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In general, one cannot expect developing countries to have the same environmental standards as developed ones. Standards can be at their efficiency levels and yet be lower than in developed countries due to differences in emissions, in the pollution absorptive capacity and in the intensity of environmental preferences. However, developing countries can be said to provide a 'pollution haven' if they set environmental standards below their efficiency levels or fail to enforce their standards in order to attract foreign investment. This article analyses which factors can give rise to pollution havens and examines whether these factors are more likely to characterise the developing world. The evidence pertaining to pollution havens is reviewed. It is argued that in spite of the rather limited evidence for their existence it is nevertheless important to evaluate policy options for tackling (potential) pollution havens. A comprehensive range of options are evaluated according to whether they appear to be effective, politically realistic, development friendly, closed to abuse and not unnecessarily restrictive.

In spite of the popularity of the pollution haven hypothesis, it is rarely defined what exactly is meant by a pollution haven. Public opinion seems to have it that any country with less strict environmental standards than one's own country is guilty of providing a pollution haven. But such a definition would be misleading as countries cannot, in general, be expected to have the same environmental standards all over the world – independently of whether or not they want to attract foreign capital. A more sophisticated definition, but inspired by the same kind of reasoning, is provided by Eskeland and Harrison (1997, p. 4): 'The pollution haven hypothesis is, perhaps, best seen as a corollary to the theory of comparative advantage: as pollution control costs begin to matter for some industries in some countries, other countries should gain comparative advantage in those industries, if pollution control costs are lower there (for whatever reason).' Again, in focusing on cost differentials as such and ignoring the reasons

for those differentials, this definition does not capture what seems to be the essence of the pollution haven hypothesis: that countries set inefficiently low environmental standards or set efficient standards, but fail to enforce them, in order to attract foreign capital.

In this article I will therefore employ the following definition: a country provides a pollution haven if it sets its environmental standards below the socially efficient level or fails to enforce its standards in order to attract foreign investment from higher standards countries or countries, which better enforce their standards. In formal economic terms, environmental standards are at their socially efficient level, if for each different pollutant the standard is set such that the marginal social benefit of an increase in pollution is just equal to the marginal social cost of such an increase. Avoiding economic jargon, this broadly translates into the requirement that the pollution levels are in accordance with the preferences of people living in a political community (here: country). Hence if environmental standards are inefficiently low, then there is excessive pollution relative to people's preferences.

There has been much academic debate on the pollution haven phenomenon (see, for example, Lucas, Wheeler and Hettige 1992; Birdsall and Wheeler 1993; Thompson and Strohm 1996; Porter 1999). This article differs from most other papers on two major accounts. First, it aspires to provide a more comprehensive analysis of which factors might give rise to pollution havens and what systematic empirical evidence tells us on their existence. As we will see, pollution havens are an elusive phenomenon in the sense that their existence is difficult to demonstrate both theoretically and empirically. Second, and more importantly, it aspires to move forward the debate in providing an analysis of policy options for dealing with this elusive phenomenon. What options do policy makers have for dealing with pollution havens and how would one evaluate those options?

Structure and outline of argument

The next section argues that even if environmental standards were at their efficiency levels everywhere, there would still likely to be international differences in those environmental standards. This is because of potential differences in the amount of existing emissions, differences in the pollution absorptive capacity of the environment in different countries as well as differences in the intensity of environmental preferences of the people living in a country. Apart from differences in the amount of existing pollution, none of these factors would suggest systematically lower environmental standards in developing as opposed to developed countries, however. Then a number of factors are examined, which could lead to pollution havens as defined above. Of these, by far the most important one is that developing countries might suffer from political-institutional deficiencies that could create a bias against environmental preferences such that their environmental standards are set inefficiently low or are non-enforced.

These theory oriented considerations are important in the sense that they help to clarify analytically when international differences in environmental standards are justified by international differences in the efficient level of standards and when they are not. However, the question is whether such a distinction is useful for empirical analysis, which after all represents the only way of knowing whether and to what extent pollution havens exist in actual reality. Ideally, one would try to assess environmental standards internationally, compare the actually existing standards to what would constitute the efficient standards and evaluate whether developing countries' standards are further away from their efficiency standards than is the case in developed countries. If so, then they would provide a pollution haven relative to developed countries. Unfortunately, such an empirical analysis is next to impossible, mainly because it is extremely difficult to say what the efficient environmental standards for each country would be. Studies analysing the pollution haven phenomenon empirically have therefore invariably

taken recourse to testing one of three proxy propositions or hypotheses that would need to hold if pollution havens did exist:

1. Differences in environmental standards affect the allocation of investment flows.
2. Developing countries' production and exports have become increasingly pollution-intensive.
3. Pollution-intensive industries flee the high-standards countries.

Reviewing the available empirical literature leads to the conclusion that there is very limited evidence in favour of either of these three propositions and several reasons are presented for why there might be such limited evidence for pollution havens.

It follows from both theoretical considerations and a review of the empirical evidence that pollution havens represent an elusive phenomenon. While their existence is difficult to demonstrate, it would be overhasty to dismiss them completely, however. Maybe insufficient data availability prevents our empirical methods from tracing them better. Also, policy makers and environmental activists alike seem to be concerned about pollution havens independent of the weak empiricial evidence for their actual existence. In times of 'globalization' and increasing flows of capital to developing countries, this concern is even likely to become stronger. If one is concerned about policy, then it is simply not enough to refer to the weak statistical evidence for pollution havens found in empirical studies. Rather, one needs to take these concerns seriously and offer policy options to address them.

This article therefore goes one important step beyond the existing literature. Since the existence of pollution havens is likely to remain a hotly debated issue, it seems more than pertinent to evaluate policy options for tackling potential or actually existing pollution havens. The last section of this article therefore examines a wide range of policy options according to a number of clearly specified criteria. It argues that assistance for political-institutional capacity building and local empowerment of people represent the best policy option.

Theoretical considerations and evidence on factors causing pollution havens

EFFICIENT INTERNATIONAL DIFFERENCES IN ENVIRONMENTAL STANDARDS

As mentioned in the last section, countries might have different environmental standards, even if those standards are set at their efficient level. Environmental standards can differ because of at least three reasons:

- *Differences in emissions of pollutants.* All other things equal, a country with higher emissions should have stricter environmental standards than a country with lower emissions. Unfortunately, data on international differences in emissions of pollutants are not directly available on an aggregate basis. However, one can use differences in energy consumption per capita as a first proxy to differences in emissions of pollutants.[1] According to World Bank (1999, table 3.7) low and middle income countries had a commercial energy use per capita of 1,766 kg of oil equivalent in 1996, whereas high income countries used 5,259 kg of oil equivalent per capita. Ceteris paribus, we would therefore, on average, expect developing countries to have laxer environmental standards due to lower emissions.

