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Kuhn, Michael; Tivig, Thusnelda

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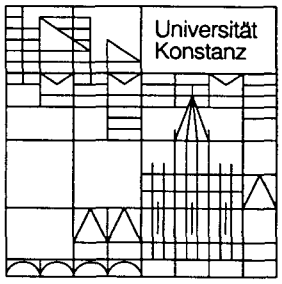

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wissenschaften und Statistik

Michael Kuhn
Thusnelda Tivig

Ecological Dumping and Environmental Capital Flight– the Economics behind the Propaganda

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Michael Kuhn

Thusnelda Tivig

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Ecological Dumping and Environmental Capital Flight - - the Economics behind the Propaganda

Michael Kuhn and Thusnelda Tivig*

University of Rostock, Dept. of Economics, 18051 Rostock

Abstract

In this paper we analyze the connection between ecological dumping and environmental capital flight which in the literature is presented in three versions: capital flees in order to ecologically dump, firms flee and thus ecologically dump, and capital flees because governments ecologically dump. We find that 'ecological dumping' describes an ill posed problem: it has little to do with dumping and need not have any impact on the environment. Looking at the existing literature we find that although 'capital flight' is a misnomer, too, there are real problems dealt with under this heading. Nevertheless, because of their emotive and misleading undertone, we should better give up both notions.

Key words: Dumping; Capital Flight; Delocation; Environment
JEL classification: F13, F21, H73, Q28

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1 Introduction

The persistence of high unemployment in many industrialized countries has led to a rethinking of the principles of international trade and factor movements. Against the background of globalization, block-building and increased awareness of strategic scope in international trade policy, environmentalists, unionists, politicians and academics brought the issue of comparative advantage back on top of their agenda. The formerly existing fundamental consensus on the welfare-improving nature of free trade based on comparative cost advantage has broken down and no comparable paradigm is in sight. Whereas in North America the debate was touched off by the NAFTA, in Europe the concern emerged with the return of formerly socialist countries into normal economic life. As economic recovery progresses in the East, people in the West become increasingly concerned for their jobs. The western public seldom perceives the opening of large new product markets in the East or the chance of cheaper consumption, for example of housing due to foreign, cheaper work. They are rather worried about the loss of competitiveness due to less environmental or other regulation, to the existence of trained, highly motivated, relatively cheap and mobile labor in these countries. They furthermore perceive the threat of industry (re)location decisions of western firms into the East on these grounds.

The idea of comparative advantage states that nations can profit through production and trade from differences in their relative marginal costs arising from differences in technologies, resource endowments (factor supplies) or consumers' preferences.[1] Incorporated into a static general equilibrium framework, this insight yields the recommendation of welfare-improving free trade. As a logical consequence, 'natural' cost advantages, as the very determinants of trade, were exempted until recently from the discussion of unfair trade practices like dumping. This understanding of comparative advantage has changed. New manner of dumping were (re)discovered - currency dumping, ecological dumping, social dumping - and there is reason to believe that others will follow; next candidates could be educational dumping and tax dumping. The admittance of supply side comparative advantage as a legitimate determinant of trade thus increasingly becomes more an exception than a rule.

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[1] See Dixit/Norman (1980) or Krugman/Obstfeld (1994), among others, for clear presentations of the theory of comparative advantage.

The same, albeit for different reasons, is true about demand side comparative advantage. In a dynamic context, factor endowments and technology are to a large extent endogenous variables, such that preferences for new products or present against future consumption become major private sector's determinants of international trade in growing economies (Grossman/Helpman, 1991). Preference-based comparative advantage in international trade is nevertheless more or less explicitly denied the same status as technology- or resource-based comparative advantage. This is one of the fallacies feeding the discussion of environmental dumping. Countries with lower environmental standards are often blamed for what evidently is a comparative advantage based on preferences for consumption over an 'intact' nature or for present over future consumption. Out of a still vague idea of world-wide sustainability, the so far local concept of environment is extended to a global scale and scarcity of resources is redefined by denying its subjective element. This is justified when transboundery pollution occurs, but the discussion of ecological dumping, the harmonization of standards, etc. is by far not limited to such cases.

The main source of dissent over the welfare-improving character of production and trade conforming to comparative cost advantage is, however, the employment aspect. Factor movements and low prices would not be understood as threats if full employment prevailed in the world economy. There would, of course, still be terms-of-trade effects but these are not perceived as comparably severe by the public. Hence, full-employment or 'voluntary unemployment' equilibrium theories based on comparative advantage are less suited for an analysis of the public's concern over ecological dumping and environmental capital flight (ECF). The same is true for other theories which also ignore the employment aspect, as many of the new growth models do.[2] In fact, the concept of dumping is inspired by the theory of comparative advantage but it operates on a different scale, namely that of single branches or firms where it clearly represents a matter of competitiveness. It is not a macroeconomic but a microeconomic problem. This is why dumping was traditionally analyzed in

[2] A notable exception from the full-employment assumption in traditional growth theory is the Post-Keynesian Harrod-Domar model. Interestingly, the celebrated new AK-models of endogenous growth produce the same knife-edge result as the Harrod-Domar model, if the assumption of a growing population is maintained. This is probably why AK-models are rather interpreted as based on learning-by-doing under the assumption of a fully employed labor force of constant size, as in Barro/Sala-i-Martin (1995).

partial equilibrium models.[3] Currently, the issue of dumping is, nevertheless, raised on a national level in the environmental context and has previously so been with respect to currency dumping.[4] The issue of competitiveness itself is discussed as an economy-wide concern as if nations could be competitive as a whole. This is, we believe, a second popular fallacy which strongly influences the ecological dumping discussion.

