ASSESSING THE RELATIVE TRANSFER EFFICIENCY OF AGRICULTURAL SUPPORT POLICIES

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
Paris 1994

COMPLETE DOCUMENT AVAILABLE ON OLIS IN ITS ORIGINAL FORMAT
ASSESSING THE RELATIVE TRANSFER EFFICIENCY
OF AGRICULTURAL SUPPORT POLICIES

This report was approved by the OECD Council in November 1993.
Preface

In November 1993, the OECD Council approved the release of this report. Regardless of the system used to support farm income, the costs to consumers and taxpayers will always be greater than the net benefits to farmers. But some systems of support are less wasteful than others. This study assesses the effectiveness of various policy instruments in transferring income to farmers, with a view to stimulating discussion on how to achieve the objective of income support at a lower cost to the domestic economy and with less distortion in world commodity markets.

The analysis focuses on four major policy instruments used to support cereals and dairy producers in OECD Member countries: a market support price; a deficiency payment; a direct income support; and a production quota. These instruments are compared in terms of the implications for consumer and taxpayer costs of delivering a given net income gain to farmers.
Assessing the Relative Transfer Efficiency of Agricultural Support Policies

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Assessing the Relative Transfer Efficiency of Agricultural Support Policies

I. Introduction

Since the call for the reform of agricultural policies at the meeting of OECD Ministers in 1987, several initiatives have been taken by Member countries to reform their agricultural policies. These initiatives, as well as developments in multilateral negotiations, indicate that agricultural policy is in transition. The move towards greater market orientation and the reduction of agricultural support, raise the issue of the effect of reform on farm incomes. Various policy measures, including an expanded role for direct income payments, have been proposed in order to support farm incomes during the reform process.

To provide a basis for assessing the income effects of policy reform, the Secretariat is analysing the transfer efficiency of agricultural policy instruments. The focus of this analysis is the effects of support reductions, policy reinstrumentation, and the potential use of direct income payments in connection with reform.

The Secretariat already calculates and publishes annual estimates of the costs of agricultural support in its Producer and Consumer Subsidy Equivalents [OECD (1993)]. These estimates provide indicators of the monetary transfers associated with agricultural policies, but do not measure the net farm income effects and the net losses to the economy associated with those policies [Cahill and Legg]. Previous analysis of the transfer efficiency of agricultural support in OECD Member countries, although somewhat limited in extent, suggests that the transfer efficiency of policies may be low in many cases [Blandford]. With total transfers from taxpayers and consumers amounting to US$354 billion for the OECD area in 1992 [OECD (1993)], considerable gains might be obtained by improving transfer efficiency.

The purpose of this paper is to assess the effectiveness of various policy instruments in transferring income to farmers. The results are intended to stimulate discussion on how governments can achieve domestic policy objectives, such as supporting farm incomes, at a lower cost to the economy and with less distortion in world commodity markets.

Section II provides a review of the principal elements which influence the transfer efficiency of a policy instrument. In Section III, the framework of analysis is described. Based on this framework, the transfer efficiency of major instruments is evaluated and compared. The results of these comparisons and the major conclusions are discussed in Sections IV and V.

II. Factors Determining the Transfer Efficiency of Agricultural Support Policies

Consumers and taxpayers generally bear the cost of support for agriculture, while farmers are the intended beneficiaries. Consumers may lose because they may have to pay higher prices and taxpayers may
lose because they may have to finance government support expenditures. If agricultural support were provided by cost-free lump sum transfers, the net amount received by farmers would be equal to the total amount paid by consumers and taxpayers (the gross transfer). In practice, however, other means of redistribution are employed which create transfer losses. As a result, the net increase in farmers’ income is smaller than the combined cost to consumers and taxpayers. Transfer efficiency analysis is concerned with the magnitude of the transfer losses associated with agricultural support instruments. Two major sources of transfer losses can be distinguished: i) **economic costs** resulting from inefficiencies in the use of productive resources and distortions in consumption patterns; and ii) **distributive leakages** due to income gains accruing to groups other than the intended beneficiaries of support.

Since the economic costs of support constitute a net loss to society, policy reforms that reduce these costs will increase aggregate income. Distributive leakages reduce the share of the gross transfer that is received as net income by the target group, thereby lowering the transfer efficiency of support. Distributive losses can be reduced through the use of instruments that channel income transfers more effectively to target groups.

The distortionary costs of support and its distributive leakages have both a domestic and an international dimension. In the domestic economy, **economic costs** arise from distortions in the use of the economy’s resources. These costs have traditionally been measured by deadweight losses in production and consumption, and the cost of taxation. Internationally, losses will result if global resources are not used optimally. Agricultural support frequently affects the volume of trade, leading to distortions in world market prices, production and consumption patterns in other countries, and in trade flows. Too many resources are tied up in the farm sectors of some countries and too little in other countries.

Part of the **distributive leakages** of agricultural support is also due to transfers to and from foreign countries. These leakages are created by terms of trade effects that transfer income across country borders, and world price effects that affect the level of domestic support expenditures. At the domestic level, farmers often share the transfers resulting from agricultural policies with both input supplying (“upstream”) industries and food processing and distribution (“downstream”) industries. In addition, part of the gross transfer will be absorbed by the costs of implementing and administering support programmes.

It may be the policy goal to transfer income not to all farmers but only to some sub-group of farmers. If a support instrument results in a distribution of benefits within the farming community that does not correspond to this policy objective, the transfer efficiency of support may be improved by switching to policy instruments that minimise benefits to non-target groups. The ability to channel income transfers to different groups of farm operators according to specific eligibility criteria has been identified as one of the aims of the efficient implementation of support [OECD (1994a)].

### III. Overall Framework of Analysis

The broad objective of transfer efficiency analysis is to relate the combined consumer and taxpayer costs associated with policy instruments to the net income farmers receive. Given the complex nature of many policy measures and the influence of specific economic parameters, particularly elasticities, on the economic costs and distributive leakages which are associated with such measures, a comprehensive assessment of transfer efficiency would require quantification. In this document, a more modest goal is pursued. The procedure followed is to compare policy instruments on the basis of the various components of transfer efficiency mentioned in the previous section, and to establish **rankings** based on each of these elements. The results presented in this paper are of a qualitative and preliminary nature.
The analysis focuses on four major policy instruments used to support cereals and dairy producers in OECD Member countries: a market support price; a deficiency payment; a production quota; and a direct income support. These instruments are “generic” in the sense that they represent stylised versions of those used in existing support policies, but do not fully describe programmes currently in place in the OECD countries. However, many of the important differences among existing support programmes can be addressed by a comparison of these four instrument types. Earlier conceptual and empirical analysis of the economic impact of these policies was published in OECD (1991).

Since many OECD Member countries are net exporters of cereals and dairy products, the transfer efficiency comparisons are initially conducted for an exporting country. Subsequently, an assessment is made of how the results might change if the country were an importer instead of an exporter.

The reference case for the comparisons of support instruments is a direct income support, which at the margin, distorts neither the market prices nor production or consumption decisions of individual commodities. In making the comparisons, it is assumed that the setting of each policy instrument is such that it increases income of the target group in a given country by a given amount, that is, the comparisons are standardised on a given increase in farm income.

The transfer efficiency of a policy instrument can be analyzed from either a unilateral or a global perspective. The difference lies in the way in which the spillover effects of domestic support instruments on farmers, consumers and government budgets in other countries are viewed. For instance, if support in a given country reduces the world market price, then this constitutes an implicit income transfer to other countries if the supporting country is a net exporter, or a transfer from these countries if the supporting country is a net importer. From a unilateral point of view, the international income transfer would lower or raise the transfer efficiency of support depending on whether the country is a net exporter or a net importer. In this paper, however, a global perspective is adopted. This is in line with the objective of promoting the use of policy instruments that are efficient based on domestic considerations and, at the same time, least distorting for world markets. Consequently, income transfers due to world market price effects are treated as an element of transfer efficiency and policy instruments are ranked with respect to the magnitude of such transfers across borders irrespective of the direction of the income flow. Alternative ways of accounting for the international effects of support are possible and might be used in analyses which do not adopt the perspective of this paper.

Much of the analysis is based on comparative static results derived from partial equilibrium supply and demand diagrams. Each policy instrument is first described and evaluated with respect to economic costs and distributive leakages. Changes in aggregate producer surplus, consumer surplus and government net expenditure are used to measure the distributional effects and the distortionary costs in production and consumption. The costs of economy-wide distortions created by income taxation are assessed on the basis of the marginal cost of public funds. Some of the more technical material relevant to the transfer efficiency comparisons is summarised in an Annex. A separate section of the Annex is devoted to the size of the economic costs of taxation.

