Efficiency of ground water rights: some political and economic aspects

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The aim of this article is to derive the efficient criterion for initially establishing ground water property rights according to the Coase theorem.

Water stock depletion, due to water mining, like water pollution, is associated to social costs and produce esternalities which call for cost-benefit analysis of alternative assignments between different claimants. Therefore this issue remains a highly political one.

Allocative efficiency is attained in the Coase theorem in a two stage process. In Stage 1 rights are allocated to individuals. In stage 2 trade for rights emerges leading to the final and efficient allocation. If there is no way to participate in the collective assignment process of stage 1, the only remaining alternative to attain rights is to trade after the assignment has been made, and if there are no transactions costs such a trade would indeed lead to an efficient resource allocation. Everybody can on principle participate in the process through which rights are allocated to individuals. If political participation is relatively cheap for an individual, he will prefer to procure the rights he needs in the political process of stage 1 and not in the private market of stage 2. The allocation of rights will then result in a sequence of collective or group arrangements which are redefined from time to time according to changes in preferences and group power. A tendency to an efficient allocation of resources does not exist at this stage.

Since the fifties efforts started in Europe to make laws, including both surface and ground waters, gradually leading to the full abolition of private rights. This led to conflicts between public water utilities and private users while it has become increasingly clear that the legal rights could be contested only in the political arena and not by court action. A first interest group that tried to question the monopoly in ground water rights held by the public water administrations were the farmers in Germany. They requested a right to fertilize their crop by liquid and mineral manures, or a right to be compensated if fertilizing was not desired by the water utilities. This right was eventually granted to the farmers. The approval of this amendment of the Federal Water Law in Summer 1986, opposed by all political groups except the farmers, clearly indicates a political compromise made over an integration – however questionable – of the «polluter-pays-principle»: the «non-polluter-compensated-principle».

The existence of a political market for ground water rights reduces the importance of a private market for ground water rights for those groups which are able to organize themselves politically. The use of a political market for rights does, however, not imply that the private market for rights will vanish completely. It is interesting therefore to investigate on what it depends whether the private market for ground water rights works. For this purpose three models will be analysed.

Model 1 describes the situation when all rights can be traded either by the water utilities or by the farmers whichever party may hold them. This is the reference point described in the Coase theorem.

Model 2 analyses the case where non tradable rights are assigned to the water utilities.

Model 3 analyses the cases where non tradable rights are assigned to the landowners.

1. Free Exchange of Ground Water Rights, Model 1

The interaction between a water utility and its surrounding farmers can be transformed in a simple graphical model. In Graph 1 the water utility has a certain demand for water protection areas i.e. areas in which the maximum use of fertilizers is limited. This demand is a function of price. The price elasticity of demand depends on the alternatives of producing clean drinking water. Thus, there is a demand curve D whose slope becomes steeper as the scope of alternatives for making water with low nitrification levels diminishes (D'). If the rights to use the ground water resources are allocated to the farmers, they may sell part of them to the water utility. Two possible supply prices are p_e and p_k. The price p_e will be relevant when the marginal revenue from fertilizing is relatively high and p_k when it is relatively small. If the water utility has been allocated the rights, it may waive a relatively large number of water resource protection areas if the price the farmers are willing to pay is relatively high (p_e). If the price the farmers are willing to pay is relatively low (p_k), the utility will offer only a few areas. Whatever the initial assignment of rights, ground water resources will eventually be used by those who are able to draw the highest return thereof.

2. Allocation of non tradable rights to water utilities, Model 2

The law grants ground water rights to the utility to enable it to produce water and not to engage in trade. For the utility therefore ground water rights are unalianable rights. The only alternative for it is to use them as extensively as possible since is has no incentive to consider the value of the ground water to alternative users. In Graph 1 the quantity demanded is depicted by X_{max} independently of farmers' demand price. From an economic point of view utilities demand prevents the polluting agricultural use of land. Insofar this assignment of rights is not efficient.

