POLLUTION AND RESOURCE ALLOCATION: REPLY

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Richardson's comments [2] on our analysis of the pollution problem [1] appear to contain three distinct strands. Firstly, Richardson accuses us of failing to allow for the possibility of controlling pollution at any point in the production-consumption process other than that at which physical commodities are actually produced. Secondly, he is critical of our failure to deal specifically with *recycling* as a possible solution to the pollution problem. Finally, he questions whether conclusions about appropriate policy responses to pollution can be generated from a discussion of general *principles*. Each strand seems to demand some response on our part, and we consider each in turn.

It seems clear that Richardson sees our focus on the question of controlling pollution '*at source*' as a crucial departure from generality.

> '. . . This model places emphasis on controlling pollution at source, i.e. in the production process, thus ignoring the possibility of control at a subsequent point, namely after the consumption activity' [2, p. 1].

But, as even a moderately casual reading of our article would reveal, this criticism is based on a gross misunderstanding and misrepresentation of what we say. Certainly, there is nothing in the structure of our model that rules out control of pollution at or beyond the point of *consumption*. Throughout our discussion, we emphasize the importance of viewing the production-consumption process for physical consumption goods as a whole; and it is perfectly clear that pollution control policies, designed to change the balance between physical goods and 'clean environment' can be applied at any point in the chain. It is true that we draw a distinction between adjustments to pollution by the 'victims' of the negative externality '. . . at the point of damage' and adjustments by the externality-generating agents '. . . at source'. This distinction is essentially that between responses to pollution at the point in the consumption or production process where residuals cause a perceived nuisance (the point of damage), and those which occur at the point where residuals are produced '. . . simultaneously with the production *and consumption* of physical goods' ([1, p. 7] emphasis added). Yet, Richardson seems to believe that our model equates the 'source' of pollution with the production process alone. This definition of 'source' is his, not ours—it is in no way a definition that is suggested by our discussion, and its relevance to our analysis lies entirely in Richardson's imagination.

Since there seems to be some confusion about this point, however, it may be useful to re-emphasize the reasons for our distinction between adjustments at 'source' and elsewhere. Typically, adjustments to pollution by receptors at the point where damage occurs—adjustments such as moving away from the pollution source, installing air cleaning or conditioning devices and so forth—are *private* in nature. These responses will occur naturally in the freely operating market whenever the private marginal gains exceed the private marginal costs of adjust-

ment. By contrast, adjustments by the externality-generating agents, whether by producers or consumers (i.e. adjustments '. . . at source' in our terminology), are typically *public* in nature, in the sense that the benefits of such adjustments are equally and totally consumed by all the affected parties. These are *not* responses which one would, in general, expect to emerge naturally in a freely operating market. To the extent that responses at source are least social cost (most efficient), there will be a case for government intervention via regulation or fiscal instruments —although, as we are at pains to point out in the latter part of our article, this case is only a weakly presumptive one.

Thus, the distinction between pollution adjustments *at source* and those at the point of damage is of considerable policy significance, for it is only in so far as adjustments at source are the more efficient that a case for public intervention can be made. The distinction between pollution from production activities and pollution from consumption activities (i.e. between production and consumption wastes) by contrast seems to us to be of no policy significance whatsoever. And the fact that we did not provide a separate analysis of each in our paper is, we believe, a reflection of the generality of our approach, rather than the opposite as Richardson implies.

Turning to the second issue raised by Richardson, it is true that we did not explicitly consider the possibility of recycling. Such neglect was deliberate. The focus of our paper related to the question of market failure and the associated question of appropriate pollution policies. To the extent that recycling, of both consumption and production wastes, is economically viable in the freely operating market it will occur naturally and hence lies outside the concern of our discussion. The recycling issue only becomes relevant for policy purposes if one or other of two possibilities occur. The first is that the freely operating market sets prices for so-called 'exhaustible' resources *improperly* so that their rate of exploitation over time is non-optimal: in this case, recycling decisions based on market prices will also be inefficient. But we made it quite clear in our original discussion that the problems of optimal pricing and rate of exploitation of exhaustible resources lay outside the scope of our paper.

The second possibility is that, although recycling is not economically viable at current market prices, it may become efficient when appropriate taxes or regulations on wastes disposal are imposed. In this case, however, it is the absence of these policy instruments to internalize the externality that gives rise to inefficient recycling decisions. In other words, the recycling possibility (like a whole range of other feasible methods of adjustment that serve to minimize residuals generated per unit of physical product) only emerges *in response* to government policies, if it emerges at all. Whether recycling or some other change in technique is most efficient depends of course on the particular case. The important point is that if the correct policy choice is made (e.g. the appropriate Pigovian damage tax), the polluting agents themselves will make the correct adjustments.[1] If one accepts this, then the isolation of the 'correct

[1] The implementation of a 'correct policy' will commonly induce a polluting agent to simultaneously use a number of methods of pollution control, including perhaps recycling. In these circumstances, when optimal adjustments have been made, the marginal social benefit from pollution abatement will equal the marginal *composite* cost of pollution abatement, and the marginal cost of pollution abatement by each method in use also will be equal to the marginal social benefit.

policy'—and not the best response to it by firms and consumers—becomes the crucial policy issue.[2] We adhere to our belief that recycling is *not* in itself relevant to the central policy question.

Finally, we come to the matter of whether a discussion of general principles is capable of indicating a preference for fiscal over regulatory instruments in the pollution context. To be sure, there will be cases where regulations may be more appropriate and nothing in our paper denies that possibility.[3] Our conclusion was simply a response to a persistent trend in the way logic appeared to take us (particularly in our arguments about information and measurement) favouring the use of fiscal instruments. Richardson's discussion has not in any way served to indicate that such a general conclusion may be inappropriate.

Generally speaking, we believe that the presumption in favour of fiscal instruments over regulations must be allowed to stand, and that the relative neglect of these instruments by policy makers, in favour of direct regulations, cannot be easily justified in efficiency terms. A serious question is therefore raised as to whether society is currently bearing unnecessarily large costs from pollution controls.

But whether this is so or not, we believe that a good grasp of the conceptual issues at stake in the pollution/environment debate is a crucial prerequisite for sensible policy formulation. Nothing, either in Richardson's comments or elsewhere, has persuaded us otherwise.

References

[1] Tony Chisholm, Cliff Walsh and Geoffrey Brennan, 'Pollution and Resource Allocation', *Australian Journal of Agricultural Economics*, Vol. 18, No. 1, April 1974.

[2] R. A. Richardson, 'Pollution and Resource Allocation: Comment', *Australian Journal of Agricultural Economics*, this issue.

[2] Our decision not to examine recycling in detail is therefore no more surprising than our failure to discuss at some length the theory of induced technical change.

[3] For instance, direct regulations are likely to be the most appropriate policy in situations where the level of pollution damage is subject to sudden and extreme fluctuations as a result of stochastic disturbances arising from, say, unusual meteorological conditions.