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## Chapter 7

# Of Models And Measures

## Some Thoughts on the Use and Abuse of Policy Indicators

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### Introduction

There has been an unusual surge in the use of policy indicators in recent years. Much of this has come from the inclusion of domestic policies in trade negotiations, both at the bilateral (U.S.-Canada) level and at the multilateral (GATT) level. Negotiating and codifying particular quantitative aspects of national policy is often convenient. But the demand is also evident for ways to capture the essence of national policies for purposes of evaluation and analysis even where no negotiations are involved. The growth of multicountry models has led to the need for variables that capture the essence of a national policy without the unnecessary detail. I want to take this opportunity to explore these two different uses of policy indicators and try to indicate what characteristics make such indicators useful. I shall conclude that we may need to rethink the way in which we calculate such policy indicators. At present, we are in danger of confusing ourselves as a profession and not helping those who seek our advice.

### What Makes a Good Policy Indicator?

One can define a policy indicator as a number which can be used to convey information about the level, impact, or effectiveness of a policy

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instrument or set of instruments. A large number of possible indicators illuminate some aspect of policy and the choice among such indicators should depend upon the use to which it is to be put. As economists, we have developed and quantified a number of these measures. Sometimes we use these as inputs into our own analyses of markets; they become the policy variables in our models. On other occasions, policy administrators, the media, and industry groups look to us for quantitative indicators that sum up the level, impact, or effectiveness of policies. The issue is whether we are meeting that twin demand.

To be useful to an administrator or trade negotiator, a policy measure should have certain features. It should be comparable over time, across commodities, across policies, and across countries; easily understood and interpreted; noncontroversial; easily measured and replicable; and reasonably accurate. A measure that does not allow comparisons gives little information for the policymaker, even if it is simple to understand, noncontroversial, and easy to calculate. A good, comparable measure which is easily understood can probably withstand a little controversy. The ease of measurement is perhaps of less direct interest to the policy administrator, though replicability might be an issue in international discussions.

To be desirable for use in economic analysis, the criteria for an indicator are almost entirely reversed. Ease of measurement (and finding a convenient source for the data) is the most crucial aspect, followed by its professional respectability and lack of controversy. Ease of understanding (by noneconomists) is of little moment, and comparability will not usually be an issue for use in a specific model.

How well do our indicators meet this dual task of monitoring policy and representing it in economic models? My answer would be "not too well." We tend to separate model building and scenario construction on the one hand from policy monitoring and indicator calculation on the other. As a result, our indicators are based on inadequate empirical foundations and our models use simplistic policy inputs. This generalization is not, however, inevitable. Measures can be both input into and output from models. Models and measures should be working together to add to our understanding of policy. We can improve our contribution to policymakers by rethinking the way we make use of both models and measures in the process of policy monitoring and advice.

## **Types of Indicators Available**

To make this argument more concrete, let us look at a few of the policy indicators in use in both economic modeling and policy description. Perhaps the most widely used is the nominal rate of protection, which is usually defined as the domestic price relative to an appropriate international price. This definition seems to fit the main requirement for an indicator of the level of a policy in a trade model in that it can be used in place of a tariff. It is both replicable and respectable and relatively easy to calculate. Although on the surface easy to understand, it does suffer from problems of interpretation in situations of world price instability. Moreover, any measure which uses world prices suffers from low credibility outside an academic environment. The nominal rate of protection (NRP) fares badly on the criteria of comparability; only in a world of tariffs and producer subsidies does the NRP have much informational content as a comparative indicator of policy levels or impacts.

As a reaction to this, policymakers have resorted to using simpler measures such as budget outlays as indicators of the extent of policies. Comparability is, at least superficially, rather good, as is comprehension. The economist might argue that a dollar spent on different programs can have very different effects, but in a zero-sum budget situation, program costs may indeed be the key policy variable. Economists have tended to react differently to the inadequacy of relative price measures, trying to make them more informative. The concept of value-added (effective) protection was devised to get around some of these problems and has had a good run in the trade literature, but as a policy indicator for administrators and the media, it has been a flop.

