TRADE AND AGRICULTURE DIRECTORATE

OECD'S PRODUCER SUPPORT ESTIMATE AND RELATED INDICATORS OF AGRICULTURAL SUPPORT

Concepts, Calculations, Interpretation and Use (The PSE Manual)

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Comments are welcome and should be sent to tad.contact@oecd.org.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

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Acronyms and Abbreviations

AC	Code used for policies included in All Commodity Transfers
ACT	All Commodity Transfers
AMS	Aggregate Measurement of Support
CAIS	Canadian Agricultural Income Stabilisation programme
CAP	Common Agricultural Policy (of the European Union)
CIF	Cost, Insurance and Freight
COP	Cereals, Oilseeds and Protein Crops
CSE	Consumer Support Estimate
ERA	Effective Rate of Assistance
ERP	Effective Rate of Protection
EU	European Union
FAO	Food and Agricultural Organisation of the United Nations
FOB	Free on Board
GC	Group Commodity
GCT	Group Commodity Transfers
GDP	Gross Domestic Product
GSSE	General Services Support Estimate
GTAP	Global Trade Analysis Project
GTAPEM	Global Trade Analysis Project – Policy Evaluation Model
IMF	International Monetary Fund
LC	Local Currency
LV	Price Levies
MFN	Most Favoured Nation
MPD	Market Price Differential
MPS	Market Price Support
NAC	Nominal Assistance Coefficient
NGO	Non-government organisation
NISA	Net Income Stabilization Account programme (Canada)
NPC	Nominal Protection Coefficient
NRA	Nominal Rate of Assistance
NRP	Nominal Rate of Protection
OECD	Organisation for Economic Co-operation and Development
OTC	Other Transfers from Consumers
OT	Code used for policies included in Other Transfers to Producers
OTP	Other Transfers to Producers
PEM	Policy Evaluation Model
PSE	Producer Support Estimate
RDR	Rural Development Regulation (of the European Union)
SAPIM	Stylised Agri-environmental Policy Impact Model
SCT	Single Commodity Transfers

T	Metric Tonne
TCT	Transfers to Consumers from Taxpayers
TPC	Transfers to Producers from Consumers
TPT	Transfers to Producers from Taxpayers
TRQ	Tariff-Rate-Quota
TSE	Total Support Estimate
URAA	Uruguay Round Agreement on Agriculture
US	United States of America
VAT	Value Added Tax
WTO	World Trade Organisation

Symbols Used in Formulas

ACT	All Commodity Transfers
AMC	All MPS Commodities
BOT	Budgetary and Other Transfers
BP	Border Price
BR	Budget Revenue
c	sub-script denoting country level
CIF	Cost, Insurance and Freight
CO	Commodity Outputs
CP	Consumer Price
CSE	Consumer Support Estimate
D	Debt
DP	Domestic Price
EFC	Excess Feed Cost
EUR	Euros
FG	Farm Gate Price
FOB	Free on Board
GDP	Gross Domestic Product
GFR	Gross Farm Receipts
GCT	Group Commodity Transfers
GR	Gross Receipts (for a commodity)
GSSE	General Services Support Estimate
i	sub-script denoting individual commodity
IF	Insurance and Freight Cost
LC	Local Currency
LV	Price Levies
LVO	Price Levies based on output
MM	Marketing Margin
MMA	Marketing Margin Adjustment
MP	Import Price
MPD	Market Price Differential
MPS	Market Price Support
MV	Monetary Value
NAC	Nominal Assistance Coefficient
NPC	Nominal Protection Coefficient
OP	Other Products
OTC	Other Transfers from Consumers
OTP	Other Transfers to Producers
PO	Payments based on output
PP	Producer Price
PSE	Producer Support Estimate

PTC	Price Transfers from Consumers
QA	Quality Adjustment
QC	Quantity of Consumption
QP	Quantity of Production
QM	Quantity of Imports
QX	Quantity of Exports
RP	Reference Price
S	Processing costs
SCT	Single Commodity Transfers
SMC	Standard MPS Commodities
SMP	Skimmed Milk Powder
STK	Stock Change
T1	Handling and Transportation Costs between Wholesale Market and the Farm Gate
T2	Handling and Transportation Costs between Border and Domestic Market
TCT	Transfers to Consumers from Taxpayers
TPC	Transfers to Producers from Consumers
TPT	Transfers to Producers from Taxpayers
TR	Average Ad valorem Tariff
TSE	Total Support Estimate
USD	US Dollars
VC	Value of Consumption
VM	Value of Imports
VP	Value of Production
VX	Value of Exports
WA	Weight Adjustment
WP	Wholesale Price
XP	Export Price
XR	Exchange Rate
XS	Value of Export Subsidies

Chapter 1

INTRODUCTION

1.1. Objectives

1. The main objectives of this manual are the following.

- To provide a comprehensive description of the methodology employed by the OECD to calculate indicators of agricultural support, by using descriptive text, mathematical equations and empirical examples.
- To describe the economic theory and principles which underlie this methodology.
- To illustrate the practical application of this methodology, including how best to deal with data limitations, and to assist those wishing to replicate the method and apply it to other countries or commodities.
- To explain how the indicators can be used for policy evaluation and modelling.

2. This manual is to be used in conjunction with other publicly available documentation, including the annual report *Agricultural Policy Monitoring and Evaluation: OECD Countries and Selected Emerging Economies* and the indicator database available at http://www.oecd.org/agriculture/pse.

1.2. Target readership

3. This manual will be of assistance to those wanting to gain a greater appreciation of the method and process used to calculate the indicators, including:

- Policy makers and analysts who would like to use the methodology for policy evaluation, to classify a new policy measure, or to evaluate the impact of a policy change on the indicators.
- Researchers who would like to use the economic information contained within the database or to calculate the indicators for other commodities or countries.
- Modellers who would like to use the information contained in the indicator database as an input into their own models, so that they understand the character of the information, and can appropriately take this into account in designing their model structures and values.

1.3. Structure

4. The Manual is organised as follows. Part I provides an introduction to the basic concepts, as covered in Chapter 1. Chapter 2 introduces the main purpose and principles behind the calculations of the indicators, with a short history in Annex 2.1. Chapter 3 explains the criteria used to identify policies included in the calculation of the indicators, how to distinguish policy transfers according to recipient, and, finally, how to classify policies.

5. Part II details the methodology for calculating the indicators. Chapter 4 explains the method used to calculate transfers derived from policies that affect the market price received by producers of agricultural commodities. Chapter 5 focuses on other transfers, including budgetary payments to producers and support based on revenue foregone, e.g. tax or credit concessions. Chapters 6 and 7 show how to bring these transfers together to calculate the indicators of support to producers and consumers respectively. Chapter 8

details the calculation of indicators that measure support through general services to agriculture and the total support to agriculture. Chapter 9 explains the aggregation of support indicators across countries to obtain multi-country totals, e.g. at the OECD level. Chapter 10 concludes Part II by outlining the data and information requirements for calculating the indicators of support.

6. Part III shows how the indicators are used to analyse policy developments and in economic modelling. Chapter11 explains how the indicators are used to interpret policy developments and what they can and cannot reveal, including appropriate wording and presentation (tables and graphs). These suggestions are neither absolute nor exhaustive, but are the result of many years of analysis, presentation and discussion of findings. Finally, Chapter 12 outlines how the indicator database is used in agricultural policy modelling at the OECD.

Chapter 2.

OVERVIEW OF THE OECD INDICATORS OF AGRICULTURAL SUPPORT

7. This chapter begins with a brief summary of why the OECD indicators of agricultural support ("the indicators") have been developed. The second section defines the indicators, and the final section outlines the underlying principles on which the indicators are established. Annex 2.1 reviews the historical development of the indicators.

2.1. Why measure agricultural support?

- The OECD indicators were developed in order to monitor and evaluate developments in agricultural policy, to establish a common base for policy dialogue among countries, and to provide economic data to assess the effectiveness and efficiency of policies.
- The indicators were mandated by OECD Ministers in 1987, have since been calculated for OECD and an increasing number of non-OECD countries, and are widely referred to in the public domain.

8. The objectives and priorities of agricultural policies in OECD countries encompassed over time a wide range of issues – from overcoming food shortages or surpluses in the post-war period to securing food safety, environmental quality and preservation of rural livelihoods at present. Policy instruments have been equally varied, reflecting changes in domestic political and economic settings and, progressively, developments in the international economic arena. Despite this diversity, policy measures applied in a country within a certain period of time can be brought together and expressed in one or several simple numbers – called support indicators – which are comparable across time and between countries. The utility of doing this is three-fold.

9. First, support indicators can be used to ***monitor and evaluate developments of agricultural policies***.[1] This includes the extent of policy reform achieved by countries, both over time and through specific reform efforts (e.g. the US Farm Bills and various CAP reforms), as well as progress towards achieving the commitment agreed to at the 1982 OECD Ministerial Council of reforming agricultural policies. This commitment stated that "agricultural trade should be more fully integrated within the open and multilateral trading system,", and it called for OECD countries to pursue "a gradual reduction in protection and a liberalisation of trade, in which a balance should be maintained as between countries and commodities." Ministers also requested the OECD to develop a method to measure the level of protection in order to monitor and evaluate progress.

10. Closely related to this, the indicators establish a ***common base for policy dialogue*** by using a consistent and comparable method to evaluate the nature and incidence of agricultural policies. While the indicators were calculated initially for OECD countries, the analysis has gradually included also non-OECD countries, such as Brazil, China, Indonesia, Russian Federation, South Africa and Ukraine and in the future also Colombia and Viet Nam. It currently includes 47 countries (27 EU members treated as a single entity), with estimates covering the period from 1986 to the present. The international comparability

1. As in the annual OECD *Monitoring and Evaluation* reports on agricultural policies, the term "policy evaluation" is understood in this manual to be the analysis of levels and composition of agricultural support with respect to the implementation of the policy reform agenda. This term is not used in this manual as the evaluation of the effectiveness or efficiency of policies, except in cases where the focus is specifically on that issue (*e.g.* in Chapter 12).

of the indicators and wide country coverage makes the indicators a useful tool for policy dialogue not only amongst OECD countries, but also with non-OECD countries, inter-governmental organisations (WTO, World Bank, IMF and FAO), farming and non-government organisations, as well as research institutions.

11. Finally, the indicator database is used in further research on policy impacts. The data serve as an ***input into modelling*** to assess the effectiveness and efficiency of policies in delivering the outcomes for which they were designed and to understand their effects on production, trade, income, the environment, etc. While the indicators cannot by themselves quantify these impacts, the economic information upon which they are based is an important building block for further analysis.

2.2. Overview of support indicators: key terms, definitions and distinctions

- "Support" is understood as gross transfers to agriculture from consumers and taxpayers, arising from governments' policies that support agriculture.
- In addition to budgetary expenditures, support includes other estimated transfers, which do not require actual monetary disbursements (e.g. credit concessions)
- The indicators reflect the provision of support, or the level of effort made by governments, as implied by their agricultural policies. As such, they are not intended to and do not measure policy impacts on production, farm incomes, consumption, trade or environment.
- The indicators represent different ways to analyse agricultural policy transfers and measure their levels in relation to various key economic variables. Together they provide a comprehensive picture of agricultural support.
- The indicators can be distinguished according to the recipient of the transfer, the unit of measurement in which they are expressed, and the type of aggregation.

12. Agricultural policies may provide direct payments to farmers. They may maintain domestic agricultural prices above those at the country's border, or grant tax and credit concessions to farmers. Support is not only comprised of budgetary payments that appear in government accounts, but also includes support of market prices, as well as other concessions that do not necessarily imply actual budgetary expenditure, such as tax concessions. The common element to all these policies is that they generate transfers to agriculture.

13. The concept of "transfer" presumes both a source of the transfer and the existence of a recipient. In the present methodology, agriculture is generally regarded as a supported sector and the main recipient of policy transfers. Consumers of agricultural commodities and taxpayers represent the two sources of transfers, i.e. the economic groups bearing the cost of agricultural support. The term "agriculture" designates primary agricultural producers as an economic group. Agricultural producers are viewed from two perspectives – as individual entrepreneurs, and collectively (i.e. as a sector). These distinctions underlie the key dimensions in which agricultural support is measured and the basic structure of the indicators.

14. The terms "support" and "policy transfers" are broadly synonymous, but may be used in different contexts. The term "support" is predominantly used to mean a "policy measure" (that generates a policy transfer) and usually appears when identifying, scoping and classifying the relevant policies. The term "policy transfer" is used mainly with respect to calculations, i.e. the process of obtaining numerical expressions of policies.

15. More fundamental for understanding of the indicators, however, is the distinction between the notions of "provision of support" and the "impact of support" (i.e. impacts of policy transfers). The indicators are the various measures of gross policy transfers. As such, they reflect the *provision* of support, or the level of effort made by governments, as implied by their agricultural policies. The indicators do not

account for the losses of that effort within the economic system, as experienced by the recipients of support. In fact, a proportion of the transfers will not end up as extra producer net income because support induces higher prices for agricultural inputs and factors, as well as generating deadweight loss of economic welfare. Moreover, the actual impact of policies on its recipients will depend on, among other things, the basis upon which support is provided (e.g. whether it is provided per tonne of output, per land unit, per farm, etc.), the level of support, and the responsiveness of farmers to changes in support. The indicators, therefore, are not intended to and do not measure *the impact* of policy effort on farm production, farm incomes, trade or environment. This explanation of the indicators as representing measures of policy effort is crucial for understanding them properly. Chapter 11 contains a detailed discussion of how the indicators should be used and interpreted, and concludes with examples of mistakes in interpretation that should be avoided.

16. The support indicators, which are introduced below, are different ways to analyse agricultural policy transfers and measure their levels in relation to various key economic variables. The names, abbreviations and definitions of the indicators are listed in Box 2.1. No single indicator can capture all aspects of agricultural support. Each serves a purpose, highlighting a dimension of the support framework. The indicators are interlinked and mutually reinforcing. When analysed together, they provide a comprehensive picture of the level and composition of support.

Box 2.1. Names and definitions of the OECD indicators of agricultural support

INDICATORS OF SUPPORT TO PRODUCERS

Producer Support Estimate (PSE): The annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm-gate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impacts on farm production or income.

Percentage PSE (%PSE): PSE as a share of gross farm receipts (including support).

Producer Nominal Assistance Coefficient (producer NAC): the ratio between the value of gross farm receipts (including support) and gross farm receipts valued at border prices (measured at farm gate).

Producer Nominal Protection Coefficient (producer NPC): the ratio between the average price received by producers at farm gate (including payments per tonne of current output), and the border price (measured at farm gate).

Producer Single Commodity Transfers (producer SCT): The annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures directly linked to the production of a single commodity such that the producer must produce the designated commodity in order to receive the transfer.

Producer Percentage Single Commodity Transfers (producer %SCT): The commodity SCT as a share of gross farm receipts for the specific commodity.

Group Commodity Transfers (GCT): The annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures whose payments are made on the basis that one or more of a designated list of commodities is produced, i.e. a producer may produce from a set of allowable commodities and receive a transfer that does not vary with respect to this decision.

All Commodity Transfers (ACT): The annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures that place no restrictions on the commodity produced but require the recipient to produce some commodity of their choice.

Other Transfers to Producers (OTP): The annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures that do not require any commodity production at all.

(continued)

INDICATORS OF SUPPORT TO GENERAL SERVICES FOR AGRICULTURE

General Services Support Estimate (GSSE): The annual monetary value of gross transfers arising from policy measures that create enabling conditions for the primary agricultural sector through development of private or public services, and through institutions and infrastructures regardless of their objectives and impacts on farm production and income, or consumption of farm products. It includes policies where primary agriculture is the main beneficiary, but does not include any payments to individual producers. GSSE transfers do not directly alter producer receipts, costs or consumption expenditures.

Percentage GSSE (%GSSE): GSSE as a share of Total Support Estimate (TSE).

INDICATORS OF SUPPORT TO CONSUMERS

Consumer Support Estimate (CSE): The annual monetary value of gross transfers from (to) consumers of agricultural commodities, measured at the farm gate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impacts on consumption of farm products.

Percentage CSE (%CSE): CSE as a share of consumption expenditure (measured at farm gate) net of taxpayer transfers to consumers.

Consumer Nominal Assistance Coefficient (consumer NAC): The ratio between the value of consumption expenditure on agricultural commodities (at farm gate) and that valued at border prices (measured at farm gate).

Consumer Nominal Protection Coefficient (consumer NPC): The ratio between the average price paid by consumers (at farm gate) and the border price (measured at farm gate).

Consumer Single Commodity Transfers (consumer SCT): The annual monetary value of gross transfers from (to) consumers of agricultural commodities, measured at the farm gate level, arising from policy measures directly linked to the production of a single commodity.

INDICATORS OF TOTAL SUPPORT TO AGRICULTURE

Total Support Estimate (TSE): The annual monetary value of all gross transfers from taxpayers and consumers arising from policy measures that support agriculture, net of associated budgetary receipts, regardless of their objectives and impacts on farm production and income, or consumption of farm products.

Percentage TSE (%TSE): TSE as a share of GDP.

17. Three distinctions can be made between the indicators (Table 2.1). The first one relates to the ***intended recipient*** of the transfer – producers individually, producers collectively, or consumers, although agriculture is always understood to be the economic sector supported by the policies (Section 3.1). For example, nine indicators measure support directed to producers individually, while two indicators measure support provided to producers collectively.

18. A second distinction can be made in relation to the ***unit of measurement***: nine indicators are expressed in *monetary* terms, and nine represent *percentages* or *ratios*. An advantage of monetary indicators is that they can be used to analyse the composition of support, e.g. to calculate the shares of PSE or GSSE by policy category, or the shares of TSE according to whether the transfers come from consumers or taxpayers. However, the monetary indicators are influenced by the size and structure of the country's agricultural sector, as well as the country's rate of inflation. Consequently, there are difficulties in using them to compare support levels between countries, to evaluate changes over time, or to assess the level of support provided within a country to different commodities. In contrast, percentage indicators and ratios, which relate policy transfers to some other monetary base, e.g. the value of agricultural production, allow such comparisons to be made.

19. Finally, the indicators can be distinguished according to the ***type of aggregation*** at which they can be derived — across commodities or geographically. While all the indicators can be calculated at the national and multi-country level, some can also be calculated for individual commodities or for groups of commodities.

Table 2.1. The OECD indicators of agricultural support

Intended recipient	Unit of measurement		Type of aggregation		
	Monetary	Percentage or ratio	Individual commodity or groups of commodities	Geographical	
				National[1] (aggregate)	Multi-country (*e.g.* OECD total)
Producers individually	PSE	%PSE and producer NAC	nc	*	*
	-	producer NPC	*	*	*
	producer SCT	producer %SCT	*	*	*
	GCT	nc	*	*	*
	ACT and OTP	nc	nc	*	*
Producers collectively	GSSE	%GSSE	nc	*	*
Consumers	CSE	%CSE and consumer NAC	nc	*	*
	-	consumer NPC	*	*	*
	consumer SCT	nc	*	*	*
All recipients	TSE	%TSE	nc	*	*

Symbols: "-" not applicable; "nc" not calculated; "*" calculated.

1. The European Union (EU) is treated as one country for the purpose of indicator calculations, given the common policy for agriculture applied throughout the Union, and specifically: the EU12 for 1986-94 including ex-GDR from 1990; EU15 for 1995-2003; and EU25 for 2004-06 and EU27 from 2007 onwards.

2.3. Basic principles of measuring support

- Several key principles determine the scope of policy measures to be considered in the estimation of agricultural support and the method for measuring support, such as:
  - A policy measure is included if it generates transfers to agricultural producers, regardless of the nature, objectives or impacts of the policy measure.
  - Transfers are measured in gross terms, taking no account of adjustments which producers may make to receive the support, e.g. to meet compliance conditions.
  - Transfers to individual producers are measured at the farm gate level.

20. A number of principles, or general rules, guide the measurement of agricultural support. Principles 1 to 3 determine the scope of policy measures to be considered in estimating agricultural support and provide criteria for identifying agricultural policies in a complex mix of government actions. Principles 4 and 6 help to define the method for measuring support and are important for interpreting the indicators.

21. *Principle 1: generation of transfers to agricultural producers as a key criterion for inclusion of policy in the measurement of support.* Policy measures generate explicit or implicit transfers to supported individuals or groups. A policy measure is considered for measurement if agricultural producers, individually or collectively, are the only, or the principal, intended recipients of economic transfers

generated by it. This is sufficient criterion for inclusion of a policy measure in the estimation of agricultural support.

22. *Principle 2: there is no consideration of the nature, objectives or economic impacts of a policy measure* beyond an "accounting" for transfers. This principle complements principle 1, in that the stated objectives, or perceived economic impacts of a policy measure, are not used as alternative or additional criteria to determine the inclusion or exclusion of a policy measure in the estimation of agricultural support.

23. *Principle 3: general policy measures available throughout the entire economy are not considered in the estimation of agricultural support*, even if such measures create policy transfers to/from the agriculture. Thus, a situation of zero support to agriculture would occur when there are only general economy-wide policies in place with no policies specifically altering the economic conditions for agriculture.

