

The Economist, "Schools Brief: Of Bees and Lighthouses", (comment on "The Problem of Social Cost", by Ronald Coase, *Journal of Law and Economics* 2, October 1960), February 23, 1991, pp. 72-73.

## SCHOOLS BRIEF Of bees and lighthouses

**This brief in our series on the modern classics of economics looks at a paper that is still as controversial as when it first appeared—and suddenly much more relevant to the debate on economic policy. It set out to demolish traditional thinking on “public goods” and “externalities”**

MOST economists, including many who would claim otherwise, find the paradigm of perfect competition indispensable for thinking about questions of resource allocation and microeconomic efficiency. Every novice student learns the elementary propositions of welfare economics. These assert that, under perfect competition, market forces will cause resources to be used in such a way that it is impossible to make somebody better off without making somebody else worse off—in this sense, perfect competition avoids waste. Such a pattern of resource allocation is called a Pareto optimum.

While learning this, the novice student also learns that perfect competition does not exist. It requires, among other things, that there be so many buyers and sellers that none can affect Prices; if a firm cuts its output it will not push up the price. It requires all the goods produced by different producers in any particular market to be “homogeneous” (i.e., identical). It requires “perfect information”. It requires there to be markets not just for actual goods but also for “contingent goods” (e.g., the market for umbrellas in London next January if it is an unusually rainy month). And so on.

One strand of modern research has devoted itself to the ferociously difficult task of building formal models that precisely state the conditions that are necessary and sufficient for competition to work, and describe whether and in what sense the result is “efficient”. The landmarks are “Existence of an Equilibrium for a Competitive Economy” by Kenneth Arrow and Gerard Debreu (published in 1954) and “General Competitive Analysis” by Mr Arrow and Frank Hahn (published in 1971). That these were towering intellectual achievements is not in doubt; however, their influence—outside the narrow circle of specialists in pure microeconomic theory—was not great.

Almost all modern economists, however much they might resist such classification, are drawn to one of two camps. The first believes that perfect competition is a useful paradigm that policymakers should take as a guide; this is the liberalising, deregulating, competition-promoting wing of the profession. The other, the interventionist wing, holds that the paradigm is a dangerous one that policymakers should ignore. In choosing where their loyalty lies, the prejudice that probably markets most is their view on public goods and externalities.

### Smokestack economics

One of the assumptions underlying the idea of a Pareto optimum is that private costs and benefits are the same as social costs and benefits. In practice, this is not always so. The price you pay for your lawnmower does not reflect the cost to your neighbours of the noise it makes when you use it. The price people and firms pay for their carbon fuels does not reflect the cost to everybody else of filling the atmosphere with greenhouse gases. These are examples of externalities—the economic effects that a transaction has on third parties.

Most economists define public goods in terms of “nonexcludability” and “non-rivalrous consumption”. Clean air is an example of non-excludability: if some people incur costs to avoid pollution, those who do not pay cannot be excluded from the benefits. They will be tempted to free-ride at others’ expense, and producers of clean air would have trouble collecting payment for their services. (In a sense, non-excludability is the obverse of externality.)

Clean air, by and large, also serves as an example of nonrivalrous consumption: by breathing, you do not perceptibly reduce the supply of air for others. This means that, even if it were possible to deal with freeriders by making them breathe dirty air, it would be economically inefficient to do so. If, at the margin,

a good can be provided costlessly, efficiency demands that it be provided free. This is another way of stating the old rule that price should be set equal to marginal cost.

Together, non-excludability and non-rivalrous consumption imply that clean air is a public good. There cannot be an efficient private market for it. The social benefits of maintaining the supply of clean air will exceed the private benefits of doing so. Unless governments use taxes, subsidies and other forms of intervention to promote it, too little will be supplied.

The crucial question for policy-makers is this: how common are externalities and public goods? For years it seemed they were common enough to turn the competitive paradigm into something of little practical use.

Standard examples were drummed into students' heads. The favourite illustration of a public good was the lighthouse: the conditions of non-excludability and non-rivalrous consumption were both met, and it was obvious that if governments did not provide lighthouses nobody would. The favourite example of an externality, odd as it might seem, was bee-keeping. Here the externality was a benefit, not a cost: bee-keepers provide pollination services for local growers of flowers and fruit. Because they are not paid for this service, there may be a socially less-than-optimal amount of bee-keeping.

Theory concerned itself mainly with asking what form government intervention should take. For instance, part of the trouble in the clean-air example is that nobody owns the air; if somebody did, polluters would not be able to dirty it with impunity. Traditional microeconomic theory stressed this link between property rights and efficiency. It is part of the government's job, on this view, to allocate property rights in an efficiency-promoting way.

Then, in 1960, Ronald Coase of the University of Virginia published "The Problem of Social Cost". Mr Coase argued that, as a rule, no form of government action is required to deal with externalities or public goods. There is no need for taxes, subsidies and public provision; and so long as property rights already exist, there is no need for energetic policies aimed at shifting them around.

The article caused a rethink in microeconomics, a rethink that is still going on. It spurred the growth of a distinct new branch of the subject, called "law and economics". And it converted many more economists to the liberal, anti-interventionist wing of their trade.

