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# **Appropriate Remedies for Non-Trade Concerns**

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## **1. Introduction**

The pre-amble of the WTO Agreement on Agriculture calls for reform to be equitable "having regard to non-trade concerns, including food security and the need to protect the environment". Article 20 calls for an ongoing process of substantial progressive reductions to support and protection while taking into account non-trade concerns.

Recent papers by Lindland (1998) and Nersten and Prestegard (1998) define non-trade concerns in the context of the multifunctional nature of agriculture. They argue that the concept of multifunctionality in agriculture, and hence non-trade concerns, are nothing more than the economic concept of positive externalities, and thus should be treated in the same analytical framework. They identify three non-trade concerns associated with agricultural production: 1) food security, 2) viability of rural areas, and 3) environmental protection. These studies state that these three non-trade concerns are not only positive externalities, but are also public goods. Lindland makes the assertion that economic theory generally recommends that subsidies be used to correct for market failures associated with public goods problems. He further argues that "support coupled to the agricultural production, seems to be the most efficient way of ensuring a sufficient production level of public goods to the extent that these public goods are joint products of the agricultural production" (Lindland pg. 23).

The opening negotiating positions of the European Union and Japan demand consideration of the multifunctional role of agriculture in the next round of negotiations on the Agreement on Agriculture. They argue that Article 20 of the exiting Agreement on Agriculture should be expanded to include the multifunctional role of agriculture. Critics suggest that the reason that Japan and the EU are promoting multifunctionality is to justify continued treatment of agriculture as a special case and to foot drag the liberalization process. This proposal has met with strong disagreement by the Cairns Group of agricultural exporting countries and the Association of Southeast Asian Nations (ASEAN). The position put forward by these groups is best expressed in an article by Freeman and Roberts (1999) which argues that multifunctionality is disguised protectionism.

Freeman and Roberts agree that concept of multifunctionality is equivalent to the economic concept of externalities. However, they argue that these spillovers involve both positive and negative externalities. Providing agricultural support is a very indirect and high cost way of enhancing spillover benefits. They advocate specific payments that are targeted at providing the multifunctional outcome as a more efficient outcome. It might be added that multifunctionality is a concept that does not just apply to the agricultural sector, but equally applies to every other economic and non-economic sector.

To date the arguments against multifunctionality do not address the economic validity of the fundamental assertions of its proponents. This paper attempts to ascertain this validity. Section 2 looks at the economic definitions of externalities and public goods, and discusses whether the three non-trade concerns identified by Lindland are indeed externalities of agriculture production, and whether they are also public goods. Section 3 examines alternative mechanisms for correcting for externalities. The concluding section discusses appropriate methods for addressing Lindland's concerns.

## **2. Externalities and Public Goods**

### **What is an Externality?<sup>1</sup>**

At least one hundred years have passed since "external economies" entered economists' vocabulary. The externality concept has been used widely but no precise and agreed upon meaning of the term as yet has emerged and differences in meanings are often fundamental in nature (Papandrea p. 13). One definition is that an externality is a situation where the action of one economic agent influences the well being of either another consumer or the production possibilities of another producer and no mechanism for compensation exists.

This definition is very broad. To be practical some narrowing of the definition is needed. Indirect pecuniary interdependencies between economic agents are often excluded from the definition because these interdependencies are just facets of the proper working of the price system. For example, a technological improvement in one sector may increase production in another sector as a result of cost savings from lower input prices for the first sector's product.

Even when pecuniary interdependencies are excluded from consideration, the resulting categorization of what "indirect consequences" qualify to be externalities is still too broad for practical use.

The working definition can be further narrowed by considering only "relevant externalities." Buchanan and Stubblebine (1962) define "irrelevant externalities" as activities or "indirect consequences" for which the affected agents have no incentive to alter the generators' behaviour. Buchanan and Stubblebine further subdivide "relevant externalities" into those that are "Pareto-relevant" and those that are "Pareto-irrelevant". "Pareto-irrelevant" externalities refer to situations where one cannot make the agents affected by the externality better off without making the generators worse off. Normally, the government should take steps to correct only "Pareto-relevant" externalities. But, if society for some reason, other than economic, attaches

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<sup>1</sup>See Appendix A for a Historical Overview of "Externalities" in Economic Literature.

greater value<sup>2</sup> to the agents affected by a externality than to the generators, then government should, in this special case also take steps to correct for the “Pareto-irrelevant” externality.