24. *Principle 4: transfers generated by agricultural policies are measured in gross terms.* Policy transfers can be defined in gross or net terms, i.e. as revenue (gross receipts) or income (revenue less costs) generated by a policy measure. The phrase *gross transfers* in the definitions emphasises that no adjustment is made in the indicators for costs incurred by producers in order to receive the support, e.g. costs to meet compliance conditions attached to certain payments, or tax clawbacks.

25. *Principle 5: policy transfers to individual producers are measured at the farm gate level*, which follows from the objective to measure support only to primary producers of agricultural commodities. Consequently, the word "*consumer*" in the definitions and methodology is understood as a first-stage buyer of agricultural commodities.

26. *Principle 6: policy measures supporting individual producers are classified according to implementation criteria*, such as: (i) the basis upon which support is provided (a unit of output, an animal head, a land unit, etc.); (ii) whether support is based on current or non-current production parameters; and (iii) whether production is required to receive support or not; and other criteria. These policy characteristics affect producer behaviour, and distinguishing policies according to implementation criteria enables further analysis of policy impacts on, for example, production, trade, income, and the environment.

27. These are the general principles applied in estimating the indicators of support. Along with the more practical underpinnings of the methodology, they will be developed further in the following chapters.

Annex 2.1.

A Short History of the Indicators

28. The widespread policy goal from the late 1940s to produce more food led to increasing concern about the effects of agricultural policies on trade relations and on the cost of policies. Combined with rapid technical progress and structural changes, trade barriers and domestic production support measures led to surpluses of farm goods, which were stocked or exported with additional subsidies. World prices for temperate-zone commodities were driven down. The costs of stock-holding and export subsidies placed heavy burdens on government budgets, consumers in countries with protected markets faced higher food bills, and competitive producers in other countries were penalised by restrictions on access to those markets. By the beginning of the 1980s, a number of OECD countries realised that action was urgently needed.

29. At the 1982 OECD Ministerial Council (consisting of Ministers of Economics, Trade and Foreign Affairs, plus a few Agriculture Ministers), it was agreed "that agricultural trade should be more fully integrated within the open and multilateral trading system… (and) that the desirable adjustments in domestic policies can best take place if such moves are planned and co-ordinated within a concerted multilateral approach aimed at achieving a gradual reduction in protection and a liberalisation of trade, in which a balance should be maintained as between countries and commodities." Ministers also decided that the Secretariat should "study the various possible ways in which the above aims could be achieved as a contribution to progress in strengthening co-operation on agricultural trade issues and as a contribution to the development of practical multilateral and other solutions."

30. An integral part of this investigation was to develop an appropriate basis for measuring agricultural subsidies. After considering the options available, the Secretariat decided to use the Producer Subsidy Equivalent (PSE), initially defined as *the payment that would be required to compensate farmers for the loss of income resulting from the removal of a given policy measure* (OECD, 1987).[2] While the PSE was at first used for modelling the effects on world commodity prices of a small reduction in agricultural subsidies, it was also recognised as a very useful tool in its own right to establish a consistent and comparative method to evaluate agricultural policies between countries.

31. The notion of a "subsidy equivalent" derives from the economic theory of protection developed in the 1960s to evaluate the effects of tariffs (Corden, 1971). According to this theory, the *producer subsidy equivalent of a policy measure*, whether an import tariff, export subsidy, payment per tonne or per hectare, etc., is the payment per unit of output that a government would have to pay producers to generate the same impact on production as that policy measure.[3] In the early 1970s, Tim Josling had applied this concept to the empirical measurement of agricultural subsidies in work for the FAO, introducing the term PSE (Josling, 1973 and Josling, 1975).

32. In 1987, a major OECD study entitled *National Policies and Agricultural Trade* offered an in-depth analysis of the agricultural policies of individual OECD countries based largely on the PSE and

2. The Consumer Subsidy Equivalent (CSE) was defined as "the implicit *tax* on consumption resulting from a given policy measure (market price support element of the PSE) and any subsidies on consumption."

3. Likewise, the *consumer tax equivalent of a policy measure* is the per unit tax that a government would have to impose to generate the same impact on consumption as that policy measure.

related indicators.[4] This study recognised the linkages between domestic and trade policies and concluded that in order to improve the trading environment actions were necessary on both trade barriers and domestic policies.

33. It was clear from the start that the "income compensation" definition did not match what was actually being measured by the OECD PSE. While policy measures providing the same amount of *monetary* transfers to producers have the same *revenue* subsidy equivalent, they may have different production and income subsidy equivalents which depend on the way the measures are implemented (per unit of output or per hectare of land producing the same output, for example). One of the first critiques in this regard noted, *inter alia*, that the PSE was a measurement of revenue transfer (Peters, 1988).

34. As a result, the PSE was redefined in 1990 as *the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm-gate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impact on farm production or income*.[5]

35. Four major refinements were made in 1999:

- The PSE acronym was changed from meaning "Producer Subsidy Equivalent" to "Producer Support Estimate".[6] It was recognised that: (a) transfers associated with a wide range of diverse policies have different "subsidy equivalents"; and (b) that some of the transfers were given for the provision of services and positive externalities rather than to subsidise the production of agricultural commodities. The more neutral term "support" acknowledges that a monetary transfer is involved whatever the policy objective.

- Changes were made to the classification of policies within the PSE (Table A2.1). This was required because of the growing scope of support policies introduced since the mid-1980s. Previously, there were five PSE categories with policies classified according to the *type* of support measure. The 1999 refinements introduced seven types of support measures with policies classified according to how they were *implemented*.

- A closely related change involved the establishment of a separate indicator to measure support provided to producers collectively, the General Services Support Estimate (GSSE). Support for "General Services" had been previously included in the PSE. This was separated from the calculation of the PSE, which now measures only support received by producers individually. Consequently, the indicator and method for measuring the total cost to consumers and taxpayers of agricultural policies also changed, from the Total Transfers to Total Support Estimate (TSE).

- Finally, a new method for calculating the national (aggregate) PSE was introduced. Previously, this had been calculated by "extrapolating" the average %PSE for a common set of commodities to all agricultural production. A new method was introduced whereby only the average ratio of

4. PSEs and CSEs were initially calculated for a set of OECD countries comprising Australia, Austria, Canada, the EEC, Japan, New Zealand and the United States for the period 1979 to 1981, and later extended to include Sweden, Finland, Norway and Switzerland.

5. The CSE was also redefined as *the annual monetary value of gross transfers from (to) consumers of agricultural commodities, measured at the farm gate level, arising from policies that support agriculture, regardless of their nature, objectives or impacts on consumption of farm products.* If negative, the CSE measures the burden (implicit tax) on consumers, indicating that higher prices resulting from market price support more than offset consumer subsidies.

6. The CSE was changed from the "Consumer Subsidy Equivalent" to the "Consumer Support Estimate".

MPS to gross farm receipts for a set of commodities is extrapolated across to the rest of agricultural production (section 6.1.1), with all transfers from non-MPS policies included specifically within the PSE through classification in the appropriate categories.

36. Further changes were introduced in 2007 to enable the indicators to better capture recent policy developments, e.g. the move to "decouple" the provision of support from specific commodity production and "re-couple" the provision of support to other criteria. Three major changes were made:

- Although still based on implementation criteria, the PSE categories were substantially redefined (Table A2.1 and section 3.3.1).
- Labels were introduced, with the result that each policy, in addition to being classified into a PSE category, could also have up to six different labels attached to it so as to provide additional detail on implementation criteria; labels serve as shorthand for categories not included in the main presentation. For example, labels give additional information on whether a payment is with or without limit, or whether a payment implies any constraints on input use by the recipient, etc. (section 3.3.3).
- PSEs for individual commodities are no longer calculated. Instead, a country total PSE is divided into Single Commodity Transfers, Group Commodity Transfers, All Commodity Transfers; and Other Transfers to Producers (section 6.3). This change reflects the fact that as a result of policy reform, support in many OECD countries is less tied to an individual commodity. Support is being increasingly provided to groups of commodities or all commodities in general, or without obliging a recipient to engage in commodity production at all. In this situation the link between some support transfers and individual commodities becomes less apparent. This necessitated an alternative presentation of support transfers with respect to their commodity specificity.

Table A2.1. Development of PSE categories

Initial 1987 categories	1999 revision	2007 revision
A. Market Price Support B. Direct payments C. Reduction in input costs D. General Services E. Other	A. Market Price Support B. Payments based on output C. Payments based on area planted/animal numbers D. Payments based on historical entitlements E. Payments based on input use F. Payments based on input constraints G. Miscellaneous	A. Support based on commodity output (Market Price Support and Payments based on output) B. Payments based on input use C. Payments based on current A/An/R/I[1], production required D. Payments based on non-current A/AN/R/I, production required E. Payments based on non-current A/AN/R/I, production not required F. Payments based on non-commodity criteria G. Miscellaneous

1. The letters stand for Area (A), Animal Numbers (AN), Receipts (R) or Income (I).

37. A new methodology to calculate the GSSE was implemented for the first time in the 2014 edition of the *Monitoring and Evaluation* report. The revised methodology clarifies the boundaries of the GSSE indicator and its components:

- The boundaries of the GSSE have been re-defined to cover only policies where primary agriculture is the main beneficiary. This definition is narrower than the one applied previously because it excludes support to services for which primary agriculture is not the main beneficiary. For example, governments fund rural services, which benefit primary

agriculture, even if farmers are not the main beneficiaries. They also provide support to upstream and downstream industries which indirectly benefits the primary sector. These measures are no longer covered by OECD indicators of support to agriculture.

- The definitions of GSSE categories have been clarified and sub-categories added to better reflect recent changes in policy priorities (Table A2.2. and section 3.4.1).

Table A2.2. Development of GSSE categories

Initial 1999 categories	2013 revision
H. Research and development	H. Agricultural knowledge and innovation system
I. Agricultural schools	H1. Agriculture knowledge generation
J. Inspection services	H2. Agricultural knowledge transfer
K. Infrastructure	I. Inspection and control
L. Marketing and promotion	I1. Agricultural product safety and inspection
M. Public stockholding	I2. Pest and disease inspection and control
N. Miscellaneous	I3. Input control
	J. Development and maintenance of infrastructure
	J1. Hydrological infrastructure
	J2. Storage, marketing and other physical infrastructure
	J3. Institutional infrastructure
	J4. Farm restructuring
	K. Marketing and promotion
	K1. Collective schemes for processing and marketing
	K2. Promotion of agricultural products
	L. Cost of public stockholding
	M. Miscellaneous

Chapter 3.

IDENTIFYING, DISTINGUISHING AND CLASSIFYING POLICIES

38. Before calculating the indicators for any particular country, it is important to understand fully the range of policy measures applied to support agriculture and the forms in which they are implemented.

39. The first section of Chapter 3 defines the policy measures included in the measurement of support. The following section differentiates the policies according to which of the three economic groups the transfer is made to. The third section details the various categories and labels attached to policy measures within the PSE, including definitions and worked examples. Similarly, the various GSSE and CSE categories are defined and discussed in the two final sections.

3.1. Identifying policies that support agriculture

- Policies are included in the estimates of support if agriculture is the only, or the major, beneficiary of the policy.
- It does not matter which government ministry or level of government implements the policy.

40. The range of policy measures included in the estimation of agricultural support are determined by the definitions and principles outlined in Chapter 2. In all cases, which government body is responsible for the policy measure giving rise to the transfer has no impact on the decision to include it or not. In other words, policy measures supporting agriculture may be under the responsibility of many different government ministries, and not just the ministry formally responsible for agriculture, and at different levels of government, e.g. central, provincial, prefectural or state. Alternatively, policies implemented by a ministry responsible for agriculture but related to non-agricultural activities, e.g. forestry or fisheries, are not considered.

41. From the definition of the PSE, a policy measure will be included in the estimation of agricultural support if it: (a) provides a transfer whose incidence is at the farm level; and (b) is directed specifically to agricultural producers or treats agricultural producers differently from other economic agents in the economy. The support provided by the policy measure may be delivered in several different ways: an increased output price (Market Price Support); a reduced input price (e.g. a fertiliser subsidy) or cost share for fixed capital; a direct payment (a cheque from the government); a revenue foregone by government (e.g. a tax concession); a reimbursement of a tax or charge (e.g. as for fuel taxes in some countries); or a gratuitous service in kind to individual farmers (e.g. delivery of extension services).

42. Support for farm product prices, or direct payments based on agricultural production or agricultural area, are clearly agricultural and producer-specific, and are included in the PSE indicator. Similarly, a payment reducing the price of fertiliser or pesticide for application on farm land, or a payment compensating for yield loss as a result of practising organic farming, is clearly agricultural and producer specific and are also included in the PSE. On the other hand, a tax concession that is available to all small businesses or to all self-employed people in an economy would not be included in the PSE because it is not specific to agriculture, even though it benefits farmers, perhaps substantially.

43. With respect to some measures, a degree of judgement needs to be exercised. This is illustrated in the following examples.

- A fertiliser subsidy may benefit gardeners and owners of golf courses, but the main beneficiary will usually be farmers. In this case, the policy measure is judged to be specific to farming and is included in the PSE. However, in the estimation of support, only the value of transfers going to agriculture is included.
- Many countries grant concessions on the use of fuel in machines for off-road use. All machinery-using sectors may benefit, or a limited number of sectors may be defined by the enabling regulations. In these cases, the benefit will be included in the PSE if agriculture is singled out as a target sector for the benefit or if, *de facto*, it is the major beneficiary of the measure.
- A grant for the conversion of farm buildings to self-catering accommodation for tourists will not be included unless eligibility for the grant is confined to farmers.
- Differential treatment of farmers in social security measures is not included because it has not been possible to determine whether the conferred benefits are specific to primary agriculture.
- Measures that provide support to individuals who may not be farmers to carry out actions on farms, e.g. a stone wall payment/environmental measure that is also available to non-farmers, may be included, although only the value of transfers going to farmers would be included.

44. The definition of the GSSE allows for a wider range of policy measures to be included in the indicator. As with the PSE, the focus is on the primary sector – agricultural production at the level of the farm. Two principal types of expenditures are included as follows.

- Expenditures associated with policy measures that are included in the PSE, but which are not received directly by farmers. For example, the costs associated with the storage and disposal of price-supported commodities by the government or an appointed agency are included in the GSSE.
- Services that benefit primary agriculture but whose initial incidence is not at the level of individual farmers: for example, agricultural education, research, marketing and promotion of agricultural goods, general infrastructural investment relating to drainage, and irrigation, and inspection services beyond the farm gate.

45. From the definition of the CSE, policy measures which provide positive transfers to first consumers of agricultural commodities, e.g. flour mills, meat-processing plants or fruit-packing houses, are also included when they are provided specifically to offset the higher prices that result from market price support. Domestic food aid associated with measures that support agriculture, e.g. distribution of government stocks acquired in the context of market interventions, are also included.

46. A continual effort is made to ensure consistency in the treatment and completeness of policy coverage. Revising the calculations and improving consistency in light of more updated data and information on policy measures is an ongoing process undertaken in conjunction with the preparation of the reports on *Agricultural Policies in OECD Countries: Monitoring and Evaluation* and *Agricultural Policies in Non-OECD Countries: Monitoring and Evaluation*.

Box 3.1. Some issues not explicitly dealt with in the PSE framework

Regulatory measures

In light of the standard division of government measures into fiscal and regulatory, a question arises about the treatment of regulations in the PSE. Generally speaking, the PSE includes policy measures that give rise to transfers. The transfers may be direct (a cheque from the government) or indirect (paid by consumers), explicit (again a cheque) or implicit (as in a tax concession). In all these cases, a recipient and a beneficiary can be clearly identified. The PSE does not capture regulations except in so far as these occur in association with transfers. For example, a production quota is captured in the estimation of Market Price Support. However sanitary or environmental regulations as such will not be reflected in the PSE unless there are transfers associated with them, e.g. if governments compensate some of the costs to comply with these regulations.

Externalities and public goods generated by agriculture

Agricultural activities not only produce commodities for food, feed, fibre or fuel, but also contribute to the preservation of ecosystems, cultural landscapes, carbon sequestration and flood management. Agriculture also generates pollution of water and air, contributes to greenhouse gas emissions, and leads to loss of habitats and biodiversity. Some farmers voluntarily treat animals (animal welfare) or provide levels of food safety that go beyond minimum legal standards. In some countries legal requirements that farmers must observe (such as banning the keeping of chicken in cages) go beyond what farmers would profitably choose to implement without support payments. Agriculture thus provides public goods and generates positive or negative externalities, which may be provided jointly with agricultural commodity production, or directly through the use of farm-based resources.

In so far as markets are absent or poorly functioning for these externalities and public goods, farmers are neither remunerated for their provision, nor charged for the pollution generated. In such cases, without some remuneration or penalty, there would tend to be an under-provision of public goods and an over-generation of environmental damage. Thus governments have put in place various agri-environmental and animal welfare policies, which involve *inter alia* payments and charges to farmers.

Consistent with the OECD definition of the PSE, the value of these (positive and negative) externalities is not explicitly captured in “gross farm receipts”. It will be recalled that gross farm receipts is the denominator of the %PSE that comprises the value of commodity production to which is added budgetary transfers from policies, some of which are to pay farmers to reduce negative externalities. Taking into account the value of these non-market public goods and externalities would mean that the denominator would represent farm receipts adjusted for externalities and public goods.

Transfers from policies that pay farmers for the *extra* costs incurred or profits foregone (from reduced commodity production) for investments or practices - such as for conserving land with high environmental value, preserving biodiversity, improving the treatment of animals, or reducing pollution - are included in both the numerator and denominator in the %PSE calculation. As the denominator of the %PSE includes the value of the transfers associated with such policies, the transfers could be considered as a proxy for the value of the relevant public goods and externalities, as measured by the additional costs of their provision. It could be argued that the *total social value* of non-market goods generated by agriculture, both positive and negative, should be included in the denominator (i.e. gross farm receipts adjusted for those goods). Three points need to be stressed in this regard: first, in so far as those non-market goods are provided jointly with marketed commodities (which is also partly dependent on the overall level of support from all sources), there is no additional *cost* incurred by farmers in their provision, while additional non-market goods will generally only be provided if there is additional remuneration (as outlined above); second, at present there is no consistent and non-contested set of *demand* valuations by society for non-market public goods (or of the value of negative externalities) across and within OECD countries which could be accounted for in the value of farm receipts; and third, some of the transfers in the “General Services Support Estimate” (GSSE) are for the provision of public goods or mitigation of negative externalities, but are not included (by definition) in the value of gross farm receipts in the %PSE calculation. Those elements in the GSSE would need to be taken into account in any overall accounting of the externalities associated with agriculture.

Other work in the OECD is currently examining the valuation of environmental externalities (in the Environment Directorate), and the measurement (and classification) of transfers associated with “agri-environmental” policies, and indicators of environmental performance in the agricultural sector (in the Trade and Agriculture Directorate).

3.2. Distinguishing between policies according to economic group

- Policy measures are attributed to three economic groups on the basis of who the recipient of the transfer, i.e. producers individually, producers collectively, or consumers of agricultural commodities.
- A series of questions helps to determine to which recipient group a policy transfer should be classified.

47. Identifying the full range of policies supporting agriculture is also largely a process of distinguishing between policy measures on the basis of which economic group receives the transfer. Three economic groups are identified, according to whether the policy measure provides transfers to producers individually (PSE) or collectively as general services to agriculture (GSSE), or whether it provides transfers to consumers individually (CSE). Appropriately distinguishing between policies is important for correctly calculating the indicators that measure the level and composition of support. This process can be aided by the following sequence of questions.

Question 1: Does the policy create a transfer to producers collectively through general services?

48. For the answer to be positive, such transfers should not depend on the actions of individual farmers or consumers, are not received by individual producers or consumers, and do not affect directly farm receipts or consumption expenditure. In answering this question, it would be useful to bear in mind the categories for classifying policies within the GSSE (section 3.4). If the answer is yes, consider the policy under the GSSE. If no, proceed to the next question.

Question 2: Does the policy measure create a transfer to producers individually based on goods or services produced, on inputs used, or on the fact of being a farming enterprise or farmer?

49. For a policy measure to be included in the PSE, it is necessary that an individual farmer takes actions to produce goods or services, to use factors of production, or to be defined as an eligible farming enterprise or farmer, in order to receive the transfer. If yes, consider it under the PSE and proceed to the following question. If no, also proceed to the following question.

Question 3*:* Does the policy create a transfer to or from consumers of agricultural commodities?

50. In the case of the CSE, it is necessary for individual consumers to take actions to consume agricultural commodities in order to receive (provide) a transfer. Examples of policies grouped in the CSE include transfers to processors (first consumers) to compensate them for higher domestic prices and consumption subsidies in cash or in kind to support consumption levels. Note also that some policies that are grouped in the PSE also constitute the CSE. These relate to the policies that create output price-based transfers. For example, a border tariff creates a price gap between domestic and world prices, resulting in consumers paying a higher price for that product. This policy measure results in transfers from consumers to producers and from consumers to government revenue (sections 4.2 and 4.3 explain this in greater detail). If yes, consider it under the CSE.

51. The TSE represents the sum of all three components, adjusted for double-counting given that the transfers associated with market price support policies appear in both the PSE and CSE calculation.

