Instruments for environmental governance: what works?

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1. Introduction

First of all, I would like to thank the Academy for doing me the great honour of inviting me to speak at this colloquium to my distinguished colleagues. As we prepared the colloquium, I found out that a keynote speaker is in fact supposed to hold two rather than one keynote speeches. However, since I was also a candidate to present a paper on environmental criminal law in China with two Chinese colleagues, I was afraid that three times Faure would have been too much for you. If I were to give two lectures, I would probably have chosen to structure it as follows: first, I would have presented what on the basis of legal and economic scholarship theoretical assumptions are on the functioning of various instruments in their ability to reduce environmental harm and to promote sustainable development. My second lecture would then have consisted of a look at empirical evidence to see to what extent the theoretical assumptions, on which much of our environmental governance is based, in fact work in practice. Since the organisation was so kind to agree that I would only give one keynote speech, I will now to some extent integrate the two approaches and briefly look at what theory tells us about how environmental law should work and spend most of my time at looking at the empirical evidence.

My talk hence does not deal directly with environmental law, but I would like to give some insights into the empirical evidence concerning the effectiveness of environmental law. To a large extent, this evidence is not provided by lawyers. Indeed, when making environmental law and choosing environmental instruments, we as environmental lawyers have many ideas or perhaps even hopes on how environmental law and more particularly specific instruments may work in promoting sustainable development. But do we actually know how effective the instruments chosen are? In other words: what do we know empirically?

Even though I believe that environmental lawyers are probably the species of lawyers most interested in empirical research on the effectiveness of legal and policy instruments the legal work in this domain remains relatively limited. This can also be understood.

One reason is that much of this empirical material on effectiveness of environmental legal instruments is the result of research not by lawyers but often by economists or other social scientists. Hence, these results are often published in journals not directly read by lawyers and often in a language, for example using mathematics and regression analysis which is difficult to understand for lawyers. Moreover, much of this empirical research will not generally deal with effectiveness of environmental law, but will look at the effect of one particular instrument on one specific environmental parameter (such as CO_2 concentrations) in one particular country or even region. Results are hence often very country specific. My message is not that we environmental lawyers should necessarily do more empirical research ourselves.[1] My message is rather that, if interpreted correctly, the results of these empirical studies do have an important message for environmental law and policy since they may allow us to fine-tune environmental policy instruments, based on proven effectiveness on deficiencies in practice.

The goal of my talk is therefore twofold: I first of all would like to present some of the empirical results concerning the effectiveness of various environmental policy instruments. The problem is that meanwhile so much has been published that I could easily fill the entire conference with that. This overview will hence necessarily entail a great degree of "cherry picking", whereby I realize that I merely present a few, according to me interesting, studies in the hope to give you the flavour of this empirical work. My second goal is to formulate a few thoughts on how to deal with and interpret these empirical results. My message in that respect is that in order to provide such interpretation, one obviously needs some theoretical backing as well.

The remainder of my talk is structured as follows: first, I will present a few general studies on what determines environmental quality (2); next, I will talk about a few studies related to particular environmental policy instruments, being mainly liability rules, regulation and market based instruments (3). Then, I will say a few words on the

[1] The prerequisites for doing decent empirical analysis are indeed not that easy to meet. For details, see Van Velthoven, B.C.J., "Empirics of Tort", in Faure, M. (ed.), *Tort Law and Economics*, Cheltenham, Edward Elgar, 2009, 453-498.

enforcement of environmental law (4) and conclude by addressing a few opportunities and challenges posed by the empirical research (5).

2. Law and environmental quality

Starting at a very general level, it may be interesting to point at important economic studies that address the question to what extent environmental law does play a role in determining environmental quality. This type of research provides interesting insights on the relative importance of institutions like environmental law.

Highly interesting empirical research has been undertaken using the concept of the "Environmental Kuznets Curve". This concept is named after the Nobel prize winner Simon Kuznets on the relationship between income inequality and income level in a country.[2] Various scholars have shown empirically that in a first phase, economic development leads to environmental degradation. However, there is a certain turning point in economic development, logically related to the point where individual income levels increase and a demand for higher environmental quality emerges, where increased economic welfare goes hand in hand with environmental improvements. The interesting question is of course when a nation reaches that turning point and for example whether China has already reached that point where a demand for environmental protection emerges.

Empirical studies look at the relationship between per capita income and various environmental indicators and show roughly that where environmental pollution is first rising as income increases after a turning point, pollution levels will be falling.[3] Interestingly, a recent empirical study shows similar evidence for China comparing the

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[2] Kuznets, S., "Economic Growth and Income Inequality", *American Economic Review,* 1955, vol. 49, 1-28.

[3] See for example Selden, Th. M. and Song, D., "Neoclassical Growth, the J-curve for Abatement, and the Inverted U-curve for Pollution", *Journal of Environmental Economics and Management*, 1995, vol. 29, 162-168.

scale of economic activity and environmental quality for a comparative broad set of environmental indicators between Chinese provinces.[4]

The policy conclusion from these studies seems to be that the best way for a nation, also like China, to promote environmental protection is to promote economic growth. Empirical evidence after all shows that higher income levels go hand in hand with increased environmental protection.[5] This leads at first blush to the for environmental lawyers' somewhat worrying conclusion that environmental law can only to a limited extent influence environmental quality since it is to a large extent dependent upon other factors such as economic welfare and income levels.

It has more particularly been the contribution of our colleague environmental lawyer Dan Esty from Yale Law School who in many joint papers with Michael Porter examined empirically to what extent not only income levels, as suggested by the environmental Kuznets curve literature, but also a nation's regulatory regime influences environmental quality. The results of this powerful research is that economic development and environmental protection go hand in hand with the improvement of a country's institutions and more particularly the environmental regulatory regime.[6] The empirical evidence hence suggests that a country can benefit environmentally not only from economic growth, but equally from developing the rule of law and strengthening its governance structures.[7]

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[4] Shen, J. and Hashimoto, Y., "Environmental Kuznets Curve on Country Level: Evidence from China", *Graduate School of Economics and Osaka School of International Public Policy*, Discussion Papers in Economics and Business, May 2004 (paper 04-09).

[5] See for example Esty, D.C. and Porter, M.E., "Industrial Ecology and Competitiveness", *Journal of Industrial Ecology*, 1998, vol. 2, 35-43 and Esty, D.C. and Porter, M.E., "Measuring National Environmental Performance and its Determinants", in Porter, M.E. and Sachs, J. (eds.), *The Global Competitiveness Report 2000*, New York, Oxford University Press, 2000.