The purpose of this paper is to disentangle the trade and the environmental concern and to thus contribute to the clarification of the connection between ecological dumping and environmental capital flight. The motivation for this attempt is our conviction that at least ecological dumping is an ill posed problem. As currently presented, the problem of ecological dumping seems directly linked to that of ECF. Domestic firms flee from relatively high environmental standards at home to countries where standards are lower or ineffectually enforced; there they engage alongside foreign producers in ecological dumping, that is, in setting ceteris paribus lower prices for their products than producers in countries with higher standards or prices lower than the 'true' (social) cost of production. That is, ***firms flee in order to ecologically dump***. This harms the domestic country through the implied loss of competitiveness and jobs and maybe also through the deterioration of the environment, if transboundary pollution occurs.

With the imposition of antidumping or countervailing duties the domestic government is supposed to reach all three types of offenders and to cure both damages. The offenders are 1. the foreign government which sets unduly low standards or does not effectually control for the enforcement of albeit sufficiently high standards; 2. the foreign producers who take advantage of their presumably intentionally protective acting government instead of voluntary restraining to less pollutant production; and 3. the domestic producers who seek to escape the high standards at home by fleeing to pollution havens from where they then export dumped products to the domestic country. The duties correct for the unfair behavior of all producers located in the foreign country, the incentive for ECF disappears and the environment improves because less production takes place in the foreign country or because the

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[3] Cf. Art. VI of GATT (1994) an antidumping or countervailing duty on dumped imports can be levied if a material injury to the domestic *industry* in case (and not to the national economy as a whole) is demonstrated.

[4] See Tivig (1996) for an analysis of the presumed currency dumping phenomenon.

collected duties are rebated with the provision that the foreign government raises the standards. The only matter which seemingly remains to be settled is the optimal design of the dumping legislation. Should ecological dumping be handled within GATT? If yes, do the existing rules suffice or how should the GATT be otherwise 'greened'? If not, what unilateral measures should be taken under what circumstances?

There are several points in the above sketched reasoning which are not clear. It starts with the level on which we should argue: national economy, sectors or single firms?, it continues with the presumed unfair behavior: in production, trade or both? and it ends with the proposed remedies: two instruments: standards and duties, for two targets: clean environment and fair trade? Some of the arguments we present on ecological dumping, albeit independently developed, can be found in other work, too, especially in Esty (1994). In setting our title we draw inspiration from Motta/Thisse (1994), "Does environmental dumping lead to delocation?".

The structure of the rest of the paper is as follows. Section 2 deals with the muddled concept of ecological dumping, section 3 looks for real problems behind the ideological façade of the environmental capital flight discussion and section 4 concludes.

2 Ecological Dumping

The problem with ecological dumping starts with its definition. At first sight, the term 'dumping' seems to have finally returned to its roots in the ecological connection: The dumping of cheap goods on foreign markets is preceded by real dumping, of pollutants on the environment, due to cheaper methods of production. However, on closer inspection, the existing literature does not offer any conclusive definition of the term; in fact, this should suffice to doubt the appropriateness of the concept itself.[5] Nevertheless we will analyze the logic of the presumed phenomenon below.

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[5] Interestingly, it is rather economists who evade the exact definition whereas trade lawyers try to pin the concept down.

Motta/Thisse (1994) have 'environmental dumping' in their title but they do not give a definition. In the abstract it is said that "Environmental dumping is often viewed as an instrument used by some countries in the attempt to attract foreign investment" (p. 563) and in the conclusions the authors state that under some of the circumstances they look at "... delocation in countries practicing 'environmental dumping' is not profitable to firms" (p. 575).[6] Nevertheless, "... the more integrated markets are the higher coordination is required among countries, since differing environmental policies make location decision of firms more likely" (p. 565). The authors thus suggest that ***firms flee because governments ecologically dump***. However, dumping is no legal issue (so far) between countries with highly integrated markets like those in the EU.

Rauscher (1994) defines ecological dumping in three and Rauscher (1996) in two different ways. In the latter, ecological dumping is found to prevail either when lower standards are set in the non-traded goods sectors as compared to the traded goods sector (Def. 2.4) or it is defined as "... an environmental legislation which does not fully internalize the domestic social cost of pollution and, thereby, gives domestic exporters an advantage in international markets" (Def. 2.3). Hence, it is again the government which dumps, and maybe not just by setting a standard but through a body of laws.

