Multifunctionality and non-agricultural supply of public goods

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Abstract

Pigouvian policies tend to change relative prices in a welfare improving way, but can also be used strategically as trade distorting policies. For this reason, the question has been raised whether a separate provision of rural public goods should be preferred to a joint production. We show in this paper that the answer to this depends on the assumptions made on the cost functions regarding the relationships between private and public outputs, and on the social demand for these public goods. We interpret the land constraint effect on the joint production, as decreasing marginal economies of scope and under this assumption, we show that the cost of a non-agricultural policy is greater than the cost of a farm policy for lower levels of production and lower level of social demand. This is through both with farm targeted payments or production subsidies, compared with non agricultural provision of the public good. We confirm this result in the two-country case, for which the optimal level of agricultural support for public good provision is in general lower than in the case of one country.

KEYWORDS : multifunctionality, jointness, economies of scope, public good, multi-output

1. Introduction

Following OECD (2000), multifunctionality of agriculture is defined in this paper as the set of public goods produced jointly with a commodity output. In those areas where agriculture can be said to be multifunctional, a key role for public policy is to ensure optimal provision of public goods (rural life, biodiversity, landscape). The public policy to provide a socially optimal level of these public goods depends on the characterisation of the jointness (see in particular Romstad et al., 2000), and on the level of the social demand for the public goods. Because of the jointness between food production and public goods, farm policies aiming at promoting such public goods are susceptible to intefere with food markets. For instance, farm subsidies are likely to have a significant impact on food markets, even if they are optimal from a national point of view (see for instance Anderson and Blackhurst, 1992). A more recent way to promote public goods in rural areas is a direct targeted payment proportional to the farmer's contribution to land management for instance. This type of policy addresses more precisely the socially desired effect of agriculture, but requires that the government is able to measure the individual contribution to the public good. Finally, the policy can be completely disconnected from farm activity, when state agents are paid to manage rural areas.

Thus, the question has been raised by OECD (2000), whether the promotion of rural public good was compatible with the objectives of trade liberalisation. Many important works have been carried out to discriminate between these policies (Romstad et al., 2000; Vatn, 2002; Peterson et al., 2003). More specifically, OECD (2000) looks whether it is possible to separate the market and non market supply of private goods and public goods. Their conclusion is that in most theoretical cases, government should explore the possibilities to separate the two types of products and proceed to this separation except in one major case: if economies of scope exist between food and public goods, then payments linked to the food products can be justified (OECD, 2003).

Nevertheless it is not clear why would economies of scope be a greater reason for farm subsidies than classical environmental externalities like in the pigouvian case for instance. Instead, one could argue that the existence of economies of scope is a reason to price specifically the public good output without any loss of efficiency. The purpose of our paper is to clarify this aspect. To do so, we need to impose further assumption on the structure of these economies of scope, that depend on the level of production, thus on prices. Having such assumptions in mind, the key point of our contribution is that the actual separation of the public good provision and the farm product supply is endogenous to the farmers decision (depending on prices). The government choice (or ability) to separate the payment of the public good and the payment of the private good does not ensure a separation of the two types of supply. Reciprocally, the government wish to over-pay the agricultural product does not ensure the conservation of jointness. Within this framework, it is no so meaningfull to try to compare the cost of a targeted farm policy (that still has a trade effect) and a commodity based farm policy (that has a unsure environmental effect depending on the commodity price). Instead, we chose to compare the cost of a non-joint provision of a public good (that really has no trade effect) and the cost of a joint provision of the two types of good (through a production subsidy or through a targeted payment). In this way, the public policy recommendation depends mainly on the level of production and the level of the social demand for public goods, and not only on the "existence" of economies of scope, which cannot really be assumed whatever the level of production. By definition, economies of scope provide farmers with an incentive to modify the private good supply as a response to the public good pricing. The further assumptions we make on the structure of the jointness are the following:

(i) the jointness between commodity and public good are due to economies of scope, which means that the two products are not necessarily produced simultaneously, but the cost of one good is affected by the quantity (and thus the price of the other good). It is important to note here that this formalisation implies that the government is able to measure (and price) any individual contribution to the public good.

(ii) we assume non constant economies of scope (to take account of the input constraint effects on the economies of scope). Thus, the optimal public policy depends on the level of production of the private good (thus, its price), and on the social demand for the public good. We show that the optimal policy is not the same for high level of public good demand and for low level.

