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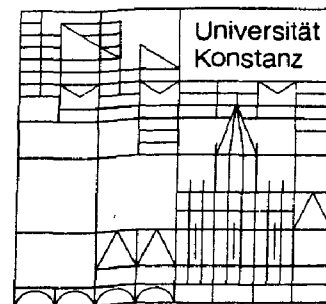
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**The Political Economy of
Environmental Decision Making**

**THE POLITICAL ECONOMY OF
ENVIRONMENTAL DECISION MAKING**

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THE POLITICAL ECONOMY OF ENVIRONMENTAL DECISION MAKING

The purpose of this paper is to investigate environmental policy making from a positive point of view. Unlike traditional normative economic policy analysis, this paper is thus not concerned with advancing policy recommendations for the benefit of the policy makers. Its objective is rather to explain why environmental policy is conducted in the manner actually observed. In particular I will address the following two crucial questions: Firstly, why is the level of environmental protection not higher considering the extent of pollution, and, secondly, why do governments tend to employ inefficient instruments if and when they attempt to deal with environmental problems at all. Before proposing answers to these two questions in sections 6 and 7, I briefly discuss the causes of environmental pollution (section 1), investigate the conditions under which state intervention in the economy is really warranted (section 2) and give a summary of the available environmental policy instruments (section 3). Section 4 then presents the basic structure of the political-economic approach and section 5 reviews the main types of models which are employed in endogenous policy theory to portray the political process. In the concluding section 8 a topical issue is addressed: I attempt to shed some light on the relationship between environmental concerns and international trade.¹

1. Causes of Environmental Pollution

The environment is not polluted out of sheer malice; on the contrary, individual agents engage in pollution-generating activities because they regard their behavior to be rational in the sense of a cost-benefit comparison. A firm, for example, may pollute the air or the water in the course of production. Taking precautions, i.e. investing in pollution abatement measures is costly; the benefit of such measures for the final claimants or the managers of the firm is, on the other hand, in most cases negligible. A consumer, to give another example, may use a spray whose propellant has a negative impact on the ozone layer. The contribution to the destruction of the ozone layer by one single consumer is, however, so small that the cost of forgoing the comfort associated with the offending

product outweighs the benefits of using a more ecologically suitable substitute. The cause of excessive environmental pollution is the sharing of the environment by a great number of people. Under these circumstances one agent's behavior affects other agents whose interests do not enter the individual decision maker's cost-benefit calculus. Economists speak in this context of externalities or, alternatively, of external costs or benefits.

Matrix 1 illustrates the problem which underlies excessive environmental pollution. To simplify the presentation, I assume that there are only two agents, A and B, who can either engage in a pollution-generating activity or refrain from doing so.² If both agents employ the strategy "pollute" they both end up with a payoff of one unit. If agent A pollutes but agent B does not, then A obtains three units, whereas B obtains nothing at all, and vice versa. The polluter thus profits from his ecologically minded neighbor and receives a higher payoff, whereas the agent who forgoes the pollution-generating activity is worse off than before. If neither agent pollutes, each is better off than when both pollute: each receives a payoff of two units. The payoff configuration depicted in Matrix 1 is called a *Prisoners' Dilemma*. The individually rational equilibrium of this game is straight forward. Whatever strategy the other player is using, a player is better off if he pollutes. Both players can thus be expected to pollute. As a consequence they end up in a mutually polluted environment which is for both of them worse than a clean one. Individual rationality here does not induce collective optimality.

Before discussing in the next section how the above Prisoners' Dilemma situation can in principle be avoided, it should be stressed that, in general, collective optimality does not call for a completely unpolluted environment. The efficient, i.e. optimal level of environmental pollution may well be strictly positive. Even though fanatic environmentalists may never agree with this statement, it is easy to see why it is correct. Figure 1 depicts the standard situation in which a pollution-producing activity gives rise to decreasing marginal benefits for the polluting agent and increasing marginal costs for a group of other agents. The activity level q_0 at which the marginal benefit of the activity disappears is *individually* optimal for the polluter. It is obvious however that this activity level is not *collectively* optimal. Starting out from q_0 , a reduction of the activity level q

decreases the polluter's benefit by less than it decreases the other agents' cost since the marginal benefit curve lies below the marginal cost curve. Thus it is collectively efficient to reduce the activity level down to the level q^* where the two curves intersect. The polluter who is made worse off by this reduction in q could always be compensated by the other agents so that in the end everybody would be better off. Notice, that for analogous reasons a further reduction in q is not efficient. The collectively optimal level of the pollution-producing activity is therefore q^* which demonstrates that pollution is indeed compatible with collective efficiency.

2. The Rationale for Government Intervention

Externalities and Prisoners' Dilemma situations represent the classic justifications for the existence of states and for government intervention [cf. Mueller (1989), chapter 2]. There are basically two ways of imposing the optimal solution by official authority in a Prisoners' Dilemma. The first is to simply outlaw the strategies which give rise to excessive external costs; the second is to change the payoffs in such a way that the use of the socially undesirable strategies is no longer individually optimal. Instead of manipulating the strategy set or the payoffs, one could, in principle, also tinker with the set of players. By merging, for example, two firms, an upstream polluter and a downstream victim, the externalities are internalized and the inefficiency disappears. This solution however is feasible for two producers, but in general infeasible for producer/consumer and consumer/consumer externalities.

Before considering government intervention in the economic process, one should always be sure that such measures are really necessary. After all, instead of imposing a certain conduct on the economic agents by means of continuous and perhaps even coercive interventions, one could try to change the rules of the game, i.e. the economic constitution. Cleverly chosen rules may well give rise to a spontaneous and satisfactory coordination of the individual agents' behavior. Indeed, it turns out that the dismal outcome of the pollution game presented in the previous section is due to the implicit assumption that the environment has no clearly defined owner. By assigning unambiguous

property rights to the environment, the prisoners' dilemma resolves itself if certain conditions are satisfied. The argument runs as follows: Consider first a polluter who owns the damaged environment. Referring again to the standard diagram in Figure 1, it can be seen that the pollution-producing agent uses the activity level q_0 unless the agents who suffer from this behavior compensate the polluter for his reducing q . Since a reduction in the activity level down to q^* decreases the victims' costs more than it decreases the polluter's benefit, compensation payment schemes exist which make both parties better off if q is set equal to q^* .³ Consider now the situation in which it is the potential victims from pollution who own the environment. In this case the polluter can only continue his pollution-producing activity if he compensates the victims. Since, up to q^* , the polluter's benefit increases more than the victims' cost, both parties are better off if the dirty fellow is allowed to indulge in his activities at level q^* , given that he indemnifies the victims appropriately.

Interestingly, the outlined bargaining process results in the efficient solution independent of how the property rights to the environment are assigned. The efficient solution, of course, only materializes if the affected agents are really aware of the fact that mutually beneficial transactions exist, if negotiations really take place and lead to an agreement and if, finally, the agreed-upon transaction is really carried out. The unambiguous assignment of property rights thus only guarantees an optimal spontaneous coordination if *transaction costs* i.e. information costs, bargaining costs, and monitoring costs, are negligible. This statement has become known as the *Coase theorem*

It is quite obvious that the Coasian preconditions are hardly ever satisfied. Transaction costs seem to be omnipresent. As a rule they vary positively with the number of agents involved in the transaction. Apart from the obvious difficulties in organizing large groups, there are two additional reasons which have their roots in strategic behavior: The group of the bribers is confronted with a free-riding problem in the sense of Olson; in the bribed group, on the other hand, each member has an incentive to hold out in order to obtain a larger compensation for his consenting to the pollution scheme. The standard

conclusion is therefore that assigning property rights to the environment can only work in those few cases in which the number of polluters and pollutees is small.

The above conclusion is probably too pessimistic. Instead of interpreting property rights as *user rights* they can be interpreted as *rights to sue*. If laws are passed which guarantee certain standards of environmental quality, victims from pollution can bring an action against identifiable polluters. This interpretation of the property rights approach has similar consequences to the original one if the number of polluters is small and the legislator succeeds in setting optimal pollution standards.

Unfortunately, assigning property rights to the environment does not solve all the problems associated with excessive environmental pollution. Passive measures which change the rules governing the economic process do not suffice to bring about a completely satisfactory outcome. This can only be achieved if the government actively intervenes in the economic process. The available instruments are discussed in the following section.⁴

3. Environmental Policy Instruments

The environment can normally be used as a free input in production or consumption. Since the external costs of the use, or rather abuse of the environment are not taken into account, excessive damages occur. From an economic point of view, the appropriate remedy is straight forward. Either the externalities are internalized by changing the property rights to the environment, or, if this is not possible because of the reasons discussed in the previous section, by levying an appropriate tax on the use of the environment. The "appropriate" tax rate is – as was noted by Pigou in 1920 – equal to the marginal external costs at the optimal pollution-producing activity level. In terms of Figure 1, the Pigovian tax rate is equal to t .

At a first glance the Pigovian tax scheme looks very attractive. The practical implementation of a Pigou tax is however not easy, to say the least, since determination of the optimal tax rate presupposes complete information about the shape of the marginal benefit and marginal cost curves. To measure, for example, the external costs caused by

a pollution-generating production process, one first has to measure the emission of pollutants per unit produced. Secondly, the relationship between the emitted pollutant and the damage to the environment needs to be established. The environmental damages then, thirdly, have to be given a monetary value. All three steps involve difficult if not unsolvable technical problems.

