

Marketable permits  
can be used to tackle  
pollution problems  
economics essay



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Explain how marketable permits can be used to tackle pollution problems.

Explain your answer with examples from the real world.

What problems might a permit system face? Again use real world examples where possible.

Pollution has subsisted as a comprehensive subject augmenting to global environmental degradation and it is a general covenant that control systems are most essential. The cornerstone of environmental economics lies in the compulsion to address market failure by the usage of certain market-based instruments that are in fact aimed at tackling negative environmental externalities. Bernard (1999) believes imposing a Pigovian tax or setting a market of pollution permits will efficiently internalize an externality, such as pollution, whilst Taschini (2010) accordingly classifies market permits, along with taxes and subsidies, as key policy instruments for the control of externalities. However empirical evidence shows that even though both taxes and subsidies have identical effects on a firm's marginal costs, they have differing effects on the firm's long-run, entry-exit decisions. It is perhaps for such reasons that policymakers have found marketable permits preferable to these two other policy instruments as a method for providing economic incentives for pollution control. This essay is focused on the examination of market permits and is feasibly divided into two distinct parts; the initial examines by what means marketable permits can be used to tackle pollution problems, by highlighting its superiority over the traditional Pigovian tax, describing the three types of market permit systems, whilst the latter shifts focus to evident flaws in this approach.

Beder (2010) notes that the problem of externalities and the concomitant market failure has long been a part of microeconomic theory, and highlights that economists perceive pollution as the implication of an absence of prices for certain scarce environmental resources. Pearce and Turner (1989) mention that obtaining a socially optimum level of pollution is the aim of pollution regulation, and the traditional approach was to impose a tax on the polluter based on estimated damage created to the environment, which is termed a Pigovian tax, which is actually a tax that equates private and social cost. Taschini (2010) affirms that this tax is a levy on the polluting agent equal to marginal social damage, or rather marginal external cost, and Crandall (2008) correspondingly notes that these pollution fees penalize polluters in proportion to the amount they discharge into an air shed, waterway, or local landfill. However one should bear in mind that “ optimum” levels are merely theoretical, because no real-world charge has the ability to come close to such a level and “ acceptable” levels are therefore referred to. Hence, as highlighted by Crandall (2008), market permits are used more widely, especially in the United States, because they do not impose large taxes on a small set of polluting industries, as would be the case with Pigovian taxes.

Pearce and Turner (1989) declare standard-setting as the most common form of pollution regulation by highlighting that it is more widespread than taxes. A pollution permit system entails the activity of setting standards, whereby government allows a certain level of pollutant emissions before issuing permits for this amount, but an amendment to the preceding

approach is made. Pollution permits are tradeable in a permit market. The graph below describes the basic elements of marketable permits.

Figure 1: The basic elements of marketable permits

The horizontal axis shows the amount of pollution permits and the level of emissions, whilst the vertical axis depicts permit price. An assumption is made that one permit is made for required for each unit of emission. MEC is the marginal external cost curve. The curve labeled MAC is the marginal abatement cost curve and is in actual fact the demand curve for permits. For example at permit price  $P$  the polluter would buy  $OQ$  permits. The polluter takes this action because it is cheaper to abate pollution from  $Q_1$  back to  $Q$ , than to buy permits. On the other hand, in the region to the left of  $Q$  it is cheaper to buy permits than to abate pollution. The vertical dotted line,  $S^*$ , is the supply curve of the permits. A further assumption is made that the issue of these permits is regulated and not responsive to price. The optimum level of an externality is the point at which MAC intersects MEC (Pearce and Turner, 1989). So the optimal number of permits is  $OQ^*$ , at a price of  $OP^*$ . If government seeks a Pareto optimum,  $OQ^*$  permits should be issued.

Nash & Revesz (2001) consequently note that tradable pollution permit regimes became increasingly popular prior to J. H Dales advocated this technique in the 1960s, which continues to be used as an environmental policy tool for pollution control as it allows firms to trade the right to emit specific pollutants, and are essentially transferable discharge licenses that polluters have the option to buy and sell in order to meet the control levels set by regulatory authorities. More specifically the regulations authority

allows only a certain level of pollutant emissions, and thereafter issues permits for this amount, which are tradable; meaning they can be bought and sold on a permit market. Accordingly McGartland & Wallace (1985) defines this as a typical approach to environmental management that determines a set of minimum standards for environmental quality. Beder (2001) states that pollution rights trading are aimed at minimizing costs to firms rather than maximizing environmental gains. As a matter of fact, over a decade ago, Beder (2001) noted that such rights were being proposed as a method of meeting Kyoto Protocol targets for greenhouse gas emissions.