IV. Summary of the Results and Conclusions

In this section, the results of the analysis performed are summarised. At first, a brief characterisation of the four policy instruments is given to spell out the assumptions underlying the transfer efficiency comparisons. The criteria used in the evaluation of the policy instruments are discussed in connection with the results.
Description of the policy instruments discussed

Discussion of each of the four instruments is based on the assumption that each is set in such a way that they increase farm income by the same amount. The mechanisms by which this is achieved are: 1) to fix the domestic market price at a higher level than the equivalent world market price, and to provide import protection and subsidies for the export of domestic surpluses if such surpluses are generated (referred to as the "market support price"); 2) to guarantee producers a per unit payment on output equal to the difference between a target price and the market price (referred to as the "deficiency payment"); 3) to set a support price and restrict production to a level below that which would otherwise occur at the support price (referred to as the "production quota"); and 4) to pay farmers a certain amount on top of the market receipts, where these payments are independent of current or future production (referred to as the "direct income support").

The market support price raises domestic producer and consumer prices, increases output, and reduces consumption. Distortions occur in both production and consumption. The deficiency payment raises the effective producer price, yet consumers pay the lower market price. It is assumed that neither the market support price nor the deficiency payment are tied to output restrictions.

The production quota is analysed within the wider context of quantitative restrictions on outputs and inputs. Such restrictions are increasingly used in some OECD Member countries, usually in combination with a support price or a deficiency payment. For instance, income transfers to farmers may be achieved by fixing a market support price above the world level, thus causing an increase in domestic production and a decline in domestic consumption. If the country was a net exporter initially, its exports will increase, and if the country was a net importer, it could become a net exporter if the support price is sufficiently high. In both cases, quantitative restrictions can be used to limit trade distortions and to reduce the government expenditures necessary to dispose of domestic surpluses in world markets.

Price support in connection with a production quota requires complementary import protection. In the discussion of the production quota, it is therefore assumed that domestic output restrictions are accompanied by import controls.

The direct income support is required to be independent of current or future output and therefore increases producer revenues without affecting consumer or producer prices. Direct income support might be provided through unit payments that are based on an invariable production volume, but farmers are not required to produce that quantity to receive the payment. The output level on which the payment is made may be based on past individual or regional production data.

The assumptions made above with respect to the policy instruments are necessary to facilitate the transfer efficiency comparisons. The validity of the conclusions drawn from the analysis is tied to these assumptions, yet many of the conclusions will also apply to situations that are slightly different. As with much economic analysis, the extent to which generalisations beyond the specific assumptions are admissible is largely an empirical question.

Presentation of the results

The results of the analysis of three of the four policy instruments -- the market support price, the deficiency payment, and the direct income support -- are summarised in Table 1. This table has one column for each of the policy instruments, and one row for each of the identified components of transfer efficiency. Within a row, policy instruments are ranked relative to each other based on how they perform.
with respect to that particular element of transfer efficiency. The higher the number attached to an instrument, the larger the efficiency loss associated with it. The rankings are valid for an exporting as well as for an importing country, although there may be differences in the magnitudes of the effects. Wherever such differences occur, they are discussed in the text. Question marks are entered in Table 1 where a ranking cannot be established without further analysis.

The rankings are intended to provide a multi-dimensional assessment of the transfer efficiency of support instruments. Since the rankings convey an ordering of instruments but do not indicate the magnitude of differences, the individual rankings cannot be aggregated to an overall efficiency measure. In fact, the predominant pattern is one in which none of the policy instruments dominates in terms of all criteria. The differences among the rankings reflect the different degrees to which instruments distort resource use and consumption, and generate leakages to non-target groups (including those associated with administrative costs).

The fourth policy instrument -- the production quota -- is discussed in a separate subsection. The special treatment of the production quota is motivated by the difficulties involved in analysing its transfer efficiency. Output controls are usually implemented in connection with some form of market price support and various combinations of support price and quota are possible to achieve a given net income transfer to farmers. As a result, specific assumptions have to be made in the analysis about the setting of the quota. This puts the production quota at a different level of generality than the other three instruments.

The interpretation of the results begins with Table 1, moving from row to row from the top of the table to the bottom. A brief description of the source of efficiency loss represented by each row precedes the discussion of the rankings. Subsequently, the results of and the difficulties involved in the analysis of the production quota are discussed. An overall assessment of the results is provided at the end of the section.

**Government and consumer costs of policy instruments**

The row elements in Table 1 are organized into three classes. The first group refers to the consumer and taxpayer costs of the transfer and is intended to establish a link between the concepts of Producer and Consumer Subsidy Equivalents and transfer efficiency. The second group addresses the income leakages that occur in the transfer process, and the third group comprises the sources of real income loss in the economy due to distortions created by support.

The first two rows in Table 1 (government and consumer costs) are not part of the transfer efficiency analysis per se but indicate the extent to which income transfers to farmers are financed by taxpayers or (via increased market prices) by consumers. Government costs are measured by the net impact of the policy instrument on the budget, and consumer costs by the change in consumer surplus. The change in government net expenditures also provides a basis for assessing the fiscal implications and the economic costs of taxation associated with a support instrument.
Table 1. **Transfer efficiency rankings of agricultural support policies**

<table>
<thead>
<tr>
<th>Policy Instrument →</th>
<th>Evaluation Criterion</th>
<th>Market Support Price</th>
<th>Deficiency Payment</th>
<th>Dir. Income Support **</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gross transfers necessary to achieve a given net income transfer to farmers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) From the government</td>
<td></td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>2) From consumers</td>
<td></td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3) <strong>Total gross transfers</strong></td>
<td></td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td><strong>Distributive leakages to non-target groups</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Administrative costs</td>
<td></td>
<td>1</td>
<td>3 (?)</td>
<td>2 (?)</td>
</tr>
<tr>
<td>5) Leakages to upstream industries</td>
<td></td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>6) Leakages to downstream industries</td>
<td></td>
<td>?</td>
<td>?</td>
<td>1</td>
</tr>
<tr>
<td>7) Leakages to non-target farmers</td>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8) Income transfers to or from foreign countries</td>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>9) <strong>Total distributive leakages</strong></td>
<td></td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td><strong>Economic costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10) Domestic DWL *** in production</td>
<td></td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>11) Domestic DWL in consumption</td>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>12) Economic costs of taxation</td>
<td></td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>13) DWL of programme administration</td>
<td></td>
<td>1</td>
<td>3 (?)</td>
<td>2 (?)</td>
</tr>
<tr>
<td>14) DWL in the rest of the world</td>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>15) <strong>Total economic costs</strong></td>
<td></td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

Explanations: The smaller the number, the smaller the economic costs and distributive leakages associated with the instrument. 1 = smallest costs or leakages; 3 = largest costs or leakages.

* All comparisons in the table are based on a given net income transfer to farmers.

** Direct income support; *** Deadweight loss.

The question marks in the row for **total gross transfers** indicate that the three policies cannot be ranked with respect to combined transfers from taxpayers and consumers unless the size of the economic costs and distributive leakages associated with each instrument are known.
In the case of an exporting country, the deficiency payment, being applied to total output and adding to export surpluses (thus exerting a downward pressure on world market prices, which in turn requires larger per unit payments), places the heaviest burden on the government budget. Direct income support, which as assumed distorts neither output nor trade, is somewhat less costly for the taxpayer. There are no deadweight losses and no world market price effects that would have to be offset by higher payments. The budgetary costs of the market support price are a function of the quantity exported and the elasticity of export demand. Unless the share of production exported includes all or nearly all of domestic output, the export subsidies associated with the market support price are likely to be smaller than the expenditures required for the deficiency payment and the direct income support. For an importing country, a market support price may generate net budget revenues if the country maintains the spread between the domestic price and the world market price through an import tariff or an import levy. However, the ranking of the three policy instruments with respect to government costs is the same for an importer as for an exporter, only the relative magnitudes will be different.

With respect to consumer costs, the ranking of the instruments is precisely the reverse of the ranking based on government costs. The market support price implies higher consumer prices, whereas there are neither immediate costs nor benefits to consumers from a direct income support. A deficiency payment may benefit consumers by increasing output and potentially lowering prices.

**Indicators of the distributive leakages associated with policy instruments**

This group of indicators refers to elements of transfer efficiency that do not constitute net income losses to the economy but represent income flows to non-target groups. Only the most important of these effects are mentioned in Table 1. Underlying the comparison is the assumption that the primary objective is to transfer income to farmers. A secondary objective may be to transfer income to certain groups of farmers (e.g., small or low-income farmers).

**Administrative costs**

The first element concerns the *administrative costs* of support. Such costs are associated with public sector implementation and administration of support programmes. Administrative costs, since they are financed from the government budget, carry with them taxation costs which should be added to those associated with direct government programme expenditures in the assessment of the economic costs of taxation. In addition, administrative costs may be imposed on private enterprises, particularly at the processing level, by some forms of support. Such additional costs will be reflected in reduced profits or passed on to consumers and farmers through higher food prices and lower farm output prices.