The separation of commodity supply and public good supply in rural areas is indeed attractive since it allows efficiency in the public goods provision following Samuelson's condition. Besides, it ensures a minimal distortion in the food markets. To this respect, one could be tempted to interpret multifunctionality (the simultaneous production of food and public good) as a second best policy for public good provision in rural areas. We show that the first best policy is generally a share of joint production and separate production of a public good depending on the commodity price, the assumptions made on the technology, the possibility for the state to price the farmers' very contribution to the public good, and the social demand.

Both types of farm payments (joint production of public goods) are non compatible with the green box of the agreement on agriculture of the World Trade Organisation, whereas the non joint way (non farm policy) is compatible. To be accepted in the green box, environmental programs should have minimal effect on the production (which is not the case with jointness conservation) and should not have a revenu increase effect, which is not the case of the optimal policy.

Finally, in the large country case, the discussion is enriched by the terms of trade effect of the public policy. We used the demonstration by Krutilla (1991) in the case of pigouvian policies to illustrate that the optimal policy is likely to be a free-riding policy. Any large importing country is tempted to over use the joint provision of the public good in order to use this jointness as a means to affect the market prices of the commodity. An exporting country will under-provide the joint public policy in order to decrease the available amount of the food commodity.

2. Agricultural and non-agricultural supply of a public good

Case (1) : Optimal provision of a joint public good

Sakai (1974) describes the jointness through a dual cost function where two outputs are related by a cost complementarity, which means when the price of one output increases the cost of the other one decreases and its production increases. The jointness described by this technology which requires in particular the free disposal of inputs, is called economies of scope. We follow in this paper this technology to describe the relationship between one good and one public good, which several authors have allready used to describe multifunctionality (see for instance Romstad, 2001; Vermersch, 2001; OCDE 2000). Within this framework, it is important to note that the jointness is never necessary, but only a cost complementarity for the farmer. The extreme case of a fixed jointness would correspond here to an infinite cost of producing the public good separately. Using Sakai's dual description of jointness is thus a very general way to describe relationships between goods, but rests on the possibility for the state to set a price for the farmers' contribution to the public good. Food and environment are here two independent variables of a cost function and the optimal level of each is determined by the prices of both goods. The gains of providing the two outputs together depend from prices. Thus, this technology assures the existence of technological possibility for a separate production or joint production and our contribution is to show that is this possibility is not a sufficient condition for the superiority of the separate supply of the public good. Instead, if economies of scope can be found between some public goods and food production, it is a source of increased efficiency of farm policies (incentives) as compared with non farm provision of the public good.

The concept of economies of scope is used here to describe the relationship between an agricultural output *y* and a public good *z*, standing for the positive farmers' contribution to land management (biodiversity conservation, landscape, etc.). Referring to the standard definition of economies of scope in the multi-commodities case (see Baumol *et al*, 1988), we define economies of scope between *y* and *z* as the cost gains achieved when a same vector of output (y,z) is produced within one production unit instead of two :

$$E(y,z) = C^m(y) + C^m(z) - C(y,z)$$

where $C(y,z)$ is the multi-output cost function of *y* and *z*, $C^m(y)$ is the mono-output cost function of *y* and $C^m(z)$ is the mono-output cost function of *z* (when non farmers provide *z*).

We impose the following hypotheses on the technology, arising from the assumption of decreasing marginal economies of scope. Marginal economies of scope are supposed to be decreasing because for high level of production, constraints on allocatable inputs appear, notable land and labor, and outputs tend to be substitute instead of complement (Moschini, 1989). When the two outputs are substitute, marginal economies of scope are negative, meaning than producing agriculture and environment together tend are more costly than separately. This assumption gives another interpretation of a familiar intuition: when land is fixed, an increase in the level of production tends to produce more negative externalities and less positive externalities.

To formalize this, we assume that all cost functions $C^m(y)$, $C^m(z)$ and $C(y,z)$ are convex, and the multi-output cost function $C(y,z)$ increases at a higher rate than the two mono-output cost function, which accounts for the greater effect of the land constraint on the multi-output technology.

$$C^{m''}(z) - C_{zz}(y,z) \leq 0$$

$$C^{m''}(y) - C_{yy}(y,z) \leq 0$$

Furthermore,

$$C^{m'}(y=0) - C_y(0,0) \geq 0$$

$$C^{m'}(z=0) - C_z(0,0) \geq 0$$

which simply accounts for the existence of economies of scope for the lower levels of production.

