Review of Agricultural Economics—Volume 24, Number 2—Pages 322–335

Multifunctionality and Agricultural Trade Negotiations

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Differing views of multifunctionality—attributing nonmarket benefits to agricultural production—continue to be an obstacle in World Trade Organization (WTO) negotiations. Some nations see multifunctionality as justifying subsidies to agricultural production; others see it as disguised protection. This paper shows that while multifunctionality never justifies trade interventions, it can justify production subsidies or taxes. Recognizing that the subsidies or taxes can be economically efficient policies, nations must precisely define and value the externalities in order to design policies and defend those interventions in the WTO. Trade rules are developed that accommodate domestic policy intervention while preventing disguised protection.

Differing views of "nontrade concerns" are a stumbling block in multilateral negotiations to liberalize trade. Article 20 of the Uruguay Round Agreement on Agriculture (URAA) calls for "substantial progressive reductions in support and protection . . . " while "taking into account . . . non-trade concerns." In the current agricultural discussions in the World Trade Organization (WTO), some nontrade concerns have appeared in the guise of multifunctionality: agricultural production provides multiple outputs that are not always valued in market transactions and, hence, are argued to be underproduced relative to what society may desire (Organisation for Economic Co-operation and Development).

The URAA set annual spending limits on production-linked intervention while allowing nations unrestricted spending for so called "Green Box" policies, including decoupled payments. The European Union, Switzerland, Norway, and Japan take the view that multifunctional objectives cannot be achieved by reinstrumentation of existing policies to "Green Box" policies. These nations argue for continued domestic support linked to agricultural production, as well as trade

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policies to meet domestic objectives. In contrast, the United States and the Cairns group argue that support to agriculture should move toward instruments decoupled from production levels and that domestic objectives do not warrant trade interventions (Mullarkey, Cooper, and Skully). Production-linked interventions are reasoned to produce international spillovers that distort global production, consumption, and trade. They see the alleged benefits of multifunctionality as independent of agricultural output and not a justification for agricultural support that is linked to production. The U.S. proposal from June 2000 states, "the United States is likewise committed to and supports policies that address non-trade concerns, including food security, resource conservation, rural development, and environmental protection. The United States maintains that these objectives are best met through non-trade-distorting means, . . ." (Office of the United States Trade Representative, p. 2).

This paper presents a conceptual framework for analyzing multifunctionality and provides an approach for multilateral trade negotiations that can bridge the gap between these positions. A brief review highlights the ambiguity and lack of precision in the multifunctionality debate. A conceptual model for an open trading economy is presented that shows the interventions required to satisfy Pareto conditions under multifunctionality. While these results are known from trade theory, both sides of the multifunctionality debate ignore critical elements of that theory. The model finds that trade policy interventions are never justified by multifunctionality. Rather, it shows the first-best policy intervention is production-linked producer subsidies when multifunctionality is linked to agricultural production. However, determining the size of that intervention is very complex as it is the aggregate of positive externalities associated with multifunctionality, as well as traditionally recognized negative externalities.

Nations may disguise protection to farmers under the banner of multifunctionality. So other nations distrust their motives and call for tight restrictions on the use of coupled subsidies. The conceptual model yields policy interventions that, in principle, can be measured and can be used to place quantitative and verifiable limits on production-linked support. The final section of the paper examines techniques to arrive at internationally acceptable instruments. Agreement on the measures and implementation of valuation methods could lead to a system of rules that complements those for traditional domestic and agricultural trade policies.

Multifunctionality

Various nations have different views on what multifunctionality means and the extent to which it can justify support to agriculture. Bohman et al. outline the definitions, positions, and arguments made by key nations. The breadth of the concept contributes to the ambiguity of multifunctionality. In its general form, multifunctionality refers to services provided by agriculture beyond the marketed agricultural output and so a jointness with agricultural production is maintained (Organisation for Economic Co-operation and Development). However, beyond that general definition, individual nations have more specific, yet varied ideas. Examples include specific benefits, such as flood control, avalanche protection, outdoor recreational activities, environmental protection, and food security. More

abstract benefits may also be included, such as preservation of cultural heritage and rural traditions. Farming—to an extent distinct from agriculture—is alleged to provide these benefits, usually in some unspecified way which should entitle farmers to subsidies.