For Stevens (1995) ecodumping is "... the sale of products in foreign markets which have artificially low environmental costs" (p.174). Rowbotham (1993) enumerates the export of goods containing toxic or dangerous substances, the export of goods made with environmentally unfriendly processes, the movement of production processes to countries with low or no environmental standards or enforcement and concludes that "... all these forms of environmental dumping fail to internalize the environmental externalities of production and thereby ... are inconsistent with the notion of sustainable development" (p. 155). Interestingly, for this author, capital flight is a form of and not caused by (the prospect of) envi-

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[6] This intuition is confirmed in a different set-up by Kuhn (1996) who shows that with product differentiation into green and non-green products, firms might well prefer to stay where environmental standards are high or even delocate towards countries with higher standards. Furthermore, with green preferences and inter-firm pollution regions are less likely to engage in a 'race to the bottom' type of deregulation. These results are derived from a model which is solved analytically and not, as usually the case in this literature, numerically.

ronmental dumping, or, put differently: ***firms flee and thus ecologically dump***. It thus refers to actions taken by firms and not by governments.

Obviously, several fears and facts are muddled into the otherwise catchy notion of environmental dumping. There are, however, some common elements to the above definitions. We would therefore not conclude with Esty (1994) that "Unfortunately, most 'ecodumping' proposals do not exhibit ... any...underlying logic" (p.163). The common elements are: (a) the recognition that environmental standards or their enforcement differ as between countries; (b) the premise that lower standards yielding lower compliance costs are set intentionally to give domestic producers a comparative cost advantage; as a by-product, then (or as part of the original intention) foreign investment might be attracted; and (c) the conviction, that lower costs and hence prices due to lower environmental standards do not constitute a natural but rather, because of (b), an unfair comparative cost advantage and, to a certain extent: (d) the recognition that the internalization of environmental externalities is important.

In what follows we argue that the notion of ecological dumping which for many authors has little to do with the environment, has really nothing in common with dumping. As far as the environment is concerned, it suffices to look at the ecodumping definitions. The selection of definitions given above is a relatively 'positive' one in the sense that two out of the four authors cited consider point (d), too. Unfortunately, this is not representative for the profession and even less so for the public opinion. Usually, only elements (a)-(c) are taken into account; if duties were levied on imports on these grounds, it would obviously be purely by chance that environmental quality improves. It is furthermore worth noting that in neither definition the possibility of lower standards due to stronger preferences of voters for consumption over a cleaner environment is explicitly considered. As far as the fact of dumping is concerned, it should be remembered that dumping is a clear-cut notion in international trade theory and law.[7] The following six questions reveal the inappropriate use of the dumping notion in the environmental context:

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[7] See art. VI of GATT 1994 and the Antidumping Code.

1) *Who dumps?*

Dumping and the anti-dumping instruments are defined and designed, respectively, for the actions of single firms or branches, at the most, that is, for microeconomic events. The environmental dumping discussion is instead explicitly connected with actions taken or omitted by states such that it is not clear whether firms or governments dump and if the view taken is a micro- or a macroeconomic one.

2) *What is dumped?*

Legally, dumping refers to a state of facts on the level of international trade that is, it deals with internationally traded products. Environmental dumping, however defined, takes place on the production level, instead: it refers either to the technology or to the factors used.[8] In the extreme we could even have 'environmental dumping' without trade and the question then is: who punishes that?

3) *How do we know that dumping occurs?*

There are basically two types of dumping as defined by US or international law: price-based dumping and cost-based dumping. In case of the former, dumping margins are calculated by comparing the prices of like products of one and the same producer in different markets. The ecodumping discussion entails, to the contrary, a price comparison as between like products of different producers (say, one operating under more stringent environmental standards than the other) in one market. When the cost-based definition is used (because there are no sales of the like product in the domestic market of the exporting country), dumping refers to the cost which the individual exporter or producer whose exports in a given period are under investigation incur. The reproach in the ecodumping discussion is instead that these costs are private not social costs and that the latter, which are higher due to environmental damage, should be considered. If this logic is followed, no investigation of individual transactions would be needed, because all producers would presumably dump as long as environmental standards are lower then whatever appropriate measure.

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[8] This would be in line with the (even more harmful) notion of 'social dumping'.

4) *Where is the injury?*

So far, following legal provisions, antidumping measures can only be imposed if a material injury to the domestic industry is demonstrated. The issue of environmental dumping unfortunately leaves the question open, whether injury to the environment is sufficient or necessary at all, for countervailing duties to be levied.

5) *Who is punished?*

As currently designed, antidumping measures might be taken against single firms or industries. Could it be the same if the dumping substrate was ecological, or should all firms from all industries which benefit from lower environmental standards be punished? After all, one could argue that the private sector is well responsible for its government's actions.

6) *Which problem should be solved?*

Presumably, that of unfair trade, as traditionally maintained and maybe that of pollution, too. However, the true issue is competitiveness and employment. Ideally, firms would cut all rivals' possibilities to set lower prices but this conflicts with the welfare improving nature of lower prices due to comparative cost advantage. With free trade, their second-best option therefore is to exempt as many cases as possible from the category 'true comparative cost advantage'. For example, preference-based comparative advantage is denied the same status as technology- or resource-based comparative advantage. Furthermore, is resource-based comparative advantage a fair issue, after all? Seemingly not, as the discussion of social dumping and ecological dumping shows.[9] It looks as though we needed a stopping rule for declaring differences, which before were perceived as comparative cost advantage, unfair trade measures.