Given this cost structure, for any pursued level of public good *z* (depending on the social demand), we have to consider two cases: either the production level *y* is low, there is a free disposal of inputs, and economies of scope are positive(a), or the production level is high and economies of scope are negative (b).

(a) for low levels of farm production $y \leq \bar{y}$:

Positive economies of scope imply:

$$C^m(y) + C^m(z) \geq C(y, z)$$

$$C^{m'}(y) - C_y(y,z) \geq 0 , \quad C^{m'}(z) + C_z(y,z) \geq 0$$

$$C_{yz} = C_{zy} \leq 0$$

From these cost functions properties one can deduce properties of economies of scope for low levels of production:

$$E(y,z) \geq 0 , E_z \geq 0, E_y \geq 0; E_{zz} \leq 0, E_{yy} \leq 0, E_{zy} = E_{yz} \geq 0$$

$$\mathbf{D^2}E(y,z) \quad \begin{pmatrix} - & + \\ + & - \end{pmatrix}$$

(b) for high of production $y \geq \bar{y}$ the substitution between *z* and *y* supposes that:

marginal economies of scope are negative:

$$C^{m'}(y) - C_y(y,z) \leq 0 , \quad C^{m'}(z) + C_z(y,z) \leq 0$$

$$C_{yz} = C_{zy} \geq 0$$

Thus,

$$E_z \leq 0, E_y \leq 0; E_{zy}=E_{yz} \leq 0 , E_{zz} \leq 0, E_{yy} \leq 0$$

$$\mathbf{D^2}E(y,z) \quad \begin{pmatrix} - & - \\ - & - \end{pmatrix}$$

Note that the maximum level of production $\bar{y}$ for having positive marginal economies of scope between agriculture and the public good depends on the desired level of public good. We write $\bar{y}(z)$ this level. As the cost function is symmetric in *y* and *z*, we can define $\bar{z}(y)$ as the maximal level of public good provision for having positive economies of scope at any given production level *y* (see figure 1).

We consider the case of suckler cow breeding on permanent prairie, generating ecological conditions favourable to the preservation of some elements of biodiversity, through the development of vegetable species of ecological interest, while grassland provides suckler cows with fodder (Plantureux, 1996). Vegetal biodiversity from extensive breeding is considered as a local public good after Samuelson's definitions of non-rivalry and non-excludability. We assume that willingness to pay exists among taxpayers for this public good. Environmental services associated to suckler cow breeding on permanent prairie are probably more important than this element of biodiversity, but we focus on it for its clarity. Economies of scope between agricultural production and biodiversity are assumed positive, which concerns only areas where the productivity in terms of beef and the productivity in terms of biodiversity are not too high, so that $z < \bar{z}(y)$, and $y < \bar{y}(z)$. Plantureux showed indeed that above a certain level of intensification, beef breeding has a negative impact on biodiversity, consistently with the assumption (b).

Economies of scope can arise from the fact that the land is a non allocatable factor between beef production and grassland biodiversity. It is therefore cheaper for a breeder to produce this type of biodiversity than it is for a non-breeder.

The private profit function is simply

$$\pi^M(p_y, p_z) = \underset{y,z}{Max}\{p_y.y + p_z.z - C(y,z)\}$$

where

$$C(y,z) = \underset{x}{Min}\{w.x; f(x,y,z) \le 0\}$$

is the cost function.

The farmer's multi-output equilibrium gives

$$\begin{cases} C_y(y,z) = p_y = C_y^m(y) - E_y(y,z) \\ C_z(y,z) = p_z = C_z^m(y) - E_z(y,z) \end{cases}$$

the comparative static of which gives:

$$\begin{pmatrix} dy \\ dz \end{pmatrix} = D.\begin{pmatrix} C_{zz}^m - E_{zz} & E_{zy} \\ E_{yz} & C_{yy}^m - E_{yy} \end{pmatrix}\begin{pmatrix} dp_y \\ dp_z \end{pmatrix}$$

where

$$D = \frac{1}{C_{zz}C_{yy} - C_{yz}^{\ 2}} \ge 0$$

We can immediately deduce that for low levels of public good provision (low level of social demand) the farmers' response to the policy is greater than the non farmers' response to the same policy. Conversely, for higher levels, the non farmers' response is greater.