The Uruguay Round Agreement allows continued public support, but places rules on how such support is delivered. Nations are not restricted in spending for decoupled support or other "Green Box" policy instruments.[1] Instruments linked to agricultural output are included in the Aggregate Measure of Support (AMS), which must be reduced under the agreement according to annual maximum spending levels. Nations disagree over the ability of Green Box instruments to achieve multifunctional objectives (Bredahl, Nersten, and Prestegard). That is, can reinstrumentation of policies under the Uruguay Round rules yield outcomes that allow nations to satisfy multifunctional goals?

A number of nations argue that Green Box instruments cannot achieve their policy objectives and the AMS annual spending limits are too confining (Bohman et al.). Inherent in this position is the belief that agricultural production provides specific joint nonfood services. Agricultural policy reform in certain cases will compromise the achievement of domestic nonfood objectives; hence, public intervention is required (Organisation for Economic Co-operation and Development). Because these societies place a high value on the joint outputs from agriculture, payments to farmers should either be shifted to the Green Box or not counted toward the AMS reduction commitments.

Other nations argue reinstrumentation to Green Box instruments allows nations to satisfy multifunctional goals when taken in conjunction with the AMS spending allowances for production-linked support. Externalities associated with multifunctionality do not justify production-related support to agriculture because they are not linked to production of specific commodities (Anderson). Further, nations question whether the externalities are even linked to agricultural production. The argument is that policy instruments not linked to production are superior and distort domestic and world markets less, thereby reducing the consequences of international spillovers that lower welfare of other nations. Even when conceding that agricultural production can produce some positive externalities, they point out that measuring or assigning values to such benefits is very difficult and risks disguised protection.

Norway illustrates the difficulty facing some nations under WTO rules. Bredahl, Nersten, and Prestegard analyze the reinstrumentation of policies for preservation of the Norwegian cultural landscape.[2] Norway faces the challenge of reinstrumenting national policies away from indiscriminate border measures to targeted support measures that meet national policy objectives. Current WTO–legal measures do not allow the production-linked support that Norwegians view as necessary to provide public goods, such as preservation of the cultural landscape. Norwegian agricultural policies proscribe many restrictions on production practices and on the scale and location of agricultural production. In the past, high domestic prices compensated farmers for the increased cost of meeting the production-related restrictions. As border measures are eliminated, the preferred alternative is to provide tightly targeted, but production-linked, subsidies. Examples include grazing practices on alpine meadows and maintenance of culturally related landscape features. Other nations face a similar dilemma, and progress

in international negotiations will be difficult until their concerns are taken into account.

Conceptual Framework

In this section, an open-economy model is presented that captures the dimensions of multifunctionality and yields Pareto conditions determining policy interventions. The model restates results from basic trade theory about policy intervention that have been known for some time but that have not been applied to the multifunctionality debate (see Johnson). Both sides, proponents as well as opponents, have overlooked critical aspects of these results.

The approach follows the framework presented by Bhagwati that uses four principal violations of Pareto conditions to rank policy alternatives. Pareto conditions for welfare maximization in a "small country" neoclassical model require that:

1. the marginal rates of substitution (MRS) in consumption equal the marginal rates of transformation (MRT) in production;
2. the MRS equal the foreign rates of transformation (FRT);
3. the MRT equal the FRT;
4. the economy must operate on its transformation frontier.

In an undistorted economy, the MRS will equal the relative price paid by consumers; the MRT will equal the relative price received by producers; and the FRT corresponds to the relative world price. Because the three relative prices are equal, free trade and no domestic production-linked intervention is the welfare-maximizing outcome for that nation.