A more elaborate set of economic indicators has found favor in the development literature, based on the analysis of social profitability. Best known among these measures is the domestic resource cost (DRC), which indicates the social opportunity cost of resources used per unit of social value added. The DRC acts as an indicator of comparative advantage (low numbers indicating less cost incurred to add the same value to traded inputs) and as a proxy for social profits (the difference between social value added and social resource cost). Its value as a policy indicator has been extensively explored by Monke and Pearson (1989), in what they style as a policy analysis matrix (PAM). The contribution of different types of policies (output, input, and factor market) to correcting

divergences between private and social costs is clearly identified in the PAM. Any measure which involves calculation of social costs is bound to be both controversial and empirically challenging. But the reward is an indicator that attempts to capture the most fundamental aspects of policy, their cost to society.

Economists working on developed country agriculture have taken a different tack. Perhaps because of the greater availability of data and econometric estimates at the market level, the emphasis has been on the analysis of costs and benefits using Marshallian partial-equilibrium measures. This approach has led to such policy indicators as the economic cost of transfer to farmers, the ratio of the producer surplus gain to the net economic cost.<sup>1</sup> More recently, with the interest in international ramifications of farm policies, a new set of indicators has been added. These indicators measure the international externality of farm programs such as the effect on the income of one country's farmers of support to those of another country.<sup>2</sup> Heavily model-based, these indicators are not easily replicable and may be somewhat controversial. They do, however, have that element of communicability that is essential to a good policy measure.

Yet another set of measures has emerged, largely as a result of work done by OECD and USDA's Economic Research Service. Their estimates have been regularly updated since 1987 (OECD, 1987, and USDA/ERS, 1987). The general set of measures are proxy indicators that translate various policies into an "equivalent" level of another policy. The tariff equivalent is the most venerable of these and has obvious value in trade matters. The producer subsidy equivalent (PSE) together with its kin, the consumer subsidy equivalent (CSE), have been widely used in recent years as policy indicators in the agricultural area.

Equivalent-type measures rely for their usefulness on the comparability and comprehension of the instrument chosen as the proxy. A PSE turns everything into producer subsidies on the assumption that such subsidies both have an intuitive meaning and are comparable across countries, commodities, policies, and time. Because of their nature as proxy measures, these policy indicators do not in themselves either require or generate information on what would happen in the absence of the policy

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<sup>1</sup> For an early example, see Josling (1969). For more rigorous treatment, see Gardner (1983).

<sup>2</sup> A powerful use of such measures is found in Roningen and Dixit (1989).

under scrutiny. Thus, they are different in kind from most of the other measures mentioned above. The NRP requires an estimate as to what prices would be like without protection; the ERP does the same for value-added. The DRC and net social profit calculations also imply knowledge of the conditions in a situation without the policy. This knowledge is necessary to be convincing as a measure of the contribution of that policy to social profit. Recasting a mix of policies as a subsidy equivalent makes no claim about what would happen in the absence of such subsidies.<sup>3</sup> The calculation is correct or incorrect depending upon whether a subsidy would truly have the same effect, not whether the no-policy scenario is correctly specified.

## **The Debate on the Use of Subsidy Equivalents**

The recent interest in subsidy-equivalent measures has stimulated a small literature on the desirability of the use of PSE-type indicators in policy descriptions and in trade negotiations. The general conclusion of this debate seems to be that as quantitative indicators of policy levels (that is, how high protection is in various countries and over time), the information imparted by the PSE has been useful. At the least, it has cured the impression that each country's agricultural price is either so complex or so different that it cannot be compared with those of others. Indeed, policy comparisons may be too easy now; the very real quantitative difference among policy instruments may not show up in the quantitative proxy, however technically correct that proxy is.

Economists, however, have been quick to point out that PSE's do not capture the net transfer to producers as a result of policy.<sup>4</sup> A subsidy payment includes the amounts transferred to input suppliers, rental payments, and transfers to foreign consumers through terms of trade changes. A relatively small part might stay with the farm family. As indicated above, the PSE does not try to indicate the impact of policies on net income; it merely compares them with a subsidy. If a subsidy overstates the transfer, so will the subsidy-equivalent. If a tariff overstates

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<sup>3</sup> That is not to say that implicit with/without policy comparisons are not useful in calculating the PSE. To add up all the effects of various instruments, calculating the effect of each (relative to its absence) and adding them up is useful. But, the definition of a PSE is not based on knowledge about the no-policy situation.

<sup>4</sup> This point has recently been forcibly made de Gorter and Harvey (1990).

the net benefits from import protection (as it will), then a tariff-equivalent will do likewise. This constraint clearly limits the direct use of PSE's in the welfare analysis of farm policies.