The administrative costs of a market support price consist mainly of the costs of tariff administration and the administrative costs of surplus disposal if domestic surpluses occur. The administrative effort is concentrated on border transactions, involving only a relatively small number of exporters and importers. For this reason, the market support price may have the lowest administrative costs. The other two policy instruments require implementation and supervision at the farm level and are therefore administratively more costly. The implementation costs of a direct income support can be quite high initially because a payment base has to be established for each individual farm. Once this base is established, the administrative costs of a direct income support programme may be reduced.

The farm-level information needed for deficiency payments consists essentially of current production data. There may also be significant costs associated with preventing fraudulent behaviour (e.g., inflated production records). If deficiency payments are made conditional on farmers meeting certain
requirements, such as land use or environmental restrictions, additional costs may be incurred to ensure compliance. On the other hand, if deficiency payments can be administered at the processing stage, the costs of programme implementation and administration may be substantially lower.

The ranking presented in Table 1 is based on the assumption that the institutional framework for the implementation and administration of the policy instruments has yet to be created. In fact, due to their different experiences with previous and current support programmes, OECD countries differ substantially with respect to existing administrative infrastructures. The small question marks in the row for administrative costs emphasise the weaknesses underlying the ranking. Improvements in the data on administrative costs would be required to substantiate that ranking.

Leakages to upstream and downstream industries

Part of the benefits of agricultural support might be captured by industries that supply inputs to farmers and industries that transform the raw farm product into intermediate or final goods. Moreover, in the farm input supplying industries as well as the processing and distribution industries, it is often the case that a few companies control large market shares, thereby occupying strategic positions in the price formation process. The potential income gains to "upstream and downstream" industries are tentatively assessed based on decompositions of producer surplus changes in the food industry.

Income gains to upstream industries may occur when a policy instrument increases the demand for purchased farm inputs. Such inputs include capital inputs (fertilizers, chemicals, machinery and other equipment, farm buildings and other structures) as well as financial services. In addition, rents may accrue to non-farm owners of primary factors used in agriculture ("absentee landowners"). Demand for these inputs increases if output is expanded and/or input substitution takes place in favour of these inputs. The market support price and the deficiency payment increase the quantity of the raw farm product available to the downstream industries, yet only the deficiency payment potentially lowers its price. The market support price raises the per unit cost of the raw farm product for food manufacturers and merchants. The direct income payment, which is not linked to current production, is neutral with respect to price and quantity and is therefore least distorting.

Whether or not food processing and distribution industries benefit from agricultural support depends primarily on the effect of the support instrument on the quantity of the commodity available to these industries and its price. Both the market support price and the deficiency payment increase the quantity of the raw farm product available to the downstream industries, yet only the deficiency payment potentially lowers its price. The market support price raises the per unit cost of the raw farm product for food manufacturers and merchants. The direct income payment, which is not linked to current production, is neutral with respect to price and quantity and is therefore least distorting.

Even with knowledge of the price and quantity effects in agriculture, the implications for incomes in food processing and marketing are difficult to assess. For instance, if the downstream industries are perfectly competitive, they would lose from increases in the supply of the farm raw product and reductions in the price thereof if the elasticity of substitution between the farm and the non-farm input is greater than the (absolute value of the) consumer demand elasticity. In this case, the decrease in the price of the final consumer good could not be compensated for by cost savings due to the cheaper raw farm product. Since it is not clear if such conditions hold in the OECD cereals and dairy processing and distribution sub-sectors, question marks appear in the relevant row in Table 1.

Furthermore, imperfection in the price formation process along the marketing chain may influence the capture of benefits from farm support. Such imperfections are often linked to differences in the market structure of agriculture and its upstream and downstream industries. On the other hand, income leakages to upstream and downstream industries may be reduced if parts of these industries are owned by farmers.
through cooperative arrangements. Issues of market and ownership structures and price formation are not addressed in this paper, however, their importance for the assessment of transfer efficiency of agricultural support is acknowledged as a possibility for further study.

**Leakages within the farm sector**

The criteria discussed so far reflect the net income effects of a policy instrument in the agricultural sector as a whole. For several reasons, especially because of social concerns and in connection with payments/taxes related to production externalities, income transfers may be intended for specific groups of farmers. In this case, the usefulness of a policy instrument in *channelling support* to these groups based on farm household characteristics or on the compliance with certain conditions, becomes a consideration for transfer efficiency.

The market support price provides a unique support level per unit of output and, with import tariffs and export subsidies being administered beyond the farm gate, appears to be the least suitable instrument of those considered for targeting income transfers to specific groups of farmers. The direct income support, on the other hand, could be tied to eligibility criteria or made conditional on specific services provided by farmers, providing that such characteristics do not violate the requirement that direct income support not be linked to current or future production. The deficiency payment ranks in between. The right to the payment can be allocated on a conditional basis, but the differential treatment of groups of farmers might render implementation of this instrument more difficult. With instruments that lend themselves to targeting specific groups of farmers, there will in general be a trade-off between the administrative costs and leakages to non-target farmers.

**Income transfers to and from foreign countries**

Another element of distributive losses is given by *income transfers across borders* implicit in the trade effects of agricultural support. The magnitude of such effects will depend on the size of the country and may be negligible if the country is a small producer, consumer and trader of the supported commodity. A change in world market prices caused by domestic policies influences the welfare of producers and consumers in other countries, and may have budgetary effects in those countries. International income transfers can be measured by surplus changes based on excess supply and demand curves facing a country.

The market support price is likely to introduce a larger surplus of domestic supply over demand (exporter), or reduce imports by more (importer) than the deficiency payment, and consequently exercises a greater downward pressure on world market prices. Consumers in other countries are potential beneficiaries, while producers in these countries see their income reduced. As defined, the direct income support does not involve income transfers to or from other countries.

**Indicators of the economic costs associated with policy instruments**

**Domestic deadweight losses**

The first two elements of economic costs are the *domestic deadweight losses in production and consumption*. The former results from the use of resources in the production of the supported commodity that could be used more productively elsewhere in the economy. The latter results from changes in the consumption pattern due to the distortion of relative consumer prices. These distortionary costs of support constitute a decrease in real income in the economy.
The market support price and the deficiency payment both increase output relative to the non-intervention level, thus leading to over-utilisation of resources in the supported sector. The direct income payment is neutral with respect to production and therefore may not create a deadweight loss. However, if the direct income support is conditional on the farmer continuing to operate the farm, it might have an effect on farm numbers and on the amount of operator labour in the sector. The direct income support will be non-distortionary only if it is granted irrespective of whether the farmer continues farming or leaves the sector altogether.

Deadweight losses on the consumer side are related to distortions in consumer prices. The instrument that raises consumer prices—the market support price—is associated with economic costs due to under-consumption. The deficiency payment will, in most cases, lead to a decline in the consumer price, thereby generating a deadweight loss from over-consumption. Only in a small open economy, where the increase in domestic production due to the deficiency payment does not influence the (world) market price, is the deficiency payment likely to be non-distorting with respect to domestic consumption. The direct income support is the only one of the three instruments that has no deadweight loss on the consumer side.

**Economic costs of taxation**

Deadweight losses are created when an income transfer involves changes in producer and/or consumer prices. If support is financed through government contributions, there are additional, economy-wide costs that are due to the effects of taxation on economic incentives. The economic costs of taxation are important in comparing policy instruments involving transfers through higher consumer prices with instruments that rely more heavily on government expenditures.

The economic costs of taxation will be more or less proportional to net government expenditures necessary to finance agricultural support programmes. This puts the market support price in the most favourable position, followed by the direct income support. The deficiency payment is associated with the highest taxation costs.

Apart from this ranking, not much can be said at this stage about the magnitude of taxation costs. Government expenditures on agricultural support account for relatively small proportions—typically less than 5 per cent—of total government budgets in OECD Member countries [OECD (1993)]. Increases in farm programme expenditures could be financed by small increases in existing tax rates, and decreases in farm budgets would enable governments to reduce tax rates by small amounts. Therefore, the taxation costs of agricultural support may be appropriately assessed in terms of the marginal cost of public funds.

However, there is little agreement among economists on the measurement and the size of the marginal cost of public funds. The difficulties encountered in the estimation of taxation costs are conceptual as well as empirical. The effects of an income tax, for instance, can be separated into a substitution effect and an income effect. The substitution effect results from a change in the relative values of labour and leisure to the taxed individual. An income tax reduces labour remuneration and increases the attractiveness of leisure relative to labour. As a result, labour supply as well as the tax revenue base will be reduced, and a net income loss is generated for the economy. The substitution effect of an income tax can be measured using the compensated labour supply curve.
The income effect refers to the change in labour supply by the taxed individual in response to the decrease in income brought about by the tax. There is evidence that for most categories of labour, this effect is positive, implying that individuals increase their labour supply to the economy in an effort to compensate for the income loss. The income effect increases the tax revenue base and may partly or completely offset the substitution effect of the tax (see the Annex for a more extensive treatment of this issue).