These Pareto conditions are obtained only if social welfare is determined solely by consumption quantities without any externalities arising from production or consumption. All goods valued by the society are traded in competitive markets. Supporters of multifunctionality contend agriculture provides nonmarket benefits (externalities) labeled, for example, as "country-side services" (Hodge). Market failure is claimed because these benefits are not exchanged in markets and so are not priced. This view reflects a much different social welfare function than that underpinning most analysis of agricultural policies: Not only is welfare determined by the consumption of goods but also by positive and negative externalities.

Previous work on multifunctionality focuses on treating externalities in agricultural production as a multiproduct production process (Hodge; Romstad). Hence, they modify the production possibilities frontier to include multifunctionality. The more general approach outlined below assumes the values or costs of externalities arise from a society's preferences for attributes, some of which may be linked to production of agricultural goods. Externalities occur because agricultural production jointly generates nonmarket attributes that societies value, so the externalities must be reflected in the social welfare function. High-income nations place a greater value on environmental attributes than low-income countries. The attributes are present in both cases, but emerge as a policy issue only when consumers value the attribute.

We specify a social utility function for a country that depends on the consumption of a nonagricultural, composite good, C_0, the consumption of several agricultural goods ($C_i, i = 1, \ldots, n$), and externalities (E_j, $j = 1, \ldots, k$) linked to agricultural outputs ($q_i, i = 1, \ldots, n$).[3,4] The nonagricultural, composite good is produced and consumed without creating externalities and is used as a numeraire. Thus, the social utility function is specified as:

$$U = U(C_0, C_1, \ldots, C_n, E_1(q_1, \ldots, q_n), \ldots, E_k(q_1, \ldots, q_n)), \tag{1}$$

where $\forall i = 0, \ldots, n, C_i > 0, \partial U/\partial C_i > 0, \partial^2 U/\partial C_i^2 \leq 0$. Like a standard social utility function, the first derivatives with respect to consumption are the marginal utilities derived from the goods and decline as quantities consumed increase.

The difference between the social utility function given by equation (1) and the standard social utility function used in international trade and policy analysis is the externalities that depend on the agricultural outputs in the economy.[5] Production of a specific commodity may generate several externalities. That is, agricultural production is a multiproduct production process which provides commodity outputs ($q_i, i = 1, \ldots, n$) and externalities (E_j, $j = 1, \ldots, k$) which may be linked to outputs. The externalities are defined to be positively linked to social utility, $\partial U/\partial E_j \geq 0, \forall j = 1, \ldots, k$. That is, each externality is defined so that increases in the externality raise social welfare. However, the effects of changes in agricultural outputs on the various externalities are unrestricted in sign. Some activities or agricultural outputs, like raising sheep in an alpine meadow, may be positive from society's viewpoint, $\partial E_j/\partial q_i \geq 0$. Some, like intensive livestock production leading to nitrate pollution, may be negative, $\partial E_j/\partial q_i \leq 0$. Some externalities may be independent of output, $\partial E_j/\partial q_i = 0$. Some production activities may produce positive externalities over some range of output and negative externalities over another range (Hodge; Romstad). In addition, a single production activity can yield multiple positive and negative externalities. For example, a dairy cow produces milk, a marketed output; positive externalities, such as country-side services; as well as negative externalities, like manure, which reduces environmental quality.

Assuming fixed resource endowments ($V_h, h = 1, \ldots, z$), and given constant returns, t, the transformation frontier gives the economy's outputs assuming price-taking agents, no factor market distortions, factor mobility, and full employment:

$$T(q_0, q_1, \ldots, q_n; V_1, \ldots, V_z, t) = 0. \tag{2}$$

This is the standard form for the transformation (or production possibilities) frontier used in trade policy analysis.