3.3. Classifying and labelling policies that support producers individually (PSE)

- Policy measures included in the PSE are classified according to specific implementation criteria. These identify the economic features of policy measures, which are important for the consequent analysis of potential impacts of policies on production, income, consumption, trade, and the environment.
- Policy measures are classified into seven categories which identify the transfer basis for the policy, whether the basis is current or non-current, and whether production is required or not.
- Policy measures in each category are further distinguished according to whether constraints are placed on output levels or input use, whether the payment rate is variable or fixed, and whether the policy transfer is specific or not as to commodities covered or excluded.
- Policy measures may be classified by category by label, or by both, according to intended use.

3.3.1. Definition of categories and sub-categories

52. The impact of policy measures on variables such as production, consumption, trade, income, employment and the environment depend, among other factors, on the way policy measures are implemented. Therefore, to be helpful for policy analysis, policy measures to be included in the PSE are classified according to implementation criteria. For a given policy measure, the ***implementation criteria*** are defined as *the conditions under which the associated transfers are provided to farmers, or the conditions of eligibility for the payment*. However, these conditions are often multiple. Thus, the criteria used to classify payments to producers are defined in a way that facilitates: the analysis of policies in the light of the "operational criteria" defined by OECD Ministers of Agriculture in 1998; the assessment in subsequent analysis of their impacts on production, consumption, income, employment, etc., through, for example, the Policy Evaluation Model (PEM); and the classification of policy measures in a consistent way across countries, policy measures and over time.

53. Policy measures with an environmental focus illustrate the role of implementation criteria in the PSE classification. Possible agri-environmental payments include cost-sharing for the installation of conservation practices, or alternatively the provision of a per hectare payment to motivate an above-standard level of environmental condition. Although in both cases the payments may have the same environmental objective, their main implementation criteria are not the same, and the incentives provided to farmers in terms of resource use and production decisions may differ. Hence, the two cases should not be considered within the same category since support is implemented differently in each case.

54. As a result of several policy developments, including policy reform initiatives and new measures of support, a new PSE classification was introduced in 2007. The key underlying principle remains that policy measures are classified according to the way they are *implemented*. The various categories and sub-categories listed in Box 3.2 have been constructed to identify the implementation criteria that are considered to be the most significant from an economic perspective and reflecting policies applied in OECD countries (the PSE categories, as they are presented in the PSE database are also shown in Table 3.1). The categories identify:

- the ***transfer basis*** for support: output (category A), input (category B), area/animal numbers/receipts/incomes (categories C, D and E), non-commodity criteria (category F);
- whether the support is based on a ***current*** (categories A, B, C, F) or ***non-current*** (historical or fixed) basis (categories D and E);
- whether ***production*** is ***required*** (categories C and D) or ***not*** (category E).

Box 3.2. Names and definitions of the PSE categories and sub-categories

A. Support based on commodity output

A.1. Market price support (MPS) - Transfers from consumers and taxpayers to agricultural producers arising from policy measures that create a gap between domestic market prices and border prices of a specific agricultural commodity, measured at the farm gate level.

A.2. Payments based on output - Transfers from taxpayers to agricultural producers from policy measures based on current output of a specific agricultural commodity.

B. Payments based on input use: Transfers from taxpayers to agricultural producers arising from policy measures based on on-farm use of inputs:

B.1. Variable input use - Transfers reducing the on-farm cost of a specific variable input or a mix of variable inputs.

B.2. Fixed capital formation - Transfers reducing the on-farm investment cost of farm buildings, equipment, plantations, irrigation, drainage and soil improvements.

B.3. On-farm services - Transfers reducing the cost of technical, accounting, commercial, sanitary and phyto-sanitary assistance, and training provided to individual farmers.

C. Payments based on current A/An/R/I[1], production required: Transfers from taxpayers to agricultural producers arising from policy measures based on current area, animal numbers, receipts or income, and requiring production. Category C is further Broken down to two sub-categories:

C.1. Based on current receipts/income - Including transfers through policy measures based on receipts or income.

C.2. Based on current area/animal numbers - Including transfers through policy measures based area/animal numbers.

D. Payments based on non-current A/An/R/I, production required: Transfers from taxpayers to agricultural producers arising from policy measures based on non-current (i.e. historical or fixed) area, animal numbers, receipts or income, with current production of any commodity required.

E. Payments based on non-current A/An/R/I, production not required: Transfers from taxpayers to agricultural producers arising from policy measures based on non-current (i.e. historical or fixed) area, animal numbers, receipts or income, with current production of any commodity not required but optional. Category E is further divided in two sub-categories according to the nature of payment rates used:

E.1. Variable rates - Transfers using payment rates which vary with respect to levels of current output or input prices, or production/yields and/or area.

E.2. Fixed rates - Transfers using payment rates which do not vary with respect to these parameters.

F. Payments based on non-commodity criteria: Transfers from taxpayers to agricultural producers arising from policy measures based on:

F.1. Long-term resource retirement - Transfers for the long-term retirement of factors of production from commodity production. The payments in this subcategory are distinguished from those requiring short-term resource retirement, which are based on commodity production criteria.

F.2. A specific non-commodity output - Transfers for the use of farm resources to produce specific non-commodity outputs of goods and services, which are not required by regulations.

F.3. Other non-commodity criteria - Transfers provided equally to all farmers, such as a flat-rate or lump-sum payment.

G. Miscellaneous payments: Transfers from taxpayers to farmers for which there is insufficient information to allocate them to the appropriate categories.

1. The abbreviations represent: A - Area; An - Animal numbers; R - Receipts; and I - Income

3.3.2. Classification criteria

55. The ***criteria*** for classifying each of the policy measures included in the PSE into a specific category, as defined in the PSE classification, are expressed through the following sequence of questions. These criteria are mutually exclusive and are applied to each policy measure sequentially. Diagram 3.1

below illustrates this procedure. Although a given policy measure may be conditional on several of the criteria, it is classified under the first applicable criterion. If a transfer to agricultural producers provided through two (or more) policy measures is available only as an aggregate amount, a suitable allocation key is used to allocate it to the appropriate categories.

3.3.3. Definition of labels

56. In addition to classification into a category, each policy measure is assigned several "labels" that provide additional details on policy implementation (Box 3.3). The six labels contain information on the constraints, placed by policies on output and payment levels or input use, further specify the basis of transfer, its commodity specificity and variability of payment rates. The alternatives offered by each label are exhaustive, so that only one of the available options can be attributed to a payment.

57. Distinction between the terms "PSE category" and "PSE label" is a matter of presentation convention. Table 3.1 shows that the PSE classification is a matrix of various policy implementation criteria where PSE categories are presented along the vertical axis and PSE labels along the horizontal axis. Labels only represent additional dimensions in which the PSE can be broken down and, like the PSE categories, are defined in terms of implementation criteria rather than policy objectives. Labels could be used as an alternative presentation of policy implementation; they also could theoretically be presented as PSE sub-categories or sub-sub-categories. For example, in PSE category E, the "with variable or fixed payment rates" label is used to create sub-categories E.1 and E.2. However, not all labels are applicable to all PSE categories (A to F). For example, the label specifying whether a payment is based on a single, group or all commodities is not applicable to policies in category *E. Payments based on non-current A/An/R/I, production not required*, or *F. Payments based on non-commodity criteria*. A label distinguishing payments based on area, animal numbers, receipts or income is by definition redundant for policies in categories *A. Support based on commodity output* and *B. Payments based on input use*. Other labels could in the future be introduced and presented as sub-categories if policy developments warrant the change. In designing the structure of the PSE database, the choice between treating a particular implementation criterion as a sub-category or a label is one of relative importance and pragmatism, rather than a conceptual difference between these two options.

58. The label "with/without current commodity production limits and/or limits to payments" relates, for example, to a production quota associated with policy measures in category A, or land set-aside associated with policy measures in category C. The label also applies to policy measures that restrict the payment as such, either by explicitly setting a maximum amount of payment, or by limiting the number of animals or land units that may receive payment. For example, a programme that provides an area payment for at the most 10 hectares is labelled as having a payment limit since payments cease beyond that area limit.

59. The label "with or without input constraints" serves to distinguish all PSE transfers (except those in category A.1) that can be provided under the condition that farmers respect certain production practices considered as environmentally or animal-welfare friendly, or which address food safety or other societal concerns. There is a further distinction between "mandatory" and "voluntary" input constraints. The former include requirements that relate to a generally applicable regulation, while the latter go beyond general regulations and are adopted by farmers voluntarily. Within the "voluntary" input constraint label, a further distinction is introduced to identify the character of constraint, i.e. whether it concerns (i) environmental practices, (ii) animal welfare, or (iii) other practices. An example below illustrates these distinctions.

60. An interest concession or capital grant can be provided: (a) for any on-farm production investment for any purpose; (b) for an environmental purpose (e.g. for on-farm manure treatment facilities), or to improve the conditions in which animals are kept. In all of these cases, the concessions or grants are linked to investment associated with commodity production, and are all classified in category *B.2. Payments based on fixed capital formation*, despite the fact that such payments are made to achieve different objectives. However, in the case of (a) the concession or grant is generally applied and is without

Table 3.1. PSE categories and labels

PSE CATEGORIES	PSE LABELS																			Value of transfers, LC million
	Current commodity production and payment limits		Payment rates		Input constraints					Payment eligibility based on							Production exceptions			
						With (voluntary)								Commodity(ies)						
	Limit	No limit	Fixed	Variable	With (mandatory)	Animal welfare	Environ-ment	Other	Without	Area	Animal number	Receipts	Income	Single	Group	All	With	Without	Year 1 . Year n
A. Support based on commodity outputs																			
A1. Market Price Support																			
commodity *n*					na	na	na	na	na	na	na	na	na	*	na	na	na	na	
commodity *m* , etc					na	na	na	na	na	na	na	na	na	*	na	na	na	na	
A2. Payments based on output																			
commodity *k*										na	na	na	na	*	na	na	na	na	
commodity *l* , etc.										na	na	na	na	*	na	na	na	na	
B. Payments based on input use																			
B1. Variable input use																			
policy measure b_{11}										na	na	na	na				na	na	
policy measure b_{1n}										na	na	na	na				na	na	
B2. Fixed capital formation																			
policy measure b_{21}										na	na	na	na				na	na	
policy measure b_{2n}										na	na	na	na				na	na	
B3. On-farm services																			
policy measure b_{31}										na	na	na	na				na	na	
policy measure b_{3n}										na	na	na	na				na	na	
C. Payments based on current A/An/R/I, production required																			
C1. Based on current receipts/income																			
policy measure c_{11}																			
policy measure c_{1n}																			
C2. Based on current area/animal numbers																			
policy measure c_{21}																			
policy measure c_{2n}																	na	na	
D. Payments based on non-current A/An/R/I, production required																			
policy measure d_1																	na	na	
policy measure d_n																	na	na	
E. Payments based on non-current A/An/R/I, production not required																			
E1. Variable rates																			
policy measure e_{11}														na	na	na			
policy measure e_{1n}														na	na	na			
E2. Fixed rates																			
policy measure e_{21}														na	na	na			
policy measure e_{2n}														na	na	na			
F. Payments based on non-commodity criteria																			
F1. Long-term resource retirement																			
policy measure f_{11}			na	na	na				na	na	na	na	na	na	na	na	na	na	
policy measure f_{1n}			na	na	na				na	na	na	na	na	na	na	na	na	na	
F2. A specific non-commodity output																			
policy measure f_{21}			na	na	na				na	na	na	na	na	na	na	na	na	na	
policy measure f_{2n}			na	na	na				na	na	na	na	na	na	na	na	na	na	
F3. Other non-commodity criteria																			
policy measure f_{31}			na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	
policy measure f_{3n}			na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	
G. Miscellaneous payments	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	

Symbols: “na” – PSE label not applicable to policy measures in a given category; “*” – PSE label applicable to policy measures in a given category by definition; LC – local currency.

constraints, while in the case of (b) there are constraints as to the specific use of inputs/farming practices. The measures under (b) can be further distinguished between those which imply mandatory constraints (i.e. installation of manure treatment facilities) and those involving voluntary constraints (i.e. improving the conditions for animals beyond the legal minimum), where related to animal welfare.

Box 3.3. Names and definitions of the PSE labels

With or without current commodity production limits and/or limits to payments (with/without L): Defines whether or not there is a specific limitation on current commodity production (output) associated with a policy providing transfers to agriculture and whether or not there are limits to payments in the form of limits to area or animal numbers eligible for those payments. Applied in categories A – F.

With variable or fixed payment rates (with V/F rates): A payment is defined as subject to a variable rate where the formula determining the level of payment is triggered by a change in price, yield, net revenue or income or a change in production cost. Applied in categories A – E.

With or without input constraints (with/without C): Defines whether or not there are specific requirements concerning farming practices related to the programme in terms of the reduction, replacement, or withdrawal in the use of inputs or a restriction of farming practices allowed. Applied in categories A – F.

– Payments conditional on compliance with basic requirements that are mandatory (*with mandatory*).

– Payments requiring specific practices going beyond basic requirements and voluntary (*with voluntary*).

- specific practices related to environmental issues (*with voluntary / environment*)

- specific practices related to animal welfare (*with voluntary / animal welfare*)

- other specific practices (*with voluntary / other*).

– Payments with no specific requirements concerning farming practices related to the programme (*without*).

Based on area, animal numbers, receipts or income (based on A/An/R/I): Defines the specific attribute (i.e. area, animal numbers, receipts or income) on which the payment is based. Applied in categories C – E.

Based on a single commodity, a group of commodities or all commodities (based on SC/GC/AC): Defines whether the payment is granted for production of a single commodity, a group of commodities or all commodities. Applied in categories A – D.

With or without commodity exceptions (with/without E): Defines whether or not there are prohibitions upon the production of certain commodities as a condition of eligibility for payments based on non-current A/An/R/I of commodity(ies). Applied in Category E.

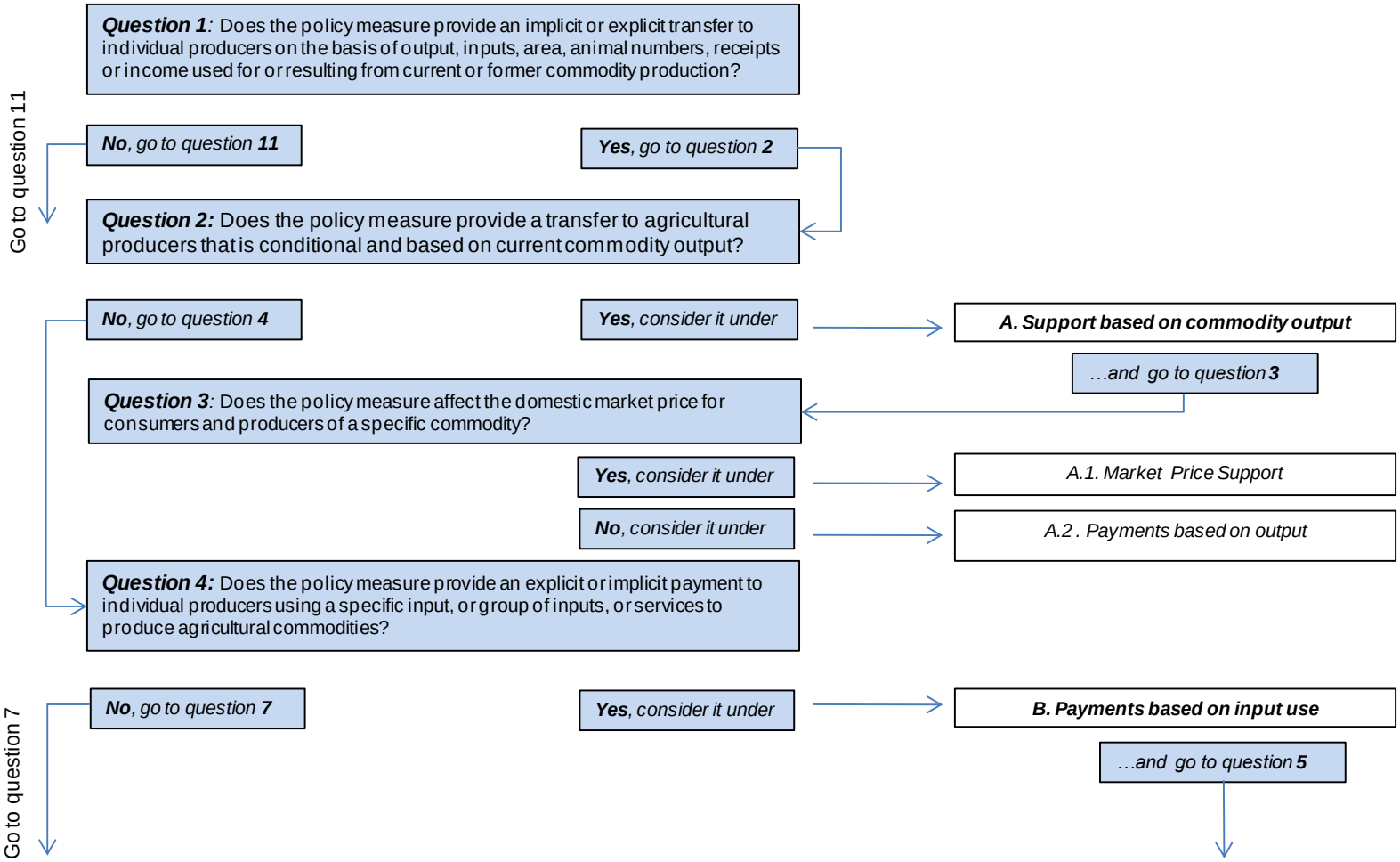
3.3.4. Work examples

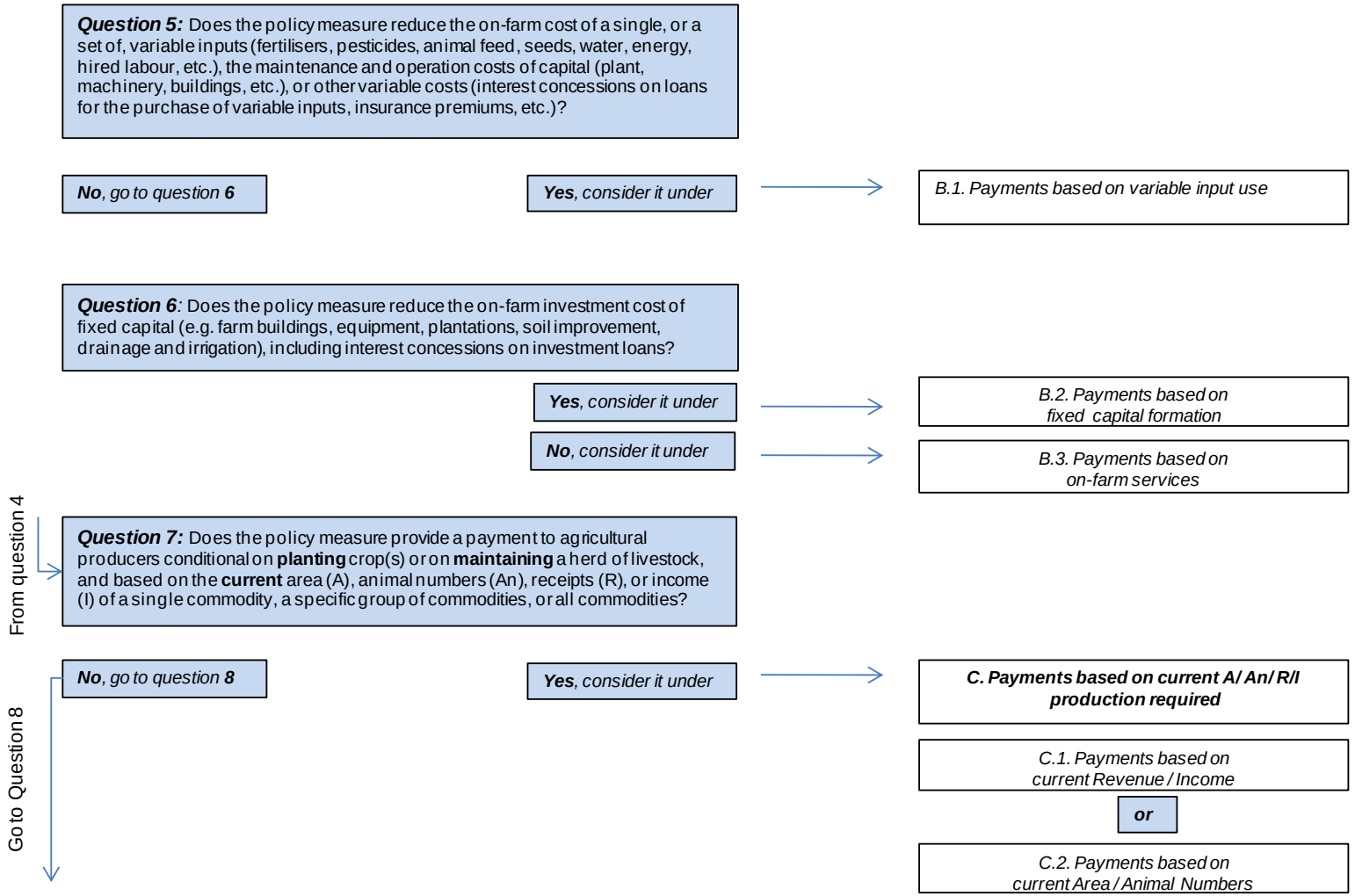
61. The examples presented in Diagram 3.1 illustrate how the criteria in sub-sections 3.3.1 and 3.3.2 are used to classify policy measures into the various PSE categories and sub-categories, and which labels are attached to the policy (sub-section 3.3.3).[7] The examples start with category *A.2. Payments based on output*, since market price support policies (category *A.1. Market Price Support*) are explained in Chapter 4 in considerable detail.

