EXTERNALITIES - THEIR NATURE AND POSSIBLE POLICY RESPONSES

Kieran McLoughlin.

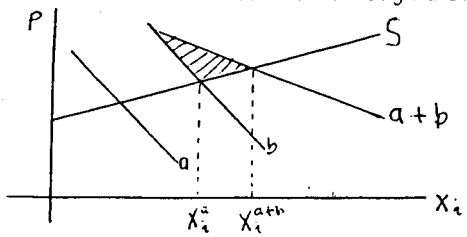
The free market has long been held to provide the most efficient method of maximising societal welfare in so far as it causes demand prices as revealed through marginal utility curves to be equated with supply prices,as revealed through marginal cost curves and thus brings about the optimal allocation of resources.

Naturally it therefore follows that if there is any distortion of this process,then the market will fail and "the link between optimality and competition is broken"[1] .There are a myriad of examples of market failure and whilst there is often disagreement on the specifics of particular cases it is generally recognised that the root cause of such failures is the presence of goods that display substantial degrees of "publicness" or "collectiveness"

Of such goods,the provision of some involves prohibitive transaction costs and while some are non rival in consumption all are non exclusive.An important category of these problematic goods/'bads' is that of externalities.

"an externality is said to exist if an activity of one party affects the utility or production possibilities of another party without being priced"[2] and the manner in which this creates a non pareto efficient outcome can be demonstrated through a simple example.

Figure 1.



Imagine we have 2 consumers,a and b.A consumes goods x and y while b consumes only y but A's consumption of x confers benefit on him.the utility functions are as follows

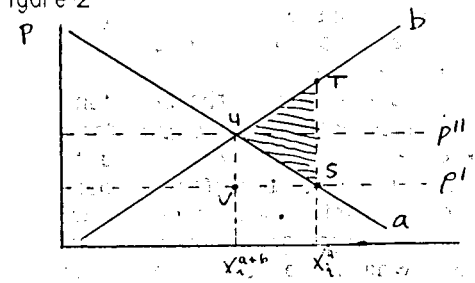
$U_a=f(x^a+y^a)$

$U_b=f(y^b+x^a)$

Now since A consumes and pays for x his demand curve for x determines the market supply .But the benefit enjoyed by b is not registered by the market :thus the true quantity demanded by a and b,i.e. x^{a+b} is not produced causing a welfare loss represented by the shaded triangle.

Similarly,a welfare loss would result if a's consumption of x caused b to suffer a disutulity which wasn't priced.

Figure 2



In the above example a chooses to consume x^a by equating his marginal valuation with the marginal cost,as represented by the price line.Of course this decision takes no account of the costs imposed on b causing over production of x and a welfare loss again indicated by the shaded area corresponding to the differerence between welfare levels at the actual consumption point and the socially optimal consumption point.

Therefore while there are many different types of externalities-positive or negative,originating in production or consumption etc.-they are all resposible for the market failing to achieve the social optimum by causing a divergence between private and social costs.thus to achieve the social optimum some corrective measure must be found.

Such a solution is immediately suggested by figure 2,namely the enactment of a mutual agreement between the parties to reduce A's consumption of x from x^a to x^{a+b}.After all,with such a move b would stand to gain an increase in utility represented by the area STUV while A would lose only SUV,leaving a net gain of STU,the exact distribution of which would depend on the bargaining power of the parties.in this situation it would be in both their interests to engage in a form of commercial logrolling whereby b would bribe a to reduce his consumption to the socially optimum position by offering him part of the surplus utilty STU and eliminating the externality.However this solution ignores distributional issues which could form an important part of the social welfare function and the gain in efficiency could be offset by a worsening of the distribution of income e.g. if a was a landlord and b a peasant.As is usual the economist *qua* economist ignores such considerations.

This does not mean that this solution is economally sound-in fact its practical feasibility is rather limited.Firstly,for such an agreement to be possible we must assume that transaction costs are low(relative to STU);however the existence of high

transaction costs is often one of the causes of market failure in the first place.Also,such a bargaining process can be undermined by strategic behaviour and untrue preference revelation,with for example a overstating his marginal valuation of x and b overstating the disutility he sustains,each trying to maximise their gains.Thus the chances of a move to a non pareto efficient position or no move at all are high.

What we are discussing is essentially the solution offered by R.Coase who argued thar externalities were best dealt with by a market in which externalities could be traded through the imposition of property rights with the affected party paying a bribe or receiving compensation depending on wherein the property rights were vested(which some may see as an arbitrary or unjust criterion),and whether a cost or a benefit is being generated.What Coase is suggesting is not so much that we need to revise our theory of externalities ,but rather ,that some phenomena that are normally seen as externalities really are not.But this is evading the definition of an externality,because if the good or "bad" can be traded in a market then it is not an externality,by definition.The puzzle then is why a market such as one Coase suggested does not exist,and if the government must intervene to provide it,then his argument loses a lot of its *laissez-faire* force.His approach is basically a one sided approach to a two sided problem,meaning that "the payment of compensation only involves the payer taking into account the costs he imposes on others,failing to make the receiver take account of the costs he imposes on the payer"[3] thus mutual costs and benefits are still not equalised and an externality persists.