Market closure is obtained with the following three sets of equations. Trade for each good (M_i) is defined as the difference between domestic use (C_i) and output (q_i):

$$M_i = C_i - q_i, \ \forall i = 0, \ldots, n. \tag{3}$$

Imports are indicated for $M_i > 0$, while exports are shown as $M_i < 0$. Also

national income and national expenditure must balance, and this is captured in a balance of trade identity where the balance of trade at world prices (P_i^*) equals 0:

$$\sum_{i=0}^{n} P_i^* M_i = 0. \tag{4}$$

Finally, to allow for the most general case, the home country is assumed to be able to affect world prices, so trade depends on the world prices according to excess demand functions:[6]

$$M_i = M_i(P_i^*), \ \forall i = 0, \ldots, n. \tag{5}$$

Maximizing the home country social utility function (1) subject to constraints given by relations (2)–(5) yields the following Pareto conditions:

$$\begin{aligned} \frac{\partial U/\partial C_i}{\partial U/\partial C_0} &= \frac{[1+1/\varepsilon_i]P_i^*}{[1+1/\varepsilon_0]P_0^*} = \frac{\partial T/\partial q_i}{\partial T/\partial q_0} \\ &\quad - \frac{\left[\sum_{j=1}^{k}\left(\partial U/\partial E_j\right)\left(\partial E_j/\partial q_i\right)\right]}{\partial U/\partial C_0}, \quad \forall i = 1, \ldots, n; \end{aligned} \tag{6}$$

where ε_i gives the trade elasticity for good i, $\varepsilon_i = (\partial M_i/\partial P_i^*)(P_i^*/M_i)$. The marginal rate of substitution for good i is the first term, $(\partial U/\partial C_i)/(\partial U/\partial C_0)$, and the marginal rate of transformation for good i is the third term $(\partial T/\partial q_i)/(\partial T/\partial q_0)$. The second term reflects the ability of the nation to use its international market power to improve terms of trade and extract welfare from the rest of the world, as is the case in the optimum tariff argument. The optimal tariff illustrates a policy instrument that can raise one country's welfare while causing a global welfare loss. The fourth term in expression (6) captures the externalities associated with the production of the ith good and does not appear in a standard model.

The presence of externalities in the home country's social utility function does not justify trade interventions. The marginal rate of substitution for good i equals the ratio of world prices adjusted by international market power as reflected by the trade elasticities. The trade policy conclusions from expression (6) match those in standard neoclassical trade theory. If the country cannot affect world prices, the trade elasticities go to infinity, and the marginal rate of substitution equals the relative world price. Free trade is a first-best trade policy intervention for a country unable to affect world prices even when positive and negative externalities are considered.

A second implication of expression (6) is that externalities linked to output in the social utility function justify a wedge between the marginal rate of substitution in consumption and the marginal rate of transformation in production for individual commodities. That is a production-coupled policy given by the fourth term in expression (6). The wedge between the marginal rate of substitution and the marginal rate of transformation has been recognized for negative externalities, where environmental payments based on resource shadow prices are argued to not distort trade (Ervin). The argument for subsidization in the presence of positive externalities is presented by Johnson (p. 125), " . . . where external economies

in production exist, ... marginal subsidies on production are required." The contribution of expression (6) is the explicit form of the intervention. The wedge is the normalized sum of the multiples of distinct effects. First, there is the effect of the ith good's output on each externality ($j = 1 \ldots, k$) and, second, the effect of each externality on social welfare.