However this inherent assumption that the environment can take a certain amount of pollution that is acceptable, and that trading can ensure efficient allocation of that capacity to firms that need to use it implies a further conjecture that the environment has an assimilative capability. This approach is consequently highly dependent on the proficiency of scientists to weigh the impact of pollution on the environment and to conclude that level of pollution that will not permanently or severely damage the environment, thus defining it has the safe level of pollution. Such standard-setting implies the establishment of specific levels of environmental concentration of the pollutant, for example a certain percent of dissolved oxygen in water or level of sewage waste in sea water. In fact Pearce and Turner (1989) note that standards are most often set with reference to a health criterion, for example a level of contaminants that must not be exceeded in order for drinking water to be declared as such.

Once the acceptable level of pollution has been determined, Pearce et al.

(1994) explain that the initial level of pollution must then be determined and <https://assignbuster.com/marketable-permits-can-be-used-to-tackle-pollution-problems-economics-essay/>

there are various ways of doing so. Beder (2001) points out that the allocation of permits can be performed in two different ways: by grandfathering or by the auction or distribution rule. Grandfathering is merely dependent on historical emissions and are allocated free of charge. Whilst auctioning of permits to firms or countries by the use of demand curves is referred to as the auction or distribution rule. In this case however permits are not free of charge and the degree of trading of permits solely depends on the total number of permits. Nevertheless Pearce et al. (1994) regard grandfathering as the alternative that does not give way to any disruptions and it tends to be acceptable to all stakeholders.

As mentioned previously pollution permits are similar to standard-setting, however they are tradeable in a permit market. There are a number of reasons why permits have to be marketable. These reasons are regarded as apparent advantages of this market-based instrument. To begin with, polluters with low costs of abatement will find it relatively easier to abate pollution rather than buy permits. Whilst polluters with higher costs of abatement will have a higher preference for buying permits than for abating pollution. Allowing polluters the opportunity to trade implicitly results in the total cost of pollution abatement being minimized, as compared to the more direct regulatory approach of setting standards. Permits can therefore be proclaimed cost-effective.

Under the occurrence of new entrants, which will shift the aggregate pollution permit demand curve to the right, governments usually wish to maintain the same level of pollution overall. This means new entrants will buy permits if they are high abatement cost industries, otherwise they will

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tend to invest in pollution control equipment. If for some reason government felt that the increased demand for permits should result in some relaxation in the level of pollution control, it has the ability to issue some new permits, thereby inducing a rightward shift of the supply curve,  $S^*$ . Alternatively, it could be considered that old standards require tautening and in this case government could enter the market itself and buy some of the permits up, holding them out of the market; resulting in a leftward shift of the supply curve. Peace and Turner sees the permit system as one that releases the possibility of varying standards with comparative ease to reflect the conditions of the day, as with financial markets, where the central bank buys and sells securities.

An environmental pressure group, for example, concerned to lower the overall level of pollution could enter the market and buy the permits at any time to hold these permits out the market or even destroy them. The intensity of preference for pollution control is reflected in such a solution, as revealed by market willingness to pay. However the peril of this idea is that a government might react adversely to a situation in which the level of pollution it had decided was optimal or acceptable was being altered by people who disagreed with it; so new permits might simply be issued each time the environmental group bought the permits. Evidently the market in permits is free, that implies anyone may buy them; this relates into an unintentional feature of opportunities for non-pollution, that is environmentalists for example.

Permits are appealing because some of the problems of pollution taxes are avoided. As mentioned at the outset, it is only necessary for a standard to be <https://assignbuster.com/marketable-permits-can-be-used-to-tackle-pollution-problems-economics-essay/>

defined, prior the development of a mechanism for issuing permits. This means that a relevant tax rate need not be found, therefore the risk of misestimating a tax rate is sidestepped. Moreover, if there is inflation in the economy, the real value of pollution taxes will change, possibly eroding their effectiveness. This is also consequently avoided, whilst inflation is already taken care of, due to economic responses. Permits, on the other hand, adjust readily to such changes, whereas taxes would require adjustment because of entry to and exit from the industry. Hence, in terms of inflation and adjustment costs, pollution permits suffice as the most efficient approach.