These technical problems fortunately do not represent an insurmountable impediment for the implementation of non-regulatory measures to solve the environmental blight. After all, if it is not possible to determine the optimal tax rate precisely, one can still use an approximation. This is the rationale for two instruments which closely resemble the optimal one. The first instrument, the *pollution tax* is simply a Pigovian tax without the underlying optimization calculus: The government sets an arbitrary tax rate for pollution-producing activities and the polluters respond by adjusting their respective activity levels. The major shortcoming of pollution taxes is that the ensuing level of pollution cannot be predicted very accurately because the relevant information (price elasticities of supply and demand) is usually not available. To circumvent this problem, marketable *emission certificates* can be issued. Using this type of instrument, the government (arbitrarily) predetermines the level of pollution. The price of the certificates is then established by market forces. The certificates can either be auctioned off or they can be distributed according to a politically determined so-called grandfathering scheme. Whichever method of allocation is used, the market price of the certificates and, of course, the level of pollution remains the same; the employed allocation method, however, has crucial distributional consequences.

Instead of punishing bad behaviour by making pollution-producing activities more expensive, one could, in principle, also reward good behavior by subsidizing ecological substitutes.⁵ Both approaches rely on incentives, i.e. they change the payoffs of the "pollution game." Pollution taxes, emission certificates and subsidies of ecological substitutes therefore represent non-regulatory policy instruments and are thus compatible with the system of a free market economy.

I now turn to a second class of instruments which restrict the strategy set of the "pollution game," regulations and prohibitions. From the point of view of traditional economic policy analysis the most important feature of these instruments is that they are inefficient. Figure 2 illustrates why this is so. It is assumed that two firms which are located in different geographical areas produce the same commodity using different technologies. Firm 1 produces more ecologically than its competitor; the marginal (external) cost curve of firm 1 (MC_1) is flatter than the MC_2 -curve. If the government restricts the production to q_0 units per firm, the total cost of pollution amounts to $q_0^2(c_1+c_2)/2$. It is possible, however, to produce more without increasing the cost of pollution. The maximal joint output of the two firms, given the above cost of pollution, can easily be calculated. It turns out that $q_1^*=(c_2/c_1)^{1/2}q_0$ and $q_2^*=(c_1/c_2)^{1/2}q_0$. The joint output thus amounts to $q_0(c_1+c_2)/(c_1c_2)^{1/2}$ which exceeds the original output of $2q_0$ since $c_1 < c_2$. Notice that $MC_1(q_1=q_1^*)=MC_2(q_2=q_2^*)=q_0(c_1c_2)^{1/2}$. This illustrates that the optimal production allocation can indeed be induced with the help of a Pigovian tax.⁶

The reason for the inefficiency of regulatory instruments is that the constraints set by the government have to be the same for all polluters; the rule of equal treatment must not be violated. However, since not all polluters are the same, this rule, which is certainly sound in the abstract, brings about rather unfavourable results when applied to pollution standards. Apart from being inefficient in the static sense as described above, regulatory environmental policy instruments also turn out to be dynamically inefficient. In the long run firms usually have the option of changing their production technology. In particular, they may be able to introduce cleaner production technologies. Politically predetermined pollution standards, however, destroy all incentives to seek and implement more ecological technologies.

The objective of the first three sections of this paper has been to demonstrate that environmental policy does not pose any serious problems as far as economic theory is concerned. The reasons for the excessive pollution of the environment are well understood. Moreover, appropriate environmental policy instruments have been developed and are available. In spite of all that, one observes that environmental policies are introduced only

very hesitantly. In addition one observes that the environmental policy instruments which are actually implemented usually exhibit a regulatory character and are thus inefficient. To understand why the political decision process brings about these perverse inefficiencies I now need to introduce some basic aspects of political-economic reasoning.

4. The Paradigm of Endogenous Policy Theory

The basic insight of the political economic approach is that efficiency considerations are less important in determining economic policy than the redistribution of income and wealth. This is not to say that the political process is not able to realize potential efficiency gains. On the contrary: If efficiency gains can be realized without any serious conflicts arising over distribution, the requisite policies will be implemented. In Figure 3, which illustrates the basic situation for a society with only two individuals, such an efficiency improving policy measure corresponds to a move from the status quo S to region I. Quite often, however, available efficiency-improving measures are not taken. In these cases the political agents cannot agree on the specific design of the measure, because of implications with regard to distribution. Some agents who form a blocking coalition refuse to consent to the measure in order to obtain more for themselves. A war of attrition results and the society remains at the inefficient status quo.⁷

Measures which move the society to region II are also efficient since the gainers gain more than the losers lose. In these cases the implementation of the policy measure clearly depends on whether or not the gainers form a winning coalition. Such efficient measures therefore may or may not be implemented straightaway. If they are not implemented, logrolling schemes may be considered which compensate the losers, thereby moving the considered policy measure into region I. The political process, however, is not only liable to prevent the implementation of efficient policy measures. Sometimes inefficient measures are even introduced. This can happen if the proposed policy measure moves the society to a point lying in region III. If the gainers from such a measure happen to form a winning coalition, only constitutional constraints can prevent the political process from implementing the inefficient policy. I thus admit that undisputed policy measures which

improve everybody's welfare are taken up by the political process. The policy measures which are more deserving of the attention of social scientists are, however, those that are contested in the political process because of their distributional consequences.

This view of the political process is of course based on a specific image of "homo politicus." Using the economic model of behavior, it is assumed that all political agents, i.e. voters, politicians, interest groups and public bureaucrats can be modelled as rational, i.e. self-interested utility maximizers. Indeed, one can even go a step further and maintain that the preferences of the political agents derive from rather elementary and tangible desires such as the maximization of income and prestige.

The paradigms of political economy as outlined above give rise to a special kind of analysis which pervades all political economic investigations. As a rule, the investigation entails four steps. In the first step the objectives of the political and economic agents involved are specified. Economic agents are usually assumed to maximize utility (consumers) and profits (firms). The political agents are portrayed, for example, as vote or income maximizers (politicians), as budget or slack maximizers (public bureaucrats), etc. The second step of the analysis is conventional. The effects of the proposed policy measure are analyzed, in particular the income or wealth distribution effects. Thus the gainers and losers are identified. The third step provides a description of the institutional setting governing the interaction between policymakers and the gainers and losers from the proposed policy measure. In the fourth and last step the influence over policy exerted by the political agents is analyzed, in order to arrive at explanations or predictions of economic policy decisions. This final step of the analysis presupposes that the mode of operation of the political process is well understood. The analysis therefore needs to be based on a tractable model of the political process. The different approaches used in endogenous policy theory to model the political process are presented in the following section.⁸

5. Approaches to Modelling the Political Process

Consider a situation in which there accrue no transaction costs in the political process. Independent of the political system, i.e. independent of the assignment of political rights, the outcome in such a situation would always be collectively optimal. In terms of Figure 1 this means that the political process would give rise to activity level q^* of the pollution-producing activity. This follows immediately from the Coase theorem. Since in the real world environmental protection is less than optimal, it is inconsistent to assume negligible transaction costs in the political process. Realistic models of the political process therefore implicitly assume that some kind of transaction costs exists.

The assumption that the costs of recontracting via compensation payments are insignificant is the least acceptable implication of the Coasian preconditions. Most modelling approaches therefore substitute it with the opposite extreme, namely the assumption that recontracting costs are prohibitive. There are two classes of models which are based on the premise that no other transaction costs occur in the political process: The *median voter model* which applies to the institutional setting of political decision making by referenda, and the *spatial models of electoral competition*. The median voter model in particular assumes that voters are perfectly informed about how the proposed policy measures would affect their utility if implemented. The main result is the following: If the voters' preferences are single-peaked (a condition which turns out to be quite often plausible), then the outcome of the political process corresponds to the preferences of a clearly defined voter - the so-called median voter. I shall present an application of the median voter model in section 8.1. The spatial models also assume perfect information: The voters are perfectly informed about the platforms of the candidates competing for public office and politicians are assumed to know the preferences of the voters. If the policy-issue space is one-dimensional and there are only two candidates, this set-up results in a convergence of the two candidates to the median voter position. This is the famous Hotelling-Downs result. In greater-dimensional policy-issue spaces, however, the model is less well behaved. Certainly, the "median in all directions" still represents the preferred position of the two competing candidates. The median,

however, only exists in very special situations. In general, the model does not yield any predictions. This embarrassing state of affairs can be overcome if one assumes more transaction costs in the political process. In particular one needs to assume that the politicians' information with respect to the voters' preferences is no longer perfect. We are then in the world of probabilistic voting, in which the existence of voting equilibria is guaranteed.

There is, however, another problem to be dealt with. The spatial models of political competition portray the politicians as purely passive agents whose only activity consists in tracking down the median voter's political position. That the politicians have such a passive role is clearly not compatible with what one observes in the real world. Additional transaction costs in the form of information costs on the part of the voters need to be introduced if one wants to arrive at a more realistic picture of the politicians' activities. The basic idea is the following. If voters are grossly uninformed they become susceptible to manipulation, i.e. election propaganda. As a consequence, the politicians are no longer bound by the preferences of the voters and the median voter policy loses its attraction. This decoupling provides the politicians with discretionary power which they can use to create and distribute rents. Thus, politically contestable rents enter the picture as well as interest groups competing for these rents. Compared to the spatial models of political competition, the picture has changed dramatically. It is no longer the voter who sits in the driving seat of the political vehicle but the politicians and the rent-seeking interest groups. Models which make use of this basic structure are called interest-group models

The traditional interest group approach comes in two versions, the political support function approach and the rent-seeking approach. In the first version, the elected politician pursues a policy which maximizes his political support. Political support is assumed to depend on the gains and losses of the interests which are directly affected by the pursued policy. Thus the policy maker balances the marginal gains of political support from the gainers against the marginal losses of political support from the losers. Technically speaking, constrained optimization is the underlying concept of this version of the interest-group approach, i.e. the interest groups are not really modelled as economic

agents who strategically interact with the policy maker in the sense of game theory. The political support function is rather an ad hoc concept which has no microeconomic foundation - it is a black box.