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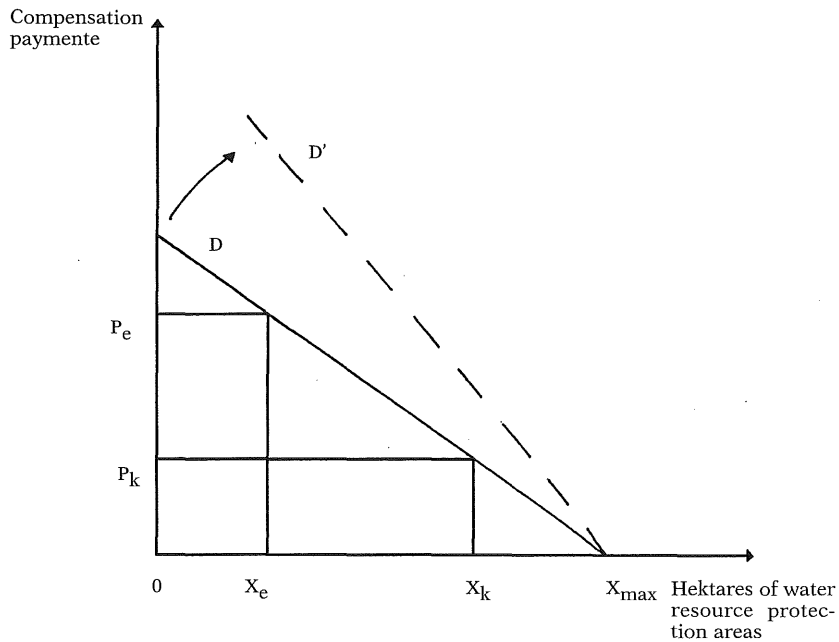
GRAPH. 1. Exchange Relations between a Water Utility and Farmers on Surrounding Territories under Alternative Property Rights Assignments.

3. *Allocation of non tradable rights to the farmers, Model 3*

The law grants water rights to the farmers to enable them to produce water and not to engage in trade. Also in this case the farmers with a fixed quota have no incentive to consider the value of the water to alternative users and tend to use their rights as extensively as possible though, this time, with the unwanted implication of inhibiting inexpensive detection and correction of poor management practices. A further source of inefficiency arises if compensation to the farmers is not tied to agricultural land use. In Graph 1 the quantity demanded is depicted by X_{max} independently of the utilities demand price. From an economic point of view farmers demand too many ground water resources. Insofar this assignment of rights is not efficient.

From the point of view of an efficient use of ground water

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resources the conclusions of this analysis are that, if there are no restrictions to trade, intensive demanders who are poorly organized will be able to buy the rights on the private market while if there are restrictions to trade, it matters who gets the rights assigned. Therefore Model 1 rates first while in both Model 2 and Model 3 the demands for water resources are too large. The difference between these last two models is that while the assignment of unalianable ground water rights to water utilities guarantees clean ground water, provided that farmers abstain from agricultural land use, the alternative assignment to farmers gives rise either to ground water pollution in the case of agricultural land use or to compensation expenditure to abstain from it. Therefore Model 2 rates in between Model 1 and Model 3 which is the least efficient.

All previous models differ in their distributive properties which can, however, be evaluated in a political decision process.

Once that the rights have been assigned, an efficient resources allocation is guaranteed, if there are no externalities, by the voluntary exchange of rights among users. There exists, however, a wide variety of limitations to this free exchange. Some users may be priviledged with respect to others so that the rights transfers are conditioned or prevented. But while voluntary exchanges may benefit both parties the same does not apply to forced transfers. If property is free voluntary exchange gives rise to the use which maximizes it in monetary terms since this use dominates others on the market. Limitations in the exchange of water rights may be obviously justified whenever changes in the use of water may damage the interests of third parties which on the contrary should be protected.

There exists a strong body of criticism aimed against the economic analysis of alternative resources allocations or, anyway, against the central idea of achieving, via the market prices, an economic optimum. Sometimes the supporters of this criticism have ended up claiming that the existence of market failures justified public intervention finalised to correct them. On the contrary it is widely shared that this way of reasoning gives rise to a *non sequitur* since it assumes that the public decisional process is efficient. The above mentioned criticism is delivered in two ways:

1. those scholars who concede that competitive market values may indicate scarsity and consumers preferences and nonetheless insist that beside the objective dependent constraint of efficiency other extra-economic values, as the desired income distribution, should guide policy evaluations;

2. those scholars who insist that the market mechanism produces incorrect evaluations anyway since price determination depends from the previous income distribution whose arbitrariness or inequity distorts prices and the same concept of economic efficiency. Infact what shall we maximize if the reference values are incorrect?

Therefore a non regulated competitive market does not attain paretian optima, if externalities exist, independently from the arbitrariness of market prices which distort resources allocation.

It is then to be considered if the existent imperfectly competitive market, which allows for strategic behaviour in absence of repeated transactions, may be used as the allocation mechanism of water resources. Society values also elements which are different from goods and services, easily measured in monetary terms, while economic values put all monetary demands on the same level, therefore higher and lower preferences are not easily selected through an economic evaluation since at the margin all the preferences are balanced.

There exist a number of arguments which soundly doubt the correcteness of market values: market imperfections, divergence between private and social costs, collective goods as in the case of water, unemployment. The conclusion is that it is not convenient to leave completely to an unregulated market mechanism the allocation of ground water resources which is fundamentally based on partial competition or interdependence.