- *Differences in pollution absorptive capacity.* In principle, different environments can have different capacities to absorp or assimilate and therefore to cope with pollution. This much is undisputed. Going one step further, it is sometimes tentatively suggested that the environment in developing countries might be characterised by higher pollution absorptive capacity (for example, Snape 1992, p. 88). However, from a natural science perspective there is no justifi-

cation for such a presumption, as the pollution absorptive capacity depends on the meteorological and topographical conditions of the local environment and also on the relevant pollutant.

- *Differences in the intensity of environmental preferences.* It is often presumed that the intensity of environmental preferences is lower in developing countries. Kriström and Riera (1996, p. 45) suggest that 'most economists would argue intuitively that environmental quality is a luxury good'. Such a presumption is in conflict with the available evidence, however. In Gallup et al. (1993), a cross-national survey encompassing 24 developed as well as developing countries, there is no statistically significant correlation between expressed personal concern about the environment and real GDP per capita in purchasing power parity in 1992 (GDP data taken from UNDP 1995, table 1). There is a correlation, statistically significant at the .01 level, between support for stronger environmental laws for business and industry as well as for citizens. However, it contradicts the common view as individuals in poor countries actually express stronger support for these laws than individuals in rich countries (Pearson Correlation -.550 for laws for business/industry, -.744 for laws for citizens).[2] These findings are not confined to the Gallup et al. (1993) survey.[3] In the 'World Values Survey' (Inglehart, Basanez and Moreno 1998), another cross-national environmental survey conducted in 43 developed and developing countries, there is no statistically significant correlation between income levels and individuals' support for environmental protection – as measured in various formulations asking for people's willingness to accept price or tax or cost increases for the reduction of environmental pollution. More systematically, Kriström and Riera (1996) have surveyed available evidence from contingent valuation studies – all coming from European countries, however. Somewhat to their own surprise they find that individuals in lower income brackets express a higher willingness-to-pay as a share of their income than individuals in higher in-

come brackets. It seems fair to say, therefore, that there is no strong evidence showing that environmental preferences of individuals in poor countries are less intense than of individuals in rich countries.

INEFFICIENT INTERNATIONAL DIFFERENCES IN ENVIRONMENTAL STANDARDS

International differences in environmental standards need not be in accordance with differences in the efficiency of environmental standards, however. There are a number of reasons that could cause such standards to inefficiently differ internationally:

- *Transboundary pollution.* So far, we have assumed that environmental pollution does not cross national boundaries. If it does, then incentives to provide a pollution haven exist as some of the burden connected to low or badly enforced environmental standards is borne by other countries. What evidence do we have on pollution spillover effects? To my knowledge, there is no evidence that pollution spillover effects are more prevalent in the developing world per se. However, we do have evidence on whether affected countries have found an agreement and have tried to internalise the pollution externality. On this account, developing countries fare worse than developed countries. According to Sand (1992) de facto participation of developing countries in international legally binding environmental agreements is in general (but not in each and every case) much less than that of developed countries. Similarly, in cross-country statistical analysis Roberts (1996) found that wealthy countries are much more likely to sign and ratify international environmental treaties than poor countries. Ceteris paribus, we would therefore expect developing countries' pollution spillovers to be less internalised via international environmental agreement than developed countries' spillovers.

- *Bias against environmental preferences.* Pollution havens can also arise if a country's standard setting institution (that is, its government or its national environmental authority) is biased against environmental preferences. Why might this be the case? First, the agents causing and therefore benefiting from environmental pollution might be less in number than the victims of pollution. There is a whole strand of public choice theory going back to Olson (1965) arguing that small groups find it easier to organise themselves and therefore to lobby the political process than big number groups. Business groups from pollution-intensive industries, for example, are usually much better lobbyists with much more money and influence available than environmental pressure or consumer groups. However, there is a drawback to this argument. If the number of pollution beneficiaries is much smaller than the number of pollution victims, then at democratic elections the victims have a comparative advantage over the former group. Presumably, therefore, this first argument is not sufficient in explaining political bias against environmental preferences. Of course, many, especially developing, countries do not hold democratic elections in the full sense, hence the beneficiaries of pollution need not fear to lose out at the ballot box. Freedom House (1999) publishes an annual index of political freedom measured on a one-to-seven scale covering the existence and fairness of elections, existence of opposition and the possibility to take over power via elections. For a selection of the 52 most important developed and developing countries, the 1996-97 index is highly correlated with real 1997 GDP per capita in purchasing power parity (Pearson Correlation .865, significant at the .01 level; Spearman's r .847, significant at the .01 level; GDP figures taken from UNDP 1999, table 1): Developed countries tend to have higher political freedoms than developing countries.

Second and connected to the last point, if the political system is characterised by corruption and is easily amenable to manipulation by powerful and wealthy special interest groups, then the beneficiaries of pollution are likely to be more influential than the comparatively less

wealthy environmental pressure or consumer groups. 'Regulatory capture' becomes easier if lobbyists from pollution-intensive industries can bribe officials from environmental agencies. Porter (1999) argues forcefully that developing countries are much more likely to suffer from this kind of failure of political system than developed ones. Transparency International (1999) publishes an index of perceived corruption, defined as the perceived corruption in the public sector in terms of abuse of public office for private gain, measured on a zero-to-ten scale. For the same 52 developed and developing countries as above, the 1996 index is highly negatively correlated with real 1997 GDP per capita in purchasing power parity (Pearson Correlation -.638, Spearman's r -.743, both significant at the .01 level; GDP figures taken from UNDP 1999, table 1): Developing countries tend to be perceived as being more corrupt than developed countries.

Third, whereas the benefits of pollution are present, tangible and highly visible in terms of the goods and services that are produced and the jobs that are created or secured, the costs of pollution are often invisible, intangible, uncertain and occur in the future. Myopic policy makers whose interests might primarily centre around the prospects of re-election in the near future, might therefore tend to focus on the benefits of pollution at the expense of its costs. They might be encouraged to do so if because of economic hardship the electorate regards other problems than environmental pollution to be the more pressing ones. Maybe surprisingly, there is no systematic evidence demonstrating that individuals in developing countries regard other problems more pressing relative to environmental problems. In the already mentioned Gallup et al. (1993) study the percentage of respondents volunteering to state environmental problems as the most important problem facing the nation is not statistically significantly correlated with GDP per capita. Similarly, in the World Values Survey (Inglehart, Basanez and Moreno 1998) approval rates for the statement 'If we want to combat unemployment in this

country, we shall just have to accept environmental problems' is not significantly negatively correlated with GDP per capita.