The rent-seeking models introduce the interest groups as fully fledged economic agents. By making lobbying outlays, the interest groups are assumed to be able to influence the political decision-making process. Thus the interest groups have to balance the expected marginal gains against the marginal costs of lobbying. The expected gains, of course, depend on the reaction of the policy maker and on the lobbying efforts undertaken by the competing interest groups. The rent-seeking contest between the interest groups thus replaces the maximization framework of the political support function approach by strategically interacting economic agents. This additional complexity, however, comes at the expense of assigning the policy maker a passive role; the rent-seeking approach portrays the policy maker's behavior with the help of an ad hoc contest-success function. The two versions of the interest-group approach thus focus on different aspects - the first on the economic calculus of the policy maker, the second on the economic calculus of the interest groups or rent seekers.

Comparing the two interest-group approaches with the spatial models of political competition, one notices at once that the first class of models focuses on electoral competition and neglects interest-group activities, whereas in the second class the converse is true. A completely satisfactory model of the political process should, however, incorporate both aspects. A modelling approach which has been designed to provide such an integrated portrait of the political process is the so-called *interest-group cum electoral competition* approach. The basic structure of this approach is the following. As compared to the traditional rent-seeking models, lobbying no longer has a direct effect on the pursued policy, but rather influences or even determines the competing candidates' election prospects. Lobbying in the form of campaign contributions in turn depends on the stakes of the rent-seeking interest groups, i.e. on the policy pronouncements of the candidates. The portrayed political relationships thus now have a rather complex structure. There are two contests going on at the same time: The interest groups compete for a

politically contestable rent and the candidates compete for public office. The two contests are connected since the instrument variable of the candidates, i.e. the policy pronouncements, determine the size of the prizes in the rent-seeking contest fought out by the interest groups. I shall return to this type of modelling of the political process in section 8.2.

6. The Political Determination of the Level of Environmental Pollution

In this section I address the first crucial question of environmental policy making: Why does one observe that the actual level of environmental protection is usually suboptimal. I focus the analysis on democratic decision-making processes. However, the political economy approach could just as well be applied to autocratic systems [cf. Tullock (1987)]. Pollution is assumed to result from production and the environmental policy instrument is a pollution tax.

The levying of a specific pollution tax on production has the following consequences: First, the price of the taxed good increases. As a consequence, the produced quantity decreases and the quality of the environment improves. If close substitutes exist for the offending good, the price effect is small and the burden of the tax falls mainly on the producer. If substitution is difficult, the quantity effect is small and the burden falls mainly on the consumers. Depending on the degree of substitutability, there are larger or smaller secondary effects on the market of the respective substitutable goods. In these markets the price also increases because of the additional demand. The producers of the substitutable goods respond by increasing their production. They thus profit from the additional demand for their products. The original consumers of the various substitution goods however now face a higher price; as a consequence their consumer surplus shrinks.

Perfect substitutes are usually hard to find. However, there may well exist foreign firms which produce the very same good; they might even produce it with the same dirty technology. Since these firms do not fall under the domestic jurisdiction, they are not affected by the tax. If such foreign competitors exist, the levying of the tax will result in a switch from domestically produced goods to imported goods. There will be almost no price

effect; domestic production however will be drastically reduced, to the benefit of the foreign producers. This scenario entails an "export of pollution."⁹ Environmentalists who advocate such a policy of pollution exportation represent (ordinary) *greens* as opposed to *supergreens* who care about the environment at large. Another secondary effect works through the pollution tax revenues, since these will eventually have some impact on the economy via the government budget constraint. Firstly, the additional tax revenues can be used to increase government spending (proportionally) or to decrease some other revenues in a relatively neutral way - indirect taxes and the money supply are suitable candidates. Secondly, however, the government can decide to earmark the additional tax revenues for specific purposes, for example to clean up inherited environmental damages or to increase social security benefits. Such a policy of earmarking obviously creates an additional clearly identifiable group of gainers from the proposed environmental policy.

So much for the first step of the analysis, i.e. the identification of the gainers and losers from pollution tax: On the side of the losers are the producers and consumers of the taxed good as well as the consumers of substitutes; on the side of the gainers, we find the producers of substitutes, in particular foreign producers of identical commodities, the consumers of the environment, and the beneficiaries from the additional tax revenues. In a second step I will now proceed to evaluate (1) the strength of the policy's impact on the various interests, (2) the respective group sizes, in order to assess to what extent the interests are amenable to organization, and (3) the visibility of the interest groups' political activities. In the final third step of the analysis I will then attempt to measure the political impact of the various gainers and losers. The respective results are summarized in Table 1.

The producers of the offending good are liable to suffer a substantial loss if the pollution tax is introduced.¹⁰ In the case of a low price elasticity of demand this is not true; at least in the long run, however, demand for most commodities tends to be rather elastic. The number of domestic producers is quite often small. These interests can therefore easily be organized. Even if the number of the domestic producers should be large (farmers are a suitable example), the producer interests might still be amenable to

strict organization because trade or producer associations may already exist. Pollution via production is quite often obscured because the causal chain linking production, emission, environmental damage, and costs is a highly technical one. It may therefore not be well understood by politicians, bureaucrats, or the public at large. Environmentalist interest groups may, however, shed some light on these relationships in some specific cases. The increased visibility will then decrease the polluters' political impact. Nevertheless, the total political impact of the domestic producers tends in general to be very strong indeed.

The consumers of the offending good may also suffer a substantial loss as a consequence of the levying of a pollution tax. However, if close substitutes or even identical foreign products are available, such a policy has only a weak if not a negligible impact on consumers' welfare. Since the number of the consumers is much larger than the number of the domestic producers and since consumer associations are not common, consumers can be expected to be less organized than the producers. The visibility of the consumers' interests, on the other hand, appears to be just as low as that of producers. Certainly, if the offending commodity generated *pollution via consumption*, consumers may be more amenable to organization because of the existence of institutions such as automobile associations. The visibility of well organized consumer interests is, however, rather high, i.e. the intentions of consumer associations cannot easily be obscured. This tends to neutralize the positive effect of a high degree of organization. I therefore conclude that the the consumers of the offending good have only a small to medium impact on the political decision process.

I now turn to the producers and original consumers of ecological substitutes. A tax levied on the offending good has in general a rather weak impact on these two interest groups. After all, there are usually many substitution possibilities; the substitution effect is thus diluted. Since the producers of substitutable goods represent a rather large and heterogenous group, they cannot easily be organized either; the original consumers of these goods probably cannot be organized at all. The producers of ecological substitutes have only one advantage: If they succeed in organizing themselves, chances are that they will be able to make themselves heard; they are certainly not likely to suffer from a

visibility problem, especially if they are supported by environmentalist pressure groups. Nevertheless, the resulting political impact, all things considered, would seem to be weak as far as producers are concerned and vitually non-existent as far as consumers are concerned.

Foreigners who produce goods which are very close substitutes of the good causing offence in the home country, directly and substantially profit from the pollution tax levied abroad. Moreover, they are able to provide themselves with a well organized lobby if only the industry is not too large on the global level. Even if the lobbying activities need to be undertaken clandestinely in order not to fall victim to a chauvinistic backlash, there does not seem to exist any serious visibility problem since the international dimension tends to obfuscate the intentions of the lobby which, perhaps, nobody cares about anyway. Foreign producers of close substitutes thus constitute a political force which has to be reckoned with. In the same way as consumers of ecological substitutes, the original consumers of close foreign substitutes do not seem to have a significant political impact on the domestic political process.

Among the gainers from pollution abatement, the consumers of the environment are the most obvious ones. As compared to the producers and consumers of the offending good, their stake, however, turns out to be relatively small. The reason is that pollution tends to damage the environment at large. Locally concentrated pollution damages do of course exist, but they are not the rule. Since many individuals are affected by the pollution-producing activity in question, they are hard to organize. The only aspect which turns out to the advantage of this group is the fact that environmentalist positions are highly visible when they are taken by a pressure group at all. This visibility can sometimes be transformed into political clout via the ballot box. Unfortunately voters are rather forgetful and environmental pressure groups usually take up only a few especially spectacular cases. It is certainly safe to say that, on average, the consumers of the environment do not exert a strong political influence.

Consider, finally, the beneficiaries of the additional pollution tax revenues. If such revenues accrue to the general fund of government receipts, i.e. if they are spent in a

neutral manner, nobody profits much from the resulting redistribution. The number of beneficiaries is simply too large. If, however, a clever political entrepreneur succeeds in earmarking the revenues to the advantage of a small and perhaps even well organized group, a significant political impact can be generated.

I am now ready to draw some conclusions. Looking at the last column of Table 1, one notices at once that the producers of the offending good represent the only cohesive interest group. Only if foreign competitors of these producers take the part of the environmentalists, or, alternatively, if the emission tax revenues are cleverly earmarked, do there exist similarly cohesive counter-lobbies which may be able to present a bold front to the polluters. It is therefore hardly surprising that the *overall level of environmental protection* turns out not to be adequate in systems of representative democracies where pressure group behavior tends to determine the political outcome. The preceding analysis has of course been rather succinct. I would therefore like to stress that the above statement refers to the level of pollution *on the average*. It therefore does not claim to possess explanatory or even predictive power for any particular environmental policy measure.

7. The Political Choice of the Means of Environmental Protection

The environmental policy instruments which are most frequently implemented are technology standards and quantitative constraints on the emission of pollutants.¹¹ The question arises as to why these regulatory instruments are more popular than the more efficient non-regulatory instruments such as pollution taxes and emission certificates. This is the second crucial question which has to be answered by the political economy of environmental decision making.