[6] See Esty, D.C. and Porter, M., "National Environmental Performance: an Empirical Analysis of Policy Results and Determinants", *Environment and Development Economics*, 2005, vol. 10, 391-434.

[7] Esty, D.C. and Porter, M.E., *Environment and Development Economics*, 2005, vol. 10, 424.

An important policy conclusion from this empirical literature is hence that, even though the Environmental Kuznets Curve, indicates a relationship between economic growth and higher environmental quality, the lesson is hence not that environmental law hence does not matter. To the contrary, Esty and Porter show convincingly that strengthening the regulatory structure also encourages the promotion of environmental quality.[8]

3. Specific Instruments

Turning now to more specific instruments we can address the question to what extent empirical evidence shows that these instruments do have the effects they are supposed to have, based on the literature.

3.1. Liability Rules

A first instrument, still very popular in environmental law, is the use of liability rules. They are supposed to have a preventive effect and deter potential polluters.[9] Much research is also devoted to the question whether environmental liability should be deterred through a negligence or a strict liability rule. Economic literature had often advanced strict liability for environmental pollution, since it would provide the potential polluters optimal incentives for accident reduction.[10] Empirical research, for example by Alberini and Austin, indeed confirmed that the imposition of strict liability in state environmental policies reduced unintended pollution releases. However, the same authors also found the remarkable result that in states with strict liability, a greater spill severity and frequency could be found, which was associated with smaller production units and thus reduced assets whereas this phenomenon was not found in states following negligence-based liability. At first sight, this surprising result (more severe pollution

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[8] This is also agued by Binder, S. and Neumayer, E., "Environmental Pressure Group Strength and Air Pollution: an Empirical Analysis", *Ecological Economics*, 2005, vol. 55, 527-538.

[9] See for example Monti, A., "Environmental Risk: a Comparative Law and Economics Approach to Liability and Insurance", *European Review of Private Law*, 2001, vol. 1, 51-79.

[10] The basic paper is of course Shavell, S., "Strict Liability versus Negligence", *Journal of Legal Studies*, 1980, vol. 9, 1-25, but see for example also the application in Pozzo, B., "The Liability Problem in Modern Environmental Statutes", *European Review of Private Law*, 1996, vol. 4, 112-129.

cases under strict liability than under negligence) seems to deny the assumption of the literature that strict liability would provide better incentives for prevention. However, the same economic literature had equally indicated that strict liability could indeed lead to perverse results if polluters were potentially insolvent, meaning that the losses could be higher than their assets.[11] The fact that Alberini and Austin hence found that under strict liability firms organise themselves in smaller production units with reduced assets precisely confirms the assumption in the literature that strict liability is efficient only if a remedy for the insolvency problem can be found. The normative conclusion from this empirical research is hence not that the policy maker should not introduce strict liability for environmental pollution, but rather that if a serious insolvency risk exists, the introduction of strict liability should be accompanied with solvency guarantees, such as the introduction of compulsory insurance.[12] Otherwise, strict liability may exactly have the effect of driving polluters to reduce the assets that are exposed to liability.[13]

An interesting effect of environmental liability was discovered in empirical research as a result of the enlargement of the European Union to Eastern Europe. Potential buyers of property in Central and Eastern Europe could be held liable, also retrospectively, for cleaning up sites that were contaminated in the past. Not surprisingly, research showed that this retrospective liability seriously limited the possibilities for privatization in those countries, since potential investors were scared away by the foresight of having to pay for the pollution of the past.[14]

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[11] See Shavell, S., "The Judgment-proof Problem", *International Review of Law and Economics*, 1986, vol. 6, 43-58 and Cooter, R., "Prices and Sanctions", *Columbia Law Review*, 1984, vol. 84, 1343-1523.

[12] As equally suggested in the literature. See e.g. Jost, P.J., "Limited Liability and the Requirement to Purchase Insurance", *International Review of Law and Economics*, 1996, vol. 16, 259-276 and Polborn, M., "Mandatory Insurance and the Judgment-proof Problem", *International Review of Law an Economics*, 1998, 141-146.

[13] For an overview of the literature concerning the incentive impacts of environmental liability see also Earnhart, D., "Liability for Past Environmental Contamination and Privatization", *Environmental & Resource Economics*, 2004, vol. 29, 97-122.

[14] Bluffstone, R.A. and Panayotou, T., "Environmental Liability and Privatisation in Central and Eastern Europe: Towards an Optimal Policy", *Environmental & Resource Economics*, 2000, vol. 17, 335-352.

Specific empirical research has also been devoted to the compensation mechanisms after an oil spill. Hendrickx shows that clean-up operations have become more expensive, more particularly as a result of pressure from environmental groups and public opinion. However, he equally found that, for a higher proportion of spills, polluters could not be identified. He suspects that, as a result of the stricter liability of the tanker owner, they might have improved their skills of concealing their identity.[15] This again shows the straightforward point that imposing stricter liabilities upon polluters unavoidably comes at a price: the stricter the liability is, the more polluters may have incentives to avoid liability e.g. by avoiding to be detected or by organizing their insolvency by bringing their polluting activities into smaller business units. These potentially perverse effects should hence be taken into account at the policy level as well.

3.2. Regulation

An impressive amount of literature is also devoted to the effectiveness of environmental regulation. Theoretical starting point for regulation is a classic paper by Shavell indicating that since information on optimal abatement techniques may often be better with government and, since, as we mentioned before, insolvency problems can arise and since for a number of reasons, a liability suit for environmental damage can never be brought,[16] regulation may be more effective to control environmental pollution than private law instruments like liability rules.[17] There seems to be substantial empirical evidence of this relative effectiveness of safety regulation in controlling environmental

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[15] See Hendrickx, R., "Maritime Oil Pollution: an Empirical Analysis", in Faure, M. and Verheij, A. (eds.), *Shifts in Compensation for Environmental Damage*, Vienna, Springer, 2007, 256-257.

[16] For example because the damage can be widespread, victims can believe damage is caused by a natural cause, no victim can be identified, long latency periods may exist as well as problems of causation.