Fourth, bias against environmental preferences can stem from political-institutional failure of a country. Even if policy makers are not biased against environmental preferences per se and try to satisfy the true preferences of their citizenship, a country, especially a developing country, might not have the advanced political, legal, administrative and regulatory capacity to provide environmental protection at the efficient level. Political-institutional failure might either lead to inefficiently low environmental standards or to non-enforcement of standards. Birdsall and Wheeler (1993, p. 138) suggest that 'the relative costs of monitoring and enforcing pollution standards are higher in developing countries, given scarcity of trained personnel, difficulty of acquiring sophisticated equipment, and the high marginal costs of undertaking any new governmental activity when the policy focus is on reducing fiscal burdens'. In using a multidimensional survey analysis of national environmental reports to the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, Dasgupta et al. (1995) find that a country's overall institutional environmental performance as measured by environmental awareness, scope of policies adopted, scope of legislation enacted, control mechanisms in place and the degree of success in implementation is positively correlated with its income per capita and the development of its legal and regulatory system.

Fifth, policy makers can be biased against environmental preferences if this allows domestic firms to reap profits from international imperfectly competitive markets. Barrett (1994) shows that if firms in these markets compete with each other in quantities (so-called Cournot-competition), then lowering environmental standards allows domestic firms to expand their output and increase their profit share at the expense of foreign firms. This is often called 'ecological dumping' and in so far as countries do not tax away all the additional firm profit, foreign investors will find it attractive to invest in a low standards countries. However, whether

'ecological dumping' can explain the provision of pollution havens is rather dubious for two reasons. First, Barrett (1994) shows as well that if companies compete with each other in prices rather than in quantities (so-called Bertrand competition), then governments have an incentive to actually raise environmental standards as this will allow domestic firms to raise their prices and increase their profit share at the expense of foreign firms. In other words, instead of 'ecological dumping' there can as well be 'ecological over-pricing' depending on the form of competition. Second, even if firms compete in quantities, all countries have an incentive to lower their environmental standards. Hence, all countries will have inefficiently low environmental standards, but there is no reason to expect that developing countries provide pollution havens relative to developed countries.

- *Dependency on capital tax revenue.* Oates and Schwab (1988) and Chao and Eden (1997) show that countries have an incentive to set environmental standards inefficiently low if their government's tax revenue depends in part on capital taxation. Lowering environmental standards is a means of attracting foreign capital and keeping domestic capital which raises tax revenue. IMF (1998, pp. 4-5) provides evidence on the types of governmental revenue as percentages of total revenue in general and on corporate taxation as a proxy to capital taxation in particular. While the percentage of total revenue stemming from corporate taxation obviously varies a lot from country to country, it is striking that quite a few developing countries derive above 15% of their total revenue from corporate taxation, whereas in developed countries the dependency ratio is usually below 15%, with the exception of Australia which has a rate of almost 17%. Ceteris paribus, we would therefore expect that some developing countries might have lower environmental standards.

- *Jurisdictional market power in the market for capital.* Van Long and Siebert (1991) and Rauscher (1994) have shown that if countries are 'large' so that they can exercise market power in the capital market (a possibility we have implicitly excluded so far), then a capital exporting country has an incentive to lower its environmental standards in order to restrict its capital export and raise its rate of return on its foreign investment. A capital importing country with market power has the opposite incentives. This argument can hardly give rise to developing countries providing pollution havens, however. First, there is hardly a developing country large enough to raise or lower the rate of return on capital. If at all, then developing countries could merely exercise market power in a concerted joint effort, which is non existent at the moment. Second, and more importantly, developing countries are net capital importers so that instead of having an incentive to provide pollution havens they would have an incentive to set inefficiently strict environmental standards!

SUMMARY OF FINDINGS

Table 1 sums up the findings on how we would expect developing countries' environmental standards to be relative to developed countries' ones under efficiency conditions. Only the lower emissions in developing countries would clearly prompt us to expect them to have laxer environmental standards. The evidence on the pollution absorptive capacity of the environment and the intensity of environmental preferences is indeterminate.

< INSERT TABLE 1 HERE >

Table 2 sums up the findings on factors, which could give rise to pollution havens. The higher prevalence of pollution spillovers, the more pronounced bias against environmental preferences and the greater dependency of government revenue on capital taxation are all factors

which could give rise to developing countries having inefficiently lax or badly enforced environmental standards relative to developed countries. Jurisdictional market power in the capital market is a potentially counteracting factor, but its practical relevance is highly questionable.

< INSERT TABLE 2 HERE >

As can be seen from tables 1 and 2, the existence of laxer or badly enforced environmental standards in the developing countries might be, but need not represent the provision of a pollution haven. Next we move to a review of the more systematic empirical evidence related to pollution havens.

Systematic empirical evidence

How to detect pollution havens? Ideally, following from the definition of pollution havens one would want to compare existing environmental standards to their efficiency levels. In practice, providing a reliable estimate of these efficiency levels would be next to impossible for most countries due to lack of reliable data and valuation studies. Invariably therefore empirical studies have simply examined whether countries with low environmental standards manage to attract capital from high standards countries. If pollution havens exist, then we would expect to find such evidence. Note, however, that such evidence is only a necessary, not a sufficient condition for proving the existence of pollution havens as the environmental standards in countries attracting investment while lower than in other countries need not be inefficiently low.

Practically all relevant empirical studies have examined one of three questions: First, whether differences in environmental standards affect the allocation of investment flows; sec-

ond, whether production and exports in developing countries (the supposed pollution havens) are becoming increasingly more pollution-intensive; and third, whether pollution-intensive industries leave high standards countries at any significant level.

DO DIFFERENCES IN ENVIRONMENTAL STANDARDS AFFECT THE ALLOCATION OF INVESTMENT FLOWS?

Pollution havens only matter if differences in environmental standards affect the allocation of investment flows. While there are not many studies on the international level, there are a few more studies examining the effects of environmental regulation on investment flows within a nation, mainly in the U.S. Mani, Pargal and Huq (1996) find that differences in the stringency of environmental enforcement in different states of India do not have a significant impact on the location of new manufacturing plants in 1994. Similarly for the U.S., Bartik (1998) does not find any statistically significant effect of variations in the stringency of state environmental standards on the location decisions of new manufacturing plants owned by the Fortune 500 companies throughout the 1970s. Levinson (1996) examines locational choice encompassing all the manufacturing industry. He finds that the investment decisions of only very few industries were significantly affected by differences in environmental standards and that the effect is rather small. McConnell and Schwab (1990) look at the impact of environmental regulation on location decisions for new plants of just one industry, the motor vehicle industry during 1973-1982. Their results are ambiguous. Depending on the definition of environmental stringency they find either no statistically significant evidence or weak evidence that some firms may be deterred at the margin from investing in regions with high environmental compliance costs.