### **Is food security an externality?**

The Lindland paper states that food security is a legitimate national concern in all countries, and postulates that the national feeling of well being associated with food security is an externality to agricultural production. In order to determine the validity of this argument it is necessary to identify (i) the externality associated with food security, (ii) the externality generating mechanism, and (iii) the relationship of this mechanism to agricultural production. The externality associated with food security may be a feeling of national well being associated with knowing that there is a secure supply of food or the externality may be related to health concerns if a large proportion of a nation's population does not have a proper diet. The externality generating mechanism most likely is consumption (or some minimal level of consumption). Consumption, is related to domestic agriculture production through a supply disposition identity that states that consumption may be sourced from domestic production, imports, or beginning stocks and that exports and future consumption (ending stocks) reduce the amount of food available for domestic consumption. Only part of the Lindland argument holds. The national sense of well being associated with the knowledge of food security is an externality, agriculture production is not the externality it is only an activity associated with the externality generating mechanism. Agricultural production is a substitute for other sources of supply such as imports and stocks.

These external effects of food security are not joint with agriculture production because consumption, the externality generating mechanism, is not joint with agriculture production. Furthermore the externality of food security cannot be joint with production. Increased agriculture production is not sufficient to guarantee food security. A country also needs guaranteed access to agricultural inputs (eg. machinery parts, fuel, fertilizer, etc) and a secure food distribution network. Neither is increased agriculture production the only method to achieve food security. Alternatively, food security can be obtained by guaranteeing secure access to food imports and increasing stock holding.

### **Is Viability of Rural Areas an Externality?**

Rural viability in some communities is related to agricultural production. Rural viability is some times equated with rural employment. Employment in this case could be considered to be the externality generating mechanism. Rural employment or the labour supply will be distributed between agricultural labour demand and labour demand by other rural enterprises. Labour is only one input in agriculture production and competing inputs can be substituted for labour as wage rates (or other factor prices) rise or as technology changes. Agriculture

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<sup>2</sup>As measured by the social welfare function.

production is only associated with rural viability and it is not an externality. The relationship is two steps removed.

The Lindland paper maintains that culture and traditions are sometimes deeply rooted in rural life and qualities, and that increased social and environmental problems often follow in the wake of urbanisation. However, these aspects are externalities to rural viability and not to agricultural production.

Furthermore, in rural communities, the interdependencies between rural viability and agriculture production are through the normal workings of the market. As such this interdependency is only a pecuniary externality.

### **Is Environmental Protection an Externality?**

Of the non-trade concerns identified in the Lindland paper, environmental protection is the most clearly associated with the traditional externality problem. But, there are both positive and negative environmental externalities arising from agricultural production, and both types have to be taken into consideration, and social trade-offs weighed, before correction is made. Not only are there both positive and negative environmental externalities arising from agriculture production, but a single environmental externality can change from being positive to negative depending upon the intensity of agricultural production. Consider the externality of landscape effects. To a certain degree, promotion of agriculture production will foster a scenic pastoral landscape, but beyond this degree the landscape effect will be lost as large buildings and silos are erected, and marginal marsh/forest areas are brought into intensive production. It has to also be remembered that agriculture is not the only generator of environmental externalities in the economy.

### **What is a Public Good?**

Samuelson (1954 and 1955) introduced a new perspective on externalities in his seminal papers on public goods. Public goods are distinguished from private goods in that the consumption of a public good by any agent cannot affect or subtract from the consumption of other agents. This aspect of public goods is called non-rivalry or nondepletability. If a good is a pure public good, then a second condition will also hold. This condition is called non-excludability, and requires that the consumption of the good by any agent cannot be limited or denied. It is generally recognized that left to its own devices, the market will provide less than the socially optimal amount of a public good. The reason for this is that each consumer's purchase of a public good provides a direct benefit not only to the consumer himself but also to every other consumer. As consumers do not consider these benefits to others in making their purchases, and because their opportunity cost for consuming another unit is zero, the payment offered to producers is not sufficient to provide a socially optimal amount of the public good. In addition, the non-excludability aspect of a pure public good creates a situation where consumers

can free ride. Each consumer has an incentive to enjoy the benefits of the public good provided by others while providing an insufficient amount himself.