Farmers' response :

$$\frac{\partial z}{\partial p_z} = \frac{1}{C_{zz}}.\frac{1}{1 - \frac{C_{yz}^{\ 2}}{C_{yy}C_{zz}}}$$

Non farmers' response:

$$\frac{\partial z}{\partial p_z} = \frac{1}{C_{zz}}$$

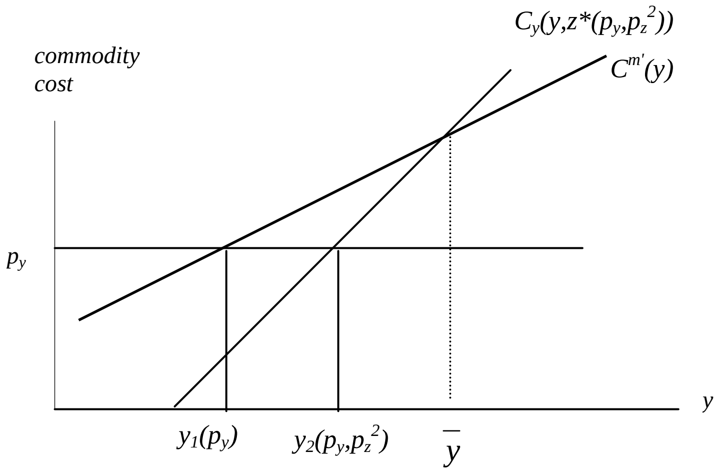
On the commodity market nevertheless, there also exists a farmers' response to this public policy:

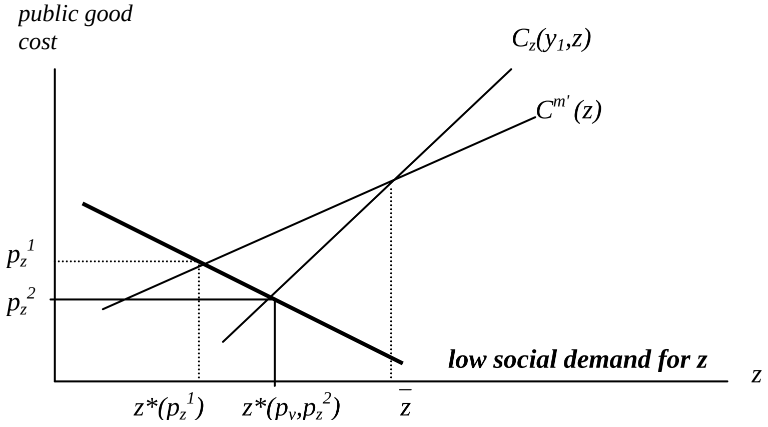
$$\frac{\partial y}{\partial p_z} = \frac{E_{yz}}{C_{zz}C_{yy} - C_{yz}{}^2}$$

The sign of this cross-effect is directly given by the assumptions on the cost structure. For low levels, the farmers' response is positive, otherwise, the substitution effect dominates, and the response is negative.

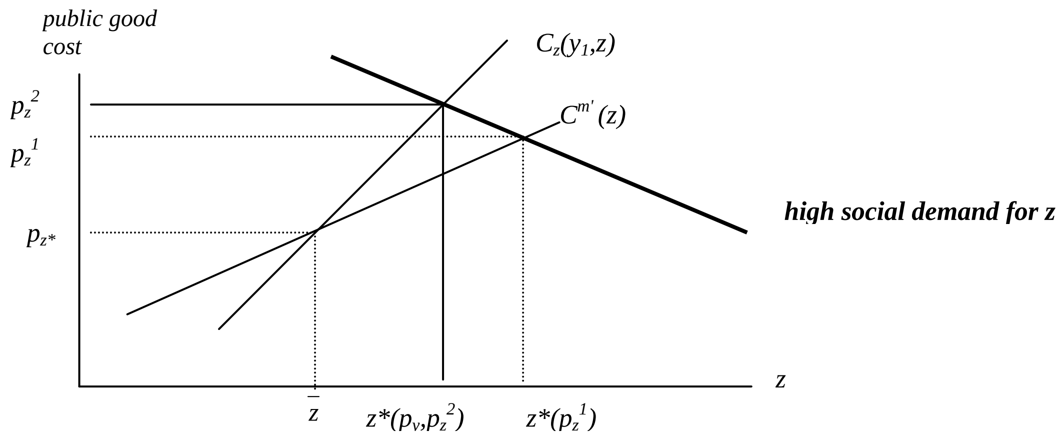
On can see this on graph 1 and 2. The best way to provide the public good depends on the production of the commodity and on the social demand. Thus the optimal pricing of farmers' contribution to the public good should be done regarding the mono-output cost for higher level of commodity production, and regarding the multi-output cost for lower levels. If the administration chooses automatically the mono-output cost to fix the p_z, then the equilibrium cost could be too high (p_z^1 instead of p_z^2).