There are many reasons for this phenomenon. The first one has to do with *rent-shifting*. Consider, for example, a monopolist who produces an output with a given technology which creates environmental side-effects.¹² The monopolist's marginal profit is assumed to vary negatively and the marginal external costs are assumed to vary positively with production q . Figure 1 can thus be used again to illustrate the following argument

(Notice that the polluter's benefit is in the present context nothing ^{else} other than the monopolist's profit). Suppose now that the government is omniscient and wishes, for whatever reasons, to implement the optimal production. This can either be achieved by charging the Pigovian tax rate t or by simply restricting the output to q^* . For the consumers of the environment, the choice of the instrument is of no consequence. The consumers of the offending product are also indifferent since the price increases in both cases by the same amount.¹³ The monopolist however clearly prefers the output restriction which reduces his profit much less than the pollution tax: The monopolist's profit under the output restriction regime is measured by the area ODBC, under the pollution tax regime it is measured by the area ADB. The profit difference, measured by the area OABC, corresponds to the pollution tax revenues. Implementing an output restriction instead of a pollution tax thus shifts the tax revenues from the general fund of government receipts to the regulated producer. Since the beneficiaries of additional tax revenues do not form a cohesive interest group, the monopolist's respective lobbying activities will in general carry the day and the industry will be regulated [cf. Buchanan and Tullock (1975)].

The above rent-shifting argument also applies to non-monopolistic industry structures. In oligopolistic industries there appears, however, a second effect which has to do with *rent creation*. If a pollution tax is levied on the output of an oligopolistic industry, the industry's output and the firms' profits are reduced, just as in the case of the monopoly. If, however, the same output reduction is imposed by an output constraint, the firms' profits may well rise.¹⁴ The reason for this somewhat surprising result is that regulation turns competing firms into cartels which could not have been enforced otherwise. Regulation can thus create cartel rents. The regulated industry's increased profitability would attract new entrants, who would like to appropriate a part of the rent created by government intervention. If total industry output should not increase after regulation has been imposed, the market needs to be closed to new entrants by official authority. Such entry barriers represent an additional advantage for the regulated firms. In an oligopolistic industry the firms thus have three reasons for a strong preference for output constraints as compared to a pollution tax: rent shifting, rent creation, and rent

protection. It is therefore not surprising that oligopolistic industries sometimes even initiate regulation via the political process [cf. Stigler (1971)].

The above remarks might suggest that environmentalist pressure groups are indifferent as to which policy instrument is used to protect the environment.¹⁵ This is however not the case. Environmentalists, as a rule, also strongly prefer regulatory instruments. The environmentalists' attitude is usually explained by their inability to accept that the environment, just as any other economic good, has a price which is reflected in the pollution tax rate. They see the idea that somebody should have the right to pollute if only he pays the appropriate price for it, as immoral if not downright obscene. Moreover, if one advocates, as the environmentalists usually do, a zero-pollution solution, prohibiting pollution-producing activities is indeed simpler than setting a prohibitive pollution tax rate. Even though these explanations do have a ring of truth, there are probably other, more tangible reasons for the environmentalists' opposition to the policy instruments compatible with a free market economy. First of all, they may simply want to support the strongest interest group - the producers - in order to make sure that some environmental policy measure - namely quotas - is taken at all. Secondly, they may consider the industrialists, who, after all, represent the most effective lobby against environmental policies, to be their arch enemies. Since industrialists are usually thought to endorse a free market economy, the environmentalists may attempt to forge a coalition with the socialists who, of course, are prone to advocate regulatory policy instruments. Thirdly, the leaders of environmentalist pressure groups may be interested in regulation for personal reasons. The (relative) success of regulatory policy measures depends on the assistance of experts. Environmentalist exponents may therefore expect to obtain rents in the form of consultancy contracts or positions in the regulatory body if regulation is introduced. Whatever the reasons for the environmentalists' attitude might be, the environmentalists find themselves in a awkward position which Yandle (1989), tongue in cheek, describes as follows: "Like bootleggers and Baptists, the two groups [environmentalists and industrialists, H.U.] argue separately for rules that restrict output." (p. 758).

So far I have treated politicians as passive brokers of various interests. Politicians, however, have interests of their own, i.e. interests which transcend the narrowly defined re-election constraint. One way of describing the behavior of politicians is to portray them as rent seekers. Politicians seek or extract rents by setting rents [cf. Appelbaum and Katz (1987) or Ursprung (1990)]. In other words, rents can only be extracted from private agents if the politician is in a position to offer the private agents a deal. The politician thus must have some kind of political discretion at his disposal. Pollution taxes do not leave politicians with a great deal of discretion; they apply to all polluters equally and they can easily be enforced. Regulatory constraints, on the other hand, tend to be highly discriminatory across firm types, industries and regions. Additional discretion is created by the administrator's policing task which "is dimensionally different from that under the tax" [Buchanan and Tullock (1975), p. 141]. It involves the monitoring of the individual firms' quotas as well as the enforcement of the barriers to entry. Since such discretion can be transformed into political support or even pecuniary rewards, politicians will always propose regulation instead of non-regulatory measures if the economic constitution does not restrict their choice set accordingly.¹⁶

McChesney (1987) describes an even more sinister scenario of rent extraction on the part of the politicians. He maintains that "political bodies will locally propose regulations that inspire affected groups to organize and lobby against the rules, thereby increasing their support of the relevant politicians. Once the rules are in place,... Congress can play the game in reverse, in effect auctioning off regulatory reform to members of the same groups... Congress would entertain the use of environmental fees and in doing so extract payments for moving away from that mechanism." [Quoted from Yandle (1989), pp. 758-759.]

Regulation, finally, is also favored by public bureaucrats since regulation, unlike pollution taxes, usually comes with a dramatic increase of administrative tasks. An expansion of the public bureaucracy clearly benefits upper-echelon administrators who, in the course of the expansion, are more likely to be promoted, thereby receiving higher salaries [cf. Niskanen (1971)].

Considering the "grand" coalition of interests favoring regulatory measures over free market instruments, it should be clear why environmental politics has in practice so little in common with the normative prescriptions of economic policy analysis. With the exception of a remarkably large number of naive or detached but certainly powerless ivory-tower economists, nobody seems to be very much interested in social efficiency. If individual activities are coordinated by markets, this lamentable neglect of social-welfare considerations does not do any harm. Adam Smith's invisible hand of the market will see to it that the moral deficiencies of acting economic man are neutralized in the aggregate. The coordination mechanism of the (democratic) political process, however, does not possess this healing capacity. The only all too visible claw of coercive government not only fails to neutralize the selfishness of economic agents, but the selfish behavior of political agents rather creates additional inefficiencies on its own.

8. Environmental Pollution and International Trade

Environmental pressure groups have recently started to criticize the activities of international organizations and supra-national institutions that have been set up to facilitate international trade and economic integration. Targets of such critique are, for example, the GATT and the Single Market (1992) project of the EC. These attacks give rise to two interrelated questions. Firstly, how does the opening of national borders to international trade affect a country's environmental policy and, secondly, how do environmental interests influence a country's international trade policy? I address these two questions in the following two sub-sections.

8.1 Endogenous Environmental Protection in a Small Open Economy

To what extent does an economy's openness influence the protection of the domestic environment? This important question has not yet been addressed in the literature. In order to set the stage for such an analysis, I analyze here endogenous environmental protection in a completely open economy which, for the sake of simplicity, is assumed to be small in the usual economic sense of *confronting given world prices*.

The political process is portrayed by the traditional median voter model which implies that environmental policy issues are either subject to referenda or, alternatively, that they completely dominate general elections. I am aware of the fact that the first implication is of little interest and that the second one is unrealistic, even though environmental issues have played and will continue to play an important role in general elections.¹⁷ I elected to use the median voter model only because it admits a neat exposition of the pertinent political-economic relationships. A more realistic model of the political process will be presented in the next sub-section. The economy is portrayed in terms of the Heckscher-Ohlin model. This has the advantage that I do not have to work out all the results in detail - the reader is assumed to be familiar with the model.

The literature on the influence of environmental policy measures on international trade dates back to the early 70s and is quite extensive.¹⁸ The exposition is based on McGuire (1982) who introduces a regulated factor of production (such as the environment) into the familiar Heckscher-Ohlin framework.¹⁹ In particular he assumes that the environment is "used up" in the production process of one of the two industries. The production function has the following appearance: $X=F(L,K,T)$, where X denotes output, L labor, K capital and T the environmental production factor. Environmental protection can be implemented by levying a pollution tax or can be directly mandated. In either case the environment will have a strictly positive (shadow) price t . Profit maximization will see to it that the marginal product of the environment equals its (shadow) price: $F_T(L,K,T)=t$. This first order condition defines an implicit function $T=G(L,K,t)$ which can be substituted back into the production function. This procedure yields a new production function $X=f(L,K,t)$ in which the environmental factor is no longer present. McGuire now shows that $f(L,K,t)=h(t)H(L,K)$ if F is a linear homogenous production function with "equal pairwise elasticities of substitution." Assuming that F has this property, one can therefore conclude that the policy variable t simply re-numbers the isoquants in the K - L space.