### **Are all Externalities Public Goods?**

The term externalities is often used interchangeably with public goods. But, although all public goods are externalities, not all externalities are public goods. Pure public goods are just a special case of an externality. Whether an externality is a public good or not depends on whether the externality can be described as depletable (rivalrous) or as non-depletable (non-rivalrous). Depletable externalities have the feature that the experience of the externality by one agent reduces the amount that will be felt by other agents. Nondepletable externalities have the characteristic of public goods in that what is felt by one individual does not affect, and is not affected by what is felt by other individuals.

There are public good aspects to the national well-being externality associated with food security, and to the culture, tradition and urban social unrest externalities associated with rural viability. Environmental externalities associated with agriculture production can be either depletable or nondepletable. For instance, pollutants in a stream can be a depletable externality, while an attractive landscape is more likely to be nondepletable.

## **3. Alternative Mechanisms for Correcting for Externalities**

### **Is the mere existence of an externality enough to justify government intervention?**

It is important to distinguish between depletable and non-depletable externalities because the appropriate mechanisms for correcting for them differ. Whereas a market based solution sometimes work well for depletable externalities, it very seldom works for nondepletable externalities.

A market solution should be used, where possible, to correct for depletable externalities. The necessary conditions<sup>3</sup> for a market solution to work are 1) there is only a small number of agents associated with the externality; 2) the transactions costs of bargaining are minimal; and 3) property rights can be enforced. The government's role in achieving the market solution is merely to foster conditions under which the two sets of parties can reach a mutually beneficial agreement. The major advantage to market based solutions is that this approach requires little knowledge on the part of the government in order to work. Private agents, however, must know each others preferences and must have equal information. Information asymmetries between agents can confound the market negotiating process.

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<sup>3</sup> Appendix A describes these necessary conditions in more detail.

In certain cases impure public goods can also be tackled through a quasi-market solution. In these circumstances, where exclusion is enforceable<sup>4</sup> the impure public good can be optimally provided through a private association. For example Ducks Unlimited buy and preserve wildlife habitats.<sup>5</sup>

### **If the Government must intervene, what are its alternative choices?**

If a market based solution is not appropriate, governments have two choices. One choice is to indirectly intervene to affect prices, and thereby affect the incentives of the individual agents. This is a preferred option so long as pricing directly affects the incentives to produce the externality. The optimal pricing of externalities, both depletable and non-depletable, requires a different price to be set for consumers (victims/beneficiaries) of the externality than is set for its producers. This two price system can be created using taxes for negative externalities and subsidies for positive externalities. The government requires a great deal of information in order to set optimal tax/subsidy levels. The optimal solution requires the tax/subsidy to be exactly equal to the marginal value of another unit of externality. This implies that it has to be possible to measure the amount of externality being produced, and it has to be possible to measure the benefits and costs of both the recipients and generators of the externality<sup>6</sup>.

It is essential that the tax/subsidy be applied directly to the externality generating activity, and not to associated activities. For example, in the case of a negative externality, although a tax<sup>7</sup> on output would lead the firm to change its level of output, it would not necessarily lead the firm to change its behaviour with respect to the externality. If the incentives are aimed appropriately, the firm will try to reduce the amount of negative externality generated per unit of output instead of just decreasing output. Taxing output is only optimal in the very special case where the externality occurs in a fixed proportions relationship with output.

Likewise with positive externalities, subsidies need to be targeted directly at the externality generator. They should not be coupled with output, but aimed at the particular

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<sup>4</sup>See the theory of club goods in Cornes and Sandler (1996).

<sup>5</sup>See Bohman et al (1999).

<sup>6</sup>Measurement can prove to be a formidable problem. It is often not technologically feasible to measure the amount of externality (particularly in the case of public goods) being produced, and even in cases where it is possible to measure, it is often prohibitively expensive to do so. Measurement of the benefits and costs associated with public goods can also prove to be very difficult. In practice the degree to which an agent is hurt or benefits from a public good is only known to the agent. Economic literature is full of instances where agents would not have the proper incentives to provide a truthful valuation of externalities. Although, there are a variety of mechanisms to solicit truthful valuations from agents, such as contingent valuation and other mechanisms which make truth telling a dominant strategy (Groves and Clark), they all have problems associated with them, and can be prohibitively expensive to carry out.