Estimates of the marginal cost of public funds cited in the economics literature are often based on the hypothetical assumption that the money raised through the tax is transferred back to taxpayers. Although these estimates vary substantially in size, the majority fall in the range from 1.2 to 1.5. That is, a 20 to 50 per cent loss is estimated for the marginal dollar raised through taxation [Hagemann et al. (1988); Alston and Hurd (1990)]. Such income-compensated estimates of the marginal cost of public funds measure only the substitution effect of the tax. Some economists believe that these estimates are appropriate for assessing the taxation costs of government intervention only in cases in which the tax revenue is indeed transferred back to the taxpayer. If the funds were spent on a public project, such as defense, these estimates would be inappropriate because taxpayers are not compensated for their income loss and the income effect of the tax on labour supply has to be taken into account in the measurement of the marginal cost of public funds. Estimates that capture the income effect in addition to the substitution effect are typically smaller than those that measure only the substitution effect [Ballard and Fullerton].

In the case of agricultural support, the tax revenues are disbursed to farmers (i.e., they are neither given back to the general taxpayer nor are they spent on a “separable” public good). This raises the question as to which of the estimates of the marginal cost of public funds would be the most appropriate for transfer efficiency analysis of agricultural support. The answer to this question will depend on the general equilibrium effects of agricultural support and especially on the degree of separability between the farm sector and other sectors of the economy with respect to labour supply behaviour. Because of the importance of taxation costs for transfer efficiency comparisons and the unresolved questions associated with it, this issue merits further work.

Deadweight costs of programme administration

The costs of programme implementation and administration constitute income to non-target groups and were as such discussed in the section on distributive leakages of support. However, there is also a deadweight loss associated with these costs9. This loss corresponds to the payments made for administrative services above and in excess of what the resources tied up in these services would earn in the absence of support programmes. The deadweight cost of programme administration is measured conceptually from the supply curve of administrative services and its magnitude is directly related to total administrative costs. The ranking with respect to the deadweight cost of administration (row 13 in Table 1) is therefore the same as the ranking with respect to administration costs (row 4).

The definition of administrative costs used here does not include lobbying expenses incurred by farmers or other beneficiaries from agricultural support nor the costs of other rent-seeking activities. If such costs were considered, they would have to be treated entirely as a net income loss to society.

Deadweight losses in other countries

The domestic deadweight losses have an international equivalent if the prices determining production and consumption in foreign countries are distorted by support in the home country. The resulting over- or under-consumption of food and over- or under-utilisation of resources in the farm sectors
of other countries reduce the potential benefits from exploiting comparative advantage. The associated deadweight losses in foreign countries are measured by the potential gains from trade that could be obtained in these countries if the source of the distortions were removed. Deadweight losses in foreign countries are related to the trade effect of a policy instrument. This effect is larger for a market support price than for a deficiency payment, because for a given transfer of income to farmers the former increases exports or reduces imports by a greater amount than the latter. The direct income support, which does not distort trade, creates no deadweight loss in other countries.

**Robustness of the transfer efficiency rankings**

The rankings in Table 1 are based on general representations of commodity markets and do not depend on specific values for key economic parameters, such as domestic supply and demand elasticities, the size of exports or imports relative to domestic production, the share of a country in world trade, and the responsiveness of the world market price to changes in the net trade volume of a commodity. Although most of the results will be valid for the parameter ranges observed in OECD Member countries for the relevant commodities, some of the conclusions related to world market price effects may be ambiguous. For instance, if a country exporting most of its production and possessing a large share of the world market, implements a market support price, it might be possible that the world market price declines by enough that the government expenditures associated with the export subsidy exceed those of a deficiency payment (that distorts the world market price by less) and a comparable direct income support programme (that leaves the world market price unchanged). If this were the case, the rankings of these three policy instruments in rows 1 and 12 of Table 1 could be reversed.

**Production quotas and other quantitative restrictions**

It is increasingly the case in OECD Member countries that farmers may benefit from a market support price or a direct payment only if they comply with certain output or input restrictions. Often introduced with the aim of limiting domestic surpluses and containing government expenditures, such quantity restrictions may alter the distributional effects of support and also the net social costs. In addition, quantitative restrictions may change the factor intensity of production, with consequences for factor use and possible implications in other areas, e.g., the environment. The multiple effects of quantitative restrictions have been described in a previous OECD report [OECD (1990)].

Quantitative restrictions are usually operated in conjunction with a price support and can therefore not be analysed in isolation. The transfer efficiency of quantitative restrictions depends on the type and the magnitude of the price support and on the trading position of the country. For instance, a given net income transfer to farmers can be achieved through various combinations of a support price and an output quota. A high price could be paid on a relatively small production quantity, or a lower per unit support could be granted for a larger quantity. If transfer efficiency were the only criterion determining programme implementation, the most efficient combination of price support and output quota would be chosen. In practice, however, the production quota may primarily be instituted in order to counterbalance the output increasing effect of an already existing price support policy. Hence, the economic costs and distributive leakages of the programme will depend on the quota level, which is in turn conditioned by such considerations as limiting government expenditures or reducing trade distortions.
Restrictions on input use may in addition change the factor composition and increase the costs of production. The implications of shifts in the cost schedule for transfer efficiency cannot be easily evaluated based on the framework of analysis used in this paper. In general, input restrictions are likely to be more distorting than output restrictions because they constrain the choice of input mix [OECD (1990)].

As an example of the difficulties involved in assessing the transfer efficiency of quantitative restrictions, consider the deadweight costs from distortions in the production of a supported commodity. If a country that is an exporter of this commodity at the current level of price support, introduces a production quota in order to curb the cost of surplus disposal, then quota output may lie below or above the quantity that would be produced if there were no government intervention. One would have to know the market supply response to price changes in order to determine whether the price support in combination with the production quota leads to a deadweight loss from over-production or to a deadweight loss from under-production or to no distortion at all. Similarly, if a country that has previously been a net importer and has become a net exporter due to high price support levels, attempts to achieve a domestic supply-demand balance by restricting output, the assessment of the trade effects and the economic losses requires fairly specific knowledge of market parameters (see Annex).

Despite these complexities, there are some observations that can be made about the performance of quantitative restrictions with respect to some of the elements of transfer efficiency discussed above. The administrative effort necessary for output quotas may be greater than that required for the market support price or for the direct income support. Initially, there may be substantial implementation costs, as output quotas have to be allocated to individual farms. If quotas are fully tradable, there may be costs associated with the supervision of quota trade. If quotas cannot be traded, they have to be reallocated as quota holders cease production and new entrants claim quota rights. If quotas are implemented at the processing level, the costs of administration will initially be borne by processors but may eventually be passed on to consumers in the form of higher prices. The administrative costs of input restrictions depend on the input concerned and the form of restriction applied. Land set-asides, for instance, may be quite costly to implement and also to administer.

The analysis of the transfer efficiency of quantitative restrictions might be facilitated by using as the reference case a situation with unrestricted price support and assessing the potential gains in transfer efficiency that could be realized by introducing restrictions on output or input use. Such a focus was adopted in the Secretariat’s previous study on quantitative restrictions [OECD (1990)] and could be used as the bases for further transfer efficiency analysis in this area.

Additional considerations in ranking policy instruments

There are several elements of transfer efficiency that have so far been ignored in this paper. Two of the more important elements concern the implications of support for technological change and primary factor adjustment, and the long-run effects of support on supply and on the prices of factors that are specific to agriculture.

Apart from the economic costs that can be related to a given time period, agricultural support may create impediments to factor adjustment, thus retarding the evolution towards a more efficient economic structure. As a consequence, the productivity-enhancing effects of technological change may not be fully exploited, and changes in consumer preferences may not be adequately accommodated. The corresponding economic losses, although potentially large in the medium to long run, cannot be assessed in a comparative static framework of analysis.
Factor adjustment concerns the movement of primary factors among farm units, and between the farm sector and other sectors of the economy. Production quotas, for instance, may have varying effects on factor movements among farm units depending on the way quotas are allocated. Fully tradable quotas should not impede such movements, whereas quotas with restricted or no tradability will have a tendency to freeze the production structure existing at the time of quota implementation, thus creating impediments to future adjustment and potentially discouraging certain types of cost-saving technological innovations. Direct income support, if tied to the farming activity, may reduce the incentive for the operators of marginal farms to leave agriculture and may thus delay the adoption of labour-saving technology in the sector.

The time horizon underlying the analysis in this paper is the short- to medium run. If a support instrument remains in place for a longer period, further considerations become important. In the long run, the supply curve is more elastic and the deadweight losses from distortions in producer prices are larger. On the other hand, the longer the duration of a programme, the smaller the average annual cost of programme implementation and administration may become. Another difference between the short and the long run concerns the distribution of programme benefits within the farm sector. With time, programme benefits tend to be capitalized into the prices of fixed factors, and the reverse will happen if a programme is eventually abandoned. Such effects would have to be analysed to determine the distribution of programme benefits across successive generations of farm owners.