The use of quantitative indicators for international negotiations has also been subject to scrutiny. The criticism, for the most part legitimate, has focused on two aspects of the PSE. The first is the implied link between income effects and output effects. All support policies generate somewhat different types of income flows; some might depend on input use, some on resource retirement, and others may be tied directly to output. Any measure that ignores these differences would misrepresent the output impact of policy. In Hertel's phrase, "the mix matters" (Hertel, 1987). The second aspect has been the implied link between output and trade effects. Policies can have different trade effects and yet similar output effects. The neglect of consumption effects is a common problem in trade policy. Why else would one encourage tariffs but discourage domestic subsidies? An uncritical use of PSE's as indicators of trade impacts would be open to this criticism.

The reaction to this debate of those of us who welcomed the increased quantification of policies and the opportunity to negotiate down the level of support in industrial-country agriculture was ambivalent. On the one hand, the weaknesses of using a simple policy measure to capture trade effects were apparent. On the other hand, the prospect of countries actually discussing quantitative reductions in all price support programs rather than haggling over the symptoms on an ad hoc basis was appealing. Criticism of the details of the measure could risk losing both baby and bathwater. Modifying the measure itself to improve its fit is better, keeping its clear advantages as an indicator of support cuts.<sup>5</sup>

This approach of modifying the measure on a seemingly ad hoc basis was clearly disturbing to the case for using the indicator in trade talks. Without a well-defined method, countries could play games with the calculations. And yet the definition of the method turned into a mininegotiation. Special interests began to take sides on the issue of the producer subsidy equivalent, aggregate measure of support, subsidy measure unit, and trade distorting equivalent (PSE/AMS/SMU/TDE), depending upon whether its use would help or hurt their cause. As the United States backed away from its use, the EC began to embrace it, or

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<sup>5</sup> This view is taken in Tangermann and others (1987).



was the causality reversed? Doubts on the way in which the PSE had been calculated in the U.S.-Canada free trade agreement also added to the confusion.<sup>6</sup> Whether the PSE has added much to the arsenal (as opposed to the lexicon) of trade negotiations as we thought 3 years ago is unclear.

## **A New Approach to Policy Indicators**

What are the lessons for our professional work and in particular for our work on policy indicators? I believe there has been widespread confusion over the meaning and interpretation of policy indicators such as the PSE which have made our work less useful to outsiders. I want to suggest a new approach which could help clarify some of the confusion still clouding the area. The approach starts with the notion of fixing the definition of a measure rather than its composition. This idea should appeal to us as economists. The consumer defines the product and its characteristics; the producer tries to meet those needs at a reasonable cost. The market signals the success of the venture. In this case, there are two "consumers," the policymaker and the modeler. Both should define the product, rather than the process by which it is created. How to create the product is the business of the profession.

Compare this with the present situation. Policy measures are defined by the formulae or techniques embodied in their generation. Both nominal and effective rates of protection are calculated from a formula. There are manuals that guide people down the path of social profitability analysis and partial equilibrium welfare calculations.<sup>7</sup> Such manuals are premised on the assumption that there is a "correct" way to calculate policy measures. This assumption clearly has benefits; assessing different protection estimates is easier if one knows that the same formulae have been employed. But the cost is that the interpretation is left to the decisionmaker. The chorus of cautionary statements that emerged from the profession when it became clear that the PSE might be used in trade negotiations is evidence of our legitimate concern. The problem was not with the PSE per se; other measures would have raised the same problems. The concern was that the measure might be misinterpreted. Fixed-definition measures would not prevent professional controversy, but

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<sup>6</sup> This controversy triggered a GAO (1991) report.

<sup>7</sup> A recent and excellent example is Tsakok (1990).

they would channel it into discussions as to how best to calculate the indicator, leaving the interpretation of the indicator reasonably transparent.

To illustrate this proposition, consider a PSE as a "generic" measure of the following type:

$PSE_{gen} =$  the subsidy which is equivalent to a set of policies.

As such, this definition is not workable for an empirical measure; instead, it defines a class of such measures. The three underscored parts of the statement have each to be further defined. The subsidy can be per unit, lump-sum, or any other form of readily identifiable transfer that has a specific interpretation. This subsidy can be equivalent in several different dimensions, such as farm income, farm output, asset value, net trade, farm employment, or the income of farmers abroad. The set of policies also can range from a single policy instrument to all government measures, both in agriculture and outside. Thus, many possible specific PSE's can use combinations of these definitions, each with its own correct interpretation.