In contrast to the last three papers, Keller and Levinson (1999) look specifically at FDI inflows to the U.S. and examine whether states with low environmental standards attract a

higher share of this investment inflow than other states. Keller and Levinson find that they do, but estimate the effect to be small. Their results stand in marked contrast to List and Co (2000) who also look at the effects of environmental regulations on FDI inflows to the U.S. Using measures of environmental stringency different from Keller and Levinson (1999), they find quite large effects of stringent environmental standards lowering a state's share of receiving FDI.

In moving to the international level, the first thing to note is that the empirical evidence from the national level, even if it was unambiguous, need not carry over as nation-states are much more diverse in many respects than the states of the U.S. Before looking at two studies, which employed systematic statistical analysis, it is interesting to note that environmental compliance costs do not figure in the 49 Competitiveness Indicators, published by the World Bank (1998b). Neither does it play a role in the competitiveness ranking of 59 countries provided by the World Economic Forum (1999). In as far as competitiveness is a metaphor for the attractiveness to invest in a country, then, in the World Bank's and World Economic Forum's view at least, environmental factors do not seem to play a role. In IMD's (1999) 'World Competitiveness' rankings the extent to which existing laws to protect the environment hinder businesses is one of the criteria, but it is merely one out of 288 and four other criteria reward countries for good environmental performance.

More systematically, Xing and Kolstad (1998) find that countries with low environmental standards tend to attract a higher share of U.S. FDI outflows than countries with high standards. However, they admit that this result might not be robust as their number of observations is quite low. Eskeland and Harrison (1997) examine how the pattern of foreign investment in four developing countries (Mexico, Morocco, Cote d'Ivoire and Venezuela) is affected by environmental regulation. They find two things: first, differences in pollution abatement costs are insignificant in determining FDI flows to these countries. Second, high-

polluting sectors do not attract more FDI than cleaner sectors – sometimes even the opposite effect is statistically significant.

ARE DEVELOPING COUNTRIES' PRODUCTION AND EXPORTS BECOMING INCREASINGLY POLLUTION-INTENSIVE?

If developing countries provide pollution havens, then we would expect that, ceteris paribus, their production, and possibly their exports as well, become more pollution-intensive over time as dirty industries migrate to these havens. Lucas, Wheeler and Hettige (1992) and Birdsall and Wheeler (1993) provide evidence that developing countries had high growth rates of pollution intensity of industrial production in the 1970s and 1980s, whereas the pollution intensity has decreased in developed countries. Similarly, Abimanyu (1996) finds that pollution intensive sectors have expanded faster than average in some developing countries in East and South East Asia. However, it is not clear whether this relative change is due to re-location of pollution-intensive industries towards developing countries or represents the environmental consequences of the industrialization process (Thompson and Strohm 1996). It is also not clear whether, even if this relative change was due to migration of pollution-intensive industries towards developing countries, re-located industries increased the exports of goods from pollution-intensive production to high environmental standards countries. First, Lucas, Wheeler and Hettige (1992) and Birdsall and Wheeler (1993) find that closed developing countries had much higher growth in pollution intensity of industrial production than export-oriented countries – a finding, which is disputed by Rock (1996), however, who claims that this result is due to statistical misspecification. Second, Mani and Wheeler (1997, p. 20) provide evidence suggesting that the consumption of pollution intensive goods in the developed world has decreased hand in hand with their decreasing pollution-intensity of production so

that the ‘consumption/production ratios of dirty-sector products in the developing world have remained close to unity’.

Tobey (1990) analyses directly the effects of differences in environmental standards on patterns of world trade finding that developed countries’ stringent standards have not significantly affected international trade patterns in the most polluting industries. He uses data from the late 1960s and early 1970s – that is, before the major wave of raising environmental standards in developed countries. But his result is confirmed by a similar analysis by Beers and Bergh (1997) for 1992. However, whereas they find no significantly negative impact of the stringency of environmental standards on exports of pollution-intensive industries as a whole, they do find such an impact with respect to the subset of 'non-resource based' pollution-intensive industries.

World Bank (1998a, p. 113) also provides more recent evidence on the pollution-intensity of exports from developed and developing countries. It computes the export-import ratio for six heavily polluting sectors – iron and steel, nonferrous metals, industrial chemicals, petroleum refineries, nonmetallic mineral products and pulp and paper products – for 53 countries. The export-import ratio of low-income countries increased by 71 percent to about 0.3 between 1986 and 1995, that of both lower and higher middle-income countries decreased and the ratio of high-income countries increased by 29 percent to 1.32.[4] The result for low-income countries leaves open the possibility that these countries provided pollution havens in the 1980s and early 1990s (and possibly before). Notably, however, the lower the income group of countries the lower as well the export-import ratio. Production of dirty industries still takes place predominantly in the richer countries. What is true for income groups holds true on a disaggregated level as well: World Bank (1998a, p. 113) finds that with very few exceptions developed countries export more goods from highly polluting sectors than they import from developing countries both in 1986 and in 1995. A possible explanation for this rather striking result

might be that dirty sectors are about twice as capital intensive than clean sectors, which in turn are about 40% more labour intensive (Mani and Wheeler 1997, p. 6) and developed countries are more capital abundant and less labour abundant than developing countries.

For the US only, Kahn (2000) looks at the pollution intensity of exports and imports in 1972, 1982 and 1992, where pollution intensity is measured according to information provided by the US Toxic Release Inventory Data. He finds that the growth in pollution-intensive imports is mainly due to growth in trade with rich nations, not with developing countries. However, he also finds that 'when poorer nations engage in trade liberalization dirty trade with the United States grows faster than clean trade with the United States' (ibid., pp. 3f.).

DO POLLUTION-INTENSIVE INDUSTRIES FLEE THE HIGH STANDARDS COUNTRIES?

Pollution havens, if existent, will attract foreign investment from countries with higher standards. Do we observe pollution-intensive industries leaving high standard countries? Evidence on this aspect exists mainly for the U.S. only. Leonard (1988) in one of the earliest comprehensive qualitative studies did not find evidence of pollution-intensive U.S. industries moving to Ireland, Spain, Mexico and Romania. More systematic and very strong evidence against the hypothesis that pollution-intensive industries migrate towards lower standards countries is provided by Albrecht (1998): He looks at the U.S. inflows and outflows of investment from clean, medium polluting and dirty industries between 1991 and 1995. He finds that dirty industries are the only ones for which more investment comes to than leaves the U.S., whereas there is a massive net outflow of investment in clean industries. As this result is not due to dirty industries growing faster than other U.S. industries, Albrecht (ibid., p. 191) concludes that 'dirty industries are not at all leaving the USA en masse'.

