Information and Pollution Permit Markets: Another View

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Abstract: In a recent article, Smith and Yates (2003) argued that regulators could gain additional information about the optimal number of permits to issue from two-sided markets. The author argues that they are incorrect in their assertion because the market they refer to is an asymmetric two-sided market in which individuals are only allowed to decrease the number of permits. When a symmetric two-sided market is considered, the public good nature of the problem makes it unlikely that any useful information can come from a two-sided market.

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In a recent article, Smith and Yates (2003) asked, Should consumers be priced out of pollution permit markets? They answered that question with a definitive yes. The reasoning they gave for their conclusion was that in two-sided markets (in which consumers can decrease the number of permits) such as are found in the Environmental Protection Agency's (EPA's) acid-rain program, the existence of a consumer who wants to retire permits is proof that the number of permits is too large because it exceeds the socially optimal amount. Although there are many useful insights in Smith and Yates' article, they are wrong in their major claim that a two-sided pollution-permit market offers "an easily observable indicator of inefficiency even when the regulator has imperfect information about the costs and benefits of pollution" (182).[1]

I believe the problem with their argument is worth pointing out because their claim about the information advantage of two-sided permit markets is a strong one. If it were correct, their article has relevance far beyond economic pedagogy; it would make a major contribution to applied economic theory. To be specific, if their argument is correct, it leads to the conclusion that *two-sided markets are always preferable to one-sided permit markets because of the extra information gained from the two-sided market and that any permit market should be set up as a two-sided, rather than a one-sided, market.* That proposition has specific applications, as they pointed out in their article. For example, if they are correct, it means, as they explicitly concluded, that regulatory agencies such as the EPA should strive to "issue permit levels that price consumers completely out of the market" (182).

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In explaining why they are wrong in their claim, I point out that, in a very rarified model, information about the optimal number of permits might be gained from a "symmetric two-sided market" (which is essentially a market in the quantity of permits that will be allowed). However, because of transactions costs and public goods problems, no useful information can be gained from such markets.

My argument is based on the observation that what Smith and Yates (2003) called a two-sided market only allows individuals to reduce the number of permits; it is more correctly called an asymmetric two-sided market. This is a problem because for a two-sided market to provide information about social efficiency, that market would have to allow individuals to both increase and decrease the number of pollution permits. The reason individuals might want to increase the number of pollution permits need not be that they prefer more pollution per se; it could be that they benefit more by the lower price of the final good whose production is responsible for the pollution that would be allowed by an increase in the number of permits.

The demand to increase the number of permits is most likely to be expressed by firms acting as agents for their consumers. This demand to increase the number of permits is not captured by the standard marginal abatement cost curve that expresses the price a firm would pay for a permit; the demand to increase the number of permits is not the demand for permits. The price the firm would pay to increase the number of permits would be equal to the price of permits only if the number of permits is set at a socially optimal level. My point is that this demand to increase pollution permits must be taken into account before any information can be gleaned from consumers' behavior in retiring pollution permits relevant to social efficiency of the number of permits.

Let me give an example. Say the government follows Smith and Yates' (2003) policy and decreases the number of permits because there is a demand by one consumer to decrease the number of permits. Doing this will raise the price of the goods, the production of which caused that pollution. This action would harm those people who would prefer the existing price of the good or a lower price for the good and who would be willing to accept the pollution associated with the current production, or higher production, if it lowered the price of the good sufficiently.

According to Smith and Yates (2003), decreasing permits will definitely improve social efficiency because, according to them, the existence of any demand to decrease permits provides information that the number of permits is too high. However, assume that at the existing price, there are 100,000 people who would have been willing to pay to increase the number of permits and accept the higher level of pollution because they value the lower price of the good of that pollution-causing good more than they were hurt by the pollution. In Smith and Yates' asymmetric two-sided market, these people have no way of revealing their demand because Smith and Yates' asymmetric two-sided market provides them no method of increasing the number of permits.[2]

The issue can be seen more clearly by thinking not of a single pollution permit market, what they call a two-sided pollution permit market, but of a two-part market—one market in pollution rights in which firms trade, given a set number

of permits, and a second separate market whose role is to determine the number of pollution permits in existence. From the perspective of a two-market problem, it is obvious that in this second market there will be both a supply of permits by individuals who are willing to pay for an increase in the quantity of permits (and hence pay a lower price for the good they want) and a demand for permits by individuals who are willing to pay for a decrease in the quantity of permits and a reduction in the amount of pollution. (I speak of individuals rather than consumers because the issue is not one of consumers versus producers but of consumers of the goods produced by firms and of consumers affected by the pollution that the production of goods causes. Producers are simply operating as proxies for those consumers who want the products whose production causes the pollution.)

Efficiency in the number of permits can be judged on the basis of equilibrium in that second market. Assuming no public goods problems (as Smith and Yates [2003] did in their initial model) and no transactions costs, as is generally assumed, the price of creating or destroying permits (the price in the first market) would have to be equal to the price of an additional unit of pollution created (the price in the second market) for there to be social efficiency. Put another way, the price of changing the number of permits would equal the price of the permits themselves. A symmetric two-sided market appropriate for social welfare analysis would be a market in which these two markets are combined, and individuals are allowed to increase or decrease the number of permits at the existing price as well as buy and sell the permits to others.

That is not the nature of the two-sided market Smith and Yates (2003) assumed. Their two-sided market was asymmetric; it allowed only those who wanted to decrease the number of permits to reveal their demand, and it allowed no expression of demand for those who wanted to increase the number of permits. This asymmetric market price is not useful in finding a social optimum because it has given no means of expression to those who want to increase the number of permits. Without that revealed demand, one does not know whether the actual quantity of permits issued is above or below the optimal quantity. Thus, contrary to Smith and Yates' conclusion, one cannot say that in this market, "If consumers actually purchase permits, it indicates that the market equilibrium is inefficient" (188).