A further issue that is explicitly linked to the passage of time and therefore can not be analysed within a static framework, is the comparative effects of policy instruments on price and income variability. Instruments may differ in the degree to which they consistently achieve the transfer target under changing economic conditions. The implications of differences in price and income variability associated with alternative policy instruments may be influenced by farmers’ attitudes towards risk, and this may influence policy choice.

Main conclusions of the analysis

This paper analyses the comparative efficiency of several types of policy instruments with respect to income redistribution from consumers/taxpayers to farmers. The two aspects of efficiency considered are distributive leakages and economic costs. The point of departure of the analysis is a desired level of farm income. Consequently, neither the motivations underlying the decision to transfer income to farmers nor the determinants of the size of the transfer are addressed.

Agricultural policy choices are primarily driven by domestic objectives and involve complex equity-efficiency trades-off. Both the level of support and the particular support instruments used have important international spillover effects. Governments are unlikely to pay sufficient attention to these effects in the absence of international coordination. This is likely to lead to sub-optimal outcomes, reinforcing the need for international coordination. This paper examines transfer efficiency from a global perspective. This is in line with the objective of promoting the use of policy instruments that are efficient based on domestic considerations and, at the same time, least distorting for world markets.

The discussion in this paper is based on a view of transfer efficiency that includes in the transfer losses real income costs as well as distributive leakages to non-target groups, and adopts a global perspective with respect to the distortions in production and consumption created by support. The assessment of the economic costs of support goes beyond the analysis of commodity markets to include the economy-wide costs of raising tax revenues for budget expenditures on support programmes and the costs incurred in setting up and maintaining the institutional framework for programme administration.
The analysis focuses on short- and medium-term effects of support instruments, but several elements of transfer efficiency that are particularly relevant for the long run are also discussed. In the long run, criteria reflecting the ability of the farm sector to adjust to changing economic and technological conditions become important. Capitalization of programme benefits into the prices of fixed factors may reduce the effectiveness of the transfers. New entrants into farming who acquire resources at elevated prices may not derive any net benefits from support but their incomes and assets may be adversely affected if support is terminated, thus creating additional opposition to reform. On the other hand, the longer the duration of a support measure, the smaller the average annual costs of programme implementation and administration may be.

The analysis of transfer efficiency undertaken in this document ignores the fact that distortions already exist in the economy and that food production might create positive or negative externalities. A full analysis of transfer efficiency will take into account the economic costs and the distributive leakages associated with cross-effects on other supported sectors, and those associated with production externalities. Moreover, the scope of the analysis is limited by the fact that it does not examine the effects of changes in the level of support or the effects of shifting from one set of instruments to another. As a result, neither the potential asymmetries between the effects of increases and decreases in the level of the transfer nor the implications of reinstrumentation are addressed. All of these considerations are important and might be explored in future work.

Several issues important to the assessment of relative transfer efficiency of agricultural support instruments have been identified but not fully resolved in the present paper. These are foremost: (i) the implications for transfer efficiency of combining administered prices or deficiency payments with quantitative restrictions on output or inputs; (ii) the economic costs of taxation and the costs of programme administration; and (iii) the implications of economic linkages between primary agriculture and its upstream and downstream industries for price transmission and the magnitude of the distributive leakages of agricultural support. Efforts to explore each of these three areas might improve further the analysis of transfer efficiency.

The difficulties inherent in transfer efficiency comparisons of support instruments can partly be overcome by decomposing the overall transfer loss into various elements and ranking instruments based on each of these elements. This approach is used in analysing three of the four instruments considered -- the market support price, the deficiency payment and the direct income support. The fourth instrument, quantitative restrictions on output and inputs, cannot be analysed at the same generic level as the other three instruments. Quantitative restrictions are usually used in connection with price support and are often introduced to curb government expenditures for surplus disposal or to reduce trade distortions created by price support. The effects of quantitative restrictions are most appropriately evaluated with respect to the unrestricted price support and will thus depend on the situation that existed prior to the introduction of such restrictions. Any meaningful transfer efficiency analysis of input restrictions would have to be based on a framework that includes input markets.

The results presented for the market support price, the deficiency payment and the direct income support (Table 1) suggest that these major classes of support instruments used in the OECD area differ in terms of their transfer efficiency. The single most important conclusion is that none of the policy instruments ranks in the same place with respect to all elements of transfer efficiency. There is no single instrument that is superior in all respects and for all purposes. Rather than establishing a hierarchy of instruments, the analysis highlights the trades-off that they involve.
Although no aggregate efficiency ranking can be established, the number of "best" and "worst" rankings for a given instrument might be taken as a weak indication of overall performance. The direct income support has the top ranking in seven out of the ten cases that involve economic costs or distributive leakages. The market support price and the deficiency payment have an equal number of lowest rankings.

In spite of the clear predominance of favourable rankings achieved by the direct income support, Table 1 highlights two issues in connection with this instrument that merit further consideration. These are the economic costs of taxation and the costs of programme administration. The transfer efficiency of the direct income support may be reduced relative to that of other instruments if the costs of taxation and/or the costs of implementing and administering a direct income support programme are high. In the absence of reliable estimates of these two cost components, their potential importance for overall transfer efficiency can be assessed only tentatively.
NOTES

1. The evaluation of policy instruments with respect to the determinants of transfer efficiency draws on consultancy work undertaken by Professor Harry de Gorter of Cornell University in the United States. That work is summarised in a consultancy report [de Gorter], which is available from the Directorate for Food, Agriculture and Fisheries on request.

2. The term *direct income support* as adopted by the OECD refers to measures that are financed by budgets and made directly to farmers, and are independent of current and future production levels [(OECD, 1994a)]. By comparison, the term *direct payments* is used to describe budgetary payments made directly to farmers, with no judgement as to their linkage with production or to factors of production.

3. This will only be true if input suppliers operate under an upward sloping marginal cost curve. Even then, income leakages due to agricultural support might be negligible if the demand by farmers for a given input is very small in comparison to use of this input in other sectors of the economy.

4. The experience with unilateral support reductions in New Zealand, for instance, suggests that certain processing industries may have benefitted from agricultural support prior to reform [OECD (1994b)].

5. Provided that economic rents are created in the downstream industries in the first place. This would be the case if these industries operate under decreasing returns to scale or if there are specific factors in production.

6. Since the first two rows in Table 1 do not represent elements of transfer efficiency *per se* but indicators of the source of the transfers, there is no double counting involved in rows 1 (transfers from the government) and 8 (income transfers to foreign countries), even where income transfers across borders are indirectly financed by government expenditures as in the case of an export subsidy.

7. A discussion of the measurement of taxation costs is contained in the Annex.

8. There are alternative ways of raising government funds for agricultural support, including sales and value added taxes, government bonds, or lotteries. Only income taxation is discussed in this paper. For a discussion of the other major source of government revenues, sales and value added taxes, see the Annex.

9. Some economists believe that the entire cost of programme implementation and administration constitutes a net income loss to society. This issue awaits further clarification.

10. Net income gains or losses to foreign countries due to the removal of trade distortions consist of gains from the elimination of deadweight losses and income transfers across country borders. In the assessment of deadweight losses in foreign countries, income transfers are netted out.
REFERENCES


ANNEX

I. Comparative Static Analysis of the Four Policy Instruments: Market Support Price, Deficiency Payment, Production Quota, and Direct Income Support

In this part of the annex, the economic costs and the distributive leakages associated with agricultural support instruments are analysed. The analysis is conducted from the point of view of a country that implements a support instrument but the effects of support on other countries are also taken into consideration in the transfer efficiency comparisons of instruments. At first, the effects on farmers, consumers, and the government budget of the supporting country are evaluated, as are income transfers to or from foreign countries and economic losses in these countries due to distortions of world market prices. Subsequently, potential income leakages from agriculture to farm input supplying (“upstream”) industries are discussed.

The transfer efficiency comparisons of support instruments are based on partial equilibrium diagrams (Figures 1 through 5). Each diagram consists of two panels, representing the domestic market and the world market, respectively. The domestic market is described by supply and demand schedules, the world market by the country’s export supply curve and an aggregate demand curve for the rest of the world in the case of an exporting country, and the country’s import demand curve and an aggregate supply curve for the rest of the world in the case of an importer. The analysis covers net exporters and net importers although the diagrams are shown only for either an exporter or an importer.

The supply and demand curves are assumed to reflect the marginal values of the commodity in production and consumption. The change in producer surplus (the area between two price lines bounded by the supply curve and the vertical axis) is a measure of producer gains or losses, and the change in consumer surplus (the area between two price lines bounded by the demand curve and the vertical axis) is a measure of net benefits or losses to consumers. Transfer efficiency comparisons are standardised on a given net income transfer to farmers as measured by the producer surplus gain.