We conclude that the mere existence of some cost-based price differences in a situation of internationally differing environmental standards does not suffice for calling this dumping or subsidization. Moreover, having such a well defined notion of dumping in the literature and

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[9] We are sure that the vivid discussion on international (capital-) tax competition currently observed will lead up to the notion of tax dumping.

law, we propose to rather find different names for *other* relevant phenomena in international trade. Finally, as already mentioned, the concept of environmental dumping usually addresses elements (a)-(c), only, that is, it refers more to competitiveness than to ecological problems. This can be seen most clearly in the location literature we refer to in section 3.

As a consequence, antidumping instruments based on the currently used notion of environmental dumping could be either applied to a presumed problem or applied without solving the problem. For, as long as production externalities are internalized in the exporting country, no economic environmental problem exists - independent of the level of standards; whereas as long as the Pigouvian efficiency condition - marginal pollution damage equals marginal abatement cost - is not fulfilled,[10] an economic environmental problem exists, which is not settled by imposing antidumping duties. ***In fact, any 'environmental dumping' - concept based on the requirement of equal standards will fail in reconciling environmental and trade concerns.***

To see this, imagine two countries A and B differing in their standards ($S_A < S_B$, where S stands for 'standard') in a manner which allows for complete internalization of environmental costs in both. If standards were harmonized, no environmental dumping would occur. However, a harmonization on the level of S_A would lead to an environmental problem in country B, whereas a harmonization on the level of S_B would not entail any environmental problem in either country but would instead represent a trade barrier for country A on which it would impose inefficiently high costs due to overinternalization.

When speaking about standards we perhaps need to make a distinction between environmental issues and economic environmental problems. For the former, the contribution of natural scientists and engineers is required. Based on their results, social scientists have then to decide which subset of ecological issues represent economic environmental problems. The answer to this question will always depend on preferences and hence on factors like culture and history, too. Let us, for simplicity, look at situations where externalities are ex-

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[10] Alternatively, Pigouvian efficiency can be expressed by marginal productivity of emissions = marginal disutility of emissions, or marginal productivity of the environment (as a factor of production) = marginal willingness to pay for the environment (as a consumption good).

clusively national.[11] At least for democratic regimes it should then be possible to assume that environmental standards are set to a level which precludes economic environmental problems for residents; but even if they are not, this is an internal problem of the respective country and any systematic, institutionalized interference - for example, through antidumping policy - should be out of question. This is not to say that there will be no consequences for trade of different standards - but they will have to come in through preferences and through innovation in the importing countries, that is, through the market, not through regulation imposed on the exporting country.

3 Environmental capital flight

The idea that there are circumstances under which capital flees instead of simply moving in search of highest marginal return, thereby enhancing overall efficiency, is one of those which makes economics look complicated to non-economists. Again, the fact that a clear definition of the presumed phenomenon is missing should us induce to be cautious as towards its relevance. In the macroeconomic theory of open economies, "... the reserve loss accompanying a devaluation scare is often labeled capital flight because the associated debit in the balance of payments accounts is a private capital outflow. Residents flee the domestic currency by selling it to the central bank for foreign exchange; they then invest the proceeds abroad" (Krugman/Obstfeld, 1994, p. 496). Hence, it is a macroeconomic phenomenon prompted by domestic economic instability in the system of fixed exchange rates when fears of devaluation arise.

The terms 'environmental capital flight' (ECF) and 'industrial flight' are mainly used in the empirical literature (Low/Yeats 1992, Jaffe et al. 1995, Kaderják/Csermely 1995, Bouman 1996). ECF is defined as the delocation of capital in reaction to a tightening of a country's environmental policy. As in the case of ecological dumping, the public perceives this as a threat to the extent that a loss of jobs is feared. There might well arise environmental problems in a country with lower environmental standards when industrial restructuring leads to a geographic shift of whole polluting industries or when ECF takes place in the form of re-

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[11] The case of transboundary environmental externalities is, of course, a much more complicated one. However, there already exist numerous multilateral environmental agreements and none of them contains provisions resembling antidumping duties. See Esty (1994, pp. 275).

location of some pollution-intensive production capacities abroad - but only if the capital-receiving country does not optimally internalize the externalities being generated within its borders.[12] However, this is not what usually worries the public in the capital losing country; it is the loss of jobs that is feared. This fear might produce an environmental concern of a different nature than the above, namely that in times of unemployment ECF might induce governments to engage in a race to the bottom type of institutional competition because each country has an incentive to undercut its competitors' policy measures in order to attract capital which creates job opportunities. The equilibrium outcome might then be the weakest possible environmental policy in each country and, consequently, a deterioration of environmental quality in all countries. Thus, the crucial distinction for the understanding of ECF is, once again, between a general-equilibrium approach to factor movements and their appraisal in the context of unemployment.