[17] See Shavell, S., "Liability for Harm versus Regulation of Safety", *Journal of Legal Studies*, 1984, vol. 13, 357-374 and Shavell, S., "A Model of the Optimal Use of Liability and Safety Regulation", *RAND Journal of Economics*, 1984, vol. 15, 271-280, building further on Wittman, D.A., "Prior Regulation versus Post Liability: the Choice between Input and Output Monitoring", *Journal of Legal Studies*, 1977, vol. 6, 193-211.

harm. More particularly Dewees demonstrated that in North America, the quality of the environment has improved substantially as a result of regulatory efforts, not so much in response to legal action in tort.[18] Also Dewees, Duff and Trebilcock hold that the large regulatory efforts to improve the environment have been met with considerable success when measured by the reduction of emissions. However, they equally stress that while environmental regulation is a determining factor in pollutant emissions and ambient concentrations, other – non-regulatory factors such as economic growth and even the weather - also influences environmental quality.[19]

An impressive amount of research is unavoidably also devoted to the fact that notwithstanding beneficial effects of regulation, regulation always entails the danger that it may not be welfare improving, but rather serves the interests of particular groups in society. The application of this so-called interest group theory of regulation has been strongly advanced by the public choice school. Maloney and McCormick were probably the first to show that also with environmental regulation industry will try to change the contents of the regulation to its advantage.[20] They argue that industry, realising that environmental regulation is unavoidable, will cooperate with the development of the regulation and try to change the contents to its advantage. A classic example is the introduction of so-called "grandfather clauses". These stipulate that the regulation will not be applicable to firms or products which are already active on the market. Nash and Revesz showed that new regulations with grandfather clauses will retard the introduction of new, clean, plants and will keep inefficient plants operate longer than they otherwise

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[18] Dewees, D., "The Comparative Efficacy of Tort Law and Regulation for Environmental Protection", *Geneva Papers on Risk and Insurance*, 1992, 446-467 and Dewees, D., "Tort Law and the Deterrence of Environmental Pollution", in Tietenberg, T.H. (ed.), *Innovation in Environmental Policy*, Aldershot, Edward Elgar, 1992, 139-164.

[19] Dewees, D.N., Duff, D. and Trebilcock, M., *Exploring the Domain of Accident Law: Taking the Facts Seriously*, Oxford, Oxford University Press, 1996, 307-323.

[20] Maloney, M.T. and McCormick, R.E., "A positive theory of environmental quality regulation", *Journal of Law and Economics*, 1982, Vol. 25, 99-123.

would.[21] There is of course also ample evidence that the grandfathering of emission rights under the European Emission Trading Scheme seriously reduced incentives of industry for pollution abatement.[22]

Also as far as China is concerned there is empirical evidence that environmental regulation does not always follow the road to optimality. Da Zhu and Jiang Ru showed that the Environmental Impact Assessment Law of 2003 lacked effective implementation in China basically because non-environmental ministeries evaded the act or organised planning environmental assessments on their own without participation by the State Environmental Protection Administration (SEPA).[23] In the case of China it was hence bureaucratic politics and rising tension between various ministeries that prevented the implementation of efficient environmental regulation, in this case related to environmental impact assessment.

Public choice theory equally predicts that if it were possible to organise a countervailing power against industry lobbying, a kind of competition between various pressure groups could emerge of which the result may be closer to the optimum than when government is only lobbied by pressure groups representing industry interest.[24] Binder and Neumayer

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[21] Nash, J.R. and Revesz, R.L., "Grandfathering and environmental regulation: the law and economics of new source review", New York University School of Law, Public Law and Legal Theory Research Paper Series, Working Paper 007-03, April 2007 (<http://ssrn.com/abstract=965840>).

[22] See Endres, A. and Ohl, C., "Kyoto, Europe? An economic evaluation of the European Emissions Trading Directive", *European Journal of Law and Economics*, 2005, Vol. 19, 17-39 and see the contributions in Peeters, M. and Deketelaere, K. (eds.), *EU climate change policy. The challenge of new regulatory initiatives*, Cheltenhem, Edward Elgar, 2006 and in Faure, M. and Peeters, M. (eds.), *Climate change and European emissions trading. Lessons for theory and practice*, Cheltenham, Edward Elgar, 2008.

[23] See Da Zhu and Jiang Ru, "Strategic environmental assessment in China: motivations, politics and effectiveness", *Journal of Environmental Management*, 2008, Vol. 88, 615-626.

[24] See generally Becker, G.S., "A theory of competition among pressure groups for political influence", *Quarterly Journal of Economics*, 1983, 371-400.

present some powerful empirical evidence of this for the environmental area.[25] They provide a systematic quantitative test of the relationship between the strength of environmental NGOs and air pollution levels. They find that environmental NGOs exert a statistically significant impact on sulferdioxide, smoke and heavy particulates concentration levels, based on a cross-country time series regression analysis. This recent paper hence provides an important empirical backing for something environmental lawyers have long advocated: public participation and NGO influence will effectively help to achieve lower pollution levels around the globe!

3.3. Command and control versus market-based instruments

An impressive amount of literature has dealt with the various aspects of comparing the traditional command and control approach via regulation with more incentive based mechanisms, referred to as economic or market-based instruments. One lesson from this literature is that it is impossible to compare generally regulation with market-based instruments, since the superiority of the one or the other is very much dependent upon the specific context, type of pollutant regulated, institutional design etc. It is indeed not difficult to point at research showing that also a regulatory approach can lead to significant reductions for example of waste water emissions and encourage the implementation of less polluting production techniques in the long run.[26] As long as command and control approaches are designed with at least one eye on cost saving incentive based systems are not necessarily superior to command and control.[27] I will indeed provide a few examples, based on empirical literature of success stories of market-based instruments, at least as far as reducing emissions is concerned, but that does not

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[25] Binder, S. and Neumayer, E., "Environmental pressure group strengths and air pollution: an empirical analysis", *Ecological Economics*, 2005, Vol. 55, 527-538.

[26] See for example Stephan, G., "Economic impact of emissions standards: a computational approach to waste water treatment in Western Europe", in Bös, D., Rose, M. and Seidl, Chr. (eds.), *Welfare and efficiency in public economics*, Berlin, Springer, 1988, 401-422.