The lack of symmetry can be seen in the assumed two-sided markets of Smith and Yates (2003) by considering their expository model that relates the marginal-abatement cost curve with the marginal-damage curve for the case of many firms and a single consumer (183). They discussed the situation in which they assumed the quantity of permits had been set too high and correctly pointed out that, in the model, given this assumption, allowing consumers to retire permits would allow a movement of the quantity of permits toward the optimum level. They further correctly argue that the consumers would continue to do so until the supply intersects at the same place as does the marginal damage and marginal abatement cost.

The lack of symmetry occurs because the market they assumed does not allow adjustment if the quantity of permits is set too low. As they pointed out, under their assumptions, when the quantity of permits is set too low, the market will remain inefficient (184). But this is a serious problem for them because their

central argument was that government could use agents' actions to obtain information about whether the quantity of permits was too high or too low. Because agents who think the quantity is too low are not allowed to reveal their demand, one cannot deduce from the fact that some people think the quantity of permits is too high and that socially efficient quantity is too high, which is what they are claiming to be able to do.

A complete market in permit quantities (a symmetric two-sided market) would theoretically solve that problem because it would allow an increase or a decrease in the number of permits to the optimal level. In a symmetric two-sided market, individuals would have a way to increase permits if they were willing to pay the going price of the permit in the same way that individuals could reduce them in an asymmetric two-sided market.

Using the reasoning of Smith and Yates in the case of the consumer and an oversupply, if the quantity of permits is set too low, the firm (one firm is assumed to avoid the public goods problem, as was the case with the individual vs. the consumer) would bid to increase the number of permits, moving the equilibrium to the social optimum where the quantity of permits intersected at the same point where the marginal-damage and the marginal-abatement cost curves intersect. Thus, with a symmetric two-sided market in Smith and Yates' model, regardless of whether the quantity of permits is set too high or too low, that quantity of permits will adjust to the equilibrium quantity. The only effect of setting the initial quantity too high or too low would be a wealth transfer from consumers or producers to the government. This is, of course, essentially a restatement of the Coase theorem, that with bargaining, and no transactions costs, individuals can arrive at an efficient equilibrium.

RELATING THE MODEL TO REALITY

On the basis of Smith and Yates' (2003) simple model, one might be tempted to argue that if the regulatory agency offered individuals the right to both buy or sell permits at the existing market price of permits, regulators could look at whether additional permits were being created or destroyed and decide whether the number of permits issued was too high or too low (subject, of course, to intertemporal incentive compatibility arguments discussed by Smith and Yates [188]). In this case, assuming no public goods argument (which is the assumption they make in their first model), on efficiency grounds, if permits are being destroyed, then the number of permits issued is too high to be socially optimal, and the market price is too low. Similarly, if permits are being created, the number of permits is too low. If permits are being neither created nor destroyed, then the market price is socially efficient in the sense that Smith and Yates are using the term.[3]

Under these assumptions, the regulatory agency could have a useful rule for determining the correct number of permits. (In fact, in the case of a symmetric two-sided market, issuing the correct number of permits would not be a problem because, using similar arguments to the Coase theorem, the quantity of permits would move to an efficient quantity even if the incorrect quantity were chosen. Only the distributional effects would be different.)

Although correct, that view is not especially helpful because that missing market is missing for very important reasons. As Smith and Yates noted, their simple model is unrealistic and is useful for expositional purposes only. Actual markets are made up of multiple individuals and multiple firms, and there are serious public goods arguments both for individuals who would like to increase the number of permits and for individuals who would like to decrease the number of permits. The public goods problem is not the only reason that the market in setting quantity of permits is missing. Another problem is asymmetric transactions costs, which would likely bias a symmetric two-sided market toward individuals wanting to increase the number of permits, because firms could act as their agents. A further problem is that pollution generally has geographic-specific and other characteristics that affect different individuals differently. Such problems undermine any argument for establishing a symmetric two-sided market.

CONCLUSION

Permit markets are becoming better understood as we gain more experience with them. As Smith and Yates (2003) point out, a major problem of such markets is that it is difficult to determine the correct number of permits to create. Thus, had Smith and Yates been correct that regulators could gain information about the optimal number of permits to issue from establishing what they called two-sided markets, their article would have been a contribution not only to economic pedagogy but also to applied economic theory. Unfortunately, they are not correct, and the answer to their title question, "Should consumers be priced out of pollution-permit markets?", is not the definitive "yes" that they give, but that ubiquitous "it depends."

NOTES

1. Their article serves a number of useful pedagogical roles in explaining permit markets to students. One useful insight is their argument that although one-sided markets (in which the quantity of permits is set and cannot be changed by participants) attain a type of productive efficiency, these markets will not attain "full social efficiency" unless the permit-issuing agency happens to issue the socially efficient number of permits. Another useful insight is their argument that social efficiency can occur only if the agency has perfect information about the costs and benefits of pollution, which the agency will never have.
2. In practice, there are methods of increasing the number of permits even if it is not explicitly allowed. For example, it can be done through lobbying government or through programs that allow pollution credits for alternative activities. My point is that to draw any information about "social optimality" from agents' activities, as Smith and Yates (2003) attempted to do, all such methods would have to be taken into account; the existence of any demand to increase permits in an asymmetrical two-sided market does not reveal that information.
3. The concept of a market is a stretch here because there is only one consumer and one firm, who in fact represent the producing and consuming side of the same individual. If the individual is buying permits, the quantity was set too high; if he is selling, the quantity was set too low.

REFERENCE

Smith, S., and A. Yates. 2003. Should consumers be priced out of pollution-permit markets? *Journal of Economic Education* 34 (2): 181–89.