The notion of a fixed-definition indicator is to prevent any problems of interpretation. Consider a few "fixed-definition" indicators that might be of interest in the context of policy reform:

- 1 - The budget cost of substituting lump-sum payments which leave the net income of farmers unchanged, following the removal of a policy.
- 2 - The per unit subsidy which would give the same output as the current policy mix.
- 3 - The direct producer subsidy which would have the same trade volume effect as the current policy mix.

Indicator (1) above is unequivocal. It is by definition the budget cost of such payments. Indicators (2) and (3) are similarly transparent in interpretation. The uncertainty comes in the calculation, not the interpretation. Estimating the budget cost may indeed be difficult. To do so, one needs a model of farmer behavior more sophisticated than encompassed in a partial equilibrium supply curve. Thus, such a model is needed to understand the effect of policy whether or not an indicator is

calculated. The model becomes more useful to policymakers because it generates the indicator that has been chosen for its relevance. The indicator becomes more useful because its definition is predetermined.

The three fixed-definition indicators listed above can be measured by specific PSE's. One could call them iso-income, iso-output, and iso-trade PSE's, respectively. No one would knowingly ask for an iso-output PSE as an indicator of the compensation required to offset the removal of price supports. No one could argue that the iso-trade PSE did not capture the different trade effects of diverse policy instruments; it does so by definition. The use would determine the measure, which would be custom-built rather than off-the-shelf.

What about the demand for policy indicators as inputs into models? These too can be customized. A trade model will usually require a fairly simple representation of domestic policy instruments. These often take the form of domestic supply and demand response to policy prices. In such cases, a measure such as an iso-output PSE (and the comparable consumer measure) will be appropriate. Transfers not tied to output or to input use would be excluded. By contrast, a world market model with no explicit domestic behavioral functions would require an iso-trade PSE to represent the relationship between world and domestic prices as a proxy for the actual set of trade-distorting policies. The model will operate "as if" the actual policies were included.

Doesn't this need ask a lot of our ability to derive these measures? Yes, but our ability is in any case limited by our understanding of the relationship between policy variables and economic impacts. In effect, we must use this understanding to improve the quality of our policy indicators. At present, models and measures compete for the eye of the policymaker. Models are constructed to answer particular scenario questions or sets of questions. Measures appear to offer a shortcut, a way to get policy answers without the full-blown model. But each measure (NRP, ERP, DRC, PSE, and so forth) contains its own implicit model. An ERP can be calculated only if we make assumptions about what value-added would be without output and input protection. Those assumptions include an informal model linking domestic price to world markets (usually that world market prices will hold in the absence of domestic protection). A PSE contains the result of a considerable amount of informal modeling of the transfers inherent in the various program instruments. My suggestion is to make that modeling apparent. Make the measures more sophisticated and accurate by harnessing the

information included in the models. Instead of competing for the policymakers' attention, the two activities would be complementary.

The implications of this can be seen by referring to the fixed-definition indicators discussed earlier. An iso-income PSE would require a sophisticated model of farm behavior. But such models exist and are used to examine the implications of changes in present program details. Simulating the replacement of some or all of the instruments currently used with a lump-sum payment which keeps net income to the farm family unchanged would seem a straightforward task. The iso-output and iso-trade PSE's are in principle easy to calculate from current models. But as models progress, the measures should keep pace. Models that include economywide feedback effects are refining our knowledge of policy impacts. A computable general equilibrium model would seem invaluable for estimation of a number of policy indicators. Hence, a CGE-based PSE would be a logical extension of recent trends in modeling.

## Conclusion

Models and measures should be seen as complementary aspects of economic analysis in support of policy advice. At present the two, as often as not, appear to be competing. Measures are seen as largely descriptive in nature and subject to misinterpretation or misuse. Where the measures require analysis, it is usually of an informal kind, with implicit models rarely specified. These descriptive statistics have found a limited place in modeling but are often considered to be a poor substitute for "policy detail." My suggestion is to think of measures as having specific definitions tied to their use and not their method of calculation. Competition would be among economists trying best to calculate the measure, rather than among marginally different measures, none of which is clearly focused on the problem. Models would be harnessed to provide sophisticated calculations, to supplement the current back-of-the-envelope methods. The measures would in effect be stylized output from the models, which in turn would allow better assessment of model strengths and model differences. Policymakers would be more likely to take seriously the output from a profession where analysts strove to refine and improve the product to meet consumer demand, rather than engage in internecine quibbles about which product the consumer should be offered.

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