The sign of the wedge is ambiguous for a specific commodity as the total of the externality effects could be positive, justifying a subsidy; negative, calling for a tax; or zero, indicating no intervention. With the definition of externality used here, $(\partial U/\partial E_j) \geq 0, \forall j = 1, \ldots, k$, increases in any externality raise social welfare. The terms $(\partial E_j/\partial q_i)$—the effect of increased production of good i on the jth externality—are more complicated. Some externalities, like those linked to multifunctionality, may be positively related to output levels. On the other hand, the same increase in the ith commodity's output may lead to more pollution that lowers environmental quality—$(\partial E_j/\partial q_i) < 0$. In many cases, $\partial E_j/\partial q_i = 0$, or the jth externality is not linked to increased output of the ith good. Also, the relationship may vary as output varies. Over a range, output increases might raise E_j, but further output increases would decrease E_j. For example, cattle on an alpine hillside might have this pattern. Up to some point, increases in cattle numbers might raise an externality associated with a bucolic landscape. As cattle numbers continue to increase, however, the scene becomes less and less bucolic and over certain densities of cattle, could become offensive. Alternative technologies also may have different linkages between E_j and q_i as captured by Romstad with a meta-production function approach.

A country's first-best policy intervention for each good is the sum of these effects across all externalities. Positive influences push the wedge in the direction of a marginal rate of transformation greater than the relative world price—a producer subsidy. Negative influences push the wedge towards a situation where the marginal rate of substitution and the relative world price exceeds the marginal rate of transformation—a producer tax. If $\partial E_j/\partial q_i = 0, \forall j = 1, \ldots, k$, no production linked subsidy or tax is imposed on good i. If this is the case, then there will be a more efficient set of policies to address externalities, such as decoupled payments.

The wedge for each commodity is the sum of the impacts from its production on the full set of externalities. Prior work, particularly for environmental problems, focuses on individual externalities linked to production of a particular commodity, and nations have adopted interventions tied to those individual externalities. Those individual terms are contained within the total wedge shown in equation (6). This formulation recognizes that the total policy intervention reflects the interdependence of multiple externalities arising from the production of an individual commodity. This approach is consistent with the recognition that a framework on multifunctionality must consider both positive and negative externalities (Organisation for Economic Co-operation and Development).

These results correspond to those found in papers analyzing the linkage between trade and environmental policy. Beghin et al. show that for a "small" country with an environmental externality, welfare is improved by reducing tariffs toward zero with an accompanying application of a pollution tax. Krutilla shows that while trade policy can achieve both trade and environmental goals, separate policies are superior for a "large" country. When trade policy and environmental

policies are separated, the optimal trade policy is imposed to reflect international market power and a tax is levied to correct the pollution externality. Vasavada, Saint-Louis, and Debailleul illustrate that trade policies can accelerate environmental damage and generate conflicts between trade policy and environmental goals. This confirms the need for separate policies as presented by Krutilla.

One strategy pursued in international negotiations to set uniform protection and to increase transparency is to include a rule on harmonization of policies. Harmonization is one centerpiece of the Sanitary and Phytosanitary Agreement. However, an implication of equation (6) is that interventions are nation specific and will be at different levels in different countries. Nations with lower positive interventions (subsidies) will raise the "competitiveness" issue and so press for harmonization. Bohman and Lindsey (1997) consider the case for environmental policy harmonization within the North American Free Trade Agreement (NAFTA) countries. Consistent with the result in equation (6), they argue against harmonizing environmental policies for agriculture.

The conceptual model offers three broad conclusions. First, it identifies a ranking of policy intervention. Trade intervention is never justified by multifunctionality. However, it may justify production-related domestic interventions. Second, any production-related domestic intervention should reflect the impacts of a commodity's production on the complete set of externalities. Nations have set interventions that reflect externalities, usually negative ones associated with environmental degradation, in a piecemeal fashion. Such interventions are but part of the total intervention implied by equation (6). Third, production-related domestic interventions are based on the externalities in an individual nation's social utility function. These externalities will differ by country; as cultural norms vary across nations, the valuation placed on externalities, and so on subsidies, will vary.