Graph 1. Multi-output cost function C versus mono-output cost function C^m





Graph 2. Multi-output versus mono-output cost function (case of a high social demand)



Result 1

To provide rural public goods that meet a low social demand, given the level of commodity production, i.e. $z^* < \bar{z}(y)$, and under the assumptions of decreasing marginal economies of scope, the joint production of commodity and public good is more efficient than the separate production of the two. The optimal policy in this case is a pricing of farmers' contribution to environment at a lower rate (p_z^2) than the optimal pricing for non farmers (p_z^1), and the quantity of the public good will be greater. The commodity production will also increase. For several public goods of this nature joint to the farming activity, this result is more significant.

For a higher level of public good pursued ($z^* > \bar{z}(y)$), the non-joint production is more efficient.

Given the simultaneous increase in *z* and *y*, the symmetrical result holds. For a given level of public good pursued, its provision is more efficiently achieved through farm policies for lower levels of commodity production and through non farm policy for higher level of commodity production.

Therefore, contrarily to a common idea, a high social demand for a particular public good will not necessarily be fulfilled at a lower cost through farm policies than through a non farm policies. But the existence of a social demand for many amenities or public good justifies farm payments as opposed to non farm policies.

Case (2) : optimal provision of a public good produced as an externality of agriculture

We consider the case where the public good is an externality of the agricultural output *y* that cannot be priced by the government, in particular, because individual contributions to the public good cannot be measured. We shall write *z(y)* the level of public good achieved through agricultural output *y*, such as the prevention of erosion in desertificating areas. This formalisation corresponds to a very different way to model the public good, which cannot be represented as an ordinary output of a multi-output production function. For each given level of output production y, there is only one level of public good provision *z*(*y*), which was not the case in the previous formalisation.

This case has been widely analysed and a major conclusion is that the social cost of agricultural production is lower than private cost and the optimal policy is generally a pigouvian like subsidy on the commodity to correct this domestic divergence between social and private cost (see for instance Anderson and Blackhurst, 1992 or Corden, 1997).

Nevertheless, it is not clear if such a subsidy should coexist with a non agricultural way of producing this public good if it exists, which could be considered as a more targeted policy.

When there is neither agricultural nor environmental policies, the public good z now derives from producer maximisation behaviour for the production of the tradable output y only. The public good z does not interfere with farmer's choices, it is only a side effect of the production of y, and it is completely determined by the level of output and inputs market prices ($y^*(p_y)$, $z(y^*(p_y))$).

Following Oecd (2000), we represent on graph 3 the effects of a subsidy ***s*** per unit of beef on biodiversity. We write y^s the total amount of beef supplied with the subsidy ***s*** and z^s the level of biodiversity then achieved.

The subsidy *s* has two simultaneous and opposite effects. It raises residents utility of a marginal gain amount HI (decreasing), while costing a marginal amount BC on the beef market (BC = ***s*** is increasing). Let $L(y)$ be this total cost, equivalent to ABC triangle. We have $L(y^*)=0$ and $L'(y^s)$=BC. Consequently, there exists an optimal subsidy on beef such as BC = HI.