The effects of a market support price are illustrated in Figure 1 for an exporting country. The intersection of the world price, \( P_W \), with the domestic supply (S) and demand (D) curves depicts the domestic equilibrium without government intervention. The world market price is determined by the intersection of the country’s export supply schedule (\( S_E \) in the right hand side panel) and the demand curve of the rest of the world (\( D_{ROW} \)). Producers and consumers in the domestic country face a price equal to the world market price. The country’s output is at \( Q_S \) and domestic consumption at \( Q_D \). The difference between domestic production and consumption, \( Q_E \), is exported at no cost to the government. In order to achieve a net income transfer to farmers equivalent to area \( a+b+c \) using a market support price, the government has to fix the domestic price at level \( P_A \). This induces farmers to expand output to \( Q_S' \), whereas consumers react to the higher price by reducing consumption to \( Q_D' \). Domestic surplus increases to \( Q_E' \), which, if exported, leads to a decline in the world market price to \( P_W' \).
As a result of the higher domestic price, consumers lose the equivalent of area a+b, and the government incurs export subsidies amounting to area b+c+d+m+l+k. The sum of the gain in producer surplus, the loss in consumer surplus and government expenditures (area b+d+m+l+k) is a partial equilibrium measure of the loss to the domestic economy. However, only part of this area (b+d) is a net loss in aggregate income, the rest (m+l+k) constitutes a transfer to foreign countries. This transfer is also represented by area j+i+h in the panel describing the world market. The net income gain in the rest of the world is given by area j+i, which is smaller than the gross transfer abroad. The difference, area h, is the deadweight cost in foreign countries.

To fund the government expenditures necessary to subsidise exports, tax revenues have to be raised. This generates an additional economic loss. Taxation costs can be measured by the marginal cost of public funds, MCF (see the second part of the annex). The gross cost of government expenditures associated with the export subsidy is MCF*(b+c+d+m+l+k). If the supporting country were an importer, the market support price would reduce imports and the government would lose revenues from import taxes or levies if such instruments are used to protect the domestic market.

Under a deficiency payment programme, the government pays farmers the difference between a pre-determined target price, P_T, and the market price on each unit of output. In this analysis, it is assumed that there are no restrictions on output or input use. To ensure the same net income transfer to farmers as with the market support price, the target price in Figure 2 has to be set at the same level as the market support price in Figure 1. Farm production also increases by the same amount (from Q_S and Q_S’ in Figure 2). The deficiency payment differs from the administered price in that consumers can buy the product at the lower market price. As a result, the increase in the exported quantity is smaller and so is the distortion of the world market price.

The deficiency payment is associated with a deadweight cost on the producer side (area d) due to overproduction, and this cost is the same as that of the market support price. There is also a deadweight cost in consumption (area m), yet this cost is due to overconsumption and not to underconsumption as is the case with the market support price. Since the deficiency payment is likely to have a smaller (in absolute value) effect on the consumer price than the market support price, the distortionary cost in consumption is also likely to be smaller.

A deficiency payment is paid on total output, whereas the government budget cost of a market price support is limited to the export subsidy on the quantity exported (in the case of an exporting country) or the revenues foregone from lower import tariff or levy receipts (in the case of an importer). Therefore, the government costs of the deficiency payment (area a+c+d+n+m+l+k) will in many cases exceed those of a market support price that achieves the same net income transfer to farmers. However, there is no guarantee that this conclusion will hold under all circumstances. If a country exporting a large share of its production and accounting for a large share of world trade in a commodity replaces a market support price with a deficiency payment, the consumption effect of this change may raise the world market price by enough that the deficiency payment is cheaper for the government than the market support price. Such would be the case if the per unit deficiency payment were much smaller than the per unit export subsidy associated with the market support price so that total deficiency payment expenditures would be smaller than total export subsidy expenditures. This would be all the more likely if such a policy switch were undertaken by several countries simultaneously.

There is no such ambiguity with respect to the gross transfer to foreign countries, which is smaller for the deficiency payment than for a comparable market support price. For a net exporter, the respective transfers are given by area j+i+h in Figure 2 and area j+i+h in Figure 1. Both the exported quantity as well as the transfer per unit of the product exported are smaller in the case of the deficiency payment. Likewise,
the net gain to foreign countries (area j+i) and the distortionary loss in these countries (area h) are smaller under a deficiency payment. Similar considerations apply for a net importer.

The direct income support, as defined in this paper, is independent of current or future output. For ease of analysis, it is assumed that direct income support is provided through a government payment to farmers, where the calculation of the payment is based on a fixed production volume (the payment base) corresponding to output in the non-intervention situation (Qₜ in Figure 3). In most cases this output level will not be known and the payment will be based on past individual or regional production data. The important characteristic of the direct payment is that it is unrelated to the farmer’s production decision, that is, it is also paid if actual production is above or below the payment base, or if the farmer decides to cease production entirely. The decision to fix the payment base at Qₜ in Figure 3 is rather arbitrary but may nevertheless approximate a particular way of implementing the programme. It also facilitates comparisons of this instrument with the market support price and the deficiency payment.

The comparison of the budget costs of the direct income support with those of the market support price and the deficiency payment is conducted in terms of an exporting country but is equally applicable to a net importer. Since the transfer efficiency comparisons are standardised on a given net income transfer to farmers, the total amount of direct income support (area a+b+d+e) in Figure 3 is equal to the producer surplus gains in Figures 1 and 2. The horizontal line separating area a+b from area d+e in Figure 3 indicates the effective producer price of a comparable market support price or a comparable deficiency payment. Area c also pertains to these two instruments, showing the surplus gain by farmers on overproduction. Since the direct income payment causes no overproduction, the money equivalent of area c has to be made up through a higher payment. The implicit “per unit” payment (per unit of the predetermined payment base) may still be lower than the per unit deficiency payment or the per unit export subsidy associated with the market support price because there is no world market price effect with a direct income support and therefore no need to offset declines in world market prices through higher payments.
Total government expenditures on direct income support may then be smaller than for the deficiency payment (which, in addition, is paid on a larger quantity). Whether the total amount of direct payments is smaller or larger than the total export subsidy associated with the market support price depends on the size of exports relative to domestic production and the magnitude of the world market price effect of a market support price. If the major part of a country’s production is consumed domestically, it is unlikely that expenditures for the export subsidy would exceed those for a comparable direct income support. This case is reflected in the rankings in rows 1 and 12 of Table 1 in the main document. However, the caveats made above apply and in certain situations the rankings may be reversed.

As defined, the direct income support has no effects on production, consumption, and exports. The world market price remains unaffected and there are no transfers abroad. There are also no domestic deadweight losses in production and consumption and no distortionary costs in foreign countries. However, the direct income support creates economic costs of taxation proportional to government expenditures.

The production quota is usually used in combination with producer price support and the economic costs and distributive effects of such a combination depend on the setting of the instruments. Transfer efficiency analysis of the production quota can therefore not be undertaken at the same generic level as that of the market price support, the deficiency payment, or the direct income support. To demonstrate the situation-specific nature of the transfer efficiency of the production quota, a special case of output restriction representative of dairy support in several OECD Member countries is discussed. In these countries, the domestic price is fixed at levels substantially above the world market price and production is restricted through quotas. The programmes allow for relatively small amounts of "concessional" imports or small surpluses that are exported. It is not entirely clear in all cases if the countries concerned would be net exporters or importers of dairy products if there were no dairy support. In Figure 4, a country is shown that is a small net importer in the no-policy situation but could become an exporter of dairy products at high support prices if production were not restricted. In this light, the production quota might be interpreted as a means of constraining government expenditures on export subsidies that would otherwise be necessary.

The production quota is set at level $Q_s'$ to support a domestic price, $P_Q$, which is significantly above the world market price. The combination of support price and production quota that will transfer a given net income to farmers depends on the elasticity of demand. In Figure 4, the quota is below the non-intervention production level $Q_s$ and a distortionary loss from underproduction (area d) is incurred. The high domestic support price requires supplementary import protection. In the extreme, no imports are allowed. This reduces demand for dairy products in the world market and depresses the world market price from $P_W$ to $P_{W'}$. The world market price effects of import protection will depend on what the level of imports would be in a situation without domestic support and border protection.

In the special case of a production quota illustrated in Figure 4, domestic consumers bear the burden of the transfer, losing the equivalent of area $a+b+c$. The net gain for farmers corresponds to area $a-d$. The net loss in other countries is given by area $e$ in the right hand side panel of Figure 4. There are no government expenditures and therefore no deadweight costs through taxation.