Valuation of Externalities

The conceptual model suggests that externalities can justify production-related intervention. Yet, protectionist interests may inflate the contribution of multifunctionality to social welfare and its linkage to output in order to increase the magnitude of the wedge. Many externalities are not assigned values in market transactions. Ervin identifies similar concerns specifically regarding environmental policies. The WTO recognizes the presence of negative environmental externalities associated with agricultural production, and nations are allowed to impose domestic taxes to offset such externalities. WTO rules also allow subsidies to cover the cost of correcting a negative externality. Yet the ability of specific national programs for environmental protection to satisfy international rules is uncertain (Ervin). *A critical question in trade negotiations is whether internationally acceptable rules for valuing positive externalities can be established and implemented by members.* The specific form of the intervention in expression (6) suggests there is an opportunity to create rules to allow nations to meet domestic policy objectives in the least trade distorting manner.

Lessons learned in the Uruguay Round negotiations for farm and trade policies offer guidance. Previous rounds that focused exclusively on border policies made little progress toward liberalizing farm trade. Inclusion of domestic farm policies

in the negotiations was seen as a precondition for progress. Yet, nations employed a variety of agricultural policies with a multitude of effects. Negotiators dealt with the multitude of policy interventions by first accepting a conceptual framework, the Aggregate Measure of Support (AMS). Then the policies to be included in the measure and the reduction commitments were negotiated. The use of the AMS as a measure was not problem free. For example, by shifting the mix of subsidies, the AMS could be reduced while maintaining or even increasing the distortion of markets (International Agricultural Trade Research Consortium). But nations agreed to use the measure, on which policies were included or excluded, and on a specified reduction commitment.

A similar approach could be applied to externalities. The intention would be to improve the transparency of policy intervention for multifunctional purposes. Acceptable methods of measuring the marginal social value of externalities, $\partial U/\partial E_j$, would be determined. Nations would be required to identify the specific externalities and how the marginal social valuation of each externality is linked to output, $\partial E_j/\partial q_i$. *This forces nations seeking subsidies under multifunctionality to state explicitly which externalities they value, what the values are, and how the values are linked to output decisions. Payments negotiated under these rules would be counted as Green Box payments even if production related.*

The total economic value (TEV) presented by Pearce is a candidate for the measurement of the marginal social value of an externality, $\partial U/\partial E_j$. This is a monetary measure of the value of a resource that is the sum of four parts. One part captures the value of direct use. Because agricultural outputs are already valued in the form of output prices in expression (6), this component would include income from other potential direct uses, like fees charged to farm tourists. A second component is the value of indirect uses, such as the value of avalanche control, reduced water pollution, flood control, or the value of viewing a picturesque countryside. The third component is the option value of the amount individuals would pay to guarantee future availability. The fourth part is the existence value that captures the value placed on knowing that the externality exists without exercising a claim on use. Setting the TEVs explicitly defines the externalities and their contribution to social welfare.

Determining empirical values for these components can be extremely difficult and controversial. How much does someone value having certain types of farms and rural communities in future years? How much would a Swiss citizen value knowing small Swiss dairy farms exist without intending to visit them? Resource economists use several techniques for estimating such values. In some instances, especially for direct and indirect uses, estimates can be made using shadow prices, the prices of substitutes or complements, or replacement costs. In some countries, urban residents pay for spending time on a farm. The damage of an avalanche or a flood can be estimated. In other cases, especially for option and existence values, contingent valuation techniques will be required. A common method for resources not traded in markets is to determine the willingness to pay (WTP) using survey techniques. Although this method has recognized problems with bias and consistency, it remains quite widely used in resource economics.

A challenging aspect is linking the TEVs to output, the third requirement. In expression (6), finding a positive value for an externality j ($\partial U/\partial E_j > 0$) is not

sufficient for a production-related subsidy. Nations trying to justify production-related subsidies would need to establish how the magnitude of each externality is tied to the level of production for specific commodities. That is, the magnitudes of each $\partial E_j/\partial q_i$ must be established.

