]	-0.115 [0.227]	-0.013 [0.275]	0.136 [0.447]	-0.127 [0.531]
FDI net inflows (%GDP)	0.348 [0.831]	0.133 [0.882]	15.552 [10.466]	10.191 [10.805]	0.701 [0.904]	0.798 [0.868]	0.374 [1.021]	0.412 [1.039]	-0.115 [2.105]	-0.353 [2.291]
Fraser index freedom of trade	0.147** [0.037]	0.137** [0.061]	0.122*** [0.041]	0.105 [0.079]	0.055 [0.090]	0.053 [0.147]	0.177** [0.044]	0.133* [0.073]	0.052 [0.076]	0.211 [0.139]
Accession to international institutions		17.542** [7.139]		4.397 [12.593]		24.585*** [9.084]		13.239 [8.551]		31.359** [15.415]
EU membership		0.332** [0.160]		0.358* [0.205]		0.628** [0.307]		0.304* [0.187]		0.305 [0.365]
Environmental ministry		0.034 [0.147]		0.07 [0.190]		-0.251 [0.347]		0.003 [0.172]		-0.239 [0.344]
Political constraints		-0.623 [0.552]		-1.585** [0.806]		0.064 [0.927]		-0.709 [0.647]		-0.244 [1.271]
Green party success		0.01 [0.067]		0.126 [0.119]		0.032 [0.090]		-0.08 [0.082]		-0.017 [0.160]
Greenpeace national bureau		0.310** [0.151]		0.269 [0.195]		0.313 [0.305]		0.088 [0.172]		0.746** [0.355]
Energy use per capita (ln)		0.323* [0.197]		0.604** [0.247]		-0.119 [0.325]		0.361 [0.230]		0.497 [0.471]
Income per capita (ln)		-0.256** [0.122]		-0.044 [0.243]		-0.22 [0.192]		-0.057 [0.146]		-0.799*** [0.266]
Observations	743	685	437	379	306	306	743	685	743	685
No. 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 > Chi ²	0.0000	0.0000	0.0000	0.0000	0.8431	0.1033	0.0004	0.0370	0.4937	0.0679

Source: Authors' own data.

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 the probability of upward shifts in environmental regulation.

IV. '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 harmonization and international co-operation. 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 harmonization; a 'race to the bottom' is thus no longer possible. The question remains as to *why* there is so much international harmonization 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 harmonization.

Incentives for International Co-operation and EU Harmonization

There are many incentives for business and other political actors to co-operate at the international level. In some cases there are also incentives for co-operation on a high level of protection. First, in the case of transnational environmental goods, there are environmentally justified incentives for

international co-operation: 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 co-operation. Second, the advantages of harmonization of product standards (cf. section II) imply not only an economic incentive for the voluntary adoption of similar standards, but also an incentive for international co-operation if the necessary institutions are present. Game theoretic analysis shows that harmonization 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 harmonization. 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 avoided or abolished by harmonization, which in this case has the same effect as a cartel. This may be in the very interest of the industry and, as a consequence, also of the governments. Whereas in price (or other illegal) cartels of private firms there remains always an incentive and an opportunity to free-ride, with international legal harmonization this cannot happen. If a common standard is set, it can be enforced and neither governments nor firms can deviate from it.

Finally, there are also 'innovative races' (Jänicke, 2005). Countries that are front-runners with respect to environmental legislation frequently may 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 harmonization at the level of the best available technology gives those industries competitive advantages. Environmental front-runner countries will normally plead for regulations on a high level of protection in international negotiations. In addition, a pioneer country avoids adaptation costs if its model of regulation becomes obligatory internationally.⁷ Thus, these countries may engage in the deliberate promotion of their own policy model during negotiations at the EU level (Holzinger and Knill, 2005). If successful, this is more effective than relying on a process of voluntary diffusion, which might never happen as it depends on all kinds of motives of other countries.

Table 4 gives an overview of the motives, the policy types and the actors interested. It can be seen that incentives for supranational harmonization are biggest in the case of product standards. There are also substantial incentives for the harmonization of process norms. For trade-irrelevant policies,

⁷ To describe this mechanism the term 'regulatory competition' has been used by Héritier *et al.* (1996). We prefer using the terms 'policy promotion' or 'upload' in order not to confuse the concepts.