[27] So Oates, W.E., Portney, P.R. and McGartland, A.M., "The net benefits of incentive-based regulation: a case study of environmental standard setting', *American Economic Review*, 1989, Vol. 79, 1233-1244.

necessarily imply that similar results could not have been reached with a regulatory approach.[28]

3.4. Taxation

There is a long tradition now with using the so-called pigovian taxes to provide incentives for emission reduction. Those interested in the details can have a look at recent literature providing detailed overviews[29] or can be referred to the global conferences on environmental taxation which are held on an annual basis as a result of which impressive volumes are produced, equally providing evidence of successes obtained with environmental taxation.[30] Just to mention a few success stories: in the Netherlands water pollution by 14 industries responsible for 90% of total water pollution decreased by 50% between 1969 and 1975 and by another 20% by 1980. Half of this reduction was, so the evidence shows, due to an effluent charge.[31] Also a comparative research by Bongaerts and Kraemer comparing the water pollution charges in France, the Netherlands and Germany came to the same conclusion that effluent charges provide a strong incentive to invest in water pollution abatement equipment. The authors argue that the effect is

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[28] For an overview of the literature see Stewart, R.B., "Economic incentives for environmental protection: opportunities and obstacles", in Revesz, R.L., Sands, Ph. and Stewart, R.B. (eds.), *Environmental law, the economic and sustainable development*, Cambridge, Cambridge University Press, 2000, 171-244; Stewart, R.B., "Controlling environmental risks through economic incentives", *Columbia Journal of Environmental Law*, 1988, Vol. 13, 153-169 and Ackerman, B. and Stewart R.B., "Reforming environmental law: the democratic case for market incentives", *Columbia Journal of Environmental Law*, 1988, Vol. 13, 171-199.

[29] See for example the contributions in Harrington, W., Morgenstern, R.D. and Sterner, Th. (eds.), *Chosing environmental policy. Comparing instruments and outcomes in the United States and Europe*, Washington, Resources for the Future, 2004.

[30] The most recent volume (containing the papers presented at the 9th Global Conference on Environmental Taxation in Singapore in 2008 is Lye, L.H., Milne, J.E., Ashiabor, H., Kreiser, L. and Deketelaere, K. (eds.), *Critical issues in environmental taxation. International and comparative perspectives*, Vol. VII, Oxford, Oxford University Press, 2009.

[31] See Dewees, D., Duff, D. and Trebilcock, M., *Exploring the domain of accident law*, 326-327.

especially strong in Germany where the charges are reduced by 50% for emitters who meet the emission standard.[32]

One should, however, not immediately become overly enthusiastic, since there is equally evidence that the special interest groups, of which we mentioned before that they affect the quality of regulation, can also be active when it comes to designing a taxation system. It is for example remarkable that pollution permits are introduced on a large scale in the US, but that taxation systems were traditionally more popular in Europe than in the US. Nobel prize winner Buchanan has argued (together with Tullock) that this should not come as a surprise since firms will prefer emission standards or emission trading (especially when emission rights are grandfathered) to taxes. Standards have the advantage that they can serve as barrier to entry to new firms, thus raising the profits of existing firms. Taxes on the other hand do not preclude entry by new firms and represent an additional cost to the existing firms on the market.[33] It should hence not come as a surprise that interest groups representing industry will oppose taxation and that as a result charges are rarely introduced "in the textbook form".[34]

As a result there is also a lot of evidence of inefficient environmental taxation and not surprisingly the likelihood of these inefficiencies increase the larger the power of the interest group involved is. For example a recent research shows that whereas a general tax to internalise externalities created by the power generating sector could create important welfare gains, a Belgian regulation is structured in such a way that independent power producers escape most of the air pollution regulation imposing the tax.[35] In the

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[32] Bongaert, J. and Kraemer, R.A., "Water pollution charges in three countries. Control through incentives", *European Environmental Review*, 1987, 12-19. They also argue that it is difficult to disentangle the separate effects of charges and emission standards.

[33] See Buchanan, J. and Tullock, G., "Polluters' profits and political response: direct controls versus taxes", *American Economic Review*, 1975, Vol. 65, 139-147.

[34] See in that respect especially Hahn, R.W., "Economic prescriptions for environmental problems: how the patient followed the doctor's orders", *Journal of Economic Perspectives*, 1989, Vol. 3(2), 95-114.

[35] See Pigano, A., Prost, S. and Van Rompuy, J., "Alternative environmental regulation schemes for the Belgian power generation sector", *Environmental & Resource Economics*, 2000, Vol. 16, 121-160.

Netherlands a regulatory digressive energy tax was introduced in 1996. As a result the larger the energy use was, the lower the tax would be. This tax therefore only gave incentives to increase the use of energy rather than decreasing it. The main concern of the policy-maker was to increase competitiveness of Dutch industry rather than serving any ecological goal.[36] Similar problems arose in China. O'Connor reports on pollution charges on air emissions, waste water discharges, noise, solid waste and radio-active wastes introduced in China at the end of the last century. Charge rates were set slightly above average operating costs of pollution control facilities in order to provide incentives for compliance. However, in practice they were not indexed to inflation as a result of which their real value eroded over time, resulting of course in weak incentives for further pollution reduction. Efforts to raise the charge met, not surprisingly, with strong opposition from industry.[37] Considerations of political acceptability may hence often limit the possibilities to introduce efficient taxation systems.[38]

Similar problems arise concerning the introduction of market based instruments and more particularly pollution charges in developing countries. Some have advocated that more particularly for developing countries market based instruments like taxation would be well suited. These would, at least on paper, be perfect instruments since they could be implemented at lower costs than command and control regulation.[39] However, others have argued that implementing market based instruments is only possible in a context

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[36] Faure, M. and Ubachs, S., "Environmental taxation in the Netherlands: a Dutch treat?", in Kreiser, L.A. (ed.), *Critical issues in international environmental taxation. Insights and analyses for achieving environmental policy goals through tax policy*, Chicago, CCH, 2002, 301-329 and Faure, M. and Ubachs, S., "Harmful tax measures and greying of taxation in the Netherlands: what went wrong?", in Ashiabor, H., Deketelaere, K., Kreiser, L. and Milne, J. (eds.), *Critical issues in environmental taxation: international and comparative perspectives*, Vol. II, Richmond, Richmond Law and Tax, 2005, 521-532.

[37] O'Connor, D., "Applying economic instruments in developing countries: from theory to implementation", *Environment and Development Economics*, 1998, Vol. 4, 96-97.

[38] O'Connor, D., Applying economic instruments in developing countries: from theory to implementation", *Environment and Development Economics*, 1998, Vol. 4, 108.