<sup>7</sup>Direct payments should not be given in compensation to victims for negative externalities. Victims typically have a variety of responses they can make to reduce the damages that they suffer. Compensation weakens or destroys victims' incentives to take defensive action. In addition to this moral hazard problem, it provides an incentive for others to enter into the victims' activity.

activity directly producing the externality. Implementing subsidies which will not affect output is problematic. The only type of subsidy which will not affect output is a direct payment where the recipient can not affect the payment's size by changing his behaviour.

The government's other choice is to directly intervene by either providing the goods themselves in the case of positive externalities or by restricting activities in the case of negative externalities. Again, for the government intervention to be effective, it has to aim right at the generator of the externality, and not at associated activities. The advantage of the regulatory approach is that it can often be targeted more specifically than other interventions.

In certain cases the regulatory approach can be combined with a partial market based approach. This approach is being used with increasing frequency to address pollution problems. For example, quotas are specified for the total acceptable level of pollution, and the rights to the use of the quota are then marketed through *tradable externality permits*. Success of this approach depends on whether the externality is measurable.

#### **4. Alternative Solutions to Non-Trade Concerns**

Three non-trade concerns - food security, viability of rural areas, and environmental protection - have been identified by the EU and Japan as reasons not to liberalize agricultural trade. As discussed in Section 2, neither food security nor viability of rural areas are, in and of themselves, externalities. However, there are external effects or public goods stemming from both food security and viability of rural areas. Economic theory tells us that any remedial action that the government decides to take to bolster production of these positive externalities has to be aimed directly at their source and not at an associated activity (which in this case is agriculture production). Agriculture production should only be targeted if it can be shown that there is a one to one correspondence between agricultural production and the national feeling of well being associated with food security or between agricultural production and the cultural heritage found in rural areas. No such relationship exists.

There are three traditional solutions the government can undertake to correct for externalities: the fostering of missing markets, granting of subsidies, and/or direct provision of the goods. The appropriate choice of instrument depends upon a number of factors including the availability of information, and the cost of implementation. In some circumstances, the goals of food security and viability of rural areas can be conflicting. To the extent these goals are self-conflicting, different instruments will be needed to achieve them, and society will have to determine the appropriate trade-off between them.

The national feeling of well-being associated with food security can be generated in a number of ways: by better informing the public that global food capacity exceeds global food demand; through development of secure access of imported production inputs and food supplies

to complement competitive domestic sources; and perhaps through public private stock holding. Because food security, and the associated feelings of well being, are not joint with agricultural production, coupled production subsidies are neither appropriate nor effective interventions.

The viability of rural areas is seldom, and decreasingly, dependent alone on agricultural production. Where this is the case, this interdependency is a result of a competitive supply capacity, and no government intervention is required. The viability of rural areas can be facilitated in a number of ways: through special measures to ensure rural, remote and less populated areas are not disadvantaged relative to their more urban or centralized counterparts in terms of access to public services and facilities (transportation, communication, education); through an on-going review of government policies, programs and services to ensure that there are no unintended and negative impacts on rural areas; and perhaps through highly targeted and time limited initiatives aimed at mobilizing local resources to exploit sustainable economic development opportunities based on a local competitive capability. Support for an increasingly productive and efficient agricultural sector is not an effective approach to realizing viable rural areas, and often works against this realization unless other non-primary agricultural employment opportunities are developed. More efficient agricultural production usually implies less labour input, which in turn implies less populace to support the rural communities.