However, very often the type of argument given above only conceals vested interests: Trade unions try to save jobs in polluting industries at a given wage level by pressuring the government either to give up their environmental policy goals or to introduce barriers to capital mobility. Knowing that the introduction of barriers to capital flows is not very likely, polluting firms could use the ECF argument as a threat to prevent governments from introducing any stringent environmental policy. A look behind the ideological façade of the ECF argument suggests three questions to be asked: (1) Will capital movements be induced by international differences in the stringency of environmental policies? (2) Will such capital movements be suboptimal with regard to national or international welfare, respectively? (3) Under what conditions will the Pigouvian efficiency condition - marginal pollution damage equals marginal abatement cost - be satisfied in the capital importing country?

There is a vast and growing theoretical literature on location showing an enormous degree of product differentiation. A common element is that countries compete for capital which is perfectly mobile between countries and inelastically supplied on a world-wide level. The crucial issue therefore is the international capital allocation which governments may try to influence. Employment effects are not discussed, usually the specification of models does

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[12] It might even be that the relief of delocating the possible environmental externalities (or the hope to so do) is so pronounced, that the loss-of-job argument pales, as for example currently observed in Germany in the discussion on nuclear energy.

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not allow for them; an exception is Rauscher (1996) who has an employment effect of capital movements in the welfare function.

Main differences between the models concern the assumptions about competition in the product market and between governments (perfect or strategic) and those about the number of instruments (one or two). The first instrument is always an environmental one: standards or emission taxes, and it is assumed that environmental quality will improve with its increased use. The other instrument, if considered, is usually a (positive or negative) tax on capital. In an oligopolistic setting, both instruments can be used strategically in order to attract capital from abroad, thereby increasing domestic production possibilities. However, if the environmental instrument is used strategically, standards or taxes will not, of course, be set efficiently conforming to the Pigouvian criterion designed for a first-best setting. Hence, the answer to question (3) is straightforward in a strategic (second-best) context.

Oates/Schwab (1988) analyze the case of many small countries under conditions of perfect competition and regional externalities, only. In a first-best world the capital tax rate is set to zero and standards are set efficiently in a Pigouvian sense. However, as soon as there is a positive tax on capital, environmental standards will be set too low. The distortion through the tax is optimally corrected through environmental policy. Van Long/Siebert (1991) additionally show that in situations of strategic interaction between governments which have a single instrument at their disposal, the distortion of environmental policies can work in both ways, such that it does not necessarily mean a race to the bottom. They derive this result in a model in which each of two large countries chooses an emission tax rate, thereby affecting the international rate of return to capital. An efficient equilibrium in this context of again only regional externalities is characterized by both countries setting their tax rates equal to marginal damage. However, capital owners have an incentive to manipulate environmental taxation in order to capture rents. In the capital-abundant country the incentive is to drive up the international rent of capital, in the capital-poor country it is to depress it. If the marginal productivity of capital positively depends on emissions as a production factor, the interest in the capital-exporting country will be to reduce environmental taxes, whereas in the capital-importing country it will be setting the tax rate above marginal damage, that is, countries will deviate from the Pigouvian level into opposite directions, depending on their relative factor endowments. Rauscher (1996) adds to this the insight that with *two* instru-

ments the emission tax rate can nevertheless be set to domestic marginal damage, because the tax on capital serves the purpose of rent shifting.

Similar results are obtained under conditions of strategic interaction among producers, too. The ECF-problem is spelled out in slightly different terms, of course, as we change to the microeconomic level. The international mobility of capital now comes about through relocation- or delocation decisions of firms. Markusen et al. (1993) set out a two-firm-two country general equilibrium framework, wherein firms' location choices are determined endogenously. National environmental taxation influences the profit levels firms can realize for each of their potential location choices, and hence is one determinant of the locational structure. In a numeric example the authors find that a continuous variation of the tax rate of the home country given the foreign tax rate will lead to frequent jumps in domestic welfare as the locational structure changes. Because of the trade-off between the profits of the domestic firm and environmental quality, the welfare maximizing tax rate will, in general, deviate from the Pigouvian rate. Allowing for sunk costs, Motta/Thisse (1994) show in an otherwise similar partial equilibrium setting, that the decision to delocate production in reaction to a stricter environmental policy is affected by the size of markets and the cost-structure (the level of fixed set-up costs in a new market and the level of (constant) variable costs as compared to transport costs). The authors show in a numerical simulation that having to obey higher environmental standards as the rival (which implies having higher marginal costs) is always detrimental, which does not come as a surprise, because in Cournot-competition equilibrium market shares always depend in this way on differences in marginal costs. The interesting result is rather that a reduction of barriers to trade in form of transport costs reinforces the probability of delocation in the form of opening up a plant in the foreign country - which represents a sort of 'complementarity result' of trade and factor movements on the level of single industries. Measures of trade liberalization should therefore go along with a higher coordination of environmental policy. Otherwise, when both: domestic standards and trade barriers are high or increase, the domestic firm might have to exit the industry on grounds of lost competitiveness. The public's concern is, however, rather that unilaterally high standards represent by themselves a trade barrier than the combination of other trade barriers and factor mobility.