[39] Blackman, A., "Columbia's discharge fee programme: incentives for polluters or regulators?", *Journal of Environmental Management*, 2009, Vol. 90, 101.

were a decent institutional and administrative structure is available.[40] These conditions will often not be met in the case of developing countries. The empirical evidence largely seems to confirm this point: in those countries where at least some institutional structure is available e.g. to set and collect environmental taxes in the public interest they may work effectively. Blackman showed in a study concerning Columbia's discharge fee programme that the reason why pollution loads dropped significantly after the programme was introduced was not so much because of incentives provided by the discharge fees, but rather as a result of incentives created through the programme for regulatory authorities to improve permitting, monitoring and enforcement.[41] Finally I should mention that although earlier research on environmental taxation in China was rather sceptical of its effectiveness, especially due to political pressure not to increase the tax rate, more recent research seems to indicate that China's discharge fee programmes have had a positive influence on pollution levels.[42]

3.5. Emissions trading

As I mentioned earlier, whereas environmental taxes and charges on emissions were popular in Europe emission trading started in the US. Hence, already since the 1980s there is overwhelming American research to show the effectiveness of trading in pollution rights. One can for example refer to research by Hahn and Hester claiming that the trading programmes concerning the Clean Air Act have led to considerable cost savings.[43] This SO_2 cap and trade programme has recently been qualified as a "living legend" of market effectiveness and the total annual health benefits associated with the

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[40] See e.g. Bell, R. and Russell, C., "Environmental policy for developing countries", *Issues in Science and Technology*, 2002, 63-70.

[41] Blackman, A., "Columbia's discharge fee programme: incentives for polluters or regulators?", *Journal of Environmental Management*, 2009, Vol. 90, 101-119.

[42] See more particularly, Wang, H. and Wheeler, D., "Financial incentives and endogenous enforcement in China's pollution levy system", *Journal of Environmental Economics and Management*, 2005, Vol. 49(1), 174-196.

[43] Hahn, R.W. and Hester, G.L., "Where did all the markets go? An analysis of EPA's emissions trading programme", *Yale Journal on Regulation*, 1989, Vol. 6, 109-153.

SO_2 emission reductions under the programme are estimated to be more than $ 50 million per year in 2010.[44]

Recently the attention has shifted from the US to Europe. The reason is of course that Europe chose emission trading as instrument to implement the Kyoto Protocol and the challenges posed by climate change.[45] Too many studies to be mentioned here have addressed the effectiveness of the EU emission trading scheme.[46] The case of the European ETS is an interesting one, simply to show the difficulties in interpreting the results of empirical research. I already mentioned that Europe chose with Directive 2003/87 of 13 October 2003 to give emissions rights basically for free to existing industry as a result of so-called grandfathering. Again, the private interest theory of regulation, mentioned above, can explain why emission trading with grandfathering was chosen instead of an environmental tax. This should not come as a surprise since grandfathering of course serves the interests of industry better[47] than costly taxation measures.

Also not surprising, at least at first sight is that grandfathering, in other words giving away allowances free of any charge, may lead to over-allocation of emission rights.[48] As a result of this over-allocation early 2007 the price of allowances dramatically dropped

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[44] So Burtraw, D. and Palmer, K., "SO_2 cap – and – trade programme in the United States. A "living legend" of market effectiveness", in Harrington, W., Morgenstern, R.D. and Sterner, Th. (eds.), *Chosing environmental policy. Comparing instruments and outcomes in the United States and Europe*, Washington, Resources for the Future, 2004, 47.

[45] See as far as the costs of climate change are concerned the interesting recent overview by Tol, R.S.J., "The economic effects of climate change", *Journal of Economic Perspective*, 2009, Vol. 23(2), 29-51.

[46] See for example the contributions in Douma, W.Th., Massai, L. and Montini, M. (eds.), *The Kyoto Protocol and beyond. Legal and policy challenges of climate change*, The Hague, TMC Asser Press, 2007.

[47] See also Rodi, M., "Legal aspects of the European emission trading scheme", in Hansjürgens, B. (ed.), *Emissions trading for climate policy, US and European perspective*, Cambridge, Cambridge University Press, 2005, 199-221.

[48] See for example Baldwin, R., "Regulation lite: the raise of emissions trading", Law Society Economy Working Papers, 3/2008 (<www.lse.ac.uk/collection/law/wps/wps.htm>).

below € 1,-. This low price for allowances obviously provides evidence of over-allocation by the European Member States.[49] However, it is more difficult to answer the question whether this necessarily makes the whole EU ETS ineffective in providing incentives for emission reductions. At first sight one may be tempted to argue that this is the case: why would any company invest in emission abatement equipment if a ton of CO_2 emission rights could be purchased at a price of lower than € 1,-? Marginal cost of pollution abatement are undoubtedly higher. However, Kuik and Oosterhuis convincingly argue that the over-allocation could be partly the result of investments in technological and other innovations which precisely caused the emissions reductions. They show that the EU ETS led to an additional abatement of between 50 and 200 million tons and equally showed that this emission trading scheme played a key role in long-term decisions of companies to develop innovative technologies, with more particularly a strong impact on the steel industry. Hence, the mere fact that the price of a ton CO_2 dropped below € 1,- (at the beginning of 2007) does not necessarily mean that this ETS had no incentive effect on innovation and would thus be ineffective. Quite the reverse may be true as well, being that the demand for emissions simply dropped, since the introduction of the EU ETS precisely had the desired effect of reducing those emissions.[50]

This shows that one has apparently to be very careful in correctly interpreting results of empirical research: the price of one ton CO_2 falling below € 1,- does not necessarily mean that the EU ETS is ineffective; one has to interpret this in the correct context.

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[49] See for example Woerdman, E., Clo, S. and Arcuri, A., "European emissions trading and the polluter pays principle: assessing grandfathering and over-allocation", in Faure, M. and Peeters, M. (eds.), *Climate change and European emissions trading. Lessons for theory and practice*, Cheltenham, Edward Elgar, 2008, 128-150.

[50] See Kuik, O. and Oosterhuis, F., "Economic impacts of the EU ETS: preliminary evidence", in Faure, M. and Peeters, M. (eds.), *Climate change and European emissions trading. Lessons for theory and practice*, Cheltenham, Edward Elgar, 2008, 208-222.

3.6. Combinations

If there is one thing clear from some of the empirical studies I discussed then it is something which is also stressed in theoretical papers, being that there is not just one optimal instrument of environmental policy, but that the key issue is how one can find an optimal combination of various instruments to reach environmental goals at the lowest cost.