These conclusions do not apply to production quotas in general. If a country that is a large exporter introduces a production quota in addition to an already existing market support price, the reduction in output may change the terms of trade in favour of the supporting country and reduce government expenditures for export subsidies. Domestic producers and consumers may be unaffected by the production quota. The effects of a production quota depend crucially on the trading position of the country and the type of support in place before the quota is implemented.
The supply schedules used for analysis in Figures 1 through 4 are standard supply curves based on the assumption of exogenous input prices. This implies that the prices of purchased farm inputs do not change due to support. If this assumption holds, producer surplus changes associated with policy instruments measure changes in net income for the owner of the farm. For owner-operated farms, the producer surplus changes measure changes in net income of the farm family. Increases in producer surplus may not adequately reflect net income gains for farm operator families if (i) part of the primary factors of production are not owned by the farm family and (ii) prices for purchased farm inputs adjust due to support over the period under consideration. The first problem concerns predominantly ownership questions of land (the "absentee landlord" problem) and is ignored in this analysis. The second problem, concerning the linkage between production agriculture and input supplying industries, is discussed in the following paragraphs using the example of the market support price (Figure 5).

If input prices were truly exogenous, the net income gain for farmers from a market support price would be correctly measured by the increase in producer surplus along the standard supply curve $S_A$ (area $a+b+c$ in Figure 5). In response to the price support, farmers increase output from $Q_{S_A}$ to $Q_{S_A'}$, causing an outward shift in the derived demand for purchased farm inputs from $D_d$ to $D_d'$ in the left hand side panel. If this shift in derived demand affects the price of the purchased farm input, distributive leakages to input supplying industries may occur. For instance, an increase in input price from $P$ to $P'$ would generate net benefits to input suppliers equivalent to area $e+f$ (provided that there are no further leakages from these industries to their input suppliers). In this case, the producer surplus change in agriculture measured with respect to the farm supply curve $S_A$ would overstate farmers’ net income gain.

The discrepancy between the increase in producer surplus and the increase in farmers’ income is due to the increase in farm input costs and can be identified in the right hand side panel by comparing the farm supply curve $S_A$ (with input price fixed at $P$) and the supply curve that is based on the higher input price $P'$ which results from support (the curve labelled $S_{A'}$). The area between the two supply curves is attributable to the increase in farm input costs and reflects the amount by which the initial producer surplus change ($a+b+c$) overstates the net income gain to farmers. The correct measure for the change in farm income is area $a-d$. 

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Conceptually, a farm supply curve can be defined that accounts for the effects of input price adjustments on farm output. Such an "equilibrium adjustment curve" is given by $S_A^*$ in Figure 5. Under certain conditions, producer surplus changes evaluated relative to this curve measure combined net income changes in the farm sector and in input supplying industries [Just, Hueth and Schmitz]. In the present case of a market support price in agriculture, the sum of the net benefits for farmers and farm input suppliers would be equivalent to area $a+b$.

Figure 5 provides a framework for the analysis of distributive leakages of agricultural support to upstream industries. For any support instrument that increases the derived demand for purchased farm inputs, the net income gain to farmers is likely to be overestimated by the corresponding producer surplus gain, with part of the difference constituting income gains to input suppliers. Such would be the case for the market support price and the deficiency payment. The production quota, on the contrary, may reduce the demand for purchased farm inputs relative to an unrestricted price support. In this case, the measured producer surplus change may understate net benefits to farmers, as it does not adequately reflect cost savings due to potentially lower input prices. Part of the difference between the producer surplus increase and the net income gain to farmers reflects income losses in input supplying industries.

II. Assessing the Economic Costs of Raising Government Funds for Farm Programmes

Income transfers to farmers may be financed by consumers via higher food prices or by taxpayers, and in many cases they involve a combination of both. In this part of the annex, the economic costs of raising tax revenues for farm programmes and the importance of such costs for the transfer efficiency of policy instruments, are discussed. From the outset, the discussion of taxation costs has to cope with a relative lack of information, as this issue has been largely neglected in the past in agricultural policy analysis. The goal pursued here is not to furnish precise estimates of taxation costs but to provide a tentative assessment of the potential magnitude of these costs and to discuss the difficulties involved in their quantification.
Three alternative ways of raising government funds are considered: (i) an income tax, (ii) a sales tax or a value added tax on all goods in the economy, and (iii) a tax on food consumption. For simplicity, it is assumed that income in the economy is entirely labour income. The discussion focuses on economic efficiency and ignores equity considerations in taxation.

Government expenditures on agricultural support account for only a small proportion of total government expenditures in OECD Member countries. Increases in farm budgets can be financed by relatively small increases in existing tax rates, and decreases in farm budgets would enable governments to reduce tax rates by small amounts. Therefore, the marginal cost of public funds (MCF) is an appropriate measure for assessing the costs of taxation associated with agricultural support.

However, estimation of the marginal cost of public funds poses several problems. Two of the more important ones are addressed in this annex. The first concerns differences in taxation structures among OECD Member countries. Some countries obtain most of their tax revenue from income taxes, whereas others rely more heavily on sales or value added taxes. In addition to such differences in existing tax regimes, implementation of a new tax may change the source of marginal revenues in a given country. For instance, if a country in which government funds are derived predominantly from income taxes, introduces a value added tax, the marginal tax revenue may come from the value added tax and not from the income tax. In this case, the marginal cost of income taxation may not be an appropriate measure for the evaluation of taxation costs in the context of agricultural policy reform. The implications of different tax structures in OECD Member countries for the MCF are not evaluated directly but the comparative discussion of three major types of taxes (income taxes, general sales or value added taxes, and commodity-specific taxes) may provide the background for such an evaluation.

The second issue concerns differences in the estimates of the marginal cost of public funds depending on the assumptions made on how the tax revenue is returned to the economy. The two reference cases are income-compensated estimates of the MCF, where it is assumed that the tax revenue is transferred back to the taxpayer so that taxpayer income does not change, and the case where it is assumed that the tax revenue is not returned to the taxpayer but spent on a "separable" public good. As will be shown below, the MCF estimates may differ substantially between these two situations. The distinction is important in the context of agricultural support, as income payments to farmers present a special way of disbursing tax revenues. This issue is discussed in the following paragraphs in connection with the income tax.

The effects of an income tax can be decomposed into a substitution effect and an income effect. The substitution effect results from a change in the relative values of labour and leisure to the taxed individual. An income tax reduces labour remuneration and increases the attractiveness of leisure relative to labour. As a result, labour supply as well as the tax revenue base will be reduced, and a net income loss is generated for the economy. The substitution effect of an income tax can be measured based on the compensated labour supply curve.

The income effect refers to the change in labour supply by the taxed individual in response to the decrease in income brought about by the tax. There is evidence that for most categories of labour, this effect is positive, implying that individuals increase their labour supply to the economy in an effort to compensate for the income loss. The income effect may increase labour supply and the tax revenue base. Analytically, the income effect is reflected in the difference between the compensated and the uncompensated (or observed) labour supply curve. The overall effect of an income tax on labour supply and the tax revenue base depends on the relative magnitudes of the substitution effect and the income effect.

Estimates of the marginal cost of income taxation are often based on the hypothetical assumption that the money raised through the tax is transferred back to taxpayers. Such income-compensated estimates...
of the marginal cost of public funds measure only the substitution effect of the tax. These estimates are appropriate for evaluation of taxation costs of government intervention in cases where the standard of comparison is a lump sum transfer.

The net social loss associated with the substitution effect of an income tax can be measured by the deadweight triangle under the compensated labour supply curve and depends on the slope of this curve. Since the slope of the compensated labour supply curve is always positive [Stiglitz], the net social cost associated with the substitution effect of a tax is always greater than zero (implying an MCF greater than one). Recent estimates of the magnitude of this type of net social loss are summarized in Hagemann, Jones and Montador (1988). The estimates found in Browning (1976; 1987) for the United States vary over a wide range but the estimates preferred by the author fall in the interval from MCF=1.2 to MCF=1.5. Similar estimates were obtained by other economists for the United States and Australia [Alston and Hurd].

If, on the other hand, the tax revenue is spent on a separable public good, such as defense, these estimates may be inappropriate because taxpayers are not compensated for their income loss. Some economists believe that in this case, the income effect of the tax on labour supply should be taken into account in the measurement of the marginal cost of public funds [Ballard and Fullerton]. MCF estimates that capture the income effect of the tax in addition to the substitution effect are typically smaller than those that measure only the substitution effect. The marginal cost of public funds may even be smaller than one if the income effect on labour supply outweighs the substitution effect. An indication of this is given by the slope of the uncompensated labour supply curve. If this curve is backward bending at the existing tax rate, that is, labour supply decreases as the wage rate increases, the MCF will be less than one [Ballard and Fullerton].

In the case of agricultural support, tax revenues are neither returned to the general taxpayer nor are they spent on a separable public good. This raises the question as to which of the alternative ways of estimating the MCF is more appropriate for transfer efficiency analysis of agricultural support.