In the following it is assumed that the shadow price t is imposed with a constraint on the use of the environment. This assumption allows to abstract from how pollution tax revenues are distributed.²⁰ In order to derive the income distribution effects of

environmental policy, consider first the case in which no constraints on the use of the environment are present, i.e. $t_0=0$. The production possibility frontier and the transformation curve in the Edgeworth production box for a given capital-labor endowment are depicted in Figures 4a and 4b.²¹ Since the economy is assumed to be small, the relative price p_x/p_y of the two goods X and Y is exogenous. In equilibrium p_x/p_y equals the marginal rate of transformation; the economy's production mix is thus given by X_0 and Y_0 . The corresponding capital and labor inputs of the two industries can be taken from the production box diagram. This diagram also reveals the factor price ratio w/r , which corresponds to the slope of the isoquants at the production point Z_0 .

Suppose it is only industry X which pollutes the environment. What happens if the use of the environment is restricted? If the restriction is binding, the shadow price of the environment will assume a positive value: $t_1 > 0$. As a consequence, industry X will become less efficient in terms of the traditional input factors which means that the transformation curve in Figure 4a shrinks in the X-dimension. The new production mix is given by X_1 and Y_1 . Notice that under the new production mix the output ratio Y/X increases. The environmental policy does not affect the shape of the curves in Figure 4b because of the above neutrality assumption. Since $Y_1/X_1 > Y_0/X_0$ the production point Z_1 lies to the left of Z_0 . At Z_1 the isoquants are flatter than at Z_0 which implies that the factor price ratio w/r decreases as a consequence of the environmental policy. The relative reward of labor thus decreases or, equivalently, the relative reward of capital increases. However, one can make an even stronger statement. Via the Rybcinski theorem, one can show that the absolute reward of capital increases, whereas the absolute reward of labor decreases.²² Since labor is used relatively intensively in the now regulated industry X, it should of course not come as a surprise that the workers are the losers from regulation.

From the above analysis, it can be inferred that the wage rate w decreases and the reward of capital r increases as the shadow price t of the environment is increased. Notice that this result applies if the pollution-producing industry uses labor relatively intensively. If the pollution-producing industry uses capital relatively intensively, labor will gain and capital will lose. Figure 5a shows how the wage rate and the capital reward depend on the

environmental policy variable.²³ Moreover it is shown how the utility e which the voters derive from the consumption of the environment changes (in monetary terms) as the quality of the environment improves with increasing t .²⁴

We are now in a position to derive the voters' preferences with respect to environmental policy measures. Assuming that the voters' utility is an additive function of income and environmental quality, one obtains the following utility function of the representative voter i : $U_i = w + a_i r K + e$, where $a_i K$ denotes voter i 's capital endowment and K the capital stock of the entire economy.²⁵ The utility functions of four different voters are depicted in Figure 5b.²⁶ The "proletarian" is a voter who does not own any capital ($a=0$). The "capitalist," on the other hand, is so wealthy that his labor income can be neglected ($w=0$). The "average voter" has the same factor endowment ratio as the whole economy; his capital endowment equals K/n , where n denotes the number of voters. The "median voter," finally, is characterized as follows: The number of voters who are wealthier than the median voter equals the number of voters who are less wealthy.

Which environmental policy measure, i.e. which shadow price t will be implemented if environmental policy is decided upon by popular referendum? Assuming perfectly informed voters, the answer is clear: The most preferred policy t_{med} of the median voter represents the only political-economic equilibrium since this proposal can beat any other proposal. The crucial point is now that this policy is not collectively optimal. Efficiency would call for the most preferred policy t_{av} of the average voter. The reason for this is that the average voter represents an undistorted diminution of the whole economy: What is good for the average voter is good for the country! The mean of factual wealth distributions is however larger than the median; one thus ends up with $t_{med} < t_{av}$ which captures one of the stylized facts of environmental politics -- the political oversupply of pollution.²⁷

8.2 The Influence of Environmental Concerns on Endogenous Tariff Formation

The political influence of environmental groups on the determination of international trade policy can be formally portrayed in a model based on political competition.²⁸ The focus on trade policy means that first best intervention is ruled out, since as we have seen

in section 3, the first best policy responses to environmental concerns do not call for trade-policy intervention. The question is, if environmental groups are aware that via their political influence they can affect trade policies adopted, how will such political influence be used - to support free trade or protectionist policies? In other words, are environmental groups agents of free trade or protectionism? A further question concerns the potential for consensus or conflict of interest among environmental groups in different countries: Do environmental groups in different political jurisdictions have a common objective in the trade policies that they seek? If environmental groups in two trading economies both seek mutual free trade or mutual protectionism, there is consensus; If one group seeks protectionism and the other free trade, there is a conflict of interest. Strategic elements may also in principle affect environmentalists' decisions regarding support for alternative trade policies: a Prisoners' Dilemma arises if the environmental interest groups in two trading economies confront a mutually beneficial policy choice that maximizes the aggregate environmental gains (or minimizes losses), but it is nevertheless individually optimal for country's environmentalists to defect and choose the alternative policy.

The answer to the questions - are environmentalists agents of free trade or protectionism, do national environmental groups have common cause with the trade policies of their comrades abroad, and do they confront strategic considerations as in a Prisoners' Dilemma? - depend upon the source of the adverse environmental impact (which lies in the consumption or production of a good) and on whether the environmentalists' concerns with the adverse environmental impact transcends their national boundaries. One can define as "green" an environmentalist who is concerned with the adverse environmental impact in his home country only, and as "supergreen" an environmentalist who is concerned with an adverse environmental impact both in his home country and in the foreign trading partner. The supergreens' position may be based on technological considerations (for example, concern with the ozone layer).

To establish the interest of environmentalists, whether they be greens or supergreens, in influencing trade policy, one first needs to establish the outcome of

political competition with regard to choice of trade policy when environmentalists are absent from the political arena. When two candidates for political office make tariff pronouncements with a view to maximizing political support – specified as campaign contributions received relative to the political opponent – it has been demonstrated that each candidate takes an extreme position on the spectrum of policies, in that one assumes a policy of free trade and the other a policy of prohibitive protection [cf. Hillman and Ursprung (1988)]. Each candidate thereby announces a policy that is optimal for his constituency, whereby constituencies consist of different producer interests that lose and gain as a protective tariff on a good is increased. The losers from tariff increases are foreign producers seeking market access, and the gainers are domestic import-competing producers. Domestic consumers are of course also losers from protectionist policies, but, on grounds of free-rider problems and small stakes in the outcome of policy determination, consumers can be presumed to be “rationally ignorant” (as they in general are) with respect to the trade policy that is to be adopted for any one industry. The protagonists with sufficient stakes in the outcome are producers who gain or lose as domestic market access to imports is denied. When producers make campaign contributions to influence candidates’ tariff policy pronouncements, the outcome is – as we have observed – a polarization of policy positions.

The introduction of environmental interests as a third group seeking to influence the political determination of trade policy does not alter this outcome of polarized policy positions in the equilibrium of political competition. The issue is, which candidate do the environmentalists support, and hence which policy prospects are improved – free trade or protection – as a consequence of the entry of the environmentalists into the political arena?

When the adverse environmental impact is associated with *domestic consumption* the environmentalists described as greens oppose imports, and hence support protectionist candidates. The greens are thus allies of protectionist domestic interests. The benefits of this political alliance are greater, the less competitive is domestic industry. The greens would ideally wish production to be undertaken by a protected monopolist. For the higher

concentration in the domestic industry, the greater the decline in domestic production, and therefore in autarky the greater the decline in domestic production (the cause of the adverse environmental impact). The protectionist policy not only reduces consumption by eliminating imports, but also allows domestic producers to take advantage of the absence of import competition to exploit their domestic market power, further decreasing consumption – and domestic consumption is minimized when there is a domestic monopoly. Supergreens as well as greens are protectionist agents in these circumstances: supergreens wish to minimize consumption everywhere, which again is achieved by protectionist policies in each country.

However, when the source of the adverse environmental impact is *domestic production* the situation is more complex and environmentalists confront strategic problems in their choice of which trade policy to support. Environmentalists who are greens wish to minimize production at home, and benefit if imports replace domestically produced output in domestic consumption. However, imports produced abroad disadvantage the foreign environmentalists, who are concerned with pollution in their own country. There is therefore a potential conflict between environmental interest groups in two trading economies, and the environmental interest groups potentially confront a Prisoners' Dilemma. The potential for the Prisoners' Dilemma is present, because of the incentive confronting environmentalists in each country to "free ride" off one another, by supporting free trade policies at home that increase pollution abroad via foreign production for export. The best outcome for environmentalists in both countries is mutual protectionism, where no country's environmentalists free ride off the other.

Whether the Prisoners' Dilemma arises to confront the environmentalists in two trading economies depends in a somewhat complex way upon market structures in the industries producing the offending good in the two economies, and on the degree of substitutability in consumption between the domestically produced good and imports in each economy. The prospects for defection (free riding behavior) depend upon the foreign supply response in producing imports for domestic production. Asymmetries in market structures in two trading economies therefore give rise to asymmetries in free riding

incentives. When market structures are more or less the same, there are shared benefits from a mutual end to free-riding, that is, from protectionist policies in each economy. Substitutability in consumption affects the likelihood of a Prisoners' Dilemma in support for trade policies, since with low substitutability, protection evokes a lower domestic output response - in the limiting case of zero substitutability, protection would not affect domestic output (and hence domestic pollution) at all. Lower levels of substitutability therefore expand the range of combinations of market structures in the two trading economies for which there is no Prisoners' Dilemma and environmentalists in both economies support protectionist policies.

When the conditions that give rise to the Prisoners' Dilemma are present, the environmentalists in different countries confront a problem of international co-ordination if they are to be effective and not work at cross-purposes to another. However, such international co-ordination is difficult, because of the gains to any one country's environment from defection. On the other hand, environmentalists who are supergreens do not confront the potential for Prisoners' Dilemma situations when deciding which trade policy to support. The supergreens internalize the potential conflicts, since they seek to minimize the total adverse environmental impact associated with international trade in both countries. Hence, the supergreens have no incentive to free ride off each others' imports, and they support protectionist candidates.