To deduce the optimal subsidy level ***s***, we formalise $L(y)$ as a function of z on the lower part of graph 3. We write $L(y) = W(z(y))$, hence

$$L'(y) = W'(z) \cdot \frac{dz}{dy} \qquad [1]$$

$W'(z)$ is the marginal cost the public good. Optimum is reached when $W'(z)$ equalises the marginal willingness to pay of the public good HI. Beyond this point, the loss incurred on beef market is greater than the marginal gain of biodiversity. The optimal subsidy *s* is such that :

$$W'(z) = HI \qquad [2]$$

We assume now that there exists a possible supply of the public good outside the agricultural sector, at a constant marginal cost $g(z) = g$. This public good *can* be and is *not necessarily* produced as an externality to the agricultural production. This non-agricultural policy leaves the commodity market equilibrium unchanged y^* while public good production is efficient z_e. Non-agricultural supply of the public good generates the amount z_e - z^* of public good. The agricultural sector supplies z^* for free.

With such an environmental policy favouring a non agricultural provision of the public good, welfare gains are GNK. With the farm policy, the gains are GHJ. Thus, one cannot assert that one way to provide a public good is systematically more efficient than the other. The environmental policy provides more public good if the social demand is high but it does not make society benefit fully from economies linked to the positive externality, when $W'(z) < g$ (where farmers are better public good providers than non farmers).

But if the social demand is low (such that it crosses $W'(z)$ below g), then the ambiguity is lifted, the farm policy is always more efficient. If we thing of agriculture as generating a bunch of many externalities with a low social value for each, then it is a strong argument in favour of farm subsidies instead of non farm policies.

It is possible indeed to achieve greater efficiency by combining non-agricultural policy and agricultural policy. Then optimal agricultural subsidy then is no more equal to resident's marginal utility, but equal to the marginal cost of public good production out of the agricultural sector.

Agricultural supply of public good is socially less costly than non-agricultural supply until this optimal level.

As long as $0<g<HI$, viz. the non agricultural marginal cost of public good is lower than the marginal cost induced by agricultural policy for an output y^s , then optimum at national level requires a strictly positive subsidy, although lower than if no alternative way to provide the public good exists.

The value of optimal agricultural subsidy ***s'*** is given by the equilibrium condition :

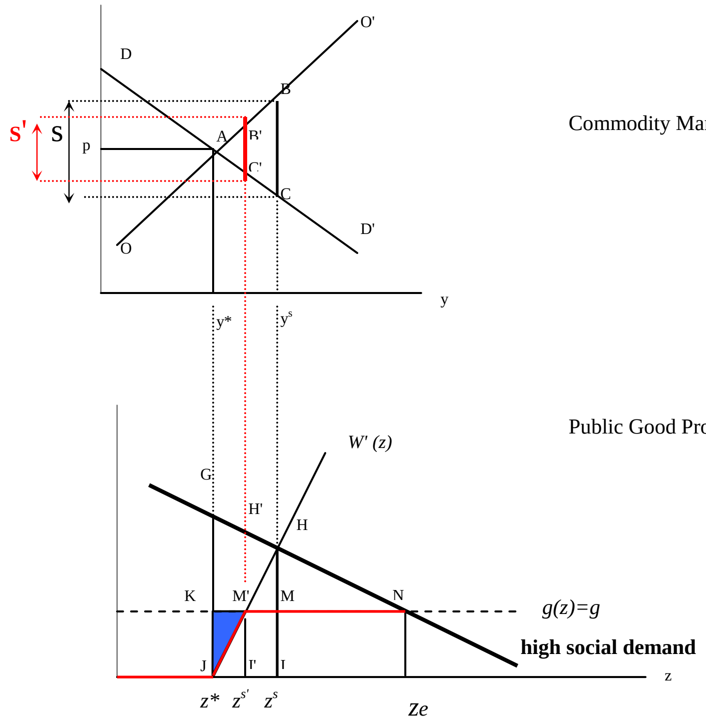
$$W'(z) = g \qquad [3]$$

From [1], we deduce ***s'*** such as :

$$L'(y) = g(z) \cdot \frac{dz}{dy} \qquad [4]$$

Public good supplied with by the agricultural sector is then $z^{s'}$, while $(z_e - z^{s'})$ is produced by the non-agricultural sector.

Graph 3. production subsidy versus non farm policy



Without agricultural policy, welfare gains of non-agricultural supply of public good are GNK.
With a farm support only, ***s***, welfare gains are GHJ.
With a farm supports ***s'***, combined with a public good supply outside the agricultural sector, total welfare gains are GNM'J, greater than GNK.