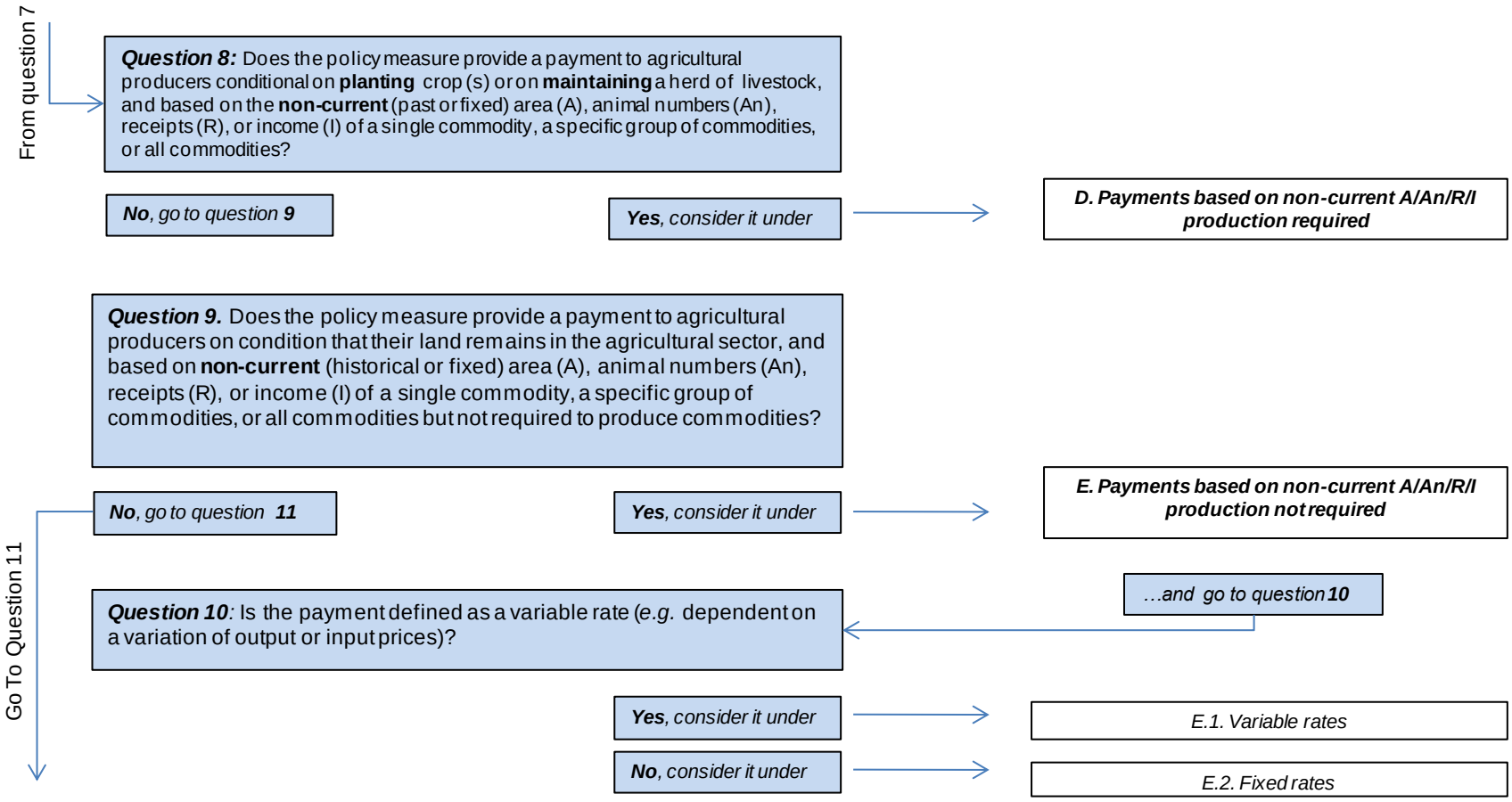
62. For each policy measure, it is understood that the questions preceding its assignment to that category are answered consistently with its assignment. So, for example a policy measure classified in category *B.1. Payments based on variable input use* entails answering "yes" to question 5 (Diagram 3.1), but to reach question 5 one must answer "yes" to questions 1, "no" to question 2, and "yes" to questions 4 and 5. For reasons of space, the answers to each preceding question are not listed for the examples; however, where necessary, comments on classification are introduced.

7. Complete information on how each policy measure is classified in individual OECD and non-OECD countries is contained in *Definitions and Sources* which, together with country PSE excel files, is available on www.oecd.org/agriculture/pse.

Diagram 3.1 PSE classification decision tree




Question 5: Does the policy measure reduce the on-farm cost of a single, or a set of, variable inputs (fertilisers, pesticides, animal feed, seeds, water, energy, hired labour, etc.), the maintenance and operation costs of capital (plant, machinery, buildings, etc.), or other variable costs (interest concessions on loans for the purchase of variable inputs, insurance premiums, etc.)?
No, go to question 6
Yes, consider it under
B.1. Payments based on variable input use
Question 6: Does the policy measure reduce the on-farm investment cost of fixed capital (e.g. farm buildings, equipment, plantations, soil improvement, drainage and irrigation), including interest concessions on investment loans?
Yes, consider it under
B.2. Payments based on fixed capital formation
No, consider it under
B.3. Payments based on on-farm services
From question 4
Question 7: Does the policy measure provide a payment to agricultural producers conditional on planting crop(s) or on maintaining a herd of livestock, and based on the current area (A), animal numbers (An), receipts (R), or income (I) of a single commodity, a specific group of commodities, or all commodities?
No, go to question 8
Go to Question 8
Yes, consider it under
C. Payments based on current A/ An/ R/I production required
C.1. Payments based on current Revenue / Income
or
C.2. Payments based on current Area / Animal Numbers


From question 7
Question 8: Does the policy measure provide a payment to agricultural producers conditional on planting crop (s) or on maintaining a herd of livestock, and based on the non-current (past or fixed) area (A), animal numbers (An), receipts (R), or income (I) of a single commodity, a specific group of commodities, or all commodities?
No, go to question 9
Yes, consider it under
D. Payments based on non-current A/An/R/I production required
Question 9. Does the policy measure provide a payment to agricultural producers on condition that their land remains in the agricultural sector, and based on non-current (historical or fixed) area (A), animal numbers (An), receipts (R), or income (I) of a single commodity, a specific group of commodities, or all commodities but not required to produce commodities?
No, go to question 11
Yes, consider it under
E. Payments based on non-current A/An/R/I production not required
…and go to question 10
Question 10: Is the payment defined as a variable rate (e.g. dependent on a variation of output or input prices)?
Go To Question 11
Yes, consider it under
E.1. Variable rates
No, consider it under
E.2. Fixed rates

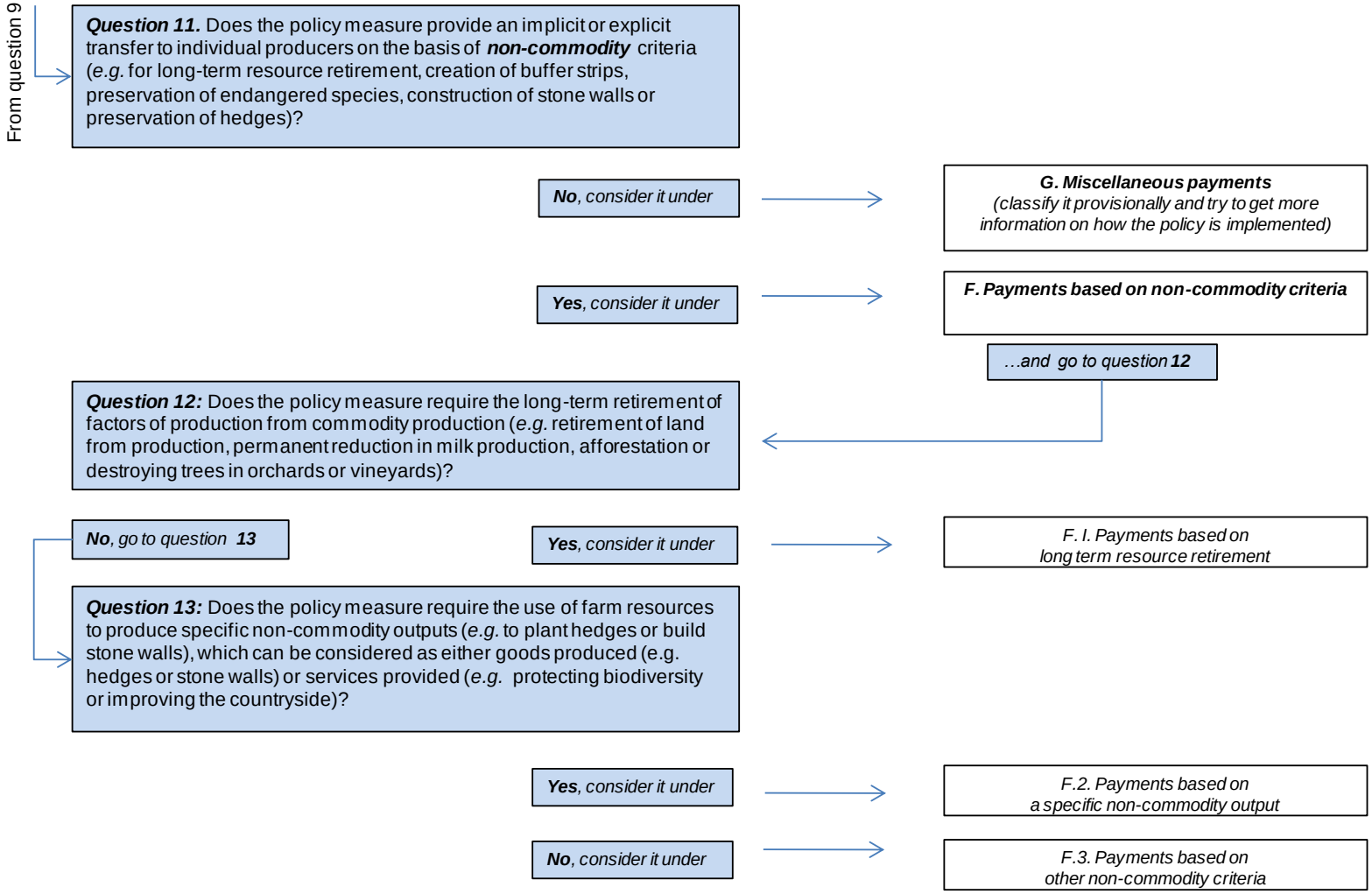

From question 9
Question 11. Does the policy measure provide an implicit or explicit transfer to individual producers on the basis of non-commodity criteria (e.g. for long-term resource retirement, creation of buffer strips, preservation of endangered species, construction of stone walls or preservation of hedges)?
No, consider it under
G. Miscellaneous payments (classify it provisionally and try to get more information on how the policy is implemented)
Yes, consider it under
F. Payments based on non-commodity criteria
…and go to question 12
Question 12: Does the policy measure require the long-term retirement of factors of production from commodity production (e.g. retirement of land from production, permanent reduction in milk production, afforestation or destroying trees in orchards or vineyards)?
No, go to question 13
Yes, consider it under
F. I. Payments based on long term resource retirement
Question 13: Does the policy measure require the use of farm resources to produce specific non-commodity outputs (e.g. to plant hedges or build stone walls), which can be considered as either goods produced (e.g. hedges or stone walls) or services provided (e.g. protecting biodiversity or improving the countryside)?
Yes, consider it under
F.2. Payments based on a specific non-commodity output
No, consider it under
F.3. Payments based on other non-commodity criteria

Table 3.2. Work examples of PSE categories and labels

Categories	Labels					
	With or without current commodity production limits	**With variable or fixed payment rates**	**With or without input constraints**	**Based on area, animal numbers, receipts or income**	**Based on a single commodity, a group of commodities or all commodities**	**With or without commodity production exceptions**
	with/ without L	***with V/F rates***	***without C/ with mandatory C/ with voluntary C environment/ animal welfare/ other***	***A/An/R/I***	***SC/GC/AC***	***with/ without E***
A.2. Payments based on output						
Loan deficiency payments (US)	without L	V	with mandatory C	na[1]	SC	na
	Payments are made on a per tonne basis to producers eligible for price support loans who agree to forego the loan. The payment is the difference between the loan rate and the domestic market price, multiplied by the quantity of each specific commodity for which the loan deficiency payment is requested, or otherwise eligible for on a crop year basis. It is labelled a "variable" payment rate as the level of payment is determined by fluctuations of market price. Payments are subject to input constraints under the conservation compliance.					
Milk Price Supplement for Cheese Production[2] (Switzerland)	with L	F	without C	na	SC	na
	Payment per tonne of milk granted to farmers delivering milk to cheese producers. As this payment is made for milk within a production quota, it is labelled with current production limits.					
B.1. Payments based on variable input use						
Fuel tax concessions[3]	without L	V or F	without C	na	AC	na
	Tax concession on diesel fuel for farmers relative to the standard tax rate. The policy is labelled as being "without" input constraints. To be labelled as "with" input constraints, a limit on total fuel use on farm would have to be in place. Labelling of the policy measure with respect to variable or fixed payment rate depends on whether the amount of concession changes when the price of fuel changes. If yes, it is labelled as "variable" rate; if not, it is labelled as "fixed" rate. Since it is available to all producers, it is labelled as supporting all commodities.					
Irrigation subsidy (Mexico)	without L	F	without C	na	GC	na
	Reduced electricity rates are set for groundwater pumping in agriculture. As the discount is fixed, the subsidy is labelled as "fixed" rate. No limits on current production or constraints on water use are set as eligibility conditions. All farmers are eligible for preferential electricity tariffs, and so the subsidy is labelled as being available for all crop commodities.					

Categories	Labels					
	With or without current commodity production and/or payment limits	**With variable or fixed payment rates**	**With or without input constraints**	**Based on area, animal numbers, receipts or income**	**Based on a single commodity, a group of commodities or all commodities**	**With or without commodity production exceptions**
	with/ without L	***with V/F rates***	***without C/ with mandatory C/ with voluntary C environment/ animal welfare/ other***	***A/An/R/I***	***SC/GC/AC***	***with/ without E***
B.2. Payments based on fixed capital formation						
Interest concessions on investment loans (e.g. Brazil)	without L	V	without C	na	AC	na
	Subsidising interest rates provides support to producers for building up their capital stock. The preferential interest rate is fixed below the market rate and the subsidy rate changes as a result of movements in market interest rate (the reference interest rate for calculating the level of the concession provided) and so it is labelled as a "variable" payment rate. There are no input constraints conditioning the eligibility for concession. Since it is available to all producers, it is labelled as supporting all commodities.					
Capital grants for on-farm infrastructure (Japan)	without L	F	without C	na	AC	na
	Budgetary allocations for the on-farm infrastructure improvement scheme, including construction of irrigation and drainage facilities and land re-parcelling. The assistance is provided without production limits or constrains on input use. As the amount of payment does not change with the variation of current output, prices, or current production costs, it is labelled as a "fixed" payment rate. Since the payment available to all producers, it is labelled as supporting all commodities.					
Property tax exemptions (Canada – provincial governments)	without L	F	without C	na	AC	na
	Provides an implicit payment to producers proportional to the value of their property, intended as agricultural capital. As the implicit payment depends on the amount of land only, it is labelled as having a "fixed" payment rate. Since it is available to all producers, it is labelled as supporting all commodities.					

Categories		Labels				
	With or without current commodity production and/or payment limits	**With variable or fixed payment rates**	**With or without input constraints**	**Based on area, animal numbers, receipts or income**	**Based on a single commodity, a group of commodities or all commodities**	**With or without commodity production exceptions**
	with/ without L	***with V/F rates***	***without C/ with mandatory C/ with voluntary C environment/ animal welfare/ other***	***A/An/R/I***	***SC/GC/AC***	***with/ without E***
B.3 Payments based on on-farm services						
Extension and advisory services (e.g. Australia, Iceland, Japan, Korea, Mexico)	without L	F	without C	na	GC or AC	na
	Federal and provincial expenditures for the activities related to the provision of information, training and services directly to farmers. This category may also include the technical assistance component of other programmes, such as conservation programmes.					
Pest and disease control	without L	F	without C	na	GC or AC	na
	The slaughtering of animals for disease-related concerns falls into this category, for example. Such payment is labelled as "without" input constraints, since the destruction of livestock is not a constraint on the amount of or use to which (non-slaughtered) animals may be put.					
AAA Farm Business Improvement Programme (FarmBis) (Australia)	without L	F	without C	na	AC	na
	Provides financial support to assist farmer participation in learning activities to improve the management of their business, natural and human resources. It is available to eligible farmers independently of the commodities they produce and so is labelled as supporting all commodities.					
C.1. Payments based on current R/I , production required						
Income tax concessions (US)	without L	F	without C	I	AC	na
	Income tax concessions to agriculture relative to the standard income tax provisions include: deductions from taxable incomes from farming; farmers' marketing and purchasing co-operatives; and export transactions of agricultural commodities. The implicit transfer to producers is based on farming income, and so is labelled as based on "income". Since it is available to all producers, it is labelled as supporting all commodities.					

Categories		Labels				
	With or without current commodity production and/or payment limits	**With variable or fixed payment rates**	**With or without input constraints**	**Based on area, animal numbers, receipts or income**	**Based on a single commodity, a group of commodities or all commodities**	**With or without commodity production exceptions**
	with/ without L	***with V/F rates***	***without C/ with mandatory C/ with voluntary C environment/ animal welfare/ other***	***A/An/R/I***	***SC/GC/AC***	***with/ without E***
C.2. Payments based on current A/An, production required						
Crop insurance payments (Canada)	without L	V	without C	A	SC	na
	Government contribution to a voluntary crop insurance scheme which covers between 70% and 90% of average yield (depending on the crop and province) over a 10 to 15-year period. Farmers finance one half of the scheme but over the years government contributions have amounted to 56% of indemnities paid. It is labelled as SCT, even though many different commodities are covered by the programme, because the programme is administered on a commodity-specific basis, each eligible commodity having a particular reference yield and payment being based on the actual yields of specific commodities. In this sense, it is like a single-commodity policy repeated for many different commodities. A "variable" rate is attributed to the payment because it is a function of current yield as compared with a reference yield and not simply area. This programme is labelled as a payment based on "area" because payments are made on a per-hectare basis. Had it been a subsidy to purchase crop insurance from a private insurance company, it would be classified under B.1 as a subsidy to a variable cost: insurance.					
Payments to organic crop farming (EU)[4]	without L	F	with voluntary C (environment)	A	GC	na
	Provides payments per hectare for a subset of commodities. Since, in order to receive the payment, organic producers have to use specific production methods going beyond basic requirements, it is labelled as "with voluntary" input constraints related to environment. Transfers are allocated to commodity group "All crops".					
Agri-environmental grass premium (EU – France)[5]	without L	F	with voluntary C (environment)	A	GC	na
	Provides a payment per hectare of grassland farmed extensively. Farmers have to fulfil specific obligations for five years. These obligations are defined at the local level and include a maximum stocking density, a minimum share of grass land in total agricultural area, the maintenance of permanent and temporary pastures, the requirement to cut the grass (if not used as pasture), limits on fertiliser application, the preservation of fixed landscape features, strong restrictions on pesticide use, and registration of practices. There are input constraints to satisfy but the level of payment is not affected by the level of input use (as in the Grassland Reserve Program classified in B.2). There is no limit on how much grass can be produced and thus no production limits.					

Categories	Labels					
	With or without current commodity production and/or payment limits	**With variable or fixed payment rates**	**With or without input constraints**	**Based on area, animal numbers, receipts or income**	**Based on a single commodity, a group of commodities or all commodities**	**With or without commodity production exceptions**
	with/ without L	***with V/F rates***	***without C/ with mandatory C/ with voluntary C environment/ animal welfare/ other***	***A/An/R/I***	***SC/GC/AC***	***with/ without E***
D. Payments based on non-current A/An/R/I, production required						
Structural income support for milk production (Norway)	with L	F	without C	R	SC	na
	Provides a lump sum payment to all farms with five or more cows. Since 99.85% of farms exceed the minimum in terms of animal units, this policy is classified as a transfer not dependent on current commodity parameters but requiring production. As this payment is made for milk within a production quota, it is labelled "with" current production limits. The payment does not vary with prices, income or cost, and so is labelled as having a fixed payment rate.					
E.1. Payments based on non-current A/An/R/I, production not required, variable rates						
Counter cyclical payments (US)	with L	V	with mandatory C	A	na	with E
	Payment for wheat, feed grains, upland cotton, rice, oilseeds and peanuts defined as the national payment rate per tonne for each specific crop times the producer's payment base yield and multiplied by 85% of the producer's payment eligible base area. Base area and yields may be those from the 1996 Farm Act or the 1998-2001 averages. For each commodity, the national payment rate per tonne is the difference between the *target price* and the *trigger level*, which is the return per tonne (*i.e*. the higher the market price or loan rate) plus the *Direct Payment* per tonne, and so is labelled as having a variable payment rate. The payment is labelled "with" input constraints because eligible producers are required to comply with certain conservation and wetland provisions. The land must be kept in agricultural uses (which includes fallow) and producers are permitted to plant all cropland acreage on the farm to any crop, except for limitations on planting fruits and vegetables, and so is labelled "with" commodity exceptions.					