The empirical literature on market-based instruments also clearly showed that it is rare that the market-based instrument alone led to improved environmental quality. Usually this was the case when the economic instruments were still used in combination with more traditional command and control instruments. An important argument to support this combined use of traditional command and control and modern economic instruments can also be found in the arguments presented by Bruno Frey. He argues that economic instruments have the disadvantage that they could lead to a so called "crowding out" of environmental moral: by simply paying for an emission right or an environmental tax the spontaneous willingness of industry to act environmentally consciously could be "crowded out", in other words reduced.[51] Recently Goeschl and Perino found evidence that taxes for CO_2 emissions crowd out intrinsic motivations whereas emission standards are neutral.[52] Also for that reason it may be important to combine market-based instruments with traditional regulatory instruments where this "crowding out" may be less of a risk.

4. Enforcement

No matter what type of instrument is chosen in environmental policy, either command and control or market-based instrument one always needs an effective enforcement and

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[51] See Frey, B.S., *Not Just for the Money: An Economic Theory of Personal Motivation*, Cheltenham, Edward Elgar, 1997 and Frey, B.S., "Morality and Rationality in Environmental Policy", *Journal of Consumer Policy*, 1997, vol. 22, 395-417.

[52] Goeschl, T. and Perino, G., *Instrument Choice and Motivation: Evidence from a Climate Change Experiment*, working paper April 2009.

sanctioning system.[53] Traditional economic analysis is based on the deterrence hypothesis as developed in the seminal work of Gary Becker.[54] The starting point of this literature is that a potential polluter will make a rational calculus of costs and benefits of complying with environmental regulation and will only comply when the expected costs of a violation are higher than the potential gains. This expected sanction consists on the one hand of the probability of being inspected, prosecuted and sanctioned and on the other hand of the sanction imposed. What does the empirical evidence teach us about these expected sanctions?

European data on detection and prosecution of environmental crime show that in fact the likelihood that a violation ends up in court and is sanctioned is extremely low. For the Flemish region in Belgium, based on data of the environmental inspectorate, it was found that the average probability of being apprehended and prosecuted for a violation is less than 1%, meaning that only one in hundred firms that are in violation will be detected and prosecuted.[55] This not only follows from the fact that the probability to be inspected is very low[56], but especially from the fact that many detected violations are not prosecuted. In the Flemish region the prosecutor dismissed 62% of violations established by the environmental inspectorate.[57] Similar data come from the U.K.: On average the

[53] See on the importance of enforcement also of market-based instruments (more particularly emissions trading) Peeters, M., "Inspection and Market-Based Regulation through Emissions Trading: The Striking Reliance on Self-Monitoring, Self-Reporting and Verification", *Utrecht Law Review*, 2006, vol. 2 (1), June and Peeters, M., "Enforcement of the EU Greenhouse Gas Emissions Trading Scheme", in Deketelaere, K. and Peeters, M. (eds), *EU Climate Change Policy: The Challenge of New Regulatory Initiatives*, Cheltenham, Edward Elgar, 2006, 169-187.

[54] Becker, G.S., "Crime and Punishment: An Economic Approach", *Journal of Political Economy*, 1968, vol. 76 (2), 169-217.

[55] See Faure, M.G. and Svatikova, K., "Criminal or Administrative Law to Protect the Environment? Evidence from Western Europe", Working paper draft May 2009.

[56] As was also established by Billiet, C. and Rousseau, S., "De zachte rechtshandhaving in het bestuurlijke handhavingspoor: de inspectiebeslissing en het voortraject van bestuurlijke sancties. Een rechtseconomische analyse", *Tijdschrift voor Milieurecht*, 2005, 19.

[57] Faure, M.G. and Svatikova, K., *Enforcement of Environmental Law in the Flemish Region*, 29. Again this was also established in earlier research. See for example Ponsaers, P. and De Keulenaer, S., "Met strafrecht

prosecution rate for pollution incidents is less than 5%.[58] However, serious incidents have a much higher prosecution rate.[59]

Similar rather depressing data can be presented as far as the sanctions are concerned that are imposed if the case gets at all to the court. A study on the fines imposed by the courts within the competence of the court of appeals of Ghent in the Flemish region in the period 1990-2000 found that an average fine of € 5 000 was imposed both in first instance and in appeal.[60] A later study referred to average fines imposed for violations in the textile sector of € 2 869 in first instance and € 7 165 in appeal.[61] For the Netherlands average fines imposed through the criminal system were reported ranging from € 1 351 to € 2 342.[62]

If one looks at these average fines imposed by criminal courts in Western Europe and multiplies this with the probability of being detected and prosecuted of about 1% this would lead to estimations in expected sanctions for example for the Flemish region varying from € 87,7[63] to € 176[64] to € 181.[65]

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tegen milieudelicten? Rol en functie van bijzondere inspectiediensten in de strijd tegen milieucriminaliteit", *Panopticon*, 2003, 250-265.

[58] See Bell, S. and McGillivray, D., *Environmental Law*, 6th edition, Oxford, OUP, 2006, 295-296.

[59] Of on average 63%. See on this targeting by the Environment Agency in the U.K. Faure, M. and Svatikova, K., *Criminal or Administrative Law to Protect the Environment? Evidence from Western Europe*, Working paper, draft May 2009, 16.

[60] Billiet, C. and Rousseau, S., "De hoogte van strafrechtelijke boetes. Een rechtseconomische analyse van milieurechtspraak (1990-2000) van het Hof van Beroep te Gent", *Tijdschrift voor Milieurecht*, 2003, 131.

[61] Billiet, C. and Rousseau, S., "De hoogte van strafrechtelijke boetes. Een rechtseconomische analyse van milieurechtspraak (1990-2000) van het Hof van Beroep te Gent", *Tijdschrift voor Milieurecht*, 2003, 131.

[62] See Schoep, G.K. and Schuyt, P.M., *Feiten en percepties van de sanctionering van milieudelicten en delicten betreffende de volksgezondheid*, Leiden, 2008.

[63] Rousseau, S., *Economic empirical analysis of sanctions for environmental violations: a literature overview*, p. 9.

[64] Rousseau, S., *The impact of sanctions and inspections on firms' environmental compliance decisions*, working paper Center for Economic Studies, Katholieke Universiteit Leuven, No. 2007-04, September 2007, 10.

However, here again one should come back to my general warning that one always has to interpret numbers with caution. One reason is that one could argue that of course not all cases are prosecuted before a criminal court, but that does not necessarily mean that nothing happens. Prosecutors can in some legal systems also propose a financial payment to the perpetrator and hence deal with the case themselves, in order to avoid the high administrative costs of the criminal prosecution. This may hence add something, but probably not a lot to the expected sanction.