Overall, then, only the potential for the Prisoners' Dilemma stand in the way of the clean solution that environmentalists are agents of, or supportive of protectionist interests - this is so, whether the adverse environmental impact is associated with consumption or production of a good. Under such circumstances, environmental interests can be "captured" by protectionist producer interests. Moreover, it may be more effective for protectionist producer interests to channel their financial political contributions that are the expression of political support via environmentalist interest groups; since it is politically more satisfactory to plead protectionism via the environmental cause than via the self-interest of producer rents in an import-competing industry.

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- ¹ Some of the issues addressed in this paper are also discussed in Kraan and Veld (1991) and in the excellent introduction to environmental economics by Frey, et al. (1991); see in particular chapters 4–6.
- ² The following argument can easily be generalized to portray a situation in which many agents each have a choice of many strategies.
- ³ The victims' costs are decreased by the area of EFBC, the polluter's benefit by EBC. The area EGBC represents, for example, a feasible compensation payment.
- ⁴ For a more detailed discussion of the available environmental policy instruments, see Siebert (1987).
- ⁵ Subsidies, however, are less efficient than taxes. Instead of neutralizing the existing distortion they distort relative prices even more, albeit in an ecological manner.
- ⁶ An analogous argument shows that a direct constraint on the level of pollution is also inefficient.
- ⁷ The war of attrition may even use resources so that the society will be worse off in the end.
- ⁸ For amore detailed discussion of these modelling approaches see Ursprung (1991).
- ⁹ Implicitly we assume here that there are no international pollution spillovers.
- ¹⁰ I will do not discuss here competitive advantages that may arise from the asymmetrical distribution of regulatory effects among different groups of firms. For such an analysis see Salop and Scheffman (1983), Bartel and Thomas (1987), or Pashigian (1984).
- ¹¹ If the production technology is given, there exists a one-to-one relationship between output and pollution. Emission quotas thus imply production quotas and vice versa.
- ¹² An analogous argument can be made for technology-imposed regulations [cf. Maloney and McCormick (1982)].
- ¹³ The price is determined by the quantity produced via the demand curve.
- ¹⁴ Starting out from the unconstrained equilibrium, the firms' profits first increase and then decrease to zero as the quantity constraint becomes stricter.
- ¹⁵ Notice that we distinguish between the consumers of the environment and organized environmentalists.

16 Using this basic idea it has been shown elsewhere [Hillman and Ursprung (1988)] that politicians always prefer voluntary export restraints to tariffs. In a nutshell, the argument runs as follows: "Rival candidates place no value on revenue that might derive from a tariff, since revenue accrues to the general fund of government receipts to which the candidates have no claim. However, while the candidates have no means of appropriating or benefitting from the revenue from a tariff that they might propose, there is a prospective benefit from the benefits transferred to firms by export constraints. The latter rent, whether secured by foreign or domestic firms, can be transformed via the political process (if only partially) into campaign contributions, thereby affecting the candidates' ultimate concern, their probabilities of attaining political office." [Quoted from Hillman (1989), pp. 100–101.]

17 For a critique of the median voter model see Rowley (1984).

18 See Siebert (1987) for a survey of the relevant literature.

19 A similar but slightly more general treatment is to be found in Siebert et al (1980), chapter 9.

20 The technical difficulties which arise in the tax case are by no means insurmountable. For an analogous political-economic analysis of endogenous tariff and capital control determination see Mayer (1984) and Schulze (1991), respectively.

21 The environmental production factor T is assumed to exceed all bounds.

22 For a proof of this statement see McGuire (1982), p.348, note 3.

23 The shadow price t^+ corresponds to strictest possible environmental policy, i.e. a prohibition of pollution.

24 Notice that it is implicitly assumed that everybody has the same preferences with respect to the quality of the environment.

25 This specification of the utility function implies that each voter is endowed with one unit of labor.

26 We assume here that the shape of the curves depicted in Figure 5a are such that the utility functions are single-peaked and that the critical values of t (such as t^{av} and t^{med}) are more or less evenly distributed over the relevant range of t .

²⁷ Notice that the obtained environmental policy is too lax because I assumed that the pollution-producing industry uses labor relatively intensively. If one assumes that the dirty industry produces in a relatively capital intensive way, the endogenously determined environmental policy would of course turn out to be too strict.

²⁸ This whole section is based on Hillman and Ursprung (1991).

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		B	
		pollute	do not pollute
A	pollute	1,1	3,0
	do not pollute	0,3	2,2