Categories	Labels					
	With or without current commodity production and/or payment limits	**With variable or fixed payment rates**	**With or without input constraints**	**Based on area, animal numbers, receipts or income**	**Based on a single commodity, a group of commodities or all commodities**	**With or without commodity production exceptions**
	with/ without L	***with V/F rates***	***without C/ with mandatory C/ with voluntary C environment/ animal welfare/other***	***A/An/R/I***	***SC/GC/AC***	***with/ without E***
E.2. Payments based on non-current A/An/R/I, production not required, fixed rates						
Single payment scheme (historic) (EU)	with L	F	with mandatory C	R	na	with E
	Payment entitlements per farm based on the farm's historic reference amounts of premiums for most crop and livestock commodities received during the period 2000-02. The value of entitlements is the total reference amount of the farm divided by the number of hectares that gave right to payments in the reference period. Single payment scheme is subject to cross-compliance conditions (the amount of payment is reduced if the farmer does not comply), and so is labelled "with mandatory" input constraints. Production is not required but producers may produce any commodity (with the exception of fruits and vegetables). It is therefore labelled as "with" commodity exceptions. From 1 January 2008, with the fruit and vegetable reform entering into force, the commodity exception ceases to be binding, but a Member State may choose to keep the commodity exemption for a transitory period until 1 January 2011.					
Single payment scheme (regional) (EU)	with L	F	with mandatory C	A	na	without E
	Payment entitlements per hectare based on the regional, historic reference amounts of premiums for most crop and livestock commodities received during the period 2000-02. The value of the per hectare entitlement is the total reference amount of the region divided by the number of eligible hectares. Production is not required and there are no restrictions on the commodities that can be produced, and so it is labelled "without" commodity exceptions.					
F.1. Payments based on non-commodity criteria: long-term resource retirement						
Afforestation (EU)[4]	without L	na	with voluntary C (environment)	na	na	na
	Payments per hectare to encourage the alternative use of agricultural land for forestry or activities related to forestry in farm holdings. Land is retired from agricultural production, and therefore, following a negative response to question 1 (sub-section 3.3.2), the classification leads directly to question 11 and then 12. Policies in category F.1 are automatically labelled as being "with" input constraints related to the environment.					
Conservation Reserve Program (US)	na	na	with voluntary C (environment)	na	na	na
	Provides annual rental payments and cost-sharing assistance to establish long-term, resource-conserving cover on eligible farmland. It is classified in F.1 because of the long-term nature of the Program, involving 10-15 year agreements. The payment is classified as "with" input constraints related to the environment because the land is taken out of production.					

Categories	Labels					
	With or without current commodity production and/or payment limits	**With variable or fixed payment rates**	**With or without input constraints**	**Based on area, animal numbers, receipts or income**	**Based on a single commodity, a group of commodities or all commodities**	**With or without commodity production exceptions**
	with/ without L	***with V/F rates***	***without C/ with mandatory C/ with voluntary C environment/ animal welfare/ other***	***A/An/R/I***	***SC/GC/AC***	***with/ without E***
F.2. Payments based on non-commodity criteria: a specific non-commodity output						
Payments for Hedges and Rustic Groves (Switzerland)	na	na	with voluntary C (environment)	Na	na	na
	Payment per hectare of hedge and rustic grove (including 3-metre-wide compulsory grass strips along them), cultivated without fertilisers and plant protection products. Payment is limited to 50% of the cultivated area on farms of more than 3 hectares and the rate of payment decreases with the altitude of the farming location. The payment is classified as "with" input constraints related to the environment, because the land is taken out of production and the grass strips are cultivated without fertilisers and chemicals.					
Payments for Floral Fallow (Switzerland)	na	na	with voluntary C (environment)	na	na	na
	Payment per hectare of floral fallow cultivated with wild indigenous species without fertilisers and plant protection products, and for which harvest is authorised once every two years and which cannot be used for fodder (to protect nesting birds). Payment is limited to 50% of the cultivated area on farms of more than 3 hectares and the rate of payment is fixed. Harvest cannot be used for fodder, so the answer to the question 1 of the classification criteria is negative, and a negative response is given to question 12 and positive to question 13. The payment is classified as "with" input constraints related to the environment because it implies a constraint on the production method.					

Notes to Table 3.2

1. The abbreviation "na" indicates that the particular label is not applicable to the respective PSE category.
2. *Supplément de prix pour le lait transformé en fromage*.
3. Countries providing fuel tax rebates include Australia, Canada, Japan, Mexico, Norway, Switzerland, the United States, and the majority of EU countries.
4. Policy measure provided for under European Commission Regulation 2078/92 and the Rural Development Regulation (RDR).
5. *Prime herbagère agro-environnementale*.

3.4. Classifying policies that support producers collectively (GSSE)

- Policy measures included in the General Services Support Estimate (GSSE) are classified into one of six main categories and related sub-categories according to the nature of the services provided to agriculture generally (and not to individual producers or consumers).

3.4.1. Definition of categories and classification criteria

63. The transfers in the GSSE are payments to eligible private or public services provided to agriculture generally, and include policies where primary agriculture is the main beneficiary. Unlike the PSE and CSE, the GSSE transfers are not destined to individual producers or consumers, and do not directly affect farm receipts (revenue) or consumption expenditure, although they may affect production or consumption of agricultural commodities in the longer term.

64. While implementation criteria are used to distinguish whether the transfer is allocated to PSE or GSSE (sections 3.1 and 3.2), the definition of the categories and related sub-categories in the GSSE and the allocation of policy measures to them is according to the nature of the service. These categories and sub-categories are named and defined in Box 3.4.

Box 3.4. Names and definitions of the GSSE categories and sub-categories

H. Agricultural knowledge and innovation system

H.1. Agricultural knowledge generation: Budgetary transfers that finance research and development (R&D) activities related to agriculture, irrespective of the institution (private or public, ministry, university, research centre or producer groups) where they take place, the nature of the research (scientific, institutional, etc.), or its purpose.

H.2. Agricultural knowledge transfer: Budgetary expenditure to finance agricultural vocational schools and agricultural programmes at high education levels, generic training and advice to farmers (e.g. accounting rules, pesticide application), not specific to individual situations, and data collection and information dissemination networks related to agricultural production and marketing.

I. Food inspection and control

I.1. Agricultural product safety and inspection: Budgetary transfers that finance activities related to agricultural product safety and inspection. This includes only expenditures for inspections of domestically produced commodities at the first level of processing and border inspections for exported commodities.

I.2. Pest and disease inspection and control: Budgetary transfers that finance pest and disease control of agricultural inputs and outputs (control at the primary agriculture level) and public funding of veterinary (for the farming sector) and phytosanitary services.

I.3. Input control: Budgetary transfers that finance the institutions providing control activities and certification of industrial inputs used in agriculture (e.g. machinery, industrial fertilisers, pesticides, etc.) and biological inputs (e.g. seed certification and control).

J. Development and maintenance of rural infrastructure

J.1. Hydrological infrastructure: Budgetary expenditure financing public investments into hydrological infrastructure (irrigation and drainage networks).

J.2. Storage, marketing and other physical infrastructure: Budgetary expenditure that finance investments to off-farm storage and other market infrastructure facilities related to handling and marketing primary agricultural products (silos, harbour facilities – docks, elevators; wholesale markets, futures markets), as well as other physical infrastructure related to agriculture when agriculture is the main beneficiary.

J.3. Institutional infrastructure: Budgetary expenditure that finance investments to build and maintain institutional infrastructure related to the farming sector (e.g. land cadastres; machinery user groups, seed and species registries; development of rural finance networks; support to farm organisations, etc.).

J.4. Farm restructuring: Budgetary payments related to reform of farm structures that finance entry, exit or diversification (outside agriculture) strategies.

K. Marketing and promotion

K.1. Collective schemes for processing and marketing: Budgetary expenditures that finance investments in collective – mainly for primary processing – marketing schemes and marketing facilities, designed to improve the marketing environment for agriculture.

K.2. Promotion of agricultural products: Budgetary expenditure that finance assistance to collective promotion of agro-food products (e.g. promotional campaigns, participation in international fairs).

L. Cost of public stockholding: Budgetary expenditure covering the cost of storage and the disposal of agricultural products, as well as the depreciation of agricultural products.

M. Miscellaneous: Budgetary payments that finance other general services that cannot be disaggregated and allocated to the above categories, often due to a lack of information.

3.4.2. Discussion

65. Within the ***Agricultural knowledge and innovation system*** category, the ***Agriculture knowledge generation*** sub-category includes budgetary expenditures that finance research and development (R&D) activities related to agriculture irrespective of the institution (private or public, ministry, university, research centre or producer group) or where they take place, the nature of research (scientific, institutional, etc.), or its purpose. The focus is on R&D expenditures on applied research related to the primary agricultural sector (see definition in the Frascati manual[8]). Social sciences related to agriculture are included. To the extent possible, R&D related to forestry, fisheries, etc., should be excluded and, if the information is not readily available, the method used to estimate their share should be clearly stated in the documentation (see *Definitions and Sources* available at www.oecd.org/agriculture/pse). This expenditure includes transfers to finance *ex situ* conservation of livestock and plant species (e.g. gene banks). Data dissemination when associated primarily with research and development (knowledge generation), e.g. reports from research and databases developed as an adjunct to research, also belongs to this sub-category.

66. The ***Agricultural knowledge transfer*** sub-category includes budgetary expenditure to finance agricultural vocational schools and agricultural programmes at the high education level. The entire expenditure on these activities is considered as related to agriculture given that the indicator measures the policy effort. This sub-category includes budgetary expenditure financing generic training and extension advice to farmers, such as accounting rules or pesticide application methods. Expenditure on advice that is specific to individual farms (e.g. a farm business plan) is included in the PSE category for payment based on services. Public expenditures on data collection and information dissemination networks related to agricultural production and marketing (e.g. information on technologies and production methods, price and market information) are also included in this sub-category.

67. In the ***Inspection and control*** category, the ***Agricultural product safety and inspection*** sub-category includes budgetary expenditure that finance activities related to agricultural product safety and inspection. This includes only expenditures on inspection of domestically--produced commodities at the first level of processing and border inspections of exported commodities. Import control activities are not included. Production and trade data may be used to make an approximate estimation of a differentiation between export and import inspections. Where such a separation is not possible, the entire expenditure on food safety and inspection should be included and mentioned in the documentation.

8. OECD (2002), *Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development*, 6th edition, OECD publishing, Paris. Available at: www.oecd-ilibrary.org/science-and-technology/frascati-manual-2002_9789264199040-en.

68. The ***Pest and disease inspection and control*** sub-category includes budgetary expenditures that finance pest and disease control of agricultural inputs and outputs (control at primary agriculture level) as well as public funding of veterinary and phytosanitary services (for the farming sector).

69. The ***Input control*** sub-category includes budgetary expenditures that finance institutions providing surveillance and certification of industrial inputs used in agriculture (e.g. machinery, industrial fertilisers, pesticides, etc.) and biological inputs (e.g. seed certification and control).

70. Within the ***Development and maintenance of infrastructure*** category, the ***Hydrological infrastructure*** sub-category includes public investments in hydrological infrastructure (irrigation and drainage networks). Water subsidies granted to individual farmers and investment subsidies to on-farm irrigation infrastructure are included in the PSE. Expenditures related to hydrological network infrastructures are included according to the share which corresponds to farmer's participation in that network (e.g. share of water used by agriculture, as reported in OECD agri-environmental indicators[9]). Flood prevention expenditures where agriculture is not the main beneficiary are not included. In the case of large investments with multiple outputs, such as dams for irrigation, water retention, flood prevention, and hydro-energy, the GSSE accounts only for the share of outputs used by primary agriculture. Investment expenditure should be accounted in the year when it occurs.

71. The ***Storage, marketing and other physical infrastructure*** sub-category includes budgetary expenditure that finances investments and operating costs for off-farm storage and other market infrastructure facilities related to handling and marketing of primary agricultural products (silos, harbour facilities such as docks and elevators, wholesale markets, futures markets). Public investments to build and maintain other physical infrastructure related to agriculture are included in the GSSE only when agriculture is the main beneficiary. In general, the share of primary agriculture activity should be above 50% of economic activity or regional employment, or of some similar indicator. The choice of the indicator should be related to the nature of the policy and data available, and should be clearly explained in the documentation.

72. The ***Institutional infrastructure*** sub-category includes budgetary expenditure that finances investments and operating costs to build and maintain institutional infrastructure related to the farming sector (e.g. land cadastres; machinery user groups, seed and species registries; development of rural finance networks; support to farm organisations, etc.). Only the institutional infrastructure closely related to agriculture should be included. The decision to include an institutional infrastructure should be clearly explained in the documentation.

73. The ***Farm restructuring*** sub-category includes budgetary expenditure related to the reform of farm structure. This includes measures related to "entry strategies" (such as assisting new farmers within the context of land reforms). Transfers provided directly to individual farmers within those programmes should be classified in the PSE. It also includes measures related to "exit strategies" and diversification strategies outside agriculture used in some developed countries, such as certain programmes in the European Union. However, support to diversification to other commodity sectors is included in the PSE.

74. Within the ***Marketing and promotion*** category, the ***Collective schemes for processing and marketing*** sub-category includes budgetary expenditure that finances investments in downstream activities (mainly at the level of primary processing) designed to improve the marketing environment for agriculture. It captures support to collective processing, marketing schemes and marketing

9. Available at: http://www.oecd.org/tad/sustainable-agriculture/agri-environmentalindicators.htm.

facilities, while support to on-farm investments in processing activities is classified in the PSE; support to individual firms (first processors) is classified in the CSE.

75. The ***Promotion of agricultural products*** sub-category includes budgetary expenditure that finances assistance to the collective promotion of agro-food products (e.g. promotion campaigns, participation on international fairs), as well as activities promoting food quality schemes. It does not include public expenditure related to export subsidies.

76. The ***Cost of public stockholding*** category includes budgetary expenditure to cover the costs of storage, depreciation of the stocks and the disposal of publicly stored agricultural products. It includes cost of public stockholding related to market interventions (intervention storage) and storage of strategic reserves (stockholding for food security purposes, state reserves). This category does not include public expenditure related to export subsidies or buying into intervention stocks.

77. The ***Miscellaneous*** category includes budgetary expenditure that finances other general services that cannot be disaggregated and allocated to one of the above categories, usually due to lack of information. All efforts should be made to obtain more information to allow for an accurate classification into one of the above categories. Further examples on allocation of specific expenditures to various GSSE categories are provided in Table 8.1 (Chapter 8).

3.5. Classifying policies that support consumers (CSE)

- The CSE includes price transfers from consumers, which is to a certain degree the mirror image of Market Price Support, adjusted to apply to quantities consumed (rather than quantities produced).
- Other policies classified in the CSE are budgetary transfers to first-stage consumers to compensate for their contribution to market price support, consumption subsidies based on the disposal of intervention stocks, and other budgetary transfers to consumers.

78. As described in Section 3.2 (Question 3), a component of the CSE is transfers associated with market price support for the production of commodities that are consumed domestically; these are called ***price transfers from (to) consumers***. These transfers are the same as those included in the PSE under *category A.1 Market Price Support*, but they are given an opposite sign in the CSE and adjusted to apply to quantities consumed (as opposed to quantities produced in the PSE). The concept is explained in detail in Chapter 4.

79. Another type of payment classified under the CSE is ***budgetary transfers to consumers*** of agricultural commodities, e.g. flour mills, meat processing plants, or fruit packing plants, where these are provided specifically to offset the higher prices resulting from market price support. An example is payments made to processors who pay the guaranteed minimum price to producers of potato starch and cotton in the European Union. Another example is a "premium for commercial buyers" in Brazil, whereby the government compensates to commercial buyers of agricultural commodities – processors or other downstream agents – the difference between the minimum guaranteed price for the product and the price the buyer is actually willing to pay. Receipt of the premium is contingent on paying agricultural producers the minimum guaranteed price.

80. Finally, ***consumption subsidies*** in cash or in kind (their monetary equivalent) associated with programmes of market price support for domestic producers are also included in the CSE. This component includes, for example, domestic food aid programmes which are based on the distribution of government stocks acquired in the context of market interventions.

Chapter 4.

ESTIMATING POLICY TRANSFERS: PRICE TRANSFERS

81. Once policies have been identified for inclusion in the measurement of support and appropriately classified, the next step is to estimate the value of transfers created by these policies. Policy transfers are divided into the following broad groups: *price transfers*, and *other transfers* (i.e. budgetary transfers and revenue foregone). This chapter shows how to estimate price transfers, while Chapter 5 discusses the estimation of other transfers.

82. The chapter begins with a theoretical discussion regarding transfers that arise from policies that affect domestic market prices. Policies that increase and decrease domestic market prices are differentiated for both importing and exporting situations. The following two sections explain how price transfers to producers and consumers are estimated. The fourth section discusses the estimation of the Market Price Differential, an integral component of price transfers.

4.1. Price transfers arising from policy measures: a graphical analysis

- Policy measures which affect the domestic price of a commodity result in a Market Price Differential (*MPD*).
- Policies which increase domestic market prices (a positive *MPD*) create transfers to producers from consumers. When the commodity is exported, producers also receive transfers from taxpayers. When the commodity is imported, additional transfers go from consumers to others, including central government, in the form of tariff revenue.
- Policies which decrease domestic market prices (a negative *MPD*) create transfers from producers to consumers. When the commodity is imported, consumers also receive transfers from taxpayers. When the commodity is exported, additional transfers go from producers to others, including central government.

83. The key theoretical assumption underlying the estimation of support is that agricultural markets are competitive. The characteristics of competitive markets, such as perfect information, homogeneity of products traded and free entry and exit, imply price arbitrage. Market agents exploit and gain from price differences across markets. Theoretically, price arbitrage works to dissipate price wedges between domestic and world market, so that there is a stable tendency of domestic prices to align with external prices when expressed in a common currency unit.[10] In this context, a persistent price differential between the domestic and external markets is the result of government interventions. As such, this price differential becomes a key parameter for estimating transfers arising from government's price policies.

84. A variety of government policy measures may affect the domestic market price of a commodity, including measures imposed at the border, such as tariffs and export subsidisation, as well as quotas on imports or exports. Domestic market interventions may include direct price administration and public

10. This influence of arbitrage on prices of identical commodities exchanged in two or more markets is often referred to as the "law of one price". This law states that in an efficient market there must be, in effect, only one price for identical commodities regardless of where and how they are traded (although in nominal terms prices in different locations and along the value chain differ according to transaction and processing costs).

stockholding. All these policy interventions alter the domestic market price of a commodity compared to its border price.

85. This policy-induced price difference is denoted as the Market Price Differential (*MPD*):

$$MPD = DP - BP \qquad [4.1]$$

where: MPD – Market Price Differential

DP – domestic market price

BP – border price

86. *MPD* is positive when the policy induces a higher domestic market price, thereby supporting commodity production. It is negative when the policy induces a lower domestic market price, thereby discouraging commodity production.[11] In the latter case, policies place a tax on producers, and price transfers are accounted for in estimated support with a negative sign. Policies which alter the domestic market price affect both producers and consumers of a commodity; but they can also involve transfers to or from the government budget and therefore have implications for taxpayers.

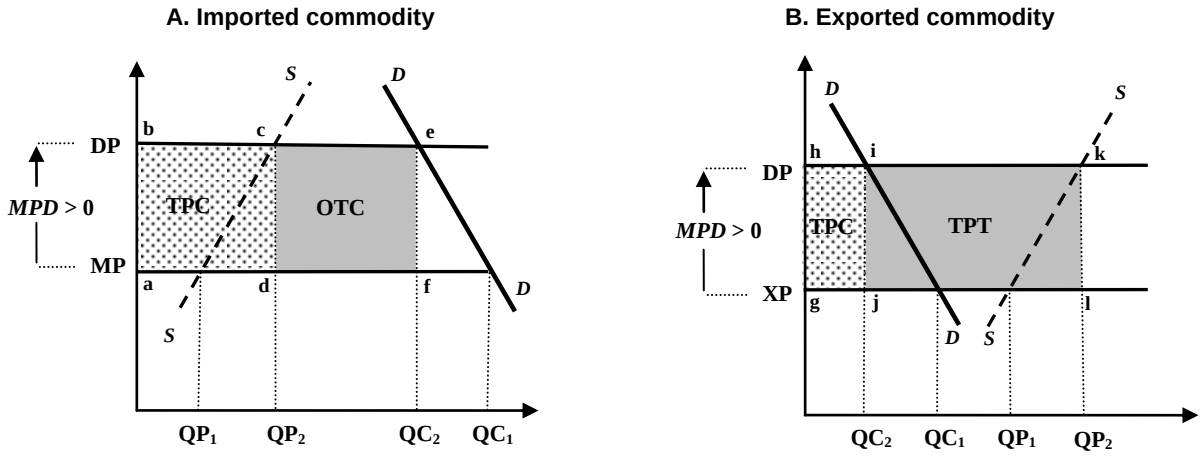
87. Using a partial equilibrium framework, Figures 4.1 and 4.2 illustrate the price transfers associated with policies that increase or decrease the domestic market price of a commodity respectively. In both cases, a distinction is made according to whether the commodity is imported or exported. Domestic supply and demand curves are denoted by *SS* and *DD* respectively. The various price transfers are distinguished according to three economic groups – producers, consumers and others (including taxpayers) – receiving and financing these transfers.