There are both positive and negative externalities associated with the environmental consequences of agricultural production. Again, trade-offs between conflicting goals have to be determined. Once the trade-offs are determined, policies need to be designed to address the specific problems. Although there may be a positive correspondence between agricultural production and landscape attributes, the correspondence is not one to one, and there is a point beyond which this correspondence becomes negative. This implies that if subsidies are the instrument chosen to correct for this landscape externality, they need to be tied to the particular attribute of agricultural production that gives the scenic value. If the scenic value comes from a particular technological practice, then any coupled payments should be focussed on this technological practice, rather than on output. If the value comes from just the fact that the land is in agricultural employment, then a per unit output subsidy is not needed. An income supplement pegged to a certain minimal level of effort, with cross-compliance regulations may be sufficient. If bio-diversity is the environmental goal, then it could more effectively be addressed through: regulations for protection of habitat, cross compliance regulations linked with direct income supplements/tax concessions, and in some cases direct payments could be tied to the number of select species of interest located on the farm.

There is no single appropriate method of government intervention to correct for externalities. The appropriate choice of instrument depends on the circumstances under which the externality occurs. Any policy formation exercise must clearly define the objectives, then target the instruments to meet the objective. The instrument must be targeted directly at the

externality generator and not at associated activities. Measurement becomes one of the most important determinants in the choice of policy instrument. Adequate measurement requires both defining and valuing the external activity. The costs of the corrective mechanism may outweigh the benefits from the change in the level of the externality. If this is the case no action should be taken to correct for the externality.

The method chosen for correcting an externality can create additional externalities. For instance, the coupled agriculture production subsidy, which the Lindland paper proposes, itself creates pecuniary externalities with the subsidies distorting international markets. Both positive and negative externalities are associated with agricultural production and addressing these externalities creates conflicting objectives. The same instrument cannot be used to address conflicting goals, and trade-offs need to be made. It is important to recognize that not all externalities are market failures requiring government intervention. Neither is it good policy to maintain an instrument while searching for new objectives to justify its continued use.

There is a very real concern that a pretence for correction of externalities may become a justification for protectionist interventions. From a practical perspective there are several methods that international agreements might use to limit the abuse of substituting externality correcting mechanisms for other trade distorting measures. A country which wishes to intervene, in the interest of correcting for positive externalities could be required to (1) demonstrate the existence of the externality and (2) provide measurable evidence that the benefits of correcting for the externality exceed the costs (including the costs imposed on international markets) arising from the corrective mechanism. To this end a net benefit approach might be appropriate where a country has to demonstrate that for instance the positive externalities of an activity exceed the all of the negative externalities associated with that activity.

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## Appendix A

### Historical Overview of Externalities in the Economic Literature

The definition for an externality which is most often quoted is that of Meade (1952) "(a)n external economy (diseconomy) is an event which confers an appreciable benefit (inflicts appreciable damage) on some person or persons who were not fully consenting parties in reaching the decision or decisions which lead directly or indirectly to the event in question". This is a very broad definition which is not specific about the institutional framework within which social interactions take place. The person or persons may be consumers or producers and the interactions may be between consumers, between producers, or between consumers and producers. Bator (1958) provided the broadest possible characterization of externalities "any situation where Paretian costs and benefits remain *external* to decentralized cost-revenue calculations in terms of prices" (1958 p 362). In effect Bator was equating all market failures with externalities.

Although there is considerable debate as to what should be included as an externality, for practical usefulness some narrowing of the definition is needed. Pecuniary externalities are often excluded because they refer to the general equilibrium interdependencies in the economy which are just facets of the proper workings of the price system. So externalities can not simply be general interdependencies in the economy. Likewise externalities like envy or altruism are usually not included in the discussion of market failing externalities.

A distinction between potentially relevant and irrelevant externalities is needed. Buchanan and Stubblebine (1962) define a potentially irrelevant external activity as one for which the affected agents have no incentive to alter the generators behaviour. From the group of potentially relevant externalities Buchanan and Stubblebine further classify Pareto-relevant and -irrelevant externalities. They argue that the desire to modify another's behaviour does not provide a good rationale for modification unless the ensuing change can be done in such a way that the party affected by the externality gains without the acting party being made worse off. This is a Pareto-relevant externality. Under this classification an externality includes both efficient and in-efficient resource allocations. The policy implication is that government should intervene when Pareto-relevant externalities remain after all possible negotiations have taken place. When all the gains from trade have been squeezed out of the situation, by the agents in question, there is no reason to intervene

A market is an institution in which individuals exchange not just commodities, but the rights to use them in particular ways for particular lengths of time (Gravel and Rees pp. 503-504). These rights which define the uses which the assets may be put are property rights. Therefore markets are institutions which organize exchange of control of commodities, where the nature of the control is defined by the property rights attached to the commodity. Prior to 1960 the examination of externalities had not focussed on the institutional arrangements within which transactions took place. Coase's article "The Problem of Social Cost" (1960) represents a turning point reflecting the growing awareness of the importance of institutions in issues of resource allocation.