Although government support for agriculture constitutes a transfer of tax revenues back to individuals, this is not exactly equivalent to the case of income-compensated taxation because the recipients of the income transfer are not identical with the taxpayers financing the transfer. Non-farm taxpayers and taxpayers that are also farmers form two groups of individuals which are affected differently by the tax. There is no income compensation for non-farm taxpayers who account for the bulk of the tax revenues. For them, an income tax will generate a substitution effect and an income effect. In general, labour supply by these taxpayers will increase and the MCF associated with this group will be lower than the comparable income-compensated MCF. If the uncompensated labour supply curve is vertical so that actual labour supply does not change due to the tax, then the substitution effect is exactly offset by the income effect and the net social cost of raising an extra dollar is zero (the MCF = 1).

For taxpayers that are farmers, the effects are different. Not only do farmers have their tax payments restituted in the form of income support, but their income increases due to the transfer. If farm households supply labour to the economy in the same way as any other household, the income effect of the transfer on farm household labour supply could be expected to be negative. It would be an empirical question whether the reduction in farm household labour supply to the economy would be balanced out by the increase in labour supply of non-farm taxpayers. If, on the contrary, farmers as a group do not adjust their labour supply to the economy in response to the income transfer, such a transfer would resemble government spending on a separable public good. This would require that farming as an activity be separable from other occupations in society. Full-time farmer-operators, who are not engaged in off-farm employment, may indeed satisfy this condition. Part-time farmers can be expected to behave more like non-farm households, thus reducing labour supply to their off-farm activity as a result of the income transfer.
Overall, the situation presented by income transfers to agriculture is somewhere between the two cases of income-compensated taxation and taxation for a separable public good as described by Browning (1987) and Ballard and Fullerton (1992), respectively. The MCF estimates quoted in Browning (1987) would then overstate the MCF relevant in the context of agricultural support, whereas those cited by Ballard and Fullerton (1992) might understate the true cost of the tax. The size of the over- or understatement increases with the difference between the compensated and the uncompensated labour supply curve of an economy.

Until now, changes in the income tax were assumed to be proportional in the sense that all income would be equally affected. If the income tax structure is progressive, changes in tax rates may affect marginal and inframarginal rates differently. Increases in inframarginal rates reduce after-tax income but do no distort the incentive to supply labour relative to leisure. Such increases generate income effects but no substitution effects [Ballard and Fullerton]. Changes in the marginal tax rate have both a substitution and an income effect. The MCF incurred by increasing inframarginal rates will therefore tend to be lower than that associated with increases in the marginal rate.

A sales tax and a value added tax on all goods in the economy are similar in terms of their economic effects and are therefore discussed together. In the hypothetical case of a sales tax at a uniform rate (and no savings in the economy), the effects of the sales tax are identical to an equiproportional income tax [Stiglitz]. In practice, it is impossible to impose a sales tax on all goods and services and so there will be distortions in relative prices. Under a sales tax, consumers will choose a bundle of goods and services that is different from the one that they would choose if the same amount of tax revenue were raised by way of an income tax. The additional distortion in relative consumption prices increases the MCF of a sales tax.

However, there are ways of increasing the efficiency of a sales tax through differential rates based on the supply and demand elasticity of the good. The optimal tax rate would be higher for goods with small demand and/or supply elasticities and lower for goods with large demand and/or supply elasticities. By adjusting tax rates across commodities according to this rule, the MCF from sales taxes can be minimised. However, in OECD Member countries currently using generalised sales taxes or value added taxes, commodities with elastic supply and/or demand (“luxury products”) are often taxed at a higher rate than commodities with inelastic supply and/or demand. It is apparent that governments are more concerned by equity than by efficiency considerations when deciding on tax structures. For this reason, sales and value added taxes may not be efficient sources of government revenues for agricultural support.

A tax on food consumption can be discussed as a special case of a generalised sales tax. The net social costs of raising funds by means of a food tax can be measured by the deadweight loss of a consumer price increase. This loss decreases with a more inelastic demand curve. A tax on a specific agricultural commodity reduces consumption of this commodity through a decrease in disposable income (the income effect for a "normal good") and an increase in the price of this commodity relative to other goods (substitution in consumption). The two effects reinforce each other, thereby reducing the tax base. The tax revenue generated by the commodity tax is lower than that of an equivalent lump-sum tax. The difference represents the deadweight loss in consumption. If demand were completely inelastic, there would be no such deadweight loss.

The efficiency of a tax on a commodity that is perfectly inelastic raises the question whether a combination of food taxes and income taxes might be more efficient to raise revenue than either one alone. Given the MCF associated with an existing income tax, would any additional funds be raised more efficiently through a food tax, a marginal increase in the income tax, or a combination of both? The answer will depend on the relative MCFs of the different types of taxation. With respect to the food tax it will, in addition, depend on the level of taxation, since the tax base is much smaller and substantially larger.
changes in the rate are required to raise a given amount of revenue. Since in general, the deadweight cost of a food tax increases at a faster rate than the tax rate itself, there will be an intervention level in the commodity market where the marginal deadweight cost of a food tax is equal to the marginal deadweight cost of an income tax. This implies that, if the food commodity is currently taxed below the level where the marginal deadweight costs of the commodity tax and the income tax are equal, the food tax should be raised, whereas it should be lowered if it is currently above the efficient level [Alston and Hurd].

If agricultural support were at zero level and should be raised, then there would be two ways to proceed depending on whether the MCF of an income tax is greater or less than one. If it is less than one, it would be efficient to increase the income tax. If the MCF of the income tax is greater than one, it would be more efficient to use a food commodity tax first until the marginal deadweight cost of the commodity tax equals that of raising an extra dollar from taxpayers. For any transfer beyond this point, a combination of increases in the commodity tax and the income tax would be efficient in achieving a given producer income goal.

Adjusting the mix of income and food taxes based on the efficiency criterion can be at odds with equity goals. Sales or value added taxes are lower for food than for most other goods in countries where such taxes exist. On the other hand, support prices for agricultural commodities in these countries often raise consumer prices to levels that exceed the prices that would prevail under a uniform sales or value added tax. This evidence suggests that a combination of income and food commodity taxes may well be a feasible alternative even in countries in which existing sales or value added taxes seem to reveal a preference for low or zero taxes on food.

There are, however, two factors that may make use of the commodity tax in combination with an income tax less desirable. First, because of the much larger tax base for the income tax as compared to an individual commodity tax, the lion’s share of transfers beyond the level where the marginal cost of income and commodity taxes are equal will come from the income tax. It might be conceivable to forego the efficiency gain from a combined tax in favour of a pure income tax for reasons of administrative simplicity.

Second, using a combination of income taxes and food commodity taxes poses the problem of determining shifts in the efficient combination over time. With economic parameters changing continuously, it would be difficult to determine the level of the food tax that maintains a balance between the marginal deadweight costs of transfers from consumers and the marginal deadweight loss of existing income taxes.

Additional drawbacks to food commodity taxes that may render their use less attractive include the potential effects of such taxes on production (with associated deadweight losses due to distortions in resource allocation), and the effects on trade and world market prices (which further reduce the efficiency of food taxes). Efficiency gains from tax combinations could only be fully realised if the commodity tax can be implemented in such a way that there are no distortions in production and trade.
NOTES

1. The excess demand curve of the rest of the world, \( D_{ROW} \), represents the difference between demand and supply in foreign countries for a given price. Consequently, a "consumer surplus" gain based on this curve (such as area \( j+i \)) in effect measures the consumer surplus gain in the rest of the world net of the producer surplus loss. Disaggregation of the net income gain in foreign countries into consumer and producer income changes would require an explicit representation of supply and demand in these countries.

2. Under this assumption, an income tax is equivalent to a wage tax.

3. To separate the costs of raising taxes from the distortionary costs that may be involved in disbursing tax revenues, it is assumed that tax revenues are transferred back to farmers in a lump-sum fashion and consequently their disbursement causes no distortion in relative prices.

4. The MCF is defined as one plus the net social cost of raising an extra dollar. Thus, a MCF of 1.05 would imply a five cent net social loss on the marginal dollar raised.


6. A separable public good is a good whose utility for society is independent of private consumption of goods and leisure and so does not affect an individual’s labour/leisure choice.

7. To focus the discussion on the deadweight costs of raising funds, the assumption that tax revenue expenditure does not distort relative prices is also maintained in the case of spending on a public good.

8. Because individuals value leisure more as they become wealthier.

9. This applies to the short run. In the long run, it is likely that full-time farmers would reduce labour input and increase leisure by employing labour-saving technology.

10. The economic effects of a tax on production versus consumption are identical at the margin [Gardner, p.35]. A value added tax differs from a sales tax in that taxation takes place at each processing stage rather than at the final point of sale to consumers.

11. Under certain conditions, optimal commodity taxes ("Ramsey taxes") are proportional to the sum of the reciprocal of the elasticities of demand and supply [Stiglitz, p.404].

12. The discussion of taxes on food consumption is motivated by the fact that much of current support to farmers is effected through direct redistribution from consumers to farmers through higher food prices. Although such redistribution bypasses the treasury, in its effects it is closely related to food taxes.
REFERENCES