88. Panel A of Figure 4.1 presents the case where policies that increase the domestic market price are introduced on an imported commodity. In the absence of these policies, equilibrium will be reached in the domestic market when the domestic price is equal to the import price (MP), with domestic production equal to QP_1 and domestic consumption equal to QC_1. The difference between demand and supply, $QC_1 - QP_1$, is met by imports.

89. Policies that increase the domestic market price are now introduced, e.g. a tariff. Producers benefit from a higher price, encouraging them to produce more; on the other hand, consumers reduce consumption. A new domestic market equilibrium is reached at price *DP*, resulting in a positive *MPD*; with production rising to QP_2, consumption falling to QC_2, and the volume of imports falling to $QC_2 - QP_2$.

11. In this discussion, and in the calculation of the indicators in general, positive and negative price gaps and the concept of support, are described from the perspective of the producer. The perspective of the consumer is the reverse. Policies which raise market prices discourage consumption; policies which lower market prices support consumption.

Figure 4.1. Price transfers associated with policies that increase the domestic market price



90. In the *import situation*, policies which increase domestic market price create the following price transfers:

- *Transfers to Producers from Consumers* (*TPC*), with the value corresponding to rectangle *abcd*:

$$TPC_i = MPD_i \times QP_i \qquad [4.2]$$

- *Other Transfers from Consumers* (*OTC*), with the value corresponding to rectangle *dcef*. These transfers are due to the fact that consumers pay the higher price *DP* for all consumption, whether the commodity is produced domestically or imported:

$$OTC_i = MPD_i \times \left(QC_i - QP_i\right) \qquad [4.3]$$

91. When there is only a tariff in place, the area *dcef* measures transfers from consumers to the budget in the form of tariff receipts. However, when other policy measures are used, e.g. tariff quotas, who receives this transfer from consumers depends on what measures are in place and how they are implemented. For example, if tariff quota imports are controlled through licences and distributed on a first-come-first-served basis, part or all of the transfer (termed "quota rents") may be obtained by those who receive the licences, whether domestic importers or foreign exporters. But no matter who receives the transfers (in the form of tariff revenue or quota rents), they have been paid by consumers.

92. Panel B in Figure 4.1 presents the case where policies that increase the domestic market price are introduced on an exported commodity. In the absence of policies, equilibrium will be reached in the domestic market when the domestic price is equal to the export price (*XP*). At this price, production is equal to QP_1 and consumption equal to QC_1. In this case, the difference between supply and demand, $QP_1 - QC_1$, is exported.

93. Policies that increase domestic market prices are now introduced. Consequently, the domestic price (*DP*) increases above the export price, creating a positive *MPD*. Producers benefit from a higher price, which encourages them to increase production to QP_2; consumers now pay a higher price, which results in a reduction in consumption to QC_2; and the quantity exported increases to $QP_2 - QC_2$.

94. In the *export situation*, policies which raise domestic market prices create the following price transfers:

- *Transfers to Producers from Consumers* (*TPC*), with the value corresponding to rectangle *ghij*:

$$TPC_i = MPD_i \times QC_i \quad [4.4]$$

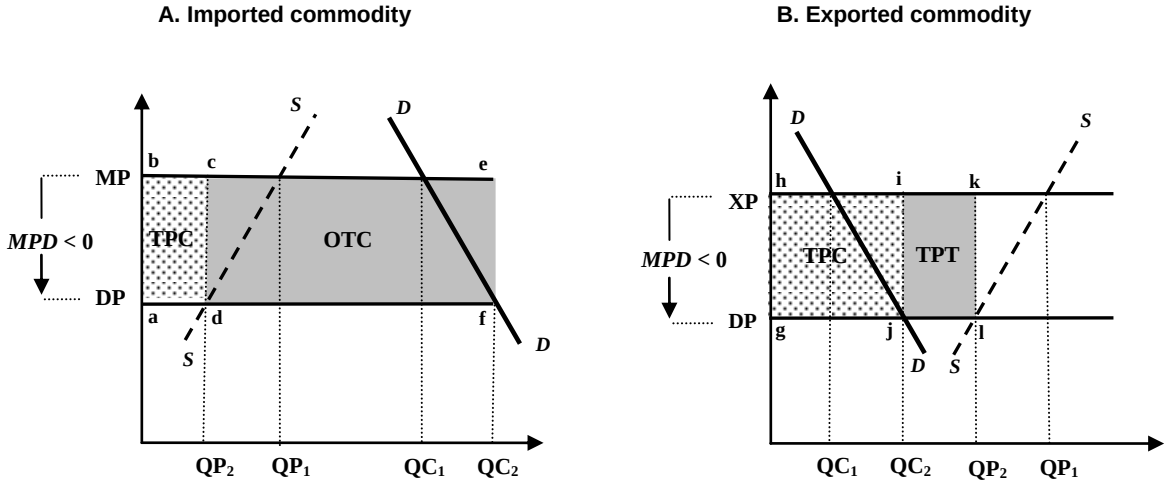
- *Transfers to Producers from Taxpayers* (*TPT*), with the value corresponding to rectangle *jikl*. These transfers represent the part of producer price support borne by taxpayers in the form of budgetary outlays on export subsidisation, food aid or public stockholding:

$$TPT_i = MPD_i \times (QP_i - QC_i) \quad [4.5]$$

95. An important distinction between the import and export situations is that in the former only part of total price transfers created (*abef*) is received by producers (*TPC*), and this part is entirely financed by consumers. In the export case, all transfers (*ghkl*) are received by producers, and their cost is shared between consumers and taxpayers.

96. A similar analysis can be done for the situation where policies that induce a lower domestic market price are introduced, i.e. when a negative *MPD* is observed (Figure 4.2). Panel A shows the outcome when such policies are introduced on an imported commodity. In the absence of policies, equilibrium will be reached in the domestic market when the domestic price is equal to the import price (*MP*). At this price, production is equal to QP_1; consumption equal to QC_1; and the difference between demand and supply, $QC_1 - QP_1$, is imported.

Figure 4.2. Price transfers associated with policies that decrease the domestic market price



97. Policies that decrease the domestic market price are now introduced. For example, the government wishes to lower food prices by setting administrative limits on domestic prices and subsidising imported product. Consequently, the domestic price (*DP*) falls below the import price, creating a negative *MPD*. Production falls to QP_2 and consumption rises to QC_2. In this case, in contrast to Panel A, Figure 4.1, there is an increase in the volume of imports, $QC_2 - QP_2$. In the import situation, policies that decrease domestic prices create price transfers to consumers (*abef*) from producers (*TPC*) and taxpayers (*OTC*).

98. Panel B of Figure 4.2 presents the case for an exported commodity. In the absence of policies, equilibrium will be reached in the domestic market when the domestic price is equal to the export price

(*XP*). At this price, production is equal to QP_1 and consumption is equal to QC_1. In this case, the difference between supply and demand, $QP_1 - QC_1$, is exported.

99. Policies that decrease the domestic market price are now introduced. For example, the government may regard agriculture as a source of budgetary revenue and impose a tax on agricultural exports. Such a policy of low food prices may also be in accordance with the government's social objectives. Consequently, the domestic price (*DP*) decreases, creating a negative *MPD*. Production falls to QP_2, and consumption rises to QC_2, leading to a decrease in the volume of exports, $QP_2 - QC_2$. In the export situation, policies that reduce the domestic market price of a commodity create transfers to consumers (*TPC*) from agricultural producers, who also finance transfers to the budget (*TPT*) in the form of export taxes, resulting in overall transfers from producers represented by the area *ghkl*.

4.2. Price transfers to producers

- The Market Price Support (*MPS*) for a commodity is estimated by adding together transfers to producers from consumers and taxpayers, alternatively found by multiplying the quantity of production by the *MPD*.
- Adjustments for Price Levies and Excess Feed Cost net out the contribution that producers make to *MPS*.

100. In calculating the indicators, price transfers to producers are called ***Market Price Support (MPS)*** and are defined as: *the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures that support agriculture by creating a gap between domestic market prices and border prices of specific agricultural commodities.*

101. Before presenting a general formula for estimating *MPS*, two new items need to be explained.

102. The first are Price Levies (*LV*), sometimes termed production taxes, which can be imposed on producers as part of market price support policy. An example of such a tax is the levy imposed on EU milk producers when they exceed their production quotas. Another example would be levies charged on producers to finance some of the cost of export subsidisation. *LV* is an observed value, which is obtained from the information on budgetary expenditures.

103. The second item is the Excess Feed Cost (*EFC*), a component accounting for the price transfers that go from livestock producers to feed producers as a result of policies which alter the domestic market price for feed crops, an important input for the former group.

104. The Price Levies and Excess Feed Cost are accounted for in the MPS in order to exclude from the value of price transfers to producers contributions that producers make to the transfers.

105. Based on the analysis in the previous section, a general formula for the calculation of MPS for commodity *i* is expressed as:

$$MPS_i = TPC_i + TPT_i - LV_i - EFC_i^{LV} \qquad [4.6]$$

where: TPC_i – Transfers to Producers from Consumers of commodity *i*

TPT_i – Transfers to Producers from Taxpayers of commodity *i*

LV_i – Price Levies for commodity *i*

EFC_i^{LV} – Excess Feed Cost for livestock commodity *i*

106. *EFC is included in the estimation of MPS for livestock commodities only* and calculated as (also illustrated in Box 4.1):

$$EFC_i^{LV} = \sum_j (MPD_j \times QC_j^i) \quad [4.7]$$

where: EFC_i^{LV} – Excess Feed Cost for livestock commodity *i*

MPD_j – Market Price Differential for feed crop j

QC_j^i – Quantity of crop *j* used as an input into the production of livestock commodity *i*

107. Note that the quantity of crops used should include *only domestically produced feed*, so that the total quantity of each feed crop, summed up across all types of livestock ($\sum_i QC_j^i$) satisfies the following condition: $\sum_i QC_j^i \le QP_j$, where QP_j is the total domestic production of crop *j*. This condition is important in the situation when consumption of a feed crop is partly covered by imports. In this case it is the quantity of domestic production (QP_j) of that crop that is used for calculation of the *EFC*, and not the total quantity consumed for feed. This condition is necessary to ensure that *the EFC component of the MPS is calculated on the basis of domestic production*, consistent with all other *MPS* components.

108. The *EFC* adjustment may increase or reduce the value of MPS for livestock depending on particular mix of price affecting policies in place. For example, in a situation where both livestock production and feed crop production are supported by policies, resulting in positive *MPDs*, the *EFC* adjustment would reduce the *MPS* value for livestock. This occurs because livestock producers pay higher prices for feed crops as a result of price support for these commodities. The opposite would be true if policies are in place to decrease the price of feed, resulting in a negative *MPS* for feed crops. In this case, livestock producers receive additional price support because they can purchase feed at lower prices.

109. Substituting from equations 4.2, 4.4 and 4.5 into 4.6 yields equations 4.8a and 4.8b which distinguish the import and export situations. Both equations reduce to the same expression of transfers to producers. However, the transfers to producers from consumers (*TPC*) and from taxpayers (*TPT*) are identified separately, and may then be used to calculate other indicators and to analyse the composition of support.

Import Situation

$$MPS_i = (MPD_i \times QP_i) - LV_i - EFC_i^{LV} \quad [4.8a]$$

In the import situation, *TPT* is zero.

Export Situation

$$\begin{aligned} MPS_i &= (MPD_i \times QC_i) + (MPD_i \times (QP_i - QC_i)) - LV_i - EFC_i^{LV} \\ &= (MPD_i \times QP_i) - LV_i - EFC_i^{LV} \end{aligned} \quad [4.8b]$$

110. In calculating the indicators, MPS is first estimated for individual commodities. These estimates are used to calculate a national (aggregate) MPS, which is a major building block for the calculation of the PSE. The procedure for selecting individual commodities for which to calculate MPS, and the method for estimating the national MPS, are provided in section 6.1, along with empirical examples.

Box 4.1. Illustration of Excess Feed Cost adjustment in price transfers

The distinction in the calculation of the Excess Feed Cost (EFC) adjustment in price transfers for producers and for consumers is illustrated in Table 4.1.

Price Transfers to Producers (MPS): the EFC adjustment is made only for livestock products and is denoted in Table 4.1 as EFC^{LV}. This adjustment is calculated for each individual livestock product accordingly, yielding results presented in the last column of the table, i.e. EFC^{LF}_1, EFC^{LF}_2, to EFC^{LF}_m.

Price Transfers from Consumers (PTC): the EFC adjustment is made only for crop products *used for feed* in the country concerned and is denoted in Table 4.1 as EFC^{CR}. This adjustment is calculated for each individual crop product, yielding results presented in the last row of the table, from EFC^{CR}_1, EFC^{CR}_2, to EFC^{CR}_n.

Table 4.1. Schema for the calculation of Excess Feed Cost in price transfers for producers and consumers

		Feed crop products				**Excess Feed Cost in price transfers to producers (MPS)**
		Feed crop 1	Feed crop 2	…	Feed crop n	Sum across all crop products
Livestock products	Livestock product 1	$MPD_1 \times QC_1^1$	$MPD_2 \times QC_2^1$	…	$MPD_n \times QC_n^1$	**EFC^{LV}_1**
	Livestock product 2	$MPD_1 \times QC_1^2$	$MPD_2 \times QC_2^2$	…	$MPD_n \times QC_n^2$	**EFC^{LV}_2**
	…	…	…	…	…	**…**
	Livestock product m	$MPD_1 \times QC_1^m$	$MPD_2 \times QC_2^m$	…	$MPD_n \times QC_n^m$	**EFC^{LV}_m**
Excess Feed Cost in price transfers from consumers (PTC)	Sum across all livestock products	**EFC^{CR}_1**	**EFC^{CR}_2**	**…**	**EFC^{CR}_n**	**EFC_C**

EFC^{LV} and EFC^{CR} *for an individual product* represent, respectively, the sums across rows and columns of Table 4.1 where each individual element is the product of quantity of feed crop j used for livestock product i (QC_j^i) and the Market Price Differential for the feed crop j (MPD_j), following formulas 4.7 and 4.10.

Summing up *across all individual products* – the EFC^{LV} for livestock products and the EFC^{CR} for crop products – yields an equal value. This value corresponds to an aggregate Excess Feed Cost Adjustment at the country level, or EFC_C in the bottom right-hand cell of Table 4.1. The aggregate EFC_C is included in the calculation of price transfers when deriving national (aggregate) level indicators.

4.3. Price transfers from consumers

- Price Transfers from Consumers (*PTC*) for a commodity are estimated by adding together transfers from consumers to producers and transfers from consumers to other recipients. Alternatively, this can be found by multiplying the quantity of consumption by the *MPD*.
- An Excess Feed Cost adjustment nets out the contribution that comes from other agricultural producers rather than from consumers.

111. Price Transfers from Consumers (*PTC*) are defined as: *the annual monetary value of gross transfers from (to) consumers of agricultural products, measured at the farm gate level, arising from policy measures that support agriculture by creating a gap between domestic market prices and border prices of specific agricultural commodities*.

112. Again, based on the analysis in section 4.1, a general formula for the calculation of ***price transfers from consumers*** resulting from policies which affect market price for commodity *i* can be expressed as:

$$PTC_i = -\left(TPC_i + OTC_i\right) + EFC_i^{CR} \qquad [4.9]$$

where: TPC_i – Transfers to Producers from Consumers of commodity *i*

OTC_i – Other Transfers from Consumers of commodity *i*

EFC_i^{CR} – Excess Feed Cost for crop commodity i

113. In this case, *TPC* and *OTC* are given a negative sign because these transfers represent an implicit tax on consumers. Excess Feed Cost (*EFC*) in the PTC is a component introduced to remove from the estimation of PTC the value of transfers that come from agricultural producers rather than from consumers. This contribution is due to the fact that part of the agricultural output – the crops used in animal feed – is purchased by livestock producers, and not by (non-agricultural) consumers. *The EFC adjustment is made only in the calculation of PTC for crop commodities*. The EFC adjustment may affect the PTC value in different ways depending on the particular mix of price policies applied. EFC for crops is calculated as follows (also illustrated in Box 4.1):

$$EFC_j^{CR} = MPD_j \times \sum_i QC_j^i \qquad [4.10]$$

where: EFC_j – Excess Feed Cost for crop *j*

MPD_j – Market Price Differential for feed crop j

QC_j^i – quantity of crop *j* consumed as feed by livestock i

114. Substituting from equations 4.2 to 4.5 yields separate calculations for both the import and export situation (4.11a and 4.11b). Both equations reduce to the same expression for calculating price transfers from consumers. Again, the practice is to estimate separate values for the recipient of the transfers from consumers to producers and others, which are then used for calculating other indicators and for analysing the composition of support.

Import Situation

$$PTC_i = -\left(\left(MPD_i \times QP_i\right) + \left(MPD_i \times \left(QC_i - QP_i\right)\right)\right) + EFC_i^{CR} = -\left(MPD_i \times QC_i\right) + EFC_i^{CR} \quad [4.11a]$$

Export Situation

$$PTC_i = -\left(MPD_i \times QC_i\right) + EFC_i^{CR} \quad [4.11b]$$

In the export situation, OTC is zero.

115. As in the case of *MPS*, *PTC* is estimated for a number of individual commodities. These estimates are then used to calculate various commodity-specific indicators of support to consumers, as well as to obtain a country's aggregate consumer Single Commodity Transfers, which is also the major building block for calculation of the Consumer Support Estimate. These topics are covered extensively in Chapter 7, including numerical examples.

4.4. Market Price Differential (MPD)

- The *MPD* measures the extent to which a set of agricultural policies affects the market price of a commodity.
- Normal practice is to calculate the *MPD* using a price gap which measures the difference between the domestic price and the border price of a commodity.
- As an alternative to the price gap method, *MPD* can be derived from the value of export subsidies or based on applied MFN tariff rate.

116. As demonstrated in the preceding sections, a key component in estimating the value of price transfers is the *MPD* which measures the extent to which policies affect the market price of a commodity. *An MPD is calculated for a commodity when one or more policies are applied that change the market price received by producers of that commodity. When there are no such policies in place, an MPD is not calculated and is assumed to be zero.*

117. Policies that change the market price for a commodity include, but are not limited to, the following list:

- Import measures – e.g. tariffs, levies, import quotas, tariff quotas and licensing requirements.
- Export measures – (a) enhancing exports, e.g. export subsidies, export credits and foreign food aid; (b) limiting exports, e.g. quantitative restrictions, licensing, export bans and export taxes.
- Domestic price support measures – e.g. production quotas, administered prices and intervention purchases, including for domestic food aid, public stockholding and market withdrawals.

118. The benefit of calculating the value of price support transfers through an *MPD* is that it captures in a single measure the combined impact on market prices of a potentially complete set of price policies. Policies which raise the price received by producers for a commodity without changing the market price (i.e. without raising consumer prices) are included elsewhere within the PSE under category *A.2 Payments based on output*.

119. Most commonly, policies affecting market prices are implemented by governments in order to increase the price received by producers of a commodity. *Ceteris paribus*, such policies will lead to a positive *MPD*. The *MPD* is interpreted as a static measure of the additional price received by producers resulting from agricultural policies in a given year. It is the extra cost paid by consumers and in some cases also by taxpayers, resulting from policies that provide market price support to agricultural production.

Alternatively, as analysed in section 4.1, some countries may implement policies that lower market price for a commodity. *Ceteris paribus*, such policies will lead to a negative *MPD*.

120. The common approach to calculate the *MPD* for a commodity is to measure the difference between two prices, i.e. a domestic market price in the presence of the policies and a border price, whether an import or export price, representing the opportunity price (cost) for domestic market participants.

121. The graphical analysis presented in section 4.1simplified the domestic market down to a single level at which transactions take place. In reality, there are a number of different levels at which prices can be measured within a domestic market: farm gate prices (i.e. prices received by producers), wholesale prices, retail prices, prices at the border, etc.; these reflect, among other things, various stages of processing. Section 4.5 discusses how to select and adjust domestic market prices and border prices to calculate the *MPD* at the farm gate level. Section 4.6 details two alternative procedures, sometimes used to derive an *MPD*, which do not rely on the price gap method.