MATRIX 1

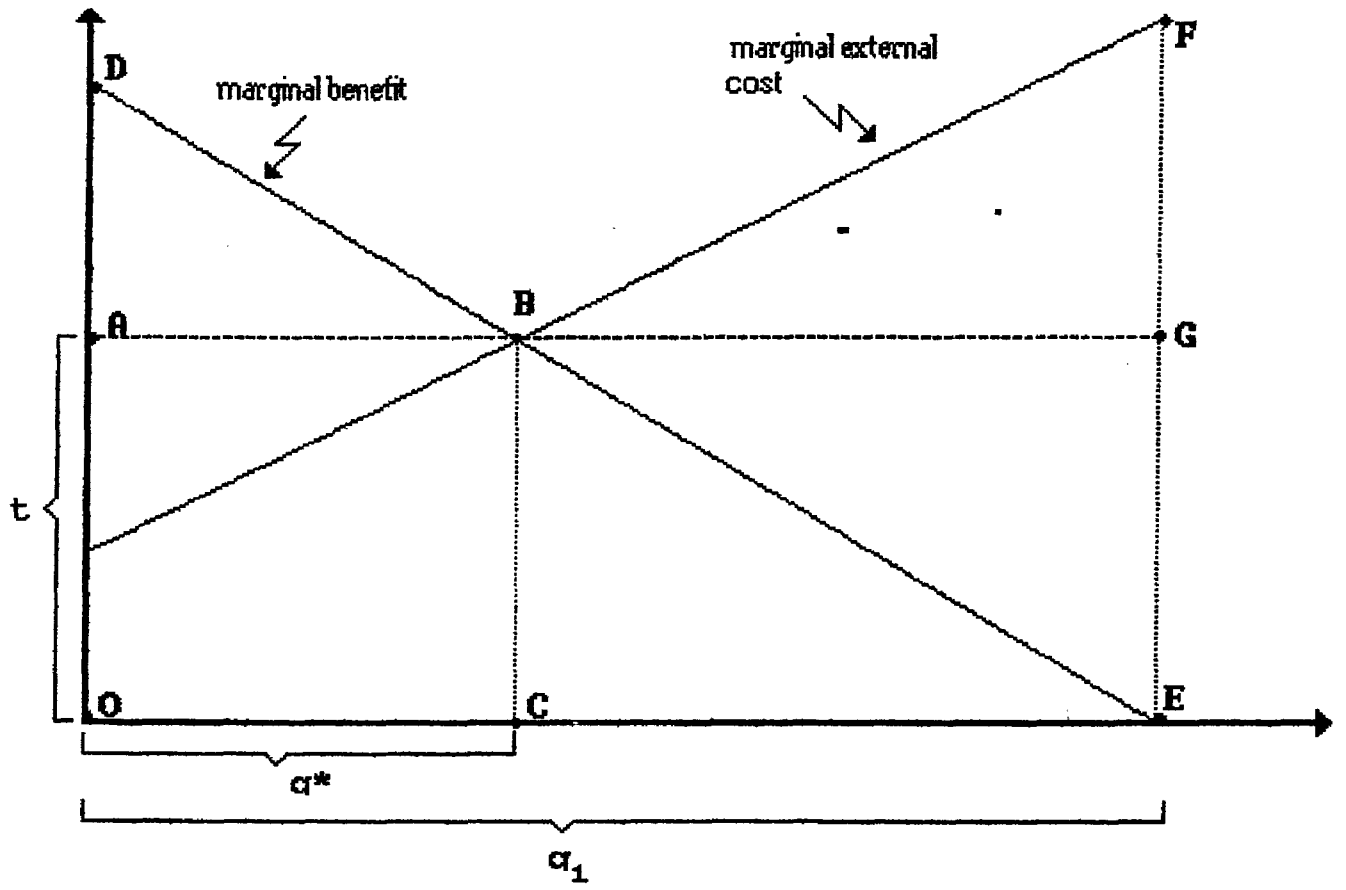


Figure 1

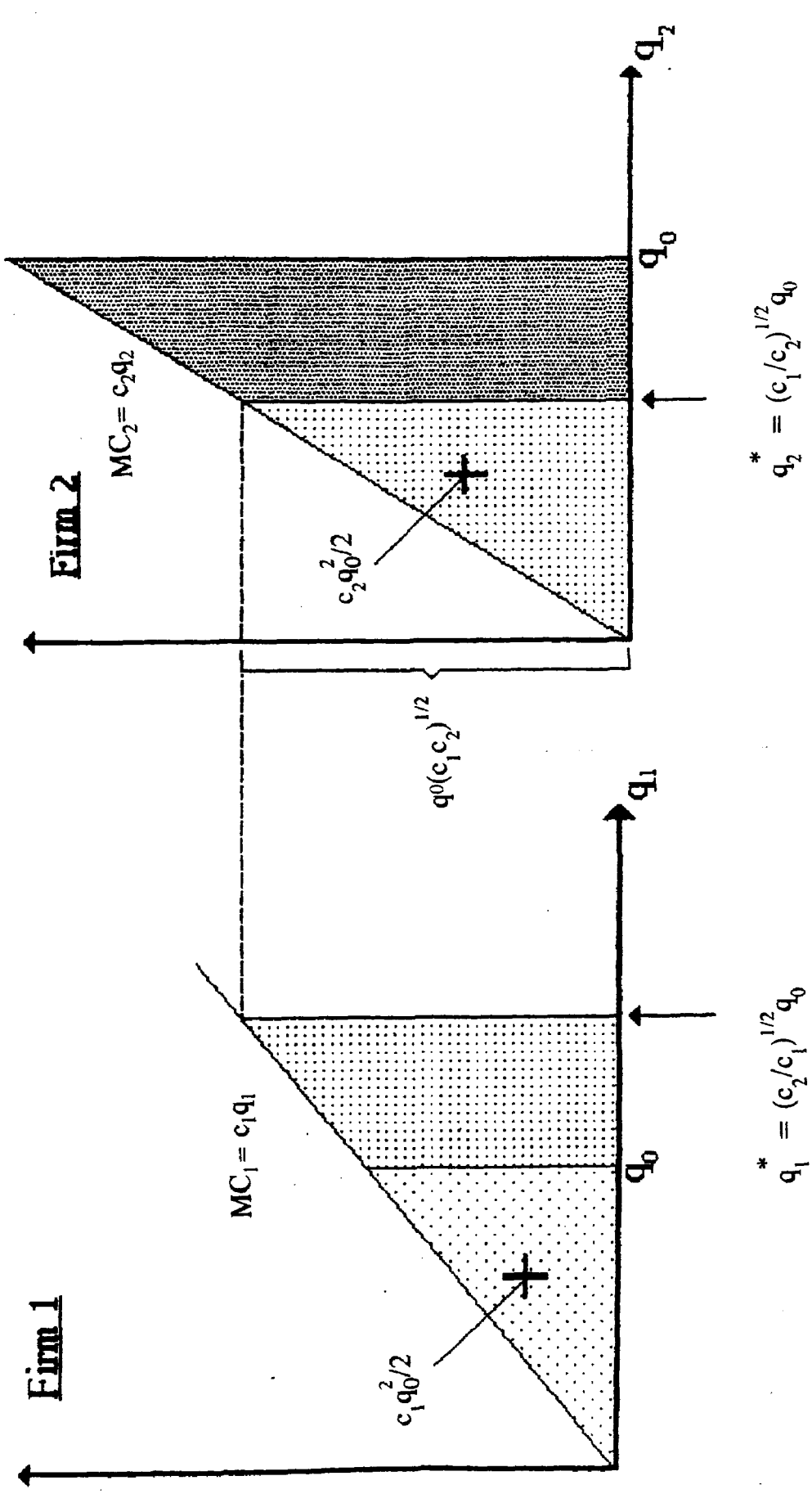


Figure 2

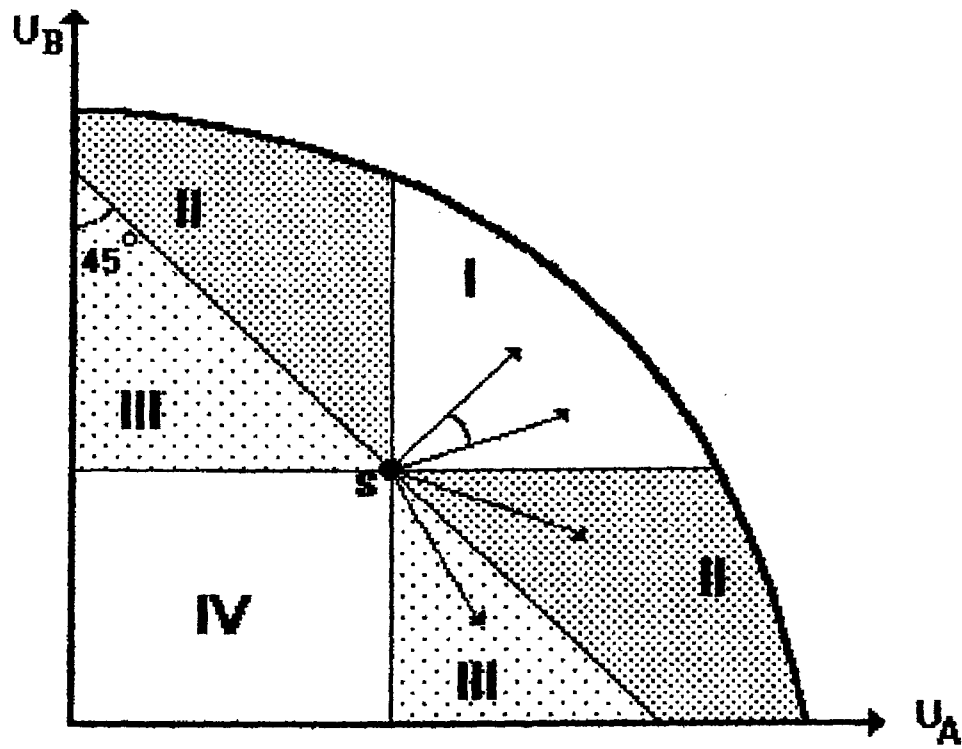


Figure 3

		economic impact	amenability to organization	visibility	resulting political impact
offending good	producers (losers)	very strong	high	low	very strong
	consumers (losers)	none to strong	low (high)	low (high)	small to medium
substitutable ecological goods	producers (gainers)	weak	low	high	weak
	consumers (losers)	very weak	nil	---	nil
foreign, closely substitutable goods	producers (gainers)	medium to strong	low to high	low	medium to strong
	consumers (losers)	marginal	nil	---	nil
consumers of environment	the	weak	low	high	rather weak
beneficiaries of the tax revenues (gainers)	neutral utilization	very weak	nil	---	nil
	earmarked utilization	medium	low	---	medium