Although it was not Coase's intention to clear up the confusion surrounding the notion of externalities (his seminal article did not refer to the word external economy) he did provide a framework in which the effects of an externality could be internalized. If the agent emitting the externality and the agents who are affected could negotiate, given an allocation of property rights with regard to the externality-generating activity, a socially optimal allocation of the externality can be attained. An efficient allocation of resources is a situation where no further mutually advantageous trades are possible. Mutually advantageous trades will not be possible where the transactions costs of the negotiation are prohibitively high and the problem of the externality will remain. The fact that externalities can be seen as inherently tied to the absence of competitive markets was originally pointed out by Meade (1952) and substantially extended by Arrow (1969). In this framework an externality arises when the private economy lacks the incentives to set up a potential market for the activity in question and the non-existence of the market will result in an inefficient allocation of resources.

Coase has had a lasting impact by centering economists' attention on the costs of alternative institutions in organizing economic activity, and the importance of these costs in evaluating the efficiency of the system. The institutional approach which has followed Coase has focussed on the formation of these institutions. The emphasis of this study has been on why the institutions have not developed and mutually beneficial exchange has not taken place. Exchange will not take place if individuals do not have effective control over the factor in question, if individuals do not have sufficient information to seek out profitable trades, and if individuals cannot agree on how to share the gains from mutually beneficial exchange.

Control over the factor depends on a system of property rights. The reasons for the lack of formation of property rights include: imperfect excludability or non-transferability. Imperfect excludability arises when effective control (i.e. the ability to determine use) of a commodity is not conferred on a single individual but rather on a (possibly large) group of individuals. When control is vested in a group, an individual who wishes to acquire control must enter into contracts with all the individuals in the group. This process may be extremely difficult or costly so that no one individual can acquire exclusive control. Factors with this characteristic are described as non-exclusive, common property or free access resources and examples include grazing lands, fishing grounds, and public parks. Control may also be defined in terms of the ability to exclude individuals. Exclusion requires devoting resources to detection and punishment. The cost of these resources is known as exclusion costs. Imperfect excludability results in potentially advantageous trades or exchanges not taking place. Even when exclusion is possible profitable exchange may not occur because of non-transferability of the factor.

Missing markets do not provide a complete description of market failure. Externalities may also not be internalized because of non-convexities in production. These non-convexities are usually associated with increasing returns to scale (Marshall's original concern with external economies). Non-convexity can also be associated with transactions costs which obstruct the formation of the market. This type of non-convexity is sometimes associated with substantial set-up costs so the private economy would lack the incentives to form a market. Heller and Starrett (1976:10) assert that an externality is "a situation in which the private economy lacks

sufficient incentives to create a potential market in some good and the non-existence of this market results in losses in Pareto efficiency". Although the failure of property rights to be developed is an important ingredient of many externality situations this failure is not by itself reason enough to conclude that there is inefficiency and hence there is scope for policy intervention.

A new angle on externalities was brought into the literature by Samuelson (1954, 1955, and 1958) in his seminal papers on public goods. Public goods are distinguished from private goods in that the consumption of the good by one agent does not subtract from the consumption of other agents. This aspect is known as non-rivalry or nondepletable. A true public good also requires that it is not possible to limit the consumption of any particular good or person. This condition is known as non-excludability.