Result 2

When a rural public good meeting a high social demand is an externality of an agricultural commodity, and when a non-agricultural supply of this public good is made possible at a constant marginal cost, the optimal policy is a combination of a production subsidy and the non agricultural policy. At the optimum, the agricultural subsidy equals the non-agricultural marginal production cost of the public good. If the social demand is low, the first best policy is a farm subsidy.

3. Extra-territorial impacts of domestic policies for a joint public good

We assess in this section the changes induced by the above described policies on trade for large countries. We consider beef trade between two countries, France (importer) and Argentina (exporter). To describe the problematic of multifunctionality, we assume that there exists a local demand in France for some public goods that can be provided either through beef production or through alternative policies. We assume marginal production costs for beef to be lower in Argentina than in France, beef quality to be the same in the two countries, and to simplify, we assume the local demand for multifunctionality in Argentina to be zero.

Policy options to supply the public good are those considered in section 2.

(i) The French government finances completely the supply of z outside the agricultural sector and incurs losses due to the externality not being internalised. In this case, impacts on agricultural production in France and Argentina are nil. This policy, although generating no distortion on beef market, is not the optimal national policy : welfare losses are registered (yellow triangle on graph 4) compared to the situation of an optimal coupled support combined with an environmental policy.

(ii) The French government sets an optimal subsidy in order to benefit from the externality. Although optimal at the national level, such a policy is not accepted in the green box of the Agreement on Agriculture of the World Trade Organisation. Indeed (graph 3), such a subsidy increases the market share of French beef, and improve French terms of trade at the expense of Argentina, as long as the France is a large beef importer (see Corden 1997 ; Bagwell and Staiger, 1999).

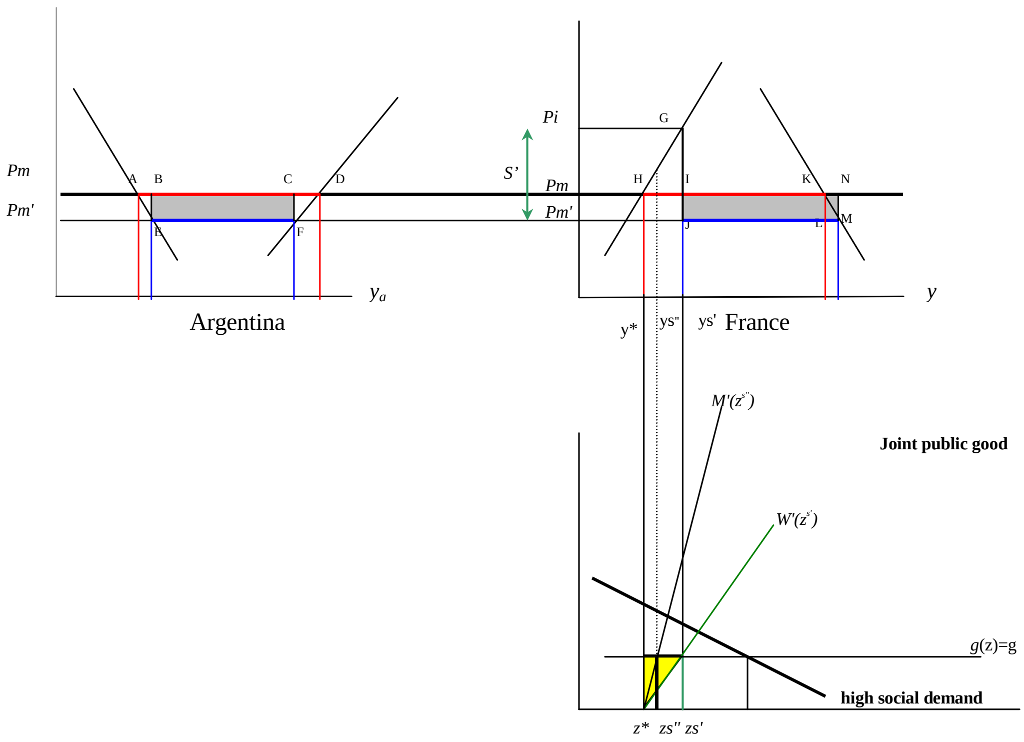
Let $J(y)$ be the international cost of the multifunctional policy in France, taking into account this term of trade effect. To deduce the optimal subsidy level ***s",*** we formalise $J(y)$ as a function of z, as we did in section 2. We write $J(y) = M(z(y))$. Hence, $J'(y) = M'(z) \cdot \frac{dz}{dy}$.