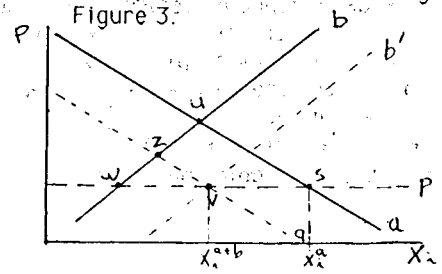
So it would seem that bargaining solutions are of dubious value in attempting to overcome the problem of externalities and that some form of coercive measures might be needed.Such measures of course could only be enacted by the government and an example would be the physical internalisation of an externality as first occurred in the case of the Tennessee Valley water authority.But while such policies can be of considerable success when applied to productive enterprises they would be wholly useless if they were tried on a multiplicity of households.

Another possible approach the government could adopt,which is in fact a derivative from Coase's suggestion would be for it to assume the property rights to a certain resource and then sell quotas to firms.the difficulty is that this would favour large firms who might concentrate their production or use of the resource in a particular area thereby conferring costs or benefits on the inhabitants of that area disproportionately relative to the rest of the population who through the state,are supposed to be owners of the resource.

Yet another alternative would be for the government to set the socially optimal output at a certain level(assuming this could be calculated given the usual problems of untrue preference revelation etc.) and then restrict all firm's output below this level.This approach to is fraught with difficulties.There would be a persistent tendency to "free-ride",indeed this is why there is a problem in the first place;thus there are very serious enforcement difficulties.The state may not pick the right limit on output and thus needlessly drive up its price,or drive firms out of the business,leaving us in a worse position than when we started-tyre factories may cause pollution,but we need some tyres.

All in all then government intervention ,apart from the infringement of property rights is seen to be problematic.The traditional solution to the externality problem which seems to overcome these difficulties is the so-called "Pigovian tax".

Figure 3.



In figure 3,as in figure 2 initial equilibrium is at point S with a's consumption of x causing b a disutility.But if the state were to impose a Pigovian tax on a's consumption of x equal in value to the marginal damage sustained by b then a"s demand curve should shift back to a' with equilibrium being re-established at point U causing the socially optimum quantity x^{a+b} to be demanded,and the apparent disappearance of the externality.But in fact equilibrium would not settle at U but rather at Z because there would now be an incentive to bargain with a loosing UZW but with b gaining VUW thus representing a net gain to the two of VUZ.Buchanan and Stubblebune in realising that the positing of a unilateral tax would not achieve the social optimum suggested that the affected party,here being b,should also be liable for a tax equal in value to the reduction of a's consumption thus shifting his demand curve back to b' which intersects a' at U,the socially optimal level.

Certainly the imposition of such a bi-lateral tax would not be without difficulties,not least of which would occur in the setting of rates which would require true preference revelation while what is known as the conscience effect also has to be taken into

consideration,but nonetheless it would seem to be a more viable and realistic measure than those already discussed..,
In conclusion therefore,we have looked at the nature of externalities and various market and policy based responses to them.Not surprisingly since externalities are a market failure,the market oriented responses did not fare too well.Policy responses at least had some chance of mitigating the externality and given the marginalism on which traditional welfare economics is based,were found to be something of a blunt instrument.A tax of some sort was suggested as "the best of a bad lot".Another problem would seem to be the lack of an adequate theory of externalities .This can be traced to the inconsistency of discussing the problem of one agent's actions affecting others in a framework that assumes that no-one's actions affect anyone else.The essence of an externality in interdependence,which is assumed away in perfect competition .Theories of oligopoly which explicitly allow for the interdependence of actions would seem to be more relevant for our purposes,and this in turn implies that game theory also has an important role to play.However work in this area is very limited and we are left with the depressing conclusion after 50 years of effort that
"it is likely that different external effects will be solved by differerent methods,including that of doing nothing."[4]

Footnotes and Bibliography.

1.Feldman,p92.
2.Boadway and Wildasin,p105.
3.Ng,p184.
4.Ng,p176.

Boadway ,R.W. and Wildasin,D.E. ,Public Sector Economics.
Ng ,Yew-kwang,Welfare Economics.
Feldman,A.M.,Welfare Economics and Social Choice Theory.
Burtchead,J. and Miner,J. ,Public Expediture.