Choo choo

Mr Coase's favourite case of externality was an American icon, the wood-burning locomotive—whose sparks, regrettably, were prone to set fire to farmers' fields. According to the conventional thinking, what matters in such a case is the allocation of property rights.

Suppose farmers have a right in law to enjoin the railway company not to set fire to their fields: the result is that the company will fit spark-suppressing equipment to their trains, and there will be less damage to the farmers' fields. Alternatively, if the company has an unfettered right to spray as many sparks as it likes, there will be plenty of damage to fields.

Mr Coase asked if this analysis was good economics, and showed that it was not. His main Point was simply that legal entitlements—property rights—can be bought and sold. They are commodities whose exchange can be analysed like that of any other. If farmers can legally insist that locomotives are spark-free, they can sell this right to the railway. If the railway is free to spark as much as it likes, farmers can pay them to reduce the sparks that locomotives emit.

Not only that, but the outcome will be the same in either case. Suppose farmers have a right to stop the sparks. If this right to emit sparks is worth more to the railway than stopping the sparks is to the farmers (because suppressing sparks is costly, say), then the railway will buy the right to emit sparks from the farmers, and the damage will continue. Suppose instead that the railway is entitled to emit sparks—but that this right is still worth more to the railway than to the farmers. In that case, the right will not be sold, and the damage will continue.

There is one difference. The initial allocation of property rights affects the distribution of income; in other words, if you own something, you are better off than if you do not. But the allocation makes no difference at all to the amount of resources devoted to suppressing sparks. Economic forces ensure that the same efficient allocation will happen in either case. This idea is known as the Coase theorem.

Though quick to qualify it, people with a taste for economics usually react with delight to Mr Coase's insight. Others find it annoying: "All very well in theory, but how often do you see deals like that in practice?" It is a fair question, and it deserves to be taken seriously.

Inspired by Mr Coase, economists began to look more carefully than before for transactions in property rights. One of the most telling studies—because it scored a direct hit on the interventionists' favourite example—was a paper published in 1973 by Steven Cheung, then at the University of Washington: "The Fable of the Bees".

#### Down on the apiary

Mr Cheung examined the bee-keeping industry in Washington. The state's farmers and bee-keepers might not have realised that they were coping with an externality, but that had not stopped them from organising a market. Mr Cheung wrote: "It is easy to find conclusive evidence showing that both nectar and pollination services are transacted in the marketplace: in some cities one need look no further than the yellow pages of the local telephone directory."

But he looked beyond the telephone book, and studied pricing and contracts in some detail. He found a surprisingly sophisticated pattern of prices (varying according to the sort of crop pollinated, the density of hives available, the risk of pesticides damaging the bees and so on). Mr Cheung showed that this pattern of pricing was, by and large, efficient.

In 1974 Mr Coase turned his own attention to lighthouses—an example of supposed market failure with an even longer pedigree than the fable of the bees. "The Lighthouse in Economics" sketched the history of lighthouses in Britain since the 17th century. It showed that lighthouses can be—and typically have been—provided by private enterprise.

In the early days, shipowners and shippers petitioned the Crown to let somebody build a lighthouse and charge a specified levy on the ships that benefited from it. These charges were collected at the ports by agents for the lighthouses. "The lighthouses were built, operated, financed and owned by private individuals, who could sell the lighthouse or dispose of it by bequest," Mr Coase found. "The role of the government was limited to the establishment and enforcement of property rights in the lighthouse." Responsibility for lighthouses was later shifted to Trinity House, a quasi-public body, but lighthouses continued to be financed by "light dues" collected from ships, not from general taxation.

The Coase theorem and the further work it inspired have demolished the presumption that externalities and public goods automatically call for government intervention. But they have not replaced it with a presumption that the market can always be left to get on with it. The work of Mr Coase and his followers has made almost all economists, whether broadly liberal or broadly interventionist, more reluctant to generalise. It has also suggested many lines of further research.

For instance, the Coase theorem admits that the market will fail if transaction costs are prohibitively high. As a result, economists are much more interested than before in correcting inefficiencies by reducing the costs of doing business; pursuing efficiency through cleverer and more ambitious regulation is definitely out of fashion.

Some critics have argued that the Coase theorem stretches the idea of transaction costs too far—to the point at which the theorem becomes true (but uselessly so) by definition. It is not much help to blame transaction costs for every market failure, as if that makes the failure somehow all right.

The theorem, and the model of competition it defends, are at their weakest when trying to account for deals struck between small numbers of transactors—in other words, when the assumption of many buyers and sellers does not hold. This is not so much a matter of transaction costs as of the unpredictability of offer and counter-offer: it moves economics into the realm of game theory, where efficient outcomes cannot be taken for granted (see box).

Sceptics may be willing to concede on bees and lighthouses—and on many other examples hitherto thought to be market failures—but the case of clean air remains awkward. It is hard to see how any entirely voluntary, market-driven approach to environmental economics could ever overcome, even in theory, the problem of free-riders. Even here, however, Mr Coase and his colleagues have forced economists to think harder about how to use market forces to achieve green ends, rather than resort too quickly to the blunderbuss of regulation.