TABLE 1

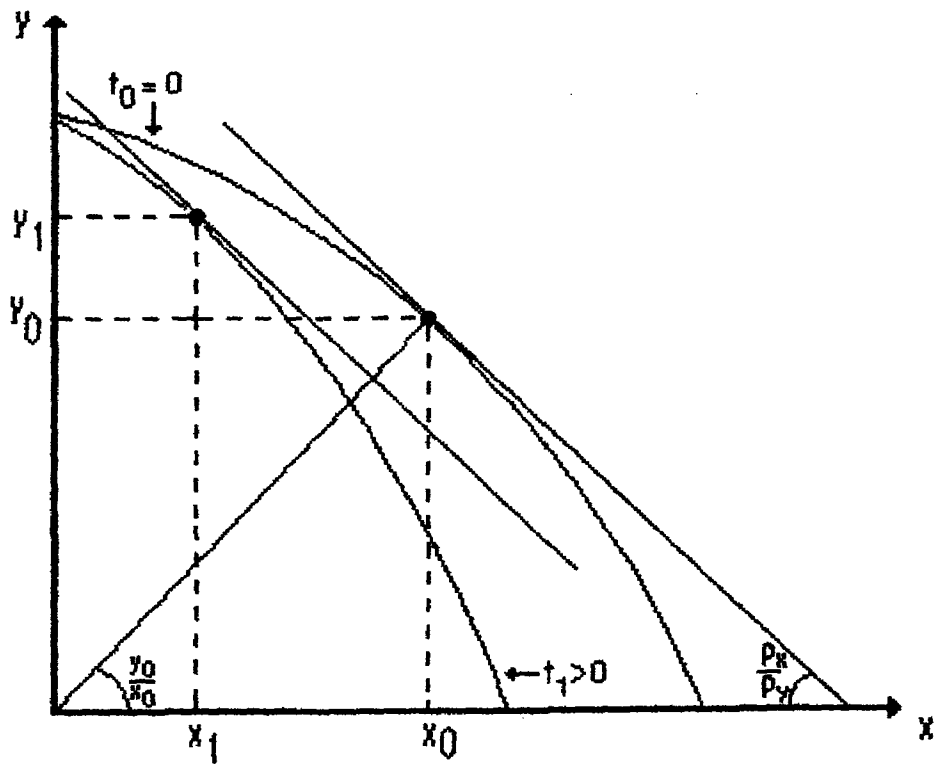


Figure 4a

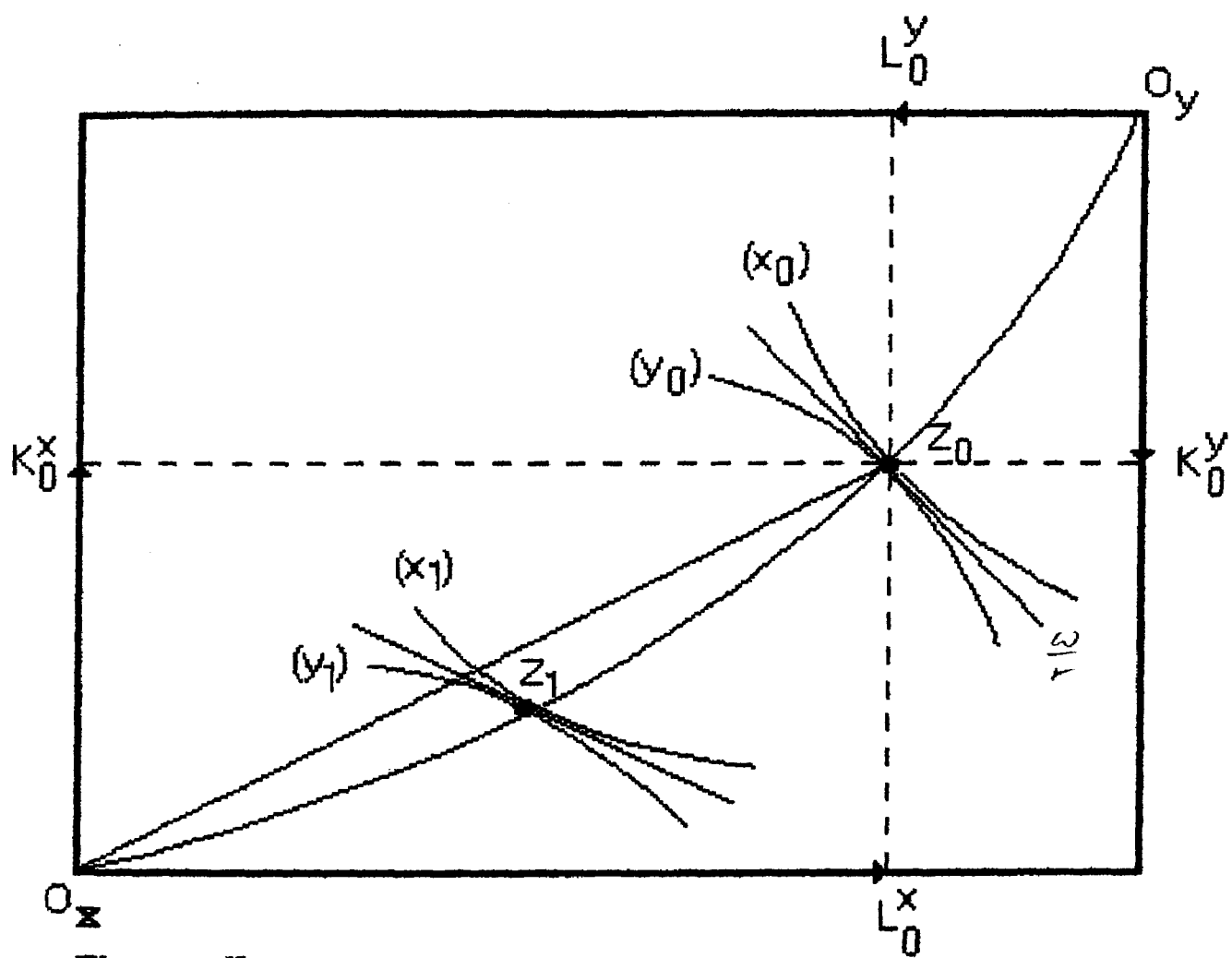


Figure 4b

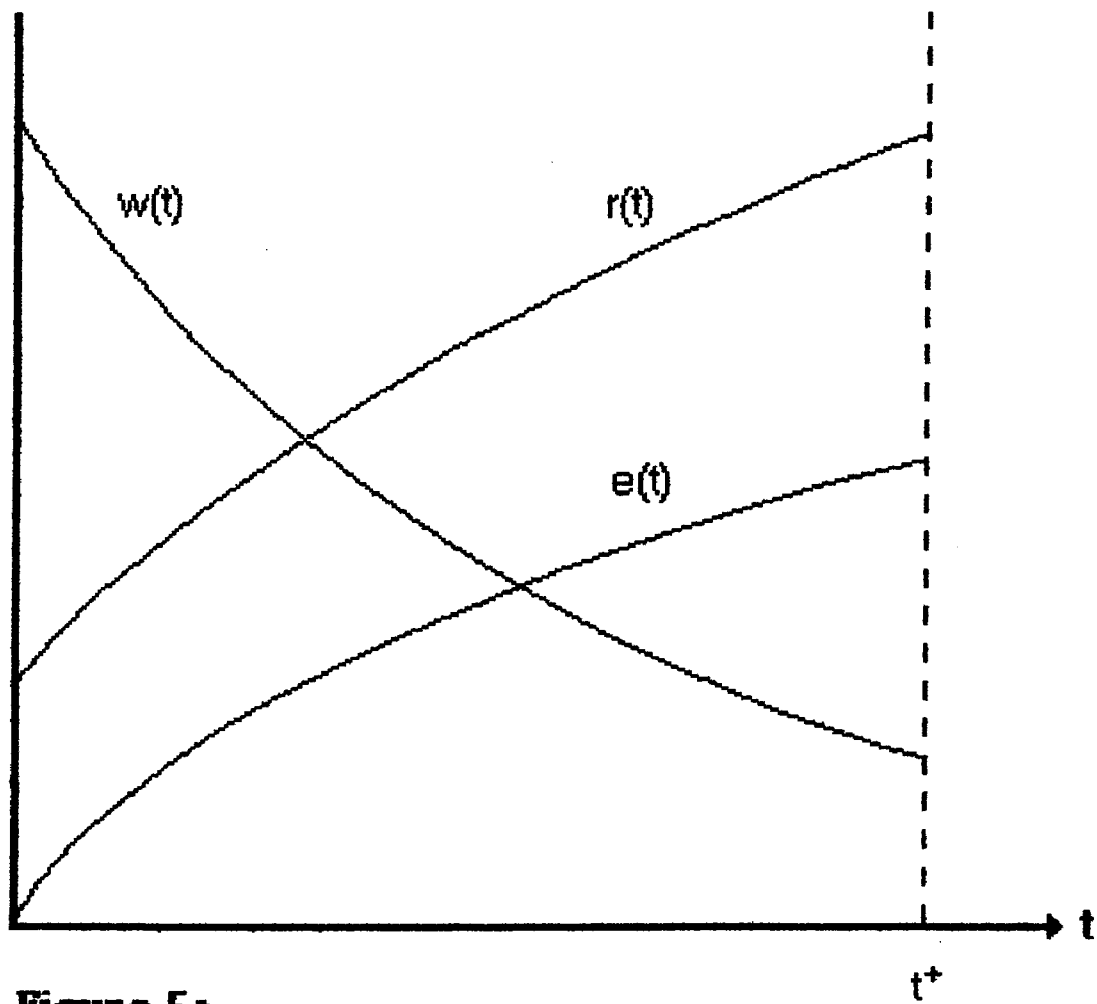


Figure 5a

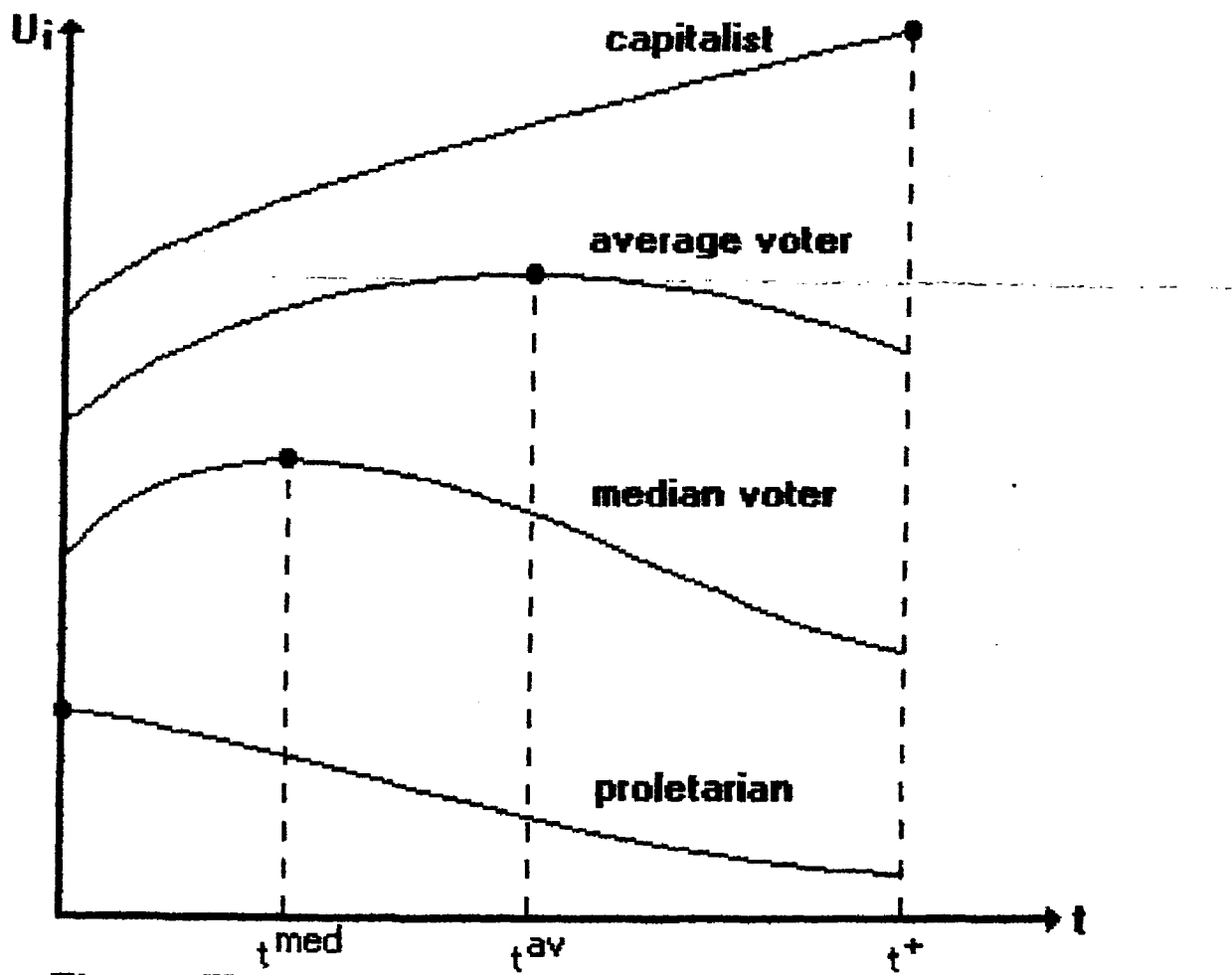


Figure 5b