For some externalities, the linkage may be relatively easy to determine using scientific methods. The environmental quality effects of nitrate pollution from various cropping activities on the quality of ground water have been estimated and used to establish regulations and levy taxes. In other cases, particularly for positive externalities, determining $\partial E_j/\partial q_i$ would be difficult. For example, how would one establish the contribution of a hectare of wheat if the externality is defined as the benefits to society from small farms? One approach would be to more precisely define the externality. Is the externality small farms or certain production and technology presently conducted on small farms such as dairy cows on pasture? Is the externality the pasture, the cows, or both? Perhaps the externality is the open landscape and has nothing to do with dairy cows or pasture. More precise definition of the externalities allows survey techniques both to value the externalities and to link those values to production levels and technologies.

Parts of this type of work are being done. Drake proceeds a considerable distance in the direction suggested by the method proposed in this paper. The externality is defined as landscape preservation in Sweden and willingness to pay (WTP) is estimated for various activities. For grains, the estimated WTP for landscape preservation is 123 ECU per hectare. Grazing and pasture generate a higher WTP of 237 ECU per hectare. The willingness to pay for wooded pastures is 299 ECU per hectare. Brunstad, Gaasland, and Vårdel incorporate willingness to pay information into the objective function of a mathematical programming model to determine optimum levels of production, production-related support, land use, and employment in Norway.

The method proposed in this paper diverges from Drake in that this method requires additional information. That is, Drake's WTP for landscape preservation of 123 ECU per hectare of grain is defined with respect to a given area and a single externality. The critical point shown by equation (6) is that the intervention needs to be separated into two components—the change in social welfare with respect to the jth externality and the change in the jth externality with respect to the ith good's output. Drake's measure captures the first effect but not the second. Furthermore, for any good, the effects must be summed across all of the externalities. That is, when setting interventions on a commodity basis, the effect of the intervention on all of the externalities must be considered.[7] Thus, Drake's measure is a point estimate for a given level of output and a single externality that does not account for the multiple attributes of a given activity or the impact of output changes.

The use of contingent valuation methods (CVM) to obtain accurate estimates of the willingness to pay has been a contentious issue in environmental and resource economics. One problem with using CVM for multifunctionality is that it requires a sophisticated survey instrument. Citizens would be asked to assign WTP values according to production activity and magnitude, technology, and location for several externalities. Questions have been raised regarding the reliability of contingent valuation methods to estimate existence values (McFadden;

Eberle and Hayden). Bergstrom and Stoll list several biases and survey design challenges in eliciting willingness to pay or willingness to accept values. Other concerns with the application of CVM include capturing the substitution effects (Cummings, Ganderton, and McGuckin) as well as issues of scope and/or embedding (Kahneman and Knetsch).

In support of using CVM, Portney reports that the National Oceanic and Atmospheric Administration (NOAA) panel headed by Kenneth Arrow and Robert Solow concluded that CVM studies can produce reliable estimates of lost use or existence values. Portney states that there is no reason why existence values should be unique to environmental policy. Individuals may have existence values for many different types of goods, including agricultural landscapes. Other researchers support the use of CVM values for policy evaluation (Brookshire and McKee; Walsh, Johnson, and McKean). Finally, Carson and Mitchell take issue with the criticisms of scope in contingent valuation studies. They contend that the issue of sensitivity of contingent valuation values to scope has always been one of survey design and administration and not an overriding flaw with the methodology.

A critical issue is the feasibility of using the proposed approach. The approach outlined in this paper places the burden of proof to precisely define and value the externalities on those nations wanting to claim multifunctionality as a justification for production-linked support. Would negotiations be smoother or more difficult? Would adoption of this approach endlessly delay negotiations? These are unanswerable questions. Presently one group of countries is very concerned about multifunctional issues and the ability of reinstrumentation to achieve multifunctional objectives. Other nations see those efforts as disguised protection. Such differences over this contentious and controversial subject invite another long round of negotiations that further isolates the WTO from important issues. The approach outlined offers a path, even if imperfect, out of this impasse.