The period of Albrecht's analysis is quite small. More importantly, it is for the U.S. only. Unfortunately, for the other G7 countries FDI data are not available on a detailed industry basis.[5] The exception is Germany, for which the following looks at FDI flows of eight pollution-intensive manufacturing sectors over the period 1989 to 1997 (data taken from Bundesbank (1994, 1997, 1999)).[6] While the cumulative direct investment of foreigners into Germany in these sectors amounts to approximately 224 billion DM, the cumulative flow of direct investment out of Germany amounts to 376 billion DM. It would be wrong, however, to regard this as evidence for a massive flight of pollution-intensive industries out of high environmental standards Germany. This is because these industries simply follow the general trend of the overall German manufacturing sector, which is characterised by massive net outflows of direct investment. Indeed, the share of pollution-intensive FDI among all German manufacturing sector FDI has remained relatively close to its average share of about 41% between 1989 and 1997. That there is a net outflow of investment in pollution-intensive sectors is therefore in itself no evidence for this flight being induced by high environmental standards. However, the same average share of pollution-intensive among all manufacturing sectors is about 39% for FDI into Germany. The difference of two percentage points could be tentatively interpreted as evidence for a net outflow of investment in these sectors even after taking into account that there is a net outflow of investment of the overall manufacturing sector. It is weak evidence at best, however, as this rather small difference of two percentage points might be caused by many other factors besides high environmental compliance costs in Germany.

In search of explanation: Why is there so little evidence for pollution havens?

It follows from this overview of empirical studies that the evidence for pollution havens is relatively weak at best and inconclusive or even negative at worst. As a next step, one might ask why low standard countries do not manage to attract more capital from high standard countries.

The first and perhaps most obvious explanation is that some of the dirtiest industries cannot migrate as they are dependent on being close to their product market. This explanation applies, for example, to electricity generation, but does not apply to the majority of industries in the manufacturing sector.

Second, the costs of environmental compliance might be too low to play a significant role in investment decisions. According to OECD (1996, table 1), while pollution abatement expenditures as a percentage of GDP have been slightly increasing between 1985 and 1992, they are estimated at well below 2% in most countries in 1992. Potential cost savings of that order might very well be too small to induce foreign investors to move to pollution havens for two reasons.[7] First, because migration itself is costly because of dismantling, transportation and new establishment costs. Second, factors other than differences in environmental compliance costs are likely to be much more important in determining international investment location decisions (Wheeler and Mody 1992). Potential pollution havens might have disadvantages with respect to these other factors, for example, they might have a badly trained workforce, a poor infrastructure and political as well as economic instability. Doing business carries many more risks in developing as opposed to developed countries. Even if industries move to developing countries, factors such as proximity to natural resources and financial as well as tax incentives might play a more important role than potential savings on environmental compliance costs.

However, there are two caveats to keep in mind: First, how high pollution abatement expenditures are depends on what the point of reference is and varies substantially from sector to

sector. If we look at pollution abatement capital expenditures as a percentage of total new capital expenditures in 1993 in the U.S., these can be as low as 1.52% for rubber and miscellaneous plastics products, but as high as 42.39% for petroleum and coal products and 13.31% for chemicals and allied products (U.S. Bureau of Census 1996, table 1). Second, should environmental compliance costs in high standards countries rise further in the future, then things could dramatically change from what they were before. Markusen, Morey and Olewiler (1995) show that in industries with increasing returns to scale, costs can rise up to a certain threshold without causing any major re-location. However, because increasing returns industries tend to make discrete rather than marginal location decisions, if costs rise beyond this threshold industries might shut down and transfer their operations to lower standards countries.

Third, even where environmental compliance costs are significant, international investors might not be deterred, as long as the environmental standards provide clear and reliable rules that apply equally to everybody. What investors dislike most is uncertainty about the future and unreliability of policy makers.

Fourth and connected to the last point, rational forward looking investors might anticipate that environmental standards in currently low standards countries might very well increase over time. It might therefore be cheaper to establish already in the present production facilities that comply with these potential future higher standards.

Fifth, if pollution abatement is characterised by scale economies, then increasing environmental standards need not induce migration. Eskeland and Harrison (1997, p. 28) argue that 'if abatement costs fall with the scale of output, then the home country firm may find it more advantageous to expand locally when facing tougher environmental regulations.'

Sixth, if multinational corporations have similar plants in both high standards and low standards countries, then it might be cheaper to install the same pollution abatement technology as in the high standards countries everywhere. This is because the costs of dismantling the

already established technology might outweigh the benefits from saving on abatement costs. This will be especially true if the abatement technology is an integral part of the production process. If instead the abatement technology is of the add-on end of pipe type, it will be quite cheap to get rid of it in order to save on abatement costs.

Seventh, foreign investors might fear for their international reputation if they are perceived as environmental villains exploiting low standards in poor countries. In migrating to these poor countries, it might therefore be worth while to voluntarily exceed local environmental standards. It is sometimes argued by economists that foreign investors not only tend to apply better environmental management than required by the host country, but also tend to demand compliance with higher environmental standards from their domestic suppliers. This positive effect on the environmental standards of the recipient country has been coined the 'pollution halo' effect and it stands in stark contrast to the pollution haven hypothesis: Instead of exploiting low environmental standards, foreign investment leads to a rise in environmental standards. Anecdotal evidence supports this hypothesis (Leonard 1988, Gentry 1999; Zarsky 1999). More systematic testing provides more ambiguous evidence. Whereas Eskeland and Harrison (1997) find that foreign owned plants in Côte d'Ivoire, Mexico and Venezuela are more energy efficient than domestically owned plants and therefore as a first approximation also less pollution intensive, Dasgupta, Hettige and Wheeler (1997) and Hettige et al. (1996) find no evidence that foreign ownership has a significant influence on environmental performance in Mexico and South and Southeast Asia, respectively.

Eighth, investors might fear negative effects on their capital market value if information about poor environmental performance becomes available. Hamilton (1995) demonstrates negative stock market reactions for U.S. companies, which had to report toxics release inventory data to the U.S. Environmental Protection Agency (EPA). Dasgupta, Laplante and Mamingi (1997) show that negative capital market reactions are not confined to the developed

world in examining how firm-specific environmental information affected capital markets in Mexico, Chile, Argentina and the Philippines. More generally, Gentry (1999, p. 16) refers to a recent review of 70 studies exploring the link between environmental and financial performance, which found that 'companies with the environmental practices were rewarded with higher stock market returns than their peers, by up to two percentage points. Moreover, positive environmental performance never translated into negative returns' (emphasis in original).