In a further step Ulph (1994), Markusen et al. (1995) and Rauscher (1996) endogenize governments' policy decisions. In a calibrated partial equilibrium model Ulph (1994) shows inter alii, that countries do not necessarily have an incentive to weaken their environmental policy by offering tax rebates. An attraction of foreign firms may lead to a higher degree of competitiveness in the home market, resulting in a transfer of profits and tax revenues away from the home country. Moreover, the delocation of a domestic producer repatriating his profits can be welfare improving, if this leads to an increase in world market share. In Markusen et al. (1995) two countries set their pollution tax rates in a non-cooperative way, thereby trying to influence a monopolists' location decision in their favor. Up to a certain degree of disutility of pollution undercutting of pollution taxes occurs such that the dramatic race to the bottom which environmentalists fear might well occur. Fortunately, we may expect to see an 'automatic stabilizer' at work in such a race: when pollution creates a high enough disutility in consumption or in production itself, taxes will probably rise. This is in line with Rauscher (1996) who shows how results depend on a second instrument (say, a subsidy) being available for influencing the location choice of firms. If countries could influence the monopolist's location choice by means of a subsidy, the emission tax rate would be set to domestic marginal damage.

Let us now turn to question (1). The literature unanimously suggests that the international capital allocation will react to shifts in environmental policy. In the extreme this might amount to firms having to shut down completely in reaction to a strict environmental policy, as mentioned above; that is, capital would be destroyed (Motta/Thisse 1994). An interesting question in connection with (1) is the direction of capital movement. Will capital always flee in reaction to a tight environmental policy, or could it be that it flows in, instead, when more attention is paid (albeit at a cost) to the environment. Intuitively, we would expect the latter to happen whenever a cleaner environment is productivity enhancing, product-quality improving or the like. Rauscher (1996) finds that under certain circumstances, when pollution has a strong negative impact on the productivity of capital, a more stringent environmental policy will lead to an inflow of capital rather than an outflow. Kuhn (1996) finds combina-

tions of cost-structures and preferences for green as opposed to non-green products which generate a similar result.[13]

The most complex question is, of course, that of welfare (2). Common to all models is the fundamental trade-off, in a country setting high standards, between the utility drawn from higher consumption (through an increase in production) and that drawn from a cleaner environment. Beyond this feature, the existing models differ substantially in the assumptions about governments' attitude (benevolent or self interested, strategic - with all behavioral options hereby offered - or not, exogenous or endogenous policy decisions) and other details of welfare maximization. Clearly, capital movements induced by differences in environmental policies are not always suboptimal under competitive conditions. As long as national environmental policies satisfy Pigouvian efficiency, any movement of capital means a welfare enhancing adjustment to the true comparative costs and is hence optimal in a national as well as an international sense (Van Long/Siebert 1991, Rauscher 1996). In this case, the negative twist of the term ECF is unjustified and strongly hints at the use of this argument for purely lobbying reasons. However, as seen before, the literature identifies a range of cases, in which national environmental policies do not satisfy Pigouvian efficiency: missing instruments (Rauscher, 1996), transboundary pollution (Van Long/Siebert 1991, Rauscher 1996), the correction of distortions generated by other tax instruments (for example, sub-optimal capital taxation) through an 'optimally' distorted environmental policy (Oates/Schwab 1988), or a suboptimal distribution of the explicit or implicit factor income of the 'environment' (Wellisch 1995).[14]

Given these results, capital movements induced by environmental policies can indeed be inefficient for a lot of reasons. In this case the fear about ECF being a negative side-effect of (optimal) environmental policies is well founded. For its ideological undertone we

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[13] See Fn. 5. In fact, we expect a turn in the direction of research in the near future towards showing under what circumstances capital *flows in* when standards are high instead of engaging in a flight. The reason is that this is a much more constructive approach and that it fits well with the endogenous-growth view of innovation and preferences as the engines of growth cf. Helpman/Grossman (1991) or Neumann (1990).

[14] Wellisch (1995) models the location decision of firms depending on the positive level of profits they can achieve in any of a great number of locations in a generally non-strategic environment. One of his results is that efficiency requires that the revenues generated by regional environmental policy are distributed in a lump-sum fashion amongst the residents of that same region.

nevertheless do not consider ECF an appropriate term for capital movements induced by environmental policies. We would rather define an "environmentally optimal capital flow" as a welfare enhancing adjustment to Pigouvian levels of environmental policies, in contrast to an "environmentally sub-optimal capital flow" as a welfare lowering adjustment to distorted environmental policies.

Finally, a look at the empirical literature might be interesting. There have been a number of approaches to assess the validity of the 'ECF' - hypothesis or, looking at the problem from the opposite side, of the 'pollution haven' - hypothesis which suggests an inflow of capital in reaction to relatively lax environmental regulation. The two hypotheses may be tested on different levels of aggregation.

On the highest level of aggregation Low/Yeats (1992) have examined the changes in the international trade structure between 1965 and 1988 with regard to pollution intensive products. Both, trade flows and revealed comparative advantage, clearly indicate a growing share of pollution intensive goods in developing countries' total exports. At the same time the share of 'dirty' products declined for industrialized countries. Hence, the ECF hypothesis cannot be dismissed a priori. However, it remains completely unclear, whether this change in trading patterns was induced by migration of dirty industries, implying a capital flow from industrialized to developing countries or by purely domestic structural change, without any international relocation of capital. Moreover, even if a delocation of capital had taken place, we would not know whether it was caused by differences in environmental regulation or by other factors, such as labor or other non-environmental input costs.