A second point is that there may be other costs than the mere sanctions imposed by the courts that could deter potential violators, e;g. related to the fact that a conviction through the criminal system could lead to a "shaming" and hence to a loss of reputation for entrepreneurs. [66]

A third reason why the low prosecution rates of environmental violations in Western Europe should be interpreted with caution is that the prosecutor could in fact engage in regulatory dealings[67] whereby the prosecutor only agrees to dismiss the case after evidence of compliance by the firm. Some argue that this so-called "soft approach" in many cases leads to compliance by firms.[68]

There may be a fourth reason why many firms comply not withstanding low expected sanctions under the criminal law.[69] This is related to the fact that companies base their *ex*

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[65] Rousseau, S., Evidence of a filtered approach to environmental monitoring, available from the author: Sandra.Rousseau@econ.kuleuven.be, August 2008, p. 9.

[66] See generally on the importance of this shaming notion Braithwaite, J., *Crime, Shame and Reintegration*, Cambridge, Cambridge University Press, 1989.

[67] See Fenn, P. and Veljanovski, C., "A Positive Economic Theory of Regulatory Enforcement", *Economic Journal*, 1988, vol. 98, 1055-1070.

[68] Billiet, C. and Rousseau, S., *Tijdschrift voor Milieurecht*, 2005, 18-19.

[69] This phenomenon has been referred to in the literature as the Harrington Paradox, following research by Winston Harrington who established that given low expected sanctions one would expect more environmental criminality than can be observed in practice (Harrington, W., "Enforcement Leverage when

ante decision on compliance on their subjective perception of the probability of being detected and prosecuted and of the sanctions that can be imposed. They may hence not be aware of the low expected sanction in reality. The Belgian economist Rousseau found strong empirical backing for this phenomenon: when firms had to pay a monetary sanction during the previous two years they were on average more in violation in a second period than other firms that did not have to pay a fine in the first period. The interpretation is clear: those who did not have to pay a fine before overestimated the expected fine and complied. Firms that were recently fined had a more accurate impression of true expected sanctions and, being aware that they were low, were not deterred any longer.[70] This has an important policy implication: fining a polluter with a too low fine can have a perverse learning effect: firms will then be informed about the low expected sanction, whereas those who were not confronted with these low sanctions may still wrongly believe that expected sanctions are higher than they actually are and thus be more induced towards compliance. The policy implication seems to be that if the agency or court decides to fine a polluter it is better not to impose any fine at all than a too low one since otherwise one would even destroy wrong, subjective perceptions by potential perpetrators that fines are higher than they actually are.

The European experience with low expected sanctions for environmental crime would, at first blush, be different in the U.S. where strict sentencing guidelines apply, to which the judge should in principle adhere.[71] However, Barrett found in a study on the application of sentencing guidelines for environmental crime "that the sentences imposed in the majority of cases reflected the reluctance of judges to impose significant incarceration for

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Penalties are Restricted", *Journal of Public Economics*, 1988, vol. 37, 29-53 and Harford, J.D. and Harrington, W., "A Reconsideration of Enforcement Leverage when Penalties Are Restricted", *Journal of Public Economics*, 1991, vol. 45, 391-395.

[70] Rousseau, S., "Timing of Environmental Inspections: Survival of the Compliant", *Journal of Regulatory Economics* 32, 2007 and Rousseau, S., *The Impact of Sanctions and Inspections on Firms' Environmental Compliance Decisions*, 19.

[71] For an economic critique of these sentencing guidelines see Easterbrook, F., "Criminal Procedure as a Market System", *Journal of Legal Studies*, 1983, vol. 12, 289-332.

violations of environmental laws".[72] Others even held that these sentencing guidelines led to negative outcomes for deterrence. Since judges consider the guidelines as unreasonable this results in the opposite effect of lenient sentencing of environmental criminals. According to some American scholars now also significant violations are in fact sentenced too leniently, which may undermine the deterrent value of environmental enforcement and may trivialize environmental law itself.[73]

5. Opportunities and challenges

This overview of some empirical research with respect to the effectiveness of various environmental instruments showed that many of those studies, even though they often originate from other scholars than lawyers, may provide interesting insights on the effects of environmental legal instruments. One reason for presenting this material here today was to show the opportunities this empirical research provides for us, environmental lawyers, but equally to point at a few challenges. At many points I indicated that there a few rules of thumb to be followed when using this empirical research.

A first and obvious rule of thumb is to interpret the research results correctly, and more specifically within their particular context. For example on the effectiveness of market-based instruments in developing countries there exists, as I showed above, a lot of different and at first blush seemingly contradicting research. A sceptic of empirical research could, as is sometimes argued, hold that anyone can always find empirical research to backup his own position, whereby an adversary could equally find other research to backup his views. The key issue is of course that much of this research is very context specific and that the specific context, explaining why e.g. market-based instruments worked well in Columbia but maybe not in other developing countries should be interpreted within the specific institutional context of that country.

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[72] Barrett, J.J., "Sentencing Environmental Crimes under the United States Sentencing Guidelines: A Sentencing Lottery", *Environmental Law*, 1992, vol. 22, 1421-1449.

[73] See Babbitt, C.J., Cory, D.C. and Kruchek, B.L., "Discretion and Criminalization of Environmental Law", *Duke Environmental Law and Policy Forum*, 2004, vol. 15, 1-64.

A second, related point is that it may be dangerous to isolate results on one particular instrument from its use in the entire environmental legal context. For example those studies pointing at the effectiveness of market-based instruments in fact equally showed that it was often not the market-based instrument itself that led to higher environmental performance, but the fact that the introduction of the instrument led to better environmental awareness and enforcement by agencies.

Context specificity is also important when looking at one particular country case study. At the first IUCN Academy of Law meeting I attended at Pace the Indian lawyer Mr Mehta was welcomed with a standing ovation when he gave a keynote speech to this distinguished audience. If one reads in the introduction to the famous casebook on environmental law in India by Divan and Rosencranz[74] that Mr Mehta was at the origin of more than thirty decisions of the supreme court of India related to environmental cases one can also understand this. Moreover, recent research by economists has proven that environmental public interest litigation and the resulting decisions of the supreme court in India have led to a substantial reduction in pollution levels, more particularly, for example, as far as ambient air quality in Delhi is concerned.[75] A straightforward policy conclusion following from this Indian case seems therefore to be that environmental public interest litigation is an effective instrument to reduce pollution levels in developing countries. Such a conclusion would obviously be wrong. First of all, even in India, many scholars hold that the judicial activism by the Supreme Court is desirable and effective, but only as a second best solution, given that the executive power fails to

[74] Divan, S. and Rosencranz, A., *Environmental Law and Policy in India. Cases, Materials and Statutes*, 2nd edition 2001.