In most analysis we tend to assume that there are just a few polluters and that the points at which the pollution is received, the 'receptor points', are also few in number. If we are to set taxes with at least a broad relationship to damage done, it will be necessary to vary the taxes by sources since different receptor points will have different assimilative capacities for pollution. Additionally, there are likely to be synergistic effects; several pollutants may combine to produce aggregate damages larger than the sum of the damages from single pollutants. To a considerable extent permits avoid this spatial problem.

Permits are also argued to have an advantage over charges systems with respect to 'technological lock-in'. Consider a need to increase the level of effluent removal, for example, it would be crucial to invest in a further type of abatement process. Therefore adjustments to changes in charge are improbable to be efficient unless the changes in the charge can be announced well in advance and can be supported by supplementary

assurance that a given charge level will be fairly stable over short and  
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medium term. Possible underestimation of abatement costs is also risked by the charge approach. In general, a permit system avoids this problem of highly-concentrated investment, government's uncertainty about abatement costs, as well as distrust by polluters of changes. Perhaps this is owed to the fact that the permits themselves are issued in quantities equal to the required standard, whilst it is prices that adjust. The demand for permits is determined by abatement costs; therefore an underestimation of these costs is merely one that the price of permits is forced up, whereas the environmental standard is maintained.

Based on the six above-mentioned advantages of marketable permits, it is clear that Pearce and Turner (1989) clearly expect the result of actual experience in permit trading to ultimately be no decline in environmental standards and a cutback in compliance, as compared to other approaches, such as a command and control, CAC, system in particular. A CAC system is such a system that would be used, for example, to regulate the extensive sulphur oxide emissions by industries, but the following example describes how marketable permits can comparably be used to restrain this problem.

Consider the existence of two factories, Alpha and Beta, which emit sulphur oxide into the atmosphere. Each factory has differing costs of controlling these emissions. Factory Alpha's statement recently reflected a cost of R200 to control one ton of sulphur oxide, whilst Beta spends R300 per ton on abatement costs. These marginal costs are illustrated below, in figure 2, by the height of the respective blocks. Note that it is assumed that the overall emissions are six tons from each Alpha and Beta. Now suppose that, under a CAC system implemented by government departments, Alpha and Beta are

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required to reduce emissions by one ton each. The resultant cost to Alpha is R200 and Beta R300, so that overall compliance cost is R500. Total emissions are now ten tons. These departments could instead issue permits for this ten tons of sulphur oxide. Since Alpha and Beta both emit the same amount of pollutants, they are regarded as equal polluters. Government should therefore see to it that the ten tons allowance is distributed equally. So via the grandfathering technique each Alpha and Beta obtain permits for five tons of sulphur oxide. Trading is allowed to occur with these permits, and the implication is that the permits acquire a market value. Let the resulting market value be R240. This is indicated by the horizontal dotted line on the graph. Since Alpha can reduce a ton of emission at a cost of R200, it will pay Alpha to reduce emissions below the number of permits held. In other words, although Alpha needs to only reduce emissions by one ton, a gain would be associated in reducing by more than a ton, say to four tons. This would give Alpha a credit of one ton to now trade with Beta. Beta would readily buy the permit because this would allow Beta to avoid cutting emissions at all. So the end result is that Alpha reduces by two tons while Beta does not reduce at all, thereby still achieving government's overall target of a combined reduction of two tons. Moreover the level of environmental quality remains as good as would be under a CAC approach, however under a permit system both factories gain from the trade.

Figure 2: Establishing the price of permits between two factories

Pearce and Turner (1989) define the three specific types of permit systems as the ambient permit system or APS, the emissions permit system or EPS, and the pollution offset system or PO.

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The emissions permit system if focused on issuing permits on the basis of source emissions, while ignoring the effects of these emissions on receptor points. In a given region or zone, the polluter would have only one market to deal with and one price, that is the price of a permit to emit pollutants in that area. Enzler (2009) says that emissions permits exhibit high for cost-effectiveness, long-term effects, dynamic efficiency, indirect profits, costs of uncertainties and information demand.