Similar problems underlie the results of Lucas et al. (1992), who find that the toxic intensity (toxic emissions per unit GDP) has grown at an increasing rate in LDCs in the 70s and 80s, when environmental regulation in OECD countries was substantially reinforced. Again, this may support the ECF hypothesis, but, nonetheless, strictness of environmental regulation cannot be disentangled from any of the other plausible explanations given above. A general shortcoming of the highly aggregate approaches is that a separation of national intersectoral and international capital movements is not tangible.

In consequence, it seems more natural to look at direct foreign investment (DFI) patterns. In their survey Jaffe et al. (1995) conclude that 'empirical evidence' for an increase of DFI undertaken by polluting industries is weak, at best. On the one hand, from 1973 to 1985, there has been an overproportional increase in overall DFI for the US chemical and mineral industry. On the other hand, only for the mineral industry the proportion of DFI in developing countries increased, for the chemical industry it actually fell. In any case, the driving forces behind the development of DFI remain unexplained.

In more recent approaches Kaderják/Csermely (1995) and Bouman (1996) have tried to estimate the influence of environmental regulation on DFI using econometric analysis. Kaderják/Csermely look at the DFI inflow into Hungary in dependence of, inter alia, environmental regulation, quality of labor, the Herfindahl index of the respective industry, and the relative size of the sector. They use the volume of NOX emission per unit gross revenue and the volume of hazardous waste per unit gross revenue as proxies for the strictness of environmental regulation. Implicit in this is the assumption that environmental regulation is less strict, and hence, that respective per unit emissions are higher, than in the countries undertaking DFI. Their main finding is, that DFI inflows are significantly explained by NOX emissions, but only insignificantly so by hazardous waste. Their interpretation is, that lower regulatory levels may serve as an incentive to delocate production, which involves significant levels of low risk pollution, such as NOX air pollution. However, liability rules and a possibly even greater risk of production in Hungary turns off DFI in sectors involving high risk pollutants, such as hazardous waste. Thus, we have some support for the 'pollution haven' hypothesis, at least for low risk pollutants.

However, the level of a specific emissions per unit gross revenue (EPGR) may for two reasons be an inappropriate proxy for regulatory strictness: Only a limited number of pollutants are taken into consideration, and it is not clear, a priori, if some omitted pollutant may contribute a great deal more to the explanation of international capital flows. Moreover, the causal relation between EPGR, DFI and regulatory levels remains an open question. Whereas Kaderják/Cseremely assume EPGR to explain DFI, causality may well run in the opposite direction: Increased DFI in pollution intensive sectors (for whatever reason) may lead to higher aggregate emission levels on the one hand and to an erosion of monopolistic revenue on the other. Hence, an increase of DFI would explain a rise of EPGR.

Finally, EPGR may be explained by factors which have not been considered at all, such as technological change in general.

In consequence, Bouman (1996) uses pollution abatement costs (PAC) and pollution abatement capital expenditures (PACE) as more direct measures for regulatory strictness. By estimating the impact of either of the two variables on (multilateral) German DFI, he tests the ECF - hypothesis. Other explanatory variables are German and foreign wage rates, and the exchange rate. The results of a regression using pooled sectoral data are insignificant but a model allowing for differences in sectoral coefficients, generates significant results. However, for a lot of sectors the coefficients for abatement cost show negative signs, implying that higher levels of PAC or PACE lead to a lower degree of DFI. This is hard to explain, since, surprisingly, some pollution intensive sectors - e.g. chemicals and mineral oil refining - exhibit substantial negative coefficients for PAC in some of the regressions, whereas other sectors - e.g. food, beverages, and tobacco - show implausibly high positive coefficients. Thus, the ambivalence of results of this otherwise promising approach, does not allow any meaningful conclusions, so far.15

4 Conclusions

The notion of 'ecological dumping', as currently defined, has nothing to do with dumping and little with the environment. The mere existence of some price differences in a situation of internationally differing environmental standards does not suffice for calling this dumping or subsidization. Moreover, the inflationary use of the emotive term dumping (ecological dumping, currency dumping, social dumping ...) is unwarranted for two reasons. First, because it stirs resentments against instead of sensibilizing the public opinion for the problems of less developed countries or simply for the right of other countries to follow different priorities. Second, it suggests that a competitive weakness might be cured by raising the rivals' (albeit perhaps unduly low) costs through regulation. This diverts attention from own efforts, like the need for firms in highly industrialized countries to permanently innovate.

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[15] At the lowest level of aggregation, a number of US studies analyze the determinants of plant location decisions. See Jaffe et al. (1995) for a survey. Most of them did not find a significant influence of environmental regulation on siting choices and if there was any influence, it was small.

As regards the presumed environmental capital flight phenomenon, we do not find conclusive evidence either in the theoretical or in the empirical literature. The former is much too 'fragmented' as to allow drawing a unified picture. From the empirical evidence we conclude that the exact nature of the relation between regulatory strictness and international capital movements still remains quite obscure with regard to measurement and model specification. However, the fact, that the ECF-hypothesis finds only limited empirical support so far, should not deceive us into believing that this will not change in the future. It seems plausible that part of the industry has not delocated due to environmental regulation until now simply because environmental policy has not become binding yet. But this might change in the future: For example, the introduction of substantial energy taxation by some countries may cause a considerable outflow of capital in energy intensive sectors.