Evaluating policy options

In considering theoretical issues concerning pollution havens, we have seen that several factors can give rise to their existence in developing countries. Of these, bias against environmental preferences is probably the most important one. In examining the empirical evidence, we have also seen, however, that there is only weak statistical evidence for their existence. Pollution havens therefore represent a rather elusive phenomenon. While environmentalists insist on the existence and relevance of the phenomenon, their claim is not convincingly backed by available empirical evidence, at least not so far.

Should analysis stop here? No. I would submit that it is important to take the analysis one step further and evaluate policy options for tackling (potential) pollution haven problems. Why? First of all, in spite of the relatively weak systematic evidence, pollution havens might very well exist. For example, limits to data availability might prevent us from detecting them. Besides, we have seen that some empirical studies do lend some support in favour of their existence. Second, and more importantly, no matter what systematic empirical evidence tells us, as a matter of fact both policy makers and environmentalists are unimpressed and remain concerned about the phenomenon. If anything, the ongoing trend towards increased foreign investment in developing countries will strengthen those concerns. There exists and is bound

to remain a wide gap between those who strongly believe in the pollution haven phenomenon and others, amongst them many economists, who believe that pollution havens are either irrelevant or simply non-existent.

Given the limitations of our current empirical knowledge and the strength of concern, it seems to me that an evaluation of policy options for dealing with (potential) pollution haven problems is indispensable. This section therefore goes one step further than most other papers and engages in an analysis of available policy options. I briefly list a fairly comprehensive range of policy options available and provide some examples for existing policies. I then introduce five criteria, with which those policy options become evaluated. Three out of these criteria – namely that options should be development friendly, closed to abuse and not unnecessarily restrictive – are heavily influenced by the fact that the evidence with respect to pollution havens is rather shaky. This is because they are likely to ensure that policy options are chosen that are favourable to developing countries, which should not become punished for something that might either not exist or be of little relevance. The inclusion of these criteria should also help in reconciling those who strongly disagree with the relevance of the pollution haven phenomenon with such an analysis. As we will see below, the policy option that fares best on our five criteria – namely assistance for capacity building and local empowerment – is also the one to which those who regard pollution havens as irrelevant could subscribe to as it would help overcoming many more general problems in environmental policy making in the developing world.

POLICY OPTIONS AND CRITERIA OF EVALUATION

I will examine the following policy options:

- *Harmonisation of environmental standards and minimum standards.* An existing example for this on a regional level are Articles 130r to 130t of the Treaty establishing the European

Community (Maastricht Treaty). The reader should note, however, that Art. 130t of the Maastricht Treaty allows EU member countries to exceed harmonised standards if such ‘more stringent protective measures’ are compatible with the treaty. Porter (1999) calls for a minimum standards agreement exclusively negotiated and concluded among developing countries.

- *Enforcement agreements.* An existing example are Art. 3 and 5 of the North American Agreement on Environmental Cooperation, the environmental side agreement to NAFTA, which requires each party to ‘effectively enforce its environmental laws and regulations through appropriate governmental action’ (Art. 5:1).
- *Trade and capital restrictions.* These encompass direct restrictions such as import bans as well as tariffs and quotas and "voluntary" export restraints. The most popular form of these restrictions are so-called eco-tariffs, which are imposed on foreign countries with lower than domestic environmental standards. Daly (1993, p. 26), for example, demands that ‘whoever sells in a nation’s market should play by that nation’s rules or pay a tariff sufficient to remove the competitive advantages of lower standards’. Arden-Clarke (1993, p. 81) from the World Wide Fund for Nature (WWF) wants ‘environmental leaders’ to be able to ‘take trade measures that “level the playing field“ between environmentally sound and unsound goods.’ The International Pollution Deterrence Act, unsuccessfully introduced into the 102d U.S. Congress as motion S.984 by Senator Boren (D-OK) called for countervailing duties equivalent to the cost that it would take a foreign firm to comply with U.S. domestic environmental standards (OTA 1992, p. 92).
- *Ecolabels.* Existing examples include the German Blue Angel, the Nordic Swan, the EU eco-label award scheme, the Canadian environmental choice programme and the Forest Stewardship Council's and Marine Stewardship Council’s ecolabelling scheme.

- *Non-binding declarations.* Existing examples include the OECD Guidelines on Multinational Enterprises, the OECD Statement of Intent on Officially Supported Export Credits and the Environment and the International Chamber of Commerce's Business Charter for Sustainable Development.
- *Assistance for political-institutional capacity building and local empowerment.* This encompasses first assistance aimed at building the capacity to formulate effective environmental policies with a long-term vision and strategy and to implement, monitor and successfully manage these policies.[8] Existing examples are the World Bank's assistance for National Environmental Action Plans, the Global Environment Facility, and the United Nations Environment Programme (UNEP) and United Nations Conference on Trade and Development (UNCTAD) joint capacity building task force for assisting developing countries in integrating their trade, environment and development policies (UNEP and UNCTAD 2000). Second, and equally important, is a strengthening of democratic citizenship and political accountability of policy makers as well as improving access of local communities to information about environmental pollution, to political decision making and to the legal system. There is ample evidence from developing countries that active and empowered citizens can play a significant role in improving local environmental conditions (Pargal and Mani 2000; World Bank 2000).

I propose to apply the following set of criteria in assessing these options. They are not meant to be hierarchical and of course they could conflict with each other for any given policy option:

- *Effective:* A policy option should achieve its objective of improving environmental standards in low standard countries.

- *Politically realistic:* A policy option should be politically realistic. Otherwise it has no chance of being realised.
- *Development friendly:* A policy option should be friendly towards the economic development prospects of developing countries. Given the huge inequalities between rich and poor countries, policies that come about at the expense of developing countries should be discouraged.
- *Closed to abuse:* A policy option should not be open to abuse by protectionist factions in high standard countries under flimsy environmental pretexts.
- *Not unnecessarily restrictive:* A policy option should not restrict international flows of capital and trade beyond the necessary extent. It is this author's conviction that a liberal capital and trade regime is desirable, ceteris paribus.

EFFECTIVE

Harmonisation of international environmental standards would be clearly ineffective. While it would raise inefficiently low environmental standards in developing countries it would also either raise them to inefficiently high standards or would lower standards in developed countries below their efficiency level. The simple lesson is that one single standard does not fit them all – except perhaps for life threatening toxics, which should be banned everywhere (witness the almost concluded negotiations on an international agreement banning persistent organic pollutants worldwide).