It is generally recognized that left to its own devices the market will provide less than the socially optimal amount of a public good. Each consumer's purchase of a public good provides a direct benefit not only to the consumer himself but also to every other consumer. Private provision creates a situation where externalities are present. Because each consumer does not consider the benefits to others and because the opportunity cost of an additional unit is zero, since an additional unit consumed by one individual does not reduce the amount available for consumption by another individual, the payment offered to producers will not be sufficient to provide a socially optimal amount of the public good. Furthermore, the non-excludability aspect of a pure public good creates a situation where consumers can free ride where each consumer has an incentive to enjoy the benefits of the public good provided by others while providing an insufficient amount himself.<sup>1</sup>

External effects impart 'publicness' to goods so that externalities are now associated with the nature or definition of public goods. The pure public good is a polar case of an externality. In most cases externalities are felt and generated by numerous parties. In the case of multilateral externalities the externality can either be described as depletable (rivalrous) or as non-depletable (non-rivalrous). Depletable externalities have the feature that the experience of the externality by one agent reduces the amount that will be felt by other agents. Nondepletable externalities have the characteristics of public goods because what is felt by one individual is not affected by the fact that other individuals are experiencing it. It is important to distinguish between depletable and non-depletable externalities because the mechanisms which can correct for market failures differ. It can be argued that a decentralized market solution can be expected to work well for depletable externalities if enforceable property rights are assigned. However, market based solutions are unlikely to work for nondepletable externalities.

The easiest type of externality to address, with a centralized or decentralized mechanism, is the bilateral externality.<sup>2</sup> With this type of externality the preferred approach is typically a

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<sup>1</sup> Exclusion can strengthen the motives for production of a public good. However, whether this effect is large enough to make the operation of a market possible is still open to debate. Thompson (1968) argues that under provision may be mitigated. Oakland (1974) has argued for a presumption of under provision even when exclusion is possible.

<sup>2</sup> Unfortunately with bilateral externalities imperfectly competitive behaviour can result so that the Pareto

decentralized bargaining mechanism. The introduction of additional agents creates problems as mechanism design has to be tailored to personalize markets. In the case of the multilateral externality there were two types of external effects: depletable and nondepletable effects. If well-defined and enforceable property rights can be specified over the externality and there are large numbers of both emitting and effected agents, so that price taking behaviour can be expected, then a socially efficient solution can be negotiated for depletable externalities. Nondepletable externalities introduce a public good aspect to the problem and the associated free rider problem. This problem precludes efficient negotiation of all mutually beneficial bargains. As a result purely market based solutions are unlikely to work in the case of a depletable externality.

Given adequate information centralized mechanisms which employ quotas or taxes may work to correct for nondepletable multilateral externalities. But the assumption that adequate information is available is very strong. In practice the degree to which an agent is affected by an externality or benefits from a public good will only be known to that agent. Information asymmetries will confound the assessment of appropriate tax or subsidy levels. Mas-Colell, Whinston, and Green (1995) provide conceptual illustrations of why the asymmetric information will produce inefficient outcomes from the bargaining process. They also compare the relative effectiveness of taxes and quotas. The answer hinges on the distribution of the type of consumers and producers (where type depends on the degree that the individual agent is affected by the externality) which is only privately observed. Given that the benefits and costs of reducing externalities are unobservable, the parties involved may not have incentives to reveal them truthfully if asked. The question is whether the government can design mechanisms where truth telling is a dominant strategy (in a game theoretic sense). The answer is that the mechanism design which makes truth telling a dominant strategy can be prohibitively expensive.

All of the potential corrective mechanisms require that the externality generating mechanism be measurable. However, this may not be technology feasible and even if it is the measurement may be prohibitively expensive. Given the costs of measuring the externality and the expense of measuring the costs and benefits to both the affected parties and externality generators, it may be optimal simply to allow the externality to persist.

At the broadest level externalities cover all instances of general interdependence in the economy. Envy and altruism are legitimately classified as externalities but is it reasonable to ascribe market failures to these emotions. The concept of an externality is broader than the category of market failures. Buchanan and Stubblebine (1962 p.p. 208-209) state that "(t)he observation of external effects, taken alone, can not provide a basis for judgment concerning the desirability of some modification in an existing state of affairs. There is not a *prima facie* case for intervention in all cases where an externality is observed to exist". Cornes and Sandler (1996 p. 64) observe that "(i)t can be instructive to pay careful attention to the attractions and limitations of alternative institutional frameworks for delivering goods and services, rather than to start with the assumption that because of certain well-established inefficiency theorems pure public goods pose intrinsic problems. To ignore this choice may overlook a vital dimension of

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optimal solution may not be practical.

the problem, and in view of the widespread assumption that such situations justify government intervention".