Conclusions

An obstacle to continued progress in trade liberalization negotiations is the differing views of multifunctionality. Under multifunctionality, agriculture is seen as providing nonmarket benefits such as landscape preservation, environmental protection, flood control, and cultural heritage. The Uruguay Round Agreement calls for intervention to be in the form of so called minimally trade-distorting instruments, also known as Green Box policies. Proponents of multifunctionality argue that current Green Box policies are too narrowly defined, and seek to include policy interventions that, while linked to agricultural output, are directed at attaining multifunctional objectives. Spending constraints under the AMS prohibit these nations from realizing their policy goals. As a result, they press for shifting some production-linked instruments to the Green Box.

This paper proposes a means of bridging the national differences over multifunctionality. The conceptual model clarifies the effects of multifunctionality by modifying the social utility function to incorporate externalities. Several important lessons emerge from this conceptual framework. First, multifunctionality never justifies trade barriers. Second, multifunctionality may justify domestic output subsidies or taxes if the level of the externality is tied to output levels. Third,

the extent of support to domestic agriculture varies by nation. Fourth, nations have the incentive to inflate the importance of multifunctionality to disguise protection, so strong disciplines must be negotiated.

Three criteria for Green Box commodity policy intervention due to multifunctionality are proposed to reduce the problem of disguised protection and to improve transparency. First, a nation would need to explicitly identify the externalities due to multifunctionality. Second, a nation would need to value those externalities using standard market and nonmarket valuation techniques. Third, the values of the externalities would have to be explicitly linked to commodity output levels.

The criteria are strong. Assigning values, especially nonmarket values, has a number of limitations. Nevertheless, such valuation is being done by resource economists and application of those techniques to multifunctional attributes could be extended. Linking the valuation of externalities to commodity output levels will be especially difficult. Yet, this is the criterion that separates decoupled payments which are presently included in the Green Box from coupled support, which is presently excluded.

At its outset, the Uruguay Round negotiators faced the challenge of determining the extent of farm policy intervention and combining the multitude of interventions into a common, agreed measure. While that measure had flaws, negotiators were able to determine reductions. This proposal offers a similar path. It bridges the current gap in views on multifunctionality. Some interventions cannot be justified by multifunctionality. Other interventions may have merit, but that merit must be demonstrated to be included in the Green Box.

Endnotes

[1] Green Box policies are those deemed not to support prices or increase consumer costs. Examples include decoupled payments, research spending, and certain types of rural development programs. The subsidies are limited to the cost of compliance for environmental programs that qualify for the Green Box exemption (see Vasavada and Warmerdam).

[2] In this case, the externality is a public good. Externalities, broadly defined, are situations where one or more agents' activities affect the utility and/or production of other agents. A public good is a special case of an externality which can be characterized as nonrival, nonexclusive. In the model presented, the public good aspects discussed would be reflected in the specific form of any linkage between the externality and agricultural outputs.

[3] Identical, homothetic preferences are traditionally imposed so individual utility functions can be aggregated and national and global policy rankings obtained.

[4] Consumption and production quantities could be defined with respect to attributes or technologies. For example, organic tomatoes could be treated as distinct from nonorganic tomatoes, as they embody different attributes due to different production technologies and could be expected to have different linkages between externalities and outputs. An alternative formulation would be to include technology as arguments in the functions linking externalities to output levels which would be closer to the meta-production function concept in Romstad.

[5] A similar social utility function which includes environmental quality can be seen in Leger, in Beghin et al., and in Schleich. A partial equilibrium version appears in Krutilla.

[6] The trade equation should include the prices of all other goods and foreign endowments of resources. Since the focus of this analysis is the presence of home country externalities, those arguments are ignored. As shown later, the trade policy intervention is unaffected by the externalities, so standard trade policy rules apply.

[7] An argument can be made that a separate policy is needed for each externality. In this framework, the intervention is directed at the individual commodity outputs and how that affects all of the externalities. The externalities are interdependent through the production of the commodity, and so the impacts are summed over the externalities by commodity.

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