[75] Raja, A.V. and Xavier, F., *Efficiency and Strategic Behaviour: The Case of Mass Torts*, working paper, Department of Economics, University of Hyderabad 2005a; Raja, A.V. and Xavier, F., *Economic Efficiency and Public Interest Litigations (PIL): Lessons from India*, paper presented at the first annual conference of the Asian Law and Economics Association, Seoul National University, Seoul, South-Korea 2005b. Raja, A.V. and Xavier, F., *Regulatory Failure and the Economic Efficiency of Public Interest Litigation*, unpublished manuscript 2007.

provide an adequate protection.[76] Moreover, many authors in India are also critical of this judicial activism and argue that it seriously violates the separation of powers.[77] Third, environmental public interest litigation may have generated beneficial effects in India since in that country, the judiciary has a long-standing reputation of independence and decision making in the public interest. The Indian solution may hence not be possible in countries where the judiciary is not of the same quality and hence the danger exists that problems of corruption and lacking capacity are as serious with the judiciary as with the legislative and executive branches of government.

A third rule of thumb is that one obviously needs a certain academic honesty in using empirical research as well. One can often notice a hard to resist tendency among academics to use or interpret empirical research in a way that fits their established beliefs. Thus for sceptics of market-based instruments like emission trading, the European experience could easily give rise to the comments that the emission trading scheme apparently was ineffective, since the price of an allowance dropped below 1 €. As I, however, showed above, this would be a wrong interpretation of the ETS, since the low price may well be the result of substantial investments made prior to the ETS as a result of which there was indeed less demand for allowances.

A fourth rule of thumb is that the results of empirical research need always to be interpreted within a specific theoretical context. For example, the fact that in some cases, strict liability led to more pollution incidents than negligence and to a tendency to organize in smaller business units, should not wrongly be interpreted as an argument

[76] See for example Mijin Cha, J., "A Critical Examination of the Environmental Jurisprudence of the Courts of India", *Albany Law Environmental Outlook Journal*, 2005, vol. 10, 197-228 and Rajamani, L., "Public Interest Environmental Litigation in India: Exploring Issues of Access, Participation, Equity, Effectiveness and Sustainability", *Journal of Environmental Law*, 2007, vol. 19(3), 293-321.

[77] Dam, S., "Green Laws for Better Health: the Past that was and the Future that may be – Reflections from the Indian Experience", *Georgia International Environmental Law Review*, 2003-04, vol. 16, 608 and 612. See also Anant, T.C.A. and Singh, J., "An Economic Analysis of Judicial Activism", *Economic and Political Weekly*, 2002, 4433-4439.

against strict liability for environmental pollution. It should be seen in the light of theoretical literature, warning that strict liability may lead to underdeterrence in case an insolvency risk emerges. That is, so the theoretical literature holds, as such no argument against strict liability, but rather to accompany it with solvency guarantees.

Many more examples have been given above, all pointing in the same direction: empirical research does provide many opportunities and useful information for environmental lawyers, but has to be interpreted with caution. That is no reason against using or doing empirical research, but rather a challenge to interpret the results within the right context.

6. Concluding remarks

In the introduction, I argued that I on the one hand wanted to show that there is a lot of empirical research out there that has important lessons for us environmental lawyers, even if it is not always easily accessible because of the language in which it is written or the type of journals in which it is published. A lot of this empirical material is already known to and read by environmental lawyers and this will only become more important in the future. It is indeed crucial for any policy instrument, be it command and control or market-based, that the policy maker has at least some ideas on the effects of the instruments chosen in practice. This requires *ex ante* taking into account available empirical research since the choice for a particular instrument is often based on assumptions upon its effects which may be merely theoretical. It also requires serious *ex post* evaluation studies to examine whether a particular instrument chosen or policy instrument implemented was indeed able to achieve the goals expected by the legislator.

As far as the contents is concerned, I provided a “tour d’horizon” of many environmental policy instruments and realize that I could not be complete. Some “cherry picking” simply showing that on many domains interesting research exists worth further exploring was the main goal of this talk.

Maybe one conclusion, looking at the many studies I discussed, could be that the empirical research does not necessarily point in the direction of strongly favouring either command and control or market-based instruments, but rather shows that the effectiveness of the instruments chosen depends to a large extent upon the particular design. Some studies point at the relative effectiveness of environmental taxation in providing incentives for emission reductions. At first blush, one could argue that this could be understood given the fact that command and control is so strongly dependent upon public enforcement of which it was shown that (at least in Western Europe) it may be weak due to low expected sanctions *ex ante*. However, studies equally showed that the tax rate is not always efficiently set and that taxation was effective only in those systems where an effective monitoring and enforcement system applied. In that respect, command and control and market-based are not that much different: both will need effective monitoring and enforcement systems.

The studies equally showed that it may not be possible to argue that one particular instrument is "best" or "optimal", but that in most cases, a combination of various instruments may be indicated. An important point for further research is hence to look for these "optimal mixes" of policy instruments, whereby these may also to a large extent depend upon country specific characteristics. It was therefore not surprising to notice that important differences exist for example between Europe and the US, but may be with Asia as well. To some extent, these differences (for example as far as instruments chosen but also enforcement styles) is concerned may be due to institutional characteristics or simply differences in environmental problems of the countries concerned. However, a lot of studies also showed that in practice, one may often notice that optimal instruments are not introduced simply because of lacking political acceptability. Hence, the reason why the US had more emission trading and Europe more environmental taxation and why initially emission rights in Europe were allocated through grandfathering is often the result of the relative power of the various interest groups involved. In this respect, the recent study by Binder and Neumayer showing that the influence of the civil society has a positive impact on environmental quality gives important empirical support for an issue that environmental lawyers already long were convinced of: if one wishes governments to

make environmental regulation in the public interest, it is very important to have environmental NGO involvement in order to provide a good counterweight for lobbying by interest groups representing industry.

I started this talk with a reference to the important research by Esty and Porter. They on the one hand showed that environmental quality does to a large extent depend upon economic growth. The most important lesson for those who want improvement of environmental quality therefore still remains: fight poverty and increase income levels. However, at the same time, their (and other) research equally showed that environmental quality is higher in those legal systems with a decent regulatory and institutional framework. Therefore, it does pay to examine, based on empirical research, which environmental instruments may in particular contexts be most effective in remedying environmental pollution. In other words: environmental law does matter!

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