In 2002 EPS was suggested as one of the main regulatory instruments for achieving Kyoto targets, as it basically causes emission cut-backs to be performed by the country that generates the lowest cost (Enzler, 2009). Enzler (2009) further makes note that this type of permit system provides as an economic incentive that has been developed for persuading companies, such as fossil fuel producers, to voluntarily change their behavior, resulting in a more efficient share of the costs of Kyoto. This is made possible by the argument that it does not matter which country emits greenhouse gases, seeing that dispersion in the atmosphere will cause the impact to be noticeable worldly. Free trade would cause countries that trade permits to both be better off. As a matter of fact the Kyoto Protocol emissions trading system is a cap-and-trade system, which means that total emissions are limited or 'capped' and each country or company involved receives an equal amount of permits. Emissions trading prevents receiving penalties for permit exceedance whilst illegal discharge is prevented by monitoring.

An emissions permit regime system is determined and implemented by a policymaker. The structure of this process, as described by Nash and Revesz

(2001), is to be described below while Figure 3 serves as an initial, diagrammatic, summary of this.

Figure 3: The steps in designing and implementing a tradeable emission permit regime

The pollutant to be regulated is identified by a policymaker, thereafter an aggregate level of emissions that would be deemed acceptable is determined for a given period of time, such as a year. This amount is then subdivided into a number of discrete emission permits, each of which authorizes the holder to emit a fixed amount of the regulated pollutant. Other relating issues are defined along with each discrete permit; such as the bundle of rights that accompanies each permit and their longevity, whether the government can eliminate permits before their expiration, and whether unused permits can be retained for future use. A mechanism for allocating these permits along prospective polluters is adopted. For example prior emission history can be considered or distributed permits through an auction system. Next it is necessary for consideration of future improvements in environmental quality, as well as for investment purposes, must be made, paying particular attention to whether non-polluters should be allowed to purchase and hold emissions permits. This translates into the task of devising rules for the subsequent trading of permits in an open market.

With a pollution offset system, as with an EPS, the permits are defined in terms of emissions and takes place within a defined zone, however trade is not on a one-for-one basis, and the standard has to be met at all receptor

points, and the exchange value of the permits is then determined by the effects of the pollutants at the receptor points (Pearce and Turner, 1989). The parties exchange emissions permits on at ratios depending on the relative effects of the associated emissions on ambient air quality at receptors with potential to violate the standard. Nash and Revesz (2001) explain that under this type of market permit system a buyer is advised to only purchase a permit if the buyer's emissions would otherwise cause a violation of an ambient standard at a receptor point, in addition it is put forward that a buyer that requires permits to increase its emissions can buy them from a particular seller only if the total emissions of both the buyer and seller adversely impact ambient air quality at a common receptor point. Clearly the pollution offset systems combine characteristics of both an APS and EPS.

McGartland and Oates (1985) proposed a modification of the then conventional pollution offset system, which was referred to as transferable discharge permits or TDPs, that was believed to be able to effectively attain the predetermined standards for environmental quality and simultaneously prevent any deterioration in areas which are already cleaner than the standards. This offset system achieves an equilibrium whereby aggregate abatement costs are minimized for the resulting level of environmental quality. Moreover under such a system, regions that already satisfy standards will see reduced costs to polluters as well as a further cleanup of the environment.

All that has been described so far are assumptions and predictions that stem from economically-based theory. In practice, however attempting to arrive at <https://assignbuster.com/marketable-permits-can-be-used-to-tackle-pollution-problems-economics-essay/>

the socially optimum level is almost always problematic. Indeed, over the time market mechanisms are increasingly being used as a tool for allocating un-priced rights and scarce resources, but according to Beder (2001) Greenpeace campaigners have particularly been arguing that emissions trading puts “blind faith” in both science and government’s ability to determine “acceptable” baseline quality standards. In fact Pearce and Turner (1989) noted many environmentalists had then still questioned the impact of permit systems on environmental quality as well as the moral strength of this system. Beder (2001) affirms that the belief that markets are more efficient than centralized government, because information can automatically be gathered to adjust supply and demand so that resources to ensure efficient allocation of resources, cannot be extended to the market for pollution permits since the information required is often difficult to obtain. Often the regulator is unable to obtain specific wastage figures that are needed to ensure optimal regulation in this market.

Moreover pollution controls divert economic resources from other economic activities, thereby reducing the potential size of measured national output (Crandall, 2008). Perhaps this is the reason behind pollution permit trading being acknowledged as only a supplement to national mitigation in the Kyoto protocol on greenhouse emissions. However the basic argument is that permit trading is cost effective; stakeholders in permit trading face lower abatement costs than those that mitigate the emissions within geographical boundaries (Eyckmans and Kverndokk, 2009).