Minimum standards fare somewhat better than harmonisation of standards as they do not imply a lowering of standards in developed countries below their efficiency level. There remains the danger, however, that minimum standards are set inefficiently high for developing countries. This danger is significantly less if minimum standards are set in an agreement exlu-

sively concluded among developing countries. To be effective, harmonised as well as minimum standards would need to include certain monitoring and enforcement requirements.

Enforcement agreements address an important point in the pollution haven debate. A country which wants to attract foreign capital in setting inefficiently low environmental standards, might not even set low nominal standards. Instead, it might set standards, which appear to be high on paper, with the understanding that they will not be enforced. Without ascribing the intention to attract foreign capital, it is often correctly pointed out that the former communist countries in Eastern Europe often had environmental standards, which looked strict on paper, but were as if non-existent in reality (Ahlander 1994). In as far as an enforcement agreement could itself be enforced it could lead to an avoidance of this phenomenon. Of course, it could have the rather perverse consequence that pollution haven countries then lower their standards or at least fail to raise them in the future.

Trade and capital restrictions are very crude measures to aim for raising environmental standards in developing countries, but they could be effective. If pollution havens are threatened with import bans or ‘ecological tariffs’ against the products produced in their location or find it hard to attract foreign investment due to capital restrictions, then those countries might very well abstain from setting inefficiently low standards or failing to enforce their standards.

Ecolabels are unlikely to be effective in raising general environmental standards in developing countries. Past evidence of effectiveness of ecolabels is usually confined to specific environmental aspects, such as whether tuna is caught with dolphin-safe nets and whether forests and marine fish stocks are managed and harvested sustainably. Otherwise it is most doubtful whether the various existent ecolabels had any significant effect so far (OECD 1997).

Non-binding declarations would be ineffective if not backed up by some backdrop threat. It is common experience that these declarations often create no more than hot air. If pollution havens exist they do so because of economic interests that do not simply vanish because of

some non-binding declaration. Mabey and McNally (1999, p. 43) suggest that 'all OECD governments admit' that the OECD guidelines on multinational enterprises 'have not greatly influenced companies'. However, voluntary company codes can become somewhat more effective if they are linked to mandatory information disclosure rules in their country of origin, as proposed by Mabey and McNally (1999).

Whether assistance for political-institutional capacity building and local empowerment would be effective depends on the factors that gave rise to pollution havens in the first instance. If they are due to bias against environmental preferences, then this option could be very effective in helping to overcome the political-institutional failures that prevent countries from setting efficient standards.

POLITICALLY REALISTIC

Harmonisation of international environmental standards is utterly unrealistic. There is no political support for such an option especially amongst the developing countries, but also amongst the developed countries (ICTSD 1999; Neumayer 2000). The same is true to a large extent for the introduction of minimum standards as well, which would fail due to resistance of developing countries. Even for an agreement exclusively concluded among developing countries there currently seems to be no significant political momentum.

An enforcement agreement could be politically easier to realise, even though doubts remain whether developing countries would consent. The reason is that they would feel stigmatised as countries in need of an international agreement to enforce their own laws and regulations. In this respect, it is pertinent to note that the enforcement clause in NAFTA had to be pushed through by the US and Canada against the explicit opposition of the Mexican government. It was one of the prices it had to pay to gain access to the North American markets.

Trade restrictions and eco-tariffs might find political support in developed countries amongst some protectionist factions and environmentalists, but proves to be unrealistic as the WTO currently puts very stringent conditions on the imposition of trade restrictions aimed at so-called process and production measures (PPMs) outside a country's jurisdiction (see Neumayer 2001b). A reform of WTO to allow these measures is utterly unrealistic as according to Art. X:3 of the Agreement Establishing the WTO it would require a two third majority and therefore the consent of developing countries, which are strictly opposed to it (ICTSD 1999).[9] Capital restrictions are not necessarily dependent on developing countries' consent, as it is a rather one sided game: developed countries invest in developing countries, but not to any significant extent vice versa. However, it is doubtful whether there is significant support for capital restrictions in developed countries. The (failed) attempt to conclude a Multilateral Agreement on Investment (MAI) (see Neumayer 1999) and the European Union's and Japan's insistence to include liberalisation of the international investment regime in any potential new round of WTO trade negotiations shows that developed countries want to de-restrict rather than restrict capital flows. Also, capital restrictions could possibly clash with the 500 or so bilateral investment agreements between developed and developing countries (UNCTAD 1998).

To establish ecolabels relating to the environmental impacts of PPMs could find political support in developed countries, but they are generally resisted by the developing world (WTO 1996). Whether such ecolabels would clash with existing WTO rules has not been tested so far. But if ecolabels became more than fringe measures in dealing with international differences in environmental standards, developing countries would likely start a dispute under WTO rules. If the WTO panel and appellate body decided against the general use of ecolabels with respect to PPMs, as seems most likely, then their use would be dependent on WTO re-

form, which would face the same resistance of developing countries as the one referred to above concerning trade restrictions.

Non-binding declarations are politically realistic as they seem to be an easy option. At the time of writing, the OECD had just finished revising its Guidelines on Multinational Enterprises, with a somewhat strengthened environmental chapter in calling for environmental management systems and a precautionary approach towards environmental uncertainty (OECD 2000).

Assistance for political-institutional capacity building and local empowerment is not particularly realistic as it would cost the developed countries money and their willingness to provide aid has substantially decreased over the last years (OECD 1999, statistical annex, table 1). If capacity building was to effectively address inefficiently low environmental standard setting in developing countries, then developed countries would need to be much more willing to provide help either bilaterally or through inter-governmental institutions like the World Bank or WTO. In as far as developing country governments might resist local empowerment, developed countries would also need to use their political influence on those governments. This influence might be rather limited, however, and developed countries might be unwilling to use whatever influence they have.

DEVELOPMENT FRIENDLY

Whether harmonisation of international environmental standards or international minimum standards would be development friendly depends on whether any assistance for developing countries to raise their standards was provided. The same holds true for an enforcement agreement. This is because often the failure of enforcement is likely to be caused not by a lack of will, but by the absence of an adequate political, legal and administrative infrastructure for enforcement. If assistance for developing countries was not given, as seems most likely, then

these three option would be rather unfriendly to developing countries as they would have to shoulder all the burden alone. Trade and capital restrictions are clearly development unfriendly. They are inspired by a desire to punish developing countries for what is perceived as undesirable behaviour on their part. The same applies, but to less extent, to ecolabels as well, at least if their imposition is not accompanied by assistance for developing countries to comply with the ecolabelling requirements. Non-binding declarations are relatively neutral with respect to development friendliness. Assistance for political-institutional capacity building almost by definition excels all other options on this criterion. To overcome the failures that gave rise to pollution havens would potentially help developing countries to rid themselves of other inefficiencies as well and would thus strengthen their overall developmental capacity.