Table 4: Incentives for International Co-operation

	<i>Motivation</i>	<i>Policy type</i>	<i>Interested actors</i>
1.	Transboundary environmental problem	Product, process, trade-irrelevant	Governments, EU Commission
2.	Advantages of harmonization	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 front-runners	Product, process	Industry, governments

Source: Authors.

incentives are lowest. As a matter of fact, all six product standards analysed here are harmonized, 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.

Co-operation as Prevention of Competition?

Finally, we take another look at our data to analyse whether environmental policies are harmonized in order to prevent regulatory competition. We restrict our analysis to those six of our policies that have been harmonized 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 one, three and five 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 that are economically significant and/or environmental pioneers: Japan, the United States and Sweden. Further down the data are 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 that 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

Table 5: Competitive Situation before the Introduction of EU Regulation, Six Limit Values

	<i>Sulphur</i> EC 75/716			<i>Lead</i> EC 78/611			<i>Car NO_x</i> EC 77/102			<i>Plants SO₂</i> EC 88/609			<i>Plants NO_x</i> EC 88/609			<i>Plants dust</i> EC 88/609		
	<i>t-5</i> 1970	<i>t-3</i> 1972	<i>t-1</i> 1974	<i>t-5</i> 1973	<i>t-3</i> 1975	<i>t-1</i> 1977	<i>t-5</i> 1972	<i>t-3</i> 1974	<i>t-1</i> 1976	<i>t-5</i> 1983	<i>t-3</i> 1985	<i>t-1</i> 1987	<i>t-5</i> 1983	<i>t-3</i> 1985	<i>t-1</i> 1987	<i>t-5</i> 1983	<i>t-3</i> 1985	<i>t-1</i> 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 Kingdom	0	0	0	X	X	X	0	0	0	X	X	X	0	0	0	X	X	X
No. adopters	3	6	8	9	10	12	0	2	2	9	10	14	5	6	12	7	8	12
No. EU adopters	1	3	4	3	3	4	0	0	0	4	4	7	1	1	5	3	3	5
% EU members	20	60	50	37	37	50	0	0	0	44	44	64	11	11	46	33	33	46
Mean +/-		+	+	+	+	+	0	0	0	+	0	+	.	+	-	+	0	+
Mean, EU > All	+	+	+	-	-	+	.	.	.	+	+	-	.	+	+	0	-	0

Source: Authors' own data.

Notes: 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. Full stop indicates no data.

whether the mean level of regulation was stricter or laxer among EU members compared to the whole group of countries having a regulation.

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 that had a regulation in place. Both observations are prerequisites for the presumed threat of regulatory competition. A notable exception is NO_x emissions from cars, for which only the United States 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 the harmful effects of 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. Héritier *et al.* (1996) give some examples of such a promotion of one's own policy model at the EU level from the environmental field.

It is in general difficult to see from our data which of the discussed motives for EU harmonization is in fact responsible for international co-operation. For all six standards, pollution is potentially transboundary. The case is most severe for NO_x and SO₂ 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 harmonization advantage, whereas this is not the case for large combustion plants. Harmonization 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 harmonization 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 harmonization 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 harmonization. Sorting out the role and contribution of the various motives for international co-operation 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 harmonized 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 harmonization advantages play a great role. Car emissions also provide an example for prevention of competition through harmonization. The introduction of the catalyst car during the 1980s started with a big German car company proposing to the German minister for environmental affairs that catalysts were made 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, pp. 199ff.).

This is anecdotal evidence that cannot be generalized. It is an indication, however, that the active search for international harmonization 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 co-operation.

Conclusions

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 article 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'. Some 94 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 co-operation at EU level and the integration of countries into international environmental regimes.

For the policies under scrutiny here, it is basically EU harmonization that can explain the upward movement. EU harmonization may, however, be motivated by imminent regulatory competition. The data show 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 harmonization of environmental standards than the avoidance of competition. Candidates are the transboundary nature of the problem, economic harmonization 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 international harmonization of environmental regulation.

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