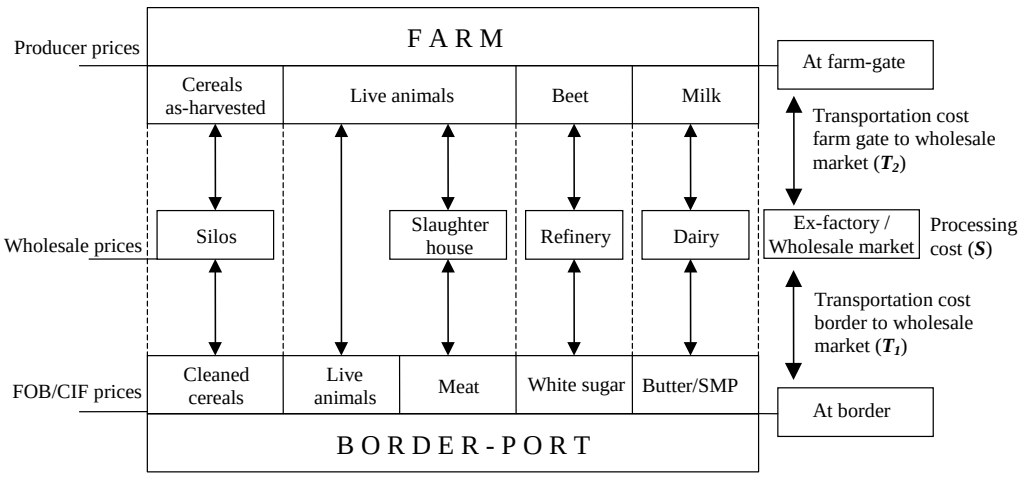
4.5. Calculating an MPD based on the price gap method

- The underlying principle is to compare "like with like" prices, at the farm gate or another level. To do so, adjustments may be needed for both marketing margins (representing the costs of processing, transportation and handling) and weight conversion (e.g. in crop processing, of livestock slaughter), and similar product quality must be ensured.
- Various formulas are used depending on whether a commodity is imported or exported.

4.5.1 General approach

122. The underlying principle is that support is measured at the farm gate level. Consequently, the task is to obtain an estimate of the price gap at the farm gate level. The challenge in doing this is that an agricultural commodity that is sold by a producer at the farm gate may be very different from the products derived from that commodity which pass over the border. This is particularly so for livestock commodities and commodities such as sugar, wine grapes and oranges, which may have a significant degree of processing involved before being traded at the border, e.g. juices made from fruit). In addition, border prices include transportation, handling and other costs incurred in bringing the product to the point of trade (Figure 4.3).

Figure 4.3. Schematic presentation of value added chain



Price gap calculation using farm gate prices

123. One method to deal with this challenge of comparing "like with like" is to compare a producer price, i.e. a price which is received at the farm gate level, with a border price that has been adjusted to make it comparable with the farm gate producer price. This involves netting (out, i.e. excluding from) the border price of marketing margins that may be applicable. It also involves weight adjustment, so that prices are comparable on a quantity basis, and adjustments for quality differences if relevant. As a result of these adjustments, *a border price measured at the farm gate level is obtained; this is further referred to as the reference price.* The *MPD* for a commodity estimated through this method is expressed as:[12]

$$MPD_i = PP_i - RP_i \qquad [4.12]$$

and:

$$RP_i = (BP_i \times QA_i - MM_i) \times WA_i \qquad [4.13]$$

where: PP_i – producer price for commodity *i*

RP_i – reference price of commodity *i* (border price at farm gate)

BP_i – border price of commodity *i* or products derived from commodity *i*

QA_i – quality adjustment co-efficient for commodity *i*

MM_i – marketing margin adjustment for commodity *i*

WA_i – weight adjustment co-efficient for commodity *i*

124. The producer price can be the annual average price received by all producers of a given commodity, or a representative producer price, perhaps of an average product quality grade. The choice relates to what suits the best for observing the "like with like" principle in comparing with the border price chosen. It is not necessarily appropriate to compare an average domestic producer price for a commodity with a border price for one specific product derived from that commodity.

125. It should also be noted that, depending on the character of the price data used: (a) border price adjustments in equation 4.13 may not necessarily be expressed in this particular algebraic form; (b) neither adjustment (for marketing margin, weight or quality) may be necessary; and that (c) making one adjustment does not necessarily require the other.

Price gap calculation using wholesale prices

126. In some cases, an approach is adopted to estimate the price gap at a higher level in the value added chain, e.g. at the wholesale level, by using wholesale prices instead of farm gate prices for comparison with border prices. In this case, the *MPD* can be expressed as:

$$MPD_i = PP_i - RP_i = WP_i - BP_i \qquad [4.14]$$

where: WP_i – wholesale price of commodity *i*

127. This approach assumes that the *absolute price gap* measured at a higher level of the processing chain, $WP_i - BP_i$, is the same as occurs at the farm gate level, $PP_i - RP_i$. In some cases, it may be more

12. Note that the *MPD* expression in equation 4.12 is in principle similar to that in equation 4.1; however, in the latter, adjustments of border price to the farm gate were omitted for simplification.

reasonable to assume the equality of the price gap in relative terms, $\frac{WP_i - BP_i}{WP_i}$, i.e. that it is the *rate of protection* that is the same at the wholesale and farm gate levels. The latter implies that a proportion of the absolute price gap measured at the wholesale level is captured at that level, and that only a part of the measured price gap is passed back to the farm gate. In this case, the *MPD* is expressed as:

$$MPD_i = PP_i \times \frac{WP_i - BP_i}{WP_i} \qquad [4.15]$$

128. It is a matter of judgment as to which of the two "equality assumptions" should be used. In principle, the more competitive the food chain, the more reason there is to assume the equality of absolute price gaps. However, if the structural characteristics of the food chain are such that it is more appropriate to assume that part of the protection is captured at higher levels of the food chain, it would be preferable to use the assumption of the equality of relative price gaps.

129. Theoretically, the method to calculate the *MPD* using the farm gate prices is superior to the one based on wholesale prices, because the latter involves rather simple assumptions on the transmission of protection across the food chain. However, in practical terms, the choice is usually determined by the nature and availability of the price and marketing margin data, and in some cases it may be more appropriate to measure the price gap at a higher level of the value chain. First, this will avoid most (or all) of the adjustments of border price to the farm gate. Both wholesale and border prices, properly selected, represent products at the same value added level. Wholesale markets may be located near the border, and hence the transportation differential between the two markets can then be ignored; a considerable advantage when information on marketing margins is scattered and difficult to obtain. Therefore, it may be more accurate in some cases to use wholesale prices to estimate the *MPD* than to adjust the border price to the farm gate when there is imperfect marketing margin data. Second, the data on farm gate prices is not always available or representative. This is the case, for example, of highly integrated industries, such as the poultry or sugar industries, where considerable quantities of primary production are directed down the food chain within one firm and without passing through the market.

Box 4.2. Setting a negative price gap to zero

In some cases, an *MPD* with the sign opposite to what would be expected based on the policies in place may be calculated. This is the case, for example, when for an exported commodity the domestic price is below the border price but no policies – export duties, export restrictions, or administrative barriers to inter-regional movement of goods – are applied that would explain the negative price gap. Similarly, when for an imported commodity it may be found that the domestic price is less than the border price, but policies which should increase the domestic price are in place, such as a tariff. In such cases, the *MPD* is set to zero, i.e. *PP* = *RP*, on the assumption that the observed price gap is due to factors not related to agricultural policies. While setting the negative *MPDs* to zero may improve the accuracy of the estimation, it may also reduce consistency over time and between countries, since positive *MPDs* may also capture the impact of non-policy factors, while negative MPDs, when set to zero, do not.

130. The following sub-sections further develop the calculation of price gap. Sub-section 4.5.2 discusses the selection of a border price, while the last three sub-sections focus on the key elements of adjusting the border price to the farm gate: sub-sections 4.5.3 and 4.5.4 discuss, respectively, the marketing margin and weight adjustments, while sub-section 4.5.5 addresses the need for quality adjustments.

4.5.2 Selecting a border price

131. A variety of border prices and alternative methods are used to calculate MPDs for OECD and selected non-OECD countries (Table 4.2). The choice of a border price for a given commodity in any country is determined by factors such as market structures, specifically the net trade position of the commodity concerned, and data availability. The net trade situation is defined by comparing total domestic

consumption and production of the commodity. When there is no trade because the commodity, tradable in principle, is highly protected, the country is treated as a net importer.

Border price for an exported commodity

132. If the country is a net exporter of the commodity, the most appropriate border price is an *FOB* unit value.[13] Very simply:

$$BP_i = FOB_i \qquad [4.16]$$

133. The *FOB* value may be either an annual average of a specific *FOB* quotation price or the annual average unit value of exports of the commodity (*i.e*. total value of exports divided by total quantity). An *FOB* value may correspond to different levels of tariff aggregations. If so, care needs to be taken to ensure that prices and quantities relate to a common unit for calculating an average unit value. It is preferable to choose the tariff lines for the least transformed products. If trade in these products is small, then more traded tariff lines may be used.

134. As shown in Table 4.2, *FOB* prices are the main source from which reference prices are derived for the European Union, Turkey, Brazil, Chile and Ukraine. For the EU, both export unit values (e.g. for pigmeat and poultry) and specific *FOB* quotation prices (e.g. the London daily price for white sugar from EU ports) are used.

135. In the case of a large exporter of a commodity, if exports account for a significant share of domestic production and no export subsidy or other export-enhancing measures are applied, the *MPD* is assumed to be zero. This assumption is made for the majority of commodities produced in Australia and New Zealand, and for apples, (table) grapes and oranges in South Africa.

13. *FOB* stands for Free on Board. It is the cost of an export good at the exit point in the exporting country, when it is loaded in the ship or other means of transport in which it will be carried to the importing country. See next footnote for *CIF*.

Table 4.2. Border prices and alternative methods used to derive the *MPD* by country

Country	Border Prices						Alternative Methods		Set equal to PP (MPD is zero)
	Net Exporter	Net Importer					Net Exporter	Net Importer	
	Country's own		Other country				Export Subsidy (per tonne)	Import tariff	
	Traded price				Other price				
	Export price (FOB)	Import price (CIF)	Import price (CIF)	Export price (FOB)	Wholesale price	Producer price			
OECD countries									
Australia	MK							RI	BA, BF, CT, EG, OA, PK, PT, RP, RS, SB, SF, SH, SO, WL, WT
Canada		MK			BF	EG, PT		MA	BA, OA, PK, RS, SB, WT, FX, PO, LN, BN. PE
Chile		WT, MA, RS, BF, MK							AP, GR, TM, PK, PT
EU-27	BA, EG, MK, OA, PK, PT, RS, WT	MA, RI, SH, TO[1]				BF	WI	FL, PO	RP, SF, SB
Iceland			SH	BF, EG, MK, PK, PT		WL			
Israel	CT	WT, AP	BS	MK, PT, EG		BF		SH	PN, TM, PB, PO, OR, GP, GR, AV
Japan		BA, CC[2], CU[2], GR[2], MK, MN[2], PR[2], RI, RS, SP[2], SW[2], WO[2], WT			PK			AP[2], BF, EG, PT	SB
Korea		BA, BF, GA, MK, PP, SB		RI	PK	EG, PT		CC	
Mexico	TM	MK		BA, MA, RI, SB, RS, SO, WT	BF, BN, CF	EG, PK, PT			
New Zealand				EG		PT			BA, BF, MA, MK, OA, PK, SH, WL, WT
Norway			SH	BA, BF, EG, MK, OA, PK, PT, WT					WL
Switzerland		BA, MA, MK3, RS, WT	SH	BF, EG, PK, PT		RP			
Turkey	AP, CT, GR, PO, SH, TB, TM	MK, WT	MA, SF	BA, BF, EG, PT, RS					
United States	MK			RS	BF		BA, EG, PK, PT, RI, WT[4]	SH, WL	MA, SB, SO
Non-OECD countries									
Brazil[5]	CF[6], PK, PT, RS,	RI, CT[7], MK		MA, WT					SB, BF
China[8]	MA	WT, CT, MK, RP, RS, SB		RI[9]				BF, SH, PT, PK	AP, PN, EG
Indonesia		MA, RS, MK, BF	PT, EG	RI			PL	SB	CO, CV, BS, RB, CF, PK
Kazakhstan	WT, BA, MA, CT	MK, PT, EG		RI, SF, PK		BF, SH, PO			
Russia[10]	WT, MA, BA, SF	RS, BF, MK, PT, PO		EG, OA, PK, RY					
South Africa[11]	MA, PN, RS	MK	BF, PK, PT, SF, SH, WT						AP, EG, GR, OR
Ukraine	BA, BF SF, MA, MK, OA, PT, SF, WT		PO	EG, PK, RS					

Notes to Table 4.2

1. Whether a *CIF* or *FOB* price is used to derive a reference price is calculated on a monthly basis depending on the net trade situation. See Box 4.3 for the treatment of seasonal markets.
2. The lower of the average annual *CIF* value or the producer price plus tariff.
3. While Swiss import prices are used for butter and SMP, the EU *FOB* export price is used for four types of cheese.
4. EEP subsidies were last provided in 1998 for BA, 1996 for *EG*, 1994 for *PK*, 2001 for *PT*, and 1995 for *RI* and *WT*.
5. For exported commodities *BF*, *CF*, *PK*, *PT*, *RS* and *SB*, negative price gaps are calculated based on actual prices but *MPD* is set at zero. For imported commodities *MA*, *RI* and *WT* applied in years for which negative price gaps are calculated, *MPD* is also set at zero (Box 4.2).
6. Weighted average of Brazilian *FOB* export prices for Arabica and Robusta coffee.
7. Brazilian import data are officially reported on an *FOB* basis.
8. For exported commodities *AP*, *BF*, *EG*, *PK*, *PN* and *PT*, negative price gaps are calculated based on actual prices, and *MPD* is set at zero.
9. Weighted average of Thai export price (*FOB*) for Indica rice and US export prices (*FAS* – Free Alongside Vessel) for Japonica-type rice.
10. For imported commodity *EG*, negative price gaps are calculated based on actual prices and *MPD* is set at zero.
11. For exported commodities *MA* and *PN*, negative price gaps are calculated based on actual prices and *MPD* is set at zero.

Commodity acronyms:

AP – Apples	FL – Plants and flowers	PE – Dry Peas	SB – Soybean
AV - Avocados	FV – Other fruit and vegetables	PR – Pears	SF – Sunflower
BA – Barley	FX - Flaxseed	PK - Pigmeat	SH – Sheep meat
BF – Beef and veal	GA – Garlic	PL – Palm oil	SO – Sorghum
BN – Dry beans	GP - Grapefruit	PN – Peanuts	SP – Spinach
BS - Bananas	GR – Grapes	PO – Potatoes	SW – Strawberries
CC – Chinese cabbage	LN - Lentils	PP – Red pepper	TB – Tobacco
CF – Coffee	MA – Maize	PT – Poultry	TM – Tomatoes
CO – Cocoa beans	MK – Milk	RB – Rubber	WI – Wine
CT – Cotton	MN – Mandarins	RI – Rice	WL – Wool
CU – Cucumbers	OA – Oats	RP – Rapeseed	WM - Watermelons
CV – Cassava	OR – Oranges	RS – Raw sugar	WO – Welsh onion
EG – Eggs	PB - Pepper	RY – Rye	WT – Wheat

Source: OECD indicator database.

Border price for an imported commodity

136. If the country is a net importer of the commodity, and if imports are regular and of a reasonable quantity, then the most appropriate border price is a *CIF* value for imports into that country.[14]

$$BP_i = CIF_i \qquad [4.17]$$

137. This can be either the annual average *CIF* unit value for imports of the commodity or products derived from the commodity, or an annual average of a specific *CIF* quotation price. *CIF* prices are used for the majority of commodities in Japan and Korea, and for some commodities in China, the EU and Switzerland.

138. As in the export case, it is preferable to choose the tariff lines for the least transformed products and, if trade in these products is small, more traded tariff lines are to be used. However, if imports are irregular and/or insignificant in quantity, other sources for prices need to be investigated. Similarly, if imports vary in quality from one year to the other, or are very different from those produced in the country, the unit value of imports should be avoided.

139. First, consider if there are other border prices that might be relevant. It may be appropriate to use a *CIF* price in another country, particularly if it is located close by and imports significant quantities of the same product.

$$BP_i = CIF_{other} \qquad [4.18]$$

where: CIF_{other} – annual average CIF unit value for imports in another country

140. As an example of this method, the EU CIF price for sheepmeat is used as a proxy for border price for Iceland, Norway and Switzerland.

141. Alternatively, if a nearby country is a major exporter of the commodity, then an *FOB* price from that source may provide a satisfactory proxy for border price. In this case, the insurance and freight to the country concerned may be added if considered significant.

$$BP_i = FOB_{other} + IF_i \qquad [4.19]$$

where: FOB_{other} – an annual average *FOB* unit value for exports from another country

IF_i – insurance and freight cost of transporting the product to country concerned

142. For example, EU *FOB* prices are used to derive border prices for livestock commodities for Iceland, Norway, Switzerland and Turkey. US *FOB* export prices are used as the basis for calculating reference prices for a number of commodities for Mexico. Sugar border prices for Mexico and the US are derived from the *FOB* price of sugar from Barbados.

143. If actual border prices are not available or relevant, it may be possible to construct a border price based on a wholesale price in another country. For example, border prices for beef in the three North

14. *CIF* stands for Cost, Insurance and Freight. It is the landed cost of an import good on the dock or other entry point in the receiving country. It includes the cost of international freight and insurance and usually also the cost of unloading onto the dock. It excludes any charge after the import touches the dock, such as port charges, handling and storage and agents' fees. It also excludes any domestic tariffs and other taxes or fees, duties or subsidies imposed by a country-importer.

American countries of Canada, Mexico and the US are derived from an Australian wholesale cattle price. A US wholesale price for pigs is used to derive a border price for pigmeat in Japan and Korea. A similar equation to 4.19 is used in this case.

144. Finally, there are certain situations where it is appropriate to derive a border price for a commodity from a producer price for the same commodity in another country:

$$BP_i = FG_{other} + IF_i \qquad [4.20]$$

where: FG_{other} – farm gate price from commodity *i* in another country

145. It can be appropriate to use this method when there is significant transformation of the commodity from that produced by the farmer to the product traded internationally. For example, border prices for wool for Norway and Iceland are derived from the New Zealand producer price for wool. This method was also used prior to 2005 to calculate the *MPD* for milk for all countries monitored. It can also be the appropriate method when the volume of international trade in the product is severely limited by sanitary and phytosanitary requirements, as in the case of poultry meat.

146. The most appropriate border price may change for a commodity within a country over time. There are primarily three reasons for this: (a) data becomes available (or unavailable), e.g. import flows become regular and significant, resulting perhaps from policy reform lowering border protection; (b) the net trade position of the commodity changes; or (c) there is a significant change in the policy measures affecting the market price of a commodity. The net trade position is reassessed every year: *if a country has been a net importer in two of the previous three years, it is considered as a net importer, and vice versa for the net exporting situation*.

Box 4.3. Calculating MPD for a commodity with seasonal markets

Some crops (e.g. fruits and vegetables) are highly perishable and seasonal. In principle, each month could be considered as a separate market given that supply is specific and cannot be transferred to the following month without bearing high storage costs and deterioration of the goods. Policy interventions, in particular import tariffs, often vary according to the month or season. At harvest time, higher import tariffs are usually applied to protect domestic production, while lower tariffs are applied in off-season periods. These are often referred to as seasonal tariffs. At the same time, market withdrawals may occur during the harvesting period.

In these cases, the annual average *MPD* is estimated by weighting seasonal *MPD*s, i.e. the difference between producer and reference prices for each season (or month) within a year, by the seasonal (monthly) quantity of marketed production. When the data are not available, the existing pattern of domestic marketed production or consumption may be estimated. Statistics on international trade are currently available on a monthly basis. Consequently, if the seasonal pattern of domestic marketed production can be estimated with a sufficient degree of reliability, domestic availability for use can be estimated (or *vice versa* if the pattern of domestic consumption is easier to estimate). When no estimation of seasonal production and consumption is possible, an annual *MPD* may be calculated by weighting seasonal *MPD*s by the number of days each tariff remains in force.

This method is used to calculate the *MPD* for tomatoes in the European Union. A *MPD* is estimated for each month as the difference between the unit value of intra-EU trade (the domestic price) and the unit value of extra-EU trade (the border price). Monthly *MPD*s are then averaged using the seasonal pattern of production, i.e. the share of monthly production in total annual production.

4.5.3 Marketing margin adjustment

147. To be correctly compared with the farm gate price, the border price must be made equivalent to the farm gate price, i.e. it must be adjusted for marketing margins, which include the costs of processing, transportation and handling of a product incurred between the farm gate and the border.

148. *Processing costs* relate to the physical transformation of primary farm products into marketable ones. Agricultural products often undergo a certain degree of transformation before they are traded: grains

are cleaned, dried, or husked; sugar beet is processed into sugar; and animals are slaughtered, cut and packed. The costs of these operations should be netted from the border price.