CLOSED TO ABUSE

International harmonisation of standards or international minimum standards are not very open to abuse as they would need the consent of lower standards countries. The same holds true for an international enforcement agreement. Capital and trade restrictions clearly are open to abuse by protectionist factions in high standards countries under green disguise, given the fundamental uncertainty about whether or not existing environmental standards are efficient or not. The severe information difficulties - are standards ineffiicently low and if so by how much? are standards not enforced and if so to what extent? - give countries imposing trade or capital restrictions substantial scope for abuse. Developing countries rightly fear an unholy alliance between ‘baptists’ (environmentalists) and ‘bootleggers’ (protectionists) in the trade arena (DeSombre 1995). Ecolabels can represent barriers to market access for developing countries and are therefore open to abuse. Many developing countries fear that they do not have adequate information and capacity to comply with ecolabels, which mainly affect goods such as textiles, leather, footwear, forestry and food products that developing countries have a

comparative advantage in producing and exporting (WTO 1996). Non-binding declarations can in principle be abused as well, but in general seem to be fairly neutral on this criterion. Assistance for political-institutional capacity building and local empowerment clearly is the policy option least open to abuse.

NOT UNNECESSARILY RESTRICTIVE

At first sight, harmonisation of international environmental standards or international minimum standards do not appear to restrict international trade and capital flows. However, if developing countries' standards were to rise above their efficient levels, these countries would face implicit restrictions towards their exports of goods and services and their import of capital. An international enforcement agreement would not be restrictive, as it would merely aspire to ensure that a country's laws and regulations have more bite than paper tigers. Trade and capital restrictions are by definition restrictive and unnecessarily so in as much as their objective can be achieved with other less restrictive measures, for example with assistance for political-institutional capacity building and local empowerment or, if effective, with ecolabels and non-binding declarations, none of which are very restrictive.

SUMMARY OF EVALUATION

Table 3 provides a summary of the findings on policy options. While no option fares unambiguously better than all other ones, assistance for political-institutional capacity building and local empowerment seems to be the best option. It has only two drawbacks: It might not be very effective if pollution havens are not due to political-institutional failure but due to other factors and it is doubtful whether developed countries are ready to provide such assistance.

< INSERT TABLE 3 HERE >

Conclusion

Developing countries might set low environmental standards for a number of reasons. Some, but by far not all, of these reasons will mean that their standards are not only low, but inefficiently so. In a world of imperfect information it is hard to detect when this is the case. Given that discrimination between efficiently low environmental standards and real pollution havens is rather difficult to achieve, the more important it becomes that policy options dealing with (potential) pollution havens are development friendly, closed to abuse and not unnecessarily restrictive – exactly the criteria on which assistance for political-institutional capacity building and local empowerment fares best.

In concluding this article, it is important to point out that even if the systematic evidence for pollution havens is relatively weak, this does not contradict the more anecdotal evidence purporting to demonstrate that at times environmental conditions in developing countries can be abhorrent and that specific industries might migrate out of high standards countries into nearby low standard areas, as for example with the so-called Maquiladora region along the U.S.-Mexican border (for a good documentation and referencing see Mabey and McNally 1999 and OTA 1992, appendix E). Especially in the mining and other resource extraction sector multinational corporations also at times do take advantage of low environmental standards in the host country – an impact on the environment, which is outside the pollution haven hypothesis proper and has not been covered by this article.

Furthermore, an important limitation of the analysis above is that I have looked at whether and under what conditions developing countries have incentives to set inefficiently low environmental standards. I have not analysed whether international capital mobility might deter all countries from setting higher environmental standards for fear of losing capital to one's com-

petitors. This hypothesised phenomenon is sometimes called 'regulatory chill' (see Neumayer 2001c). More generally, while examining whether developing countries provide pollution havens relative to developed countries, I have not examined whether all countries set low environmental standards compared to their respective efficiency levels. Such an analysis would be outside the reach of the present paper (see Neumayer 2001b).

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Table 1: Developing countries' environmental standards relative to developed countries' standards under <u>efficiency</u> conditions

Factor	*Evidence*
Emissions	laxer
Pollution-absorptive capacity	indeterminate
Intensity of environmental preferences	indeterminate

Table 2: Developing countries' environmental standards relative to developed countries' standards under non-efficiency conditions

Factor	*Evidence*
Pollution spillovers	laxer
Bias against environmental preferences	laxer
Dependency on revenue from capital taxation	laxer
Jurisdictional market power	stricter

Table 3: Evaluation of policy options

POLICY OPTIONS	CRITERIA OF EVALUATION				
	effective	**politically realistic**	**development friendly**	**closed to abuse**	**not unneccessarily re-strictive**
Harmonisation of standards	--	--	-	+	-
Minimum standards	+/-	--	-	+	+/-
Enforcement agree-ment	+	-	-	+	++
Trade and capital sanctions	++	--	--	--	--
Ecolabels	-	+/-	-	-	+
Non-binding declarations	-	++	+/-	+/-	+
Assistance for capacity building and local empowerment	+	-	++	++	++

Legend: ++ very good, + good, +/- neutral, – poor, -- very poor

ENDNOTES

[1] Eskeland and Harrison (1997) provide statistical evidence from U.S. data that energy use is highly correlated with different measures of emissions.

[2] Spearman's r is –.506, significant at the .05 level and –.689, significant at the .01 level, respectively.

[3] See also Neumayer (2001a).

[4] The World Bank does not control for differentials in export-import ratios in overall goods and services, which, strictly speaking, it should do. As this ratio is 0.9 for low income and 1.03 for high income countries in 1995 (data taken from World Bank 1997), the World Bank's (1998a, p. 113) conclusions remain valid, however: Even after taking into account differences in the overall export-import ratio, low income countries import many more goods from dirty industries than they export.

[5] This conclusion is based on an analysis of the sources provided in the technical notes to OECD (1998a).

[6] These cover the chemical industry, petroleum refining without extraction, production of synthetics and rubber wares, iron- and metal mining as well as founding, paper and pulp production as well as processing.

[7] As these figures include public environmental expenditures as well, which do not directly represent costs to the private sector, they tend to overestimate the true cost of compliance with environmental standards for the private sector.

[8] Research by Laplante and Rilstone (1995) shows that both inspections and the threat of inspections are important determinants in enhancing compliance of firms with environmental regulations.

[9] The amendment would only be binding on the parties accepting it.