$M'(z)$ is the total marginal cost in Argentina and France beef markets. At free-trade world price level p_m, $M'(z^*) = 0$.

Beef subsidy in France has an uncertain impact on national welfare (IKMJ - GHI) because it leads to changes in world prices (terms of trade effect). Effects on Argentina is always negative (ADFE). Because BCFE = IKLJ. And if we do not take into account the public good effects, the effect of beef support in France is always negative : -ABE-CDF-GHI-KMN.

To integrate the public good effect, we note that $M'(z)$ equals -ABE -CDF -GHI –KMN. $M'(z)$ is increasing in z for all $z > z^*$ because all of its components are decreasing in y for all $y > y^*$. Finally, because we assume $\frac{dz}{dy}$ >0 for all $y > y^*$, it follows that $M'(z) \cdot \frac{dz}{dy}$ is increasing. The value of the globally optimal subsidy ***s"*** is given by the equilibrium condition : $M'(z) = g$.

Graph 4. Extra-territorial effects of agricultural support



Following [1] et [4] we deduce the optimal agricultural subsidy ***s''*** taking into account welfare effects in both Argentina and France : ***s"*** is such as : $J'(y) = M'(z)\cdot\frac{dz}{dy} = g\cdot\frac{dz}{dy}$

Finally, we prove that *J'(y)* is greater than *L'(y):*

- In the case of a closed economy, we have *L'(y) = BC = s'*
- In the two-country case, *J'(y)* = GI + NM + BE + CF = $(p_i - p_m) + (p_m - p_m') + 2.(p_m - p_m')$ $= p_i + 2.p_m - 3.p_{m'}$

Because $p_i - p_{m'} = s'$, it follows that $J'(y) = s + 2(p_m - p_m')$, hence $0 < \boldsymbol{s''} < \boldsymbol{s'}$

Result 3

In the two-countries case, under the assumptions made in section 2, the globally optimal agricultural subsidy for the provision of a public good is strictly positive even if an alternative way to obtain the public good at a constant marginal cost exists.

If the social demand for the public good is high, the optimal policy is a combination of a farm subsidy and a non agricultural provision.

4. Conclusion

We consider two different ways to model the linkage between a farm commodity output and a public good.

In the first case, the public good is an output of a multi-output technology and the optimal policy is a pricing of this output. Under the assumption of economies of scope, which generally corresponds to low level of production, we show that the separation of the two types of outputs is more costly than the joint production, unless the commodity production is very high and the social demand for the public good is very high.

In the second case we consider the public good as an ordinary externality of the commodity production. We show that when a non-agricultural supply of public good is made possible, a separation of these two types of goods is more costly for a low level of production, and becomes less costly when production increases. The optimal policy is then a combination of both policies. We show further that in the two-country case, the optimal agricultural subsidy once extra-territorial effects have been taken into account remains strictly positive, but is lower than in the case of a closed economy.

We draw two consequences on policy design :

1. Separating the provision of public goods and the production of commodity outputs cannot be a general recommendation relying on efficiency basis.

2. Separating the provision of public goods and the production of commodity outputs is not synonymous to targeting policy on the provision of public goods.

3. A joint production of public goods (through targeted payments) is preferable to separate production in areas with conditions where the level of production is low and factors are unconstrained.

4. When targeted payments are not possible, a farm subsidy alone (if social demand is low) or combined with a non agricultural provision (if the demand is high) is pareto superior to a non agricultural policy only.

5. Protectionism or subsidies that could help enhance multifunctionality in a given country may generate a net cumulative welfare that exceeds the level created through free trade. However, a "multifunctional" policy (i.e. that would be motivated by public goods reasons) in large countries creates both winners and losers in comparison with free-trade. For both importing and exporting countries, the nationally optimal policy differs from the policy maximizing global welfare. This latter includes a certain level of agricultural support in the multifunctional importing country that would partly internalise the terms of trade effect of the agricultural policy. The rest of the public good should be produced through the non agricultural sector until global optimum is reached.

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