The major problem presumably is to find a theoretically sound and empirically tractable welfare measure incorporating the valuation of the environment *and* of employment. Unless we have found it, no political conclusions can be drawn, even if we knew that capital movements induced by environmental regulation are significant.

Finally, in the ecodumping and environmental capital flight literature two concerns are mingled which we have tried to disentangle: that of competitiveness and trade and the environmental one. Our conclusion is that if the true underlying problem is the environment, capital 'flight' is necessary for development; without development, no switch to less environment-intensive technics will occur. If, to the contrary, the worrying problems are competitiveness and trade and thus, in fact, unemployment, we must recognize that there is not much left from the idea of comparative advantage, if we correct it for cheaper labor, less scarce environment, better education and all other potential sources of 'dumping'. Maybe, production and trade conforming to comparative advantage is a good advise in situations of full employment, only.

References

Barro, Robert J. and Xavier Sala-i-Martin (1995), Economic Growth, New York et al.: McGraw-Hill.

Bouman, Mathijs (1996), Do Pollution Abatement Costs Induce Direct Foreign Investments?, mimeo, University of Amsterdam and Tinbergen Institute.

Dixit, Avinash K. and Victor Norman (1980), Theory of International Trade, Cambridge: Cambridge University Press.

Esty, Daniel C. (1994), Greening the GATT: Trade, Environment, and the Future, Washington D.C.: Institute for International Economics

Grossman, Gene M. and Elhanan Helpman (1991), Innovation and Growth in the Global Economy, Cambridge, Mass., and London: MIT Press.

Jaffe, Adam B., Peterson, Steven R. and Robert N. Stavins (1995), Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?, Journal of Economic Literature 33, 132-163.

Kaderják, Péter and Ágnes Csermely (1995), Cheap Environmental Services of Hungary: How Attractive they are for foreign Investors?, mimeo, Budapest University of Economic Sciences & KOPINT-DATORG, Budapest.

Krugman, Paul R. and Maurice Obstfeld (1994), International Economics: Theory and Policy (3rd ed.) New York: Harper Collins.

Kuhn, Michael, Environmental Policy, Firm Location and Product Differentiation - the Role of 'Green' Preferences and Inter-Firm Pollution, working paper, University of Rostock.

Low, Patrick and Alexander Yeats (1992), Do 'Dirty' Industries Migrate?, in: Low, Patrick (ed.), International Trade and the Environment, World Bank Discussion Papers 159, Washington D.C..

Lucas, Robert E.B., Wheeler, David and Hemamala Hettige (1992); Economic Development, Environmental Regulation and the International Migration of Toxic Pollution: 1960-1988, in: Low, Patrick (ed.), International Trade and the Environment, World Bank Discussion Papers 159, Washington D.C..

Markusen, James R., Morey, E. R. and N. Olewiler (1993), Environmental Policy when Market Structure and Plant Locations Are Endogenous, Journal of Environmental Economics and Management 24, 69-86.

Markusen, James R. Morey, E. R. and N. Olewiler (1995), Competition in regional environmental policies when plant locations are endogenous, Journal of Public Economics 56, 55-77.

Motta, Massimo and Jacques-François Thisse (1994), Does environmental dumping lead to delocation?, European Economic Review 38, 563-576.

Neumann, Manfred (1990), Zukunftsperspektiven im Wandel: Lange Wellen in Wirtschaft und Politik, Tübingen: J.C.B. Mohr.

Oates, Wallace E. and R.M. Schwab (1988), Economic Competition among Jurisdictions: Efficiency Enhancing or Distortion Inducing?, Journal of Public Economics 35, 333-354.

Rauscher, Michael (1994), On Ecological Dumping, Oxford Economic Papers 46, 822-840.

Rauscher, Michael (1996), International Trade, Factor Movements, and the Environment, habilitation thesis (publication forthcoming), Universität Kiel.

Rowbotham, Elizabeth J. (1993), Dumping and subsidies: their potential effectiveness for achieving sustainable development in North America, Journal of world trade 27, 145-173.

Stevens, Candice (1995), Eco-Dumping: More myth than reality, in: Internationale Politik und Gesellschaft 2, 174-180.

Tivig, Thusnelda (1996), Währungsdumping, Jahrbücher für Nationalökonomie und Statistik 215, 201-215.

Ulph, Alistair (1994), Environmental Policy, Plant Location and Government Protection, in: Carraro, Carlo (ed.), Trade, Innovation, Environment, Dordrecht et al., 123-163.

Van Long, Ngo and H. Siebert (1991), Institutional Competition Versus ex-ante Harmonization: The Case of Environmental Policy, Journal of Institutional and Theoretical Economics 147, 296-311.

Wellisch, Dietmar (1995), Locational Choices of Firms and Decentralized Environmental Policy with Various Instruments, Journal of Urban Economics 37, 290-310.