149. *Transportation and handling costs* relate to the spatial movement of products and represent another source of value added beyond the farm gate. The way in which the border price is adjusted for transportation costs depends on whether the product is imported or exported (Figure 4.3). In the case of *imports*, the first step is to add to the CIF price the costs of transporting the product from the border to the internal wholesale market (T_1). This is necessary in order to account for the full cost of an import at the domestic market level. The second step is to subtract from this price the cost of transporting the product from the wholesale market to the farm gate (T_2). This is necessary to express the price of an import in farm gate equivalent terms. The marketing margin adjustment to the CIF price, which also takes into account processing costs, is thus expressed as:

150. $$CIF_i^* = CIF_i + T_1 - T_2 - S \qquad [4.21]$$

where CIF_i^* – CIF price of imported product *i* adjusted to the farm gate (reference price)

T_1 – handling and transportation costs between border and domestic wholesale market

T_2 – handling and transportation costs between wholesale market and the farm gate

S – costs of processing farm product into imported product *i*

151. In the case of *exports*, an *FOB* price is adjusted *only* downwards to the farm gate so as to exclude all internal costs incurred between the farm gate and the border. The marketing margin adjustment in the case of an export is expressed as follows:

152. $$FOB_i^* = FOB_i - T_1 - T_2 - S \qquad [4.22]$$

where FOB_i^* – *FOB* price of exported product *i* adjusted to the farm gate (reference price)

T_1 – handling and transportation costs between border and domestic wholesale market

T_2 – handling and transportation costs between wholesale market and the farm gate

S – costs of processing of farm product into exported product *i*

153. All cost elements of the margin adjustment should be those of the country concerned (whether an importer or exporter) and not the costs reflecting the market structures of another country.

154. There can be difficulties in obtaining reliable or regular data on marketing costs, and these difficulties may justify some simplifications. A standard simplification relates to adjustments of the *CIF* price for imported commodities. As can be seen from equation 4.21, one element of the transportation costs (T_1) increases the reference price, while another (T_2) reduces it. This allows for the assumption that these costs offset each other, a simplification which is actually applied in the majority of cases where *CIF* prices are used. Adjustment for processing costs can be minimised (or omitted) by selecting external prices for products that are minimally transformed.

4.5.4 Weight adjustment

155. As farm products undergo physical treatment before they are traded, more than one unit of weight of a farm gate product is typically required to obtain one unit of weight of a traded product. For example, one tonne of boneless beef requires the processing of approximately 1.9 tonnes of live animal, or *vice versa*, one tonne of live animal yields only 0.53 tonnes of boneless beef. Hence, border and farm gate prices may not be directly comparable, in the sense that they reflect different quantities of a farm gate product (or alternatively, they reflect different quantities of a traded product). For comparisons to be accurate, the two prices need to be expressed on the same weight basis, i.e. in terms of either the farm gate commodity or the traded product. This is achieved by adjusting for weight either the producer price or the border price. Both methods yield the same price gap result. Using equation 4.13 (where other adjustment are omitted for simplicity), the alternative for the weight adjustment is as follows:

Option 1: Expressing producer price in boneless beef weight equivalent*:*

$$PP_{bb} = \frac{PP_{bl}}{WA_{bb}} \qquad [4.23]$$

Option 2: Expressing reference price in live animal weight equivalent:

$$RP_{bl} = (BP_{bb} - MM_{bb}) \times WA_{bb} \qquad [4.24]$$

where: PP_{bb} – producer price for beef in boneless beef weight equivalent

PP_{bl} – producer price for beef in live animal weight equivalent

WA_{bb} – weight adjustment co-efficient (tonnes of boneless beef obtained from one tonne of live animal)

BP_{bb} – border price of boneless beef

RP_{bl} – reference price of boneless beef in live animal weight equivalent

MM_{bb} – marketing margin adjustment to border price of boneless beef

156. The algebraic procedure of the weight adjustment may not always be such as written in equations 4.23 and 4.24. It is determined by how the weight adjustment coefficient (*WA*) is expressed. For example if *WA* is expressed in tonnes of live animal required to obtain one tonne of boneless beef (1.9 tonnes), i.e. if it represents a reciprocal of WA_{bb} as defined above, the procedure would be to multiply the producer price by *WA* in equation 4.23 and to divide the border price (with margin adjustment) by *WA* in equation 4.24.

157. It is also *important to ensure that all quantity variables used in calculations* (e.g. quantities of production and consumption) *are expressed in the same weight equivalent* as that applied for prices.

4.5.5. Quality adjustment

158. The domestic market and border prices used to estimate the *MPD* should represent commodities/products of similar quality. Quality relates to such product attributes as size, colour, moisture level, protein, fat or oil content, degree of impurities, bacterial pollution, etc. Among other factors, these determine commodity prices and cause price differentials, which may emerge independently of price

policies. The measured *MPD* should be free from the "noise" due to quality differences, so that the border price is comparable with the domestic price in terms of product quality.

159. A quality differential should not be confused with price differences that reflect the degree of processing that the commodity has undergone. For example, prices for meat can be expressed in terms of carcass meat, meat with bone, or boneless meat. Each of the three prices represents three different stages of processing, and the corresponding price differentials are due to the value added at each stage and to the physical transformation of product, although each price may represent meat obtained from the same animal and therefore reflecting the same product quality.

160. For the majority of *MPD* estimates, no quality adjustment is made, indicating that it is generally assumed that the quality composition of domestic and traded commodities/products is reasonably comparable. However, there are a few cases (summarised in Table 4.3) when specific adjustments to the border price are made to bring it closer to the domestic producer price in terms of some specific quality characteristic. The way in which the adjustment is carried out largely depends on the type of quality characteristics affecting the price levels and data availability.

161. *Example 1: MPD based on weighted average for different market segments*. An *MPD* is estimated for the various market segments; an average *MPD* is calculated by weighting each segment *MPD* by the share of that segment in domestic production. This method can only be used when both domestic and border prices can be identified for products of different segments.

162. This method, for example, is used to estimate the *MPD* for beef and veal in Switzerland where veal represents about 40% of the total value of beef and veal production. The *MPD* for beef and veal is the weighted average of the *MPD*s estimated individually for veal and beef:

$$MPD_{BF} = MPD_V \times \frac{VP_V}{VP_{BF}} + MPD_B \times \frac{VP_B}{VP_{BF}} \qquad [4.25]$$

where MPD_{BF} – weighted average *MPD* for beef and veal

MPD_V – *MPD* based on prices for veal

MPD_B – *MPD* based on prices for beef (cows, bulls, steers and heifers)

VP_V – value of veal production

VP_B – value of beef production (cows, bulls, steers and heifers)

VP_{BF} – total value of beef and veal production

163. When the average quality of commodities produced domestically is very different from the quality of commodities available at the border, there are two possible options to compare like with like.

164. *Example 2: applying a quality adjustment coefficient to the border price* to bring it to a comparable level of quality with the domestic price. This method is used to estimate the *MPD* of wheat for Ukraine, which is a net exporter of wheat. The *MPD* is estimated based on a differential between the Ukrainian average domestic and export prices of wheat. Feed wheat typically accounts for the majority share of Ukrainian exports, while domestic production is relatively evenly distributed between milling and feed quality wheat. In order to eliminate the impact of such quality asymmetry on the levels of average domestic and export prices and therefore on the measured *MPD*, the reference price is adjusted as follows:

$$BP^{*}_{WT} = BP_{WT} \times QA \quad [4.26]$$

and $$QA = \frac{BP^{*}_{WT}}{BP_{WT}} \quad [4.27]$$

where BP^{*}_{WT} – border price with quality adjustment

BP_{WT} – border price before quality adjustment

QA – quality adjustment coefficient

165. The quality adjustment coefficient (QA) in equation 4.27 can be derived as follows:

(i) express the domestic producer price of wheat (PP_{WT}) as a weighted average of domestic producer prices for feed (PP_{feed}) and milling (PP_{mill}) wheat with weights – a and b respectively – being the quantity shares of each wheat type in total domestic production:

$$PP_{WT} = a \times PP_{feed} + b \times PP_{mill} \quad [4.28a]$$

(ii) express the border price of wheat (BP_{WT}) as a weighted average of border prices for feed (BP_{feed}) and milling (BP_{mill}) wheat, with weights – c and d respectively – being the quantity shares of each wheat type in country's total exports:

$$BP_{WT} = c \times BP_{feed} + d \times BP_{mill} \quad [4.28b]$$

(iii) express BP_{mill} through BP_{feed}, assuming ΔP to be a quality price differential between the two prices:

$$BP_{mill} = (1 + \Delta P) \times BP_{feed} \quad [4.28c]$$

(iv) express BP_{WT} through BP_{feed} using [4.28c]:

$$BP_{WT} = c \times BP_{feed} + d \times (1 + \Delta P) \times BP_{feed} = BP_{feed} \times (c + d \times (1 + \Delta P)) \quad [4.28d]$$

(v) assume the adjusted border price of wheat (BP^{*}_{WT}) to be a weighted average of border prices for feed (BP_{feed}) and milling (BP_{mill}), with weights being shares of feed and milling wheat in domestic production – a and b – and express BP^{*}_{WT} in terms of border price of feed wheat using [4.28d]:

$$BP^{*}_{WT} = a \times BP_{feed} + b \times (1 + \Delta P) \times BP_{feed} = BP_{feed} \times (a + b \times (1 + \Delta P)) \quad [4.28e]$$

(vi) obtain QA using [4.27], [4.28d] and [4.28e]

$$QA = \frac{BP^{*}_{WT}}{BP_{WT}} = \frac{a + b \times (1 + \Delta P)}{c + d \times (1 + \Delta P)} \quad [4.28f]$$

166. As is seen from equation 4.28e, the key assumption used for this method is that the adjusted border price is a weighted average of border prices for feed and milling wheat with weights corresponding to quantity shares of these two types of wheat *in domestic production*. Another assumption is that the quality premium for milling wheat *(*ΔP) is the same for both domestically marketed and exported grain. Calculation of the quality adjustment coefficient requires information on the composition of domestic

production and exports in terms of quantities of feed and milling wheat (coefficients *a*, *b*, *c*, and *d*) and the quality price differential between milling and feed wheat (ΔP). It is possible to apply this method to any other commodity and to adapt the formula to include any number of quality grades, if relevant.

167. *Example 3: using weighted average of border prices for specific quality grades*. Brazil is a net exporter of coffee. A higher-priced Arabica coffee accounts for around 90% of Brazilian exports and a lower-priced Robusta coffee for the remaining 10%. The shares of these two groups in domestic production are around 75% and 25% respectively. The difference in the quality composition of domestic production and exports is tackled by constructing a weighted average reference price, as follows:

$$BP_{CF} = FOB_A \times \frac{QP_A}{QP_{CF}} + FOB_R \times \frac{QP_R}{QP_{CF}} \qquad [4.29]$$

where: BP_{CF} – weighted average border price of coffee

FOB_A – export price of Arabica coffee

FOB_R – export price of Robusta coffee

QP_A – quantity of Arabica coffee produced

QP_R – quantity of Robusta coffee produced

QP_{CF} – total quantity of coffee produced

168. The border price in equation 4.29 represents a weighted average of the Robusta and Arabica export prices, with weights corresponding to the shares of these two groups in domestic production. As in the previous example, this is a key assumption for harmonizing quality composition of border and domestic prices. This method is also used to derive China's import price for rice, which represents a weighted average of Japonica and Indica-type rice. This method, therefore, can be used both for exported and imported products, but requires the existence of international trade prices for products of specific quality grades.

Table 4.3. Methods used for adjusting prices for quality difference

Country	Weighted average MPD for different market segments	Adjusted border price	
		With quality adjustment co-efficient	Weighted average of border prices for specific quality grades
Canada	BF	-	-
US	BF	-	-
Norway	-	PT	-
Switzerland	BF	-	-
Brazil	-	-	CF
China	-	-	RI, WT
Ukraine	-	BA, WT, MA	-

4.6. Alternative methods for calculating an MPD

- Instead of using a price gap to calculate a *MPD*, export subsidy or import tariff rates may be used, after adjustment and/or weighting to ensure comparability.

169. Two methods alternative to comparing domestic and border prices, are sometimes used to estimate an MPD for a commodity.

170. In a ***net export*** situation, if the country has significant levels of exports of a commodity and uses export subsidies to bridge the gap between domestic and world prices, the level of export subsidy per tonne of exports is assumed to represent the MPD. In this case, the *MPD* can be expressed as:

$$MPD_i = \frac{XS_i}{QX_i} \qquad [4.30]$$

where: XS_i – value of export subsidies for commodity *i* or products derived from *i*

QX_i – level of exports of the commodity *i* for the annual period

171. This method is used to calculate the *MPD* of several commodities (barley, eggs, pigmeat, poultry, rice and wheat) for the United States, where the value of export subsidies is derived from expenditures by commodity on the Export Enhancement Programme (EEP). The same approach is also applied in the case of wine for the European Union.

172. Compared to the general method of estimating a price gap, the approach that involves using a unit export subsidy may lead to some underestimation if additional export competition instruments such as export credits are used. The effects may also fail to be picked up in cases where they constitute the only intervention, if no price gap measurement is undertaken or possible.

173. The alternative method in the case of a ***net import*** situation is to derive the *MPD* directly from tariffs. This method is not a preferred option if other *MPS* policies such as tariff quotas, licensing or state-trading enterprises be in place, because it does not capture the extent to which these policies change domestic market prices. However, it can be used even when other policies exist if price data is unavailable or unreliable and it is believed that deriving an *MPD* by this method results in a more accurate estimate of *MPS* for the commodity. The *MPD* can be expressed as either:

$$MPD_i = PP_i \times \frac{tr_i}{1 + tr_i} \qquad [4.31]$$

where: tr_i – average *ad valorem* tariff applying to commodity *i*

or

$$MPD_i = TR_i \qquad [4.32]$$

where: TR_i – average specific tariff applying to commodity *i*

174. The most appropriate tariffs to use are the *statutory applied MFN tariffs* that would pertain to imports: *statutory* rather than collected tariff revenue, since the latter ignores prohibitive tariffs that do not yield any revenues; *applied* rather than WTO bound tariffs, since they are the tariffs effectively protecting the market and can be significantly different from bound levels; and *MFN* rather than preferential tariffs, since they represent the protection level imposed on marginal imports.

175. Commodities are traded at various degrees of processing and packaging that correspond to different tariff lines which may have significantly different tariff rates. In addition, for some commodities that have a limited shelf life, tariffs can vary by season (Box 4.3). Consequently, there are two major steps that must be carried out in order to calculate an average tariff for a commodity.

176. The first step is to ensure that the tariffs applying to imports of the commodity are expressed in the same form. Statutory tariff rates can be *ad valorem* or specific. Sometimes they are a mixture of both. To average several tariff lines, all tariffs have to be converted to either an *ad valorem* equivalent or a specific equivalent. The appropriate border prices to use for tariff conversion should be those corresponding to the specific tariff lines. But if the information is not available, e.g. if no trade occurs because the tariff is prohibitive, an alternative price has to be used, for example, another indicator of the world price of the same product, the border price of a close tariff line or the border price of the commodity itself converted to the appropriate processing equivalent.

177. The final step is to apply an appropriate weighting to the tariffs. If significant flows of trade occur for all tariff lines, tariffs can be weighted by import volumes, ensuring that volumes have been converted to the same product weight. If there are no imports for some tariff lines, for example because of prohibitive tariffs, another weighting system has to be used, usually a simple average.

4.7. Work examples

178. As the preceding sections of this chapter show, the calculation of a MPD is an essential task in the estimation of market price support transfers. It requires a thorough understanding of how the policy works, knowledge of the relevant agricultural commodity markets, including trade flows, access to sources of domestic and trade data, and great care to ensure that the correct price comparisons and the required adjustments are made. The following tables provide illustrative examples of how a *MPD* is calculated, based on the methods outlined in section 4.5. The examples relate to key agricultural commodities, such as grains (wheat), sugar, and meat (beef), while Annex 4.1 deals specifically with the calculation of the implicit reference price and the *MPD* for milk.

179. It should be emphasised that, *while the arithmetic process for calculating a MPD varies between the examples, the underlying principle is always the same,* i.e. *to ensure the comparison of "like with like".*

180. Table 4.4 provides an example of how a *MPD* may be calculated for wheat based upon specific policy interventions, market characteristics and data availability. In this example, only milling wheat is produced in the country. This could be the case, for example, due to certain cultivation traditions and/or government policies where protection is provided to milling wheat through an import tariff, while feed wheat enters the domestic market duty-free. Consequently, the difference between production and consumption of food wheat is zero. While the country is a net importer, importing some 20 000 tonnes of feed wheat, it would not be correct to base the reference price on these imports because of the difference in quality between the two types of wheat.

181. As there are no imports of milling wheat into the country, an appropriate border price needs to be found from information other than the country's own trade. In this example, a close neighbour country is a major importer of milling wheat. The average *CIF* price of wheat imports for milling in the neighbour provides a suitable proxy for a border price of wheat in the example country (equation 4.18). Domestic processing costs are then subtracted from the border price to obtain a reference price that is comparable to the producer price (equation 4.13). Given the geographic characteristics of the country's market, an assumption is made that the handling and transportation costs between wholesale market and border (T_1) and internal handling and transportation costs between farm gate and wholesale market (T_2) offset each other. These costs are therefore not explicitly considered in the estimation of the marketing margin. The reference price is then subtracted from the producer price to obtain a *MPD* (equation 4.12).

Table 4.4. WHEAT: Calculation of a MPD for a net importer

Reference price based on other country's import price and marketing margin adjustment

Symbol	Description	Units	Value	Source / equation
QP	Production	000 T	100	Data
	of which for feed	000 T	0	Data
VP	Value of production	LC million	35	Data
PP	Producer Price	LC/T	350	Data or (VP / QP) * 1000
QC	Consumption	000 T	120	Data
	Consumption for feed	000 T	20	
BP	Border Price	LC/T	300	CIF_{other}
CIF_{other}	CIF price at neighbour	LC/T	300	Data
MM	Marketing Margin	LC/T	20	S, with $T_1 = T_2$
S	Processing costs (cleaning and drying)	LC/T	20	Data
RP	Reference Price	LC/T	280	BP - MM
MPD	Market Price Differential	LC/T	70	PP - RP

182. Table 4.5 provides an example of how a reference price could be calculated when wheat is produced for both milling and feed uses within a country. In this example, wheat production is split 50/50 between milling and feed wheat, with tariff protection and export subsidies used to support wheat producers. The country is a net exporter of wheat, exporting one half of its total wheat production, and 80% of exports comprise wheat for feed use.

183. In this case, the average export price of wheat is not comparable to the average producer price because the product composition (in terms of milling and feed wheat) varies significantly. A quality adjustment to the border price is therefore required. The available information allows a quality adjustment as expressed in equations 4.26 and 4.27 to be made. From the adjusted border price (*BP*QA*), a marketing margin is deducted, including processing costs and all internal handling and transportation costs (between farm and wholesale market and between wholesale market and border). In the example shown, this results in a reference price that is higher and a *MPD* that is lower than with the average border price without quality adjustment. However, if milling wheat dominated exports, the opposite would be the case.

184. In the case of wheat, a considerable amount of trade takes place in product that has undergone only minor processing, so that no weight adjustment is needed. For other products, such as sugar and beef, trade mainly occurs in more highly processed forms. In these cases, the calculation of a *MPD* requires not only a marketing margin adjustment but also an appropriate weight adjustment between the farm and traded products.

185. Table 4.6 provides an example of how a *MPD* could be calculated for sugar under specific policy and market characteristics, and data availability. In the example, farmers produce 2 million tonnes of raw sugar cane, which is transformed into 300 000 tonnes of refined sugar. In order to determine whether the country is a net importer or exporter, the country's total production and consumption of sugar are compared. The quantity consumed should account for all forms of sugar consumption (including in processed foods, such as confectionery). This information is typically obtained from the country's production, supply and utilisation balance sheet for sugar: this aggregates consumption of sugar in all forms and expresses these quantities in common physical terms, e.g. in refined sugar equivalent.

186. Calculation begins by expressing domestic production of sugar cane in refined sugar equivalent. This is done by multiplying the quantity of sugar cane produced by the extraction rate of refined sugar from sugar cane (0.15). Domestic production of sugar cane can now be compared with total consumption, also

expressed in refined sugar equivalent. As can be seen from Table 4.6, the country's sugar consumption exceeds domestic production, with imports representing 33% of domestic consumption.

187. The average *CIF* value of refined sugar imports is the appropriate border price, from which processing costs are deducted (assuming again in this case of a net importer that the two transport components from wholesale to border and farm to wholesale offset each other). However, this price is a refined sugar price, while the producer price is in raw cane terms. Producer price may be expressed in refined sugar equivalent in two ways, and depending on the data available. If the price available is for raw cane sugar (PP_{cane}), it can be divided by the extraction rate of refined sugar from sugar cane (*WA*) (equation 4.23). In the example the *WA* corresponds to the units of refined sugar obtained from one unit of raw sugar cane (i.e. a ratio of 0.15 indicates that one tonne of raw sugar cane yields 0.15 tonnes of refined sugar). If only the total value of sugar cane production is available (*VP*), it can be divided by the quantity of sugar cane expressed in refined sugar equivalent ($QP_{refined}$). As can be seen from Table 4.6, both options yield the same producer price in refined sugar equivalent. This price is comparable to the reference price, and is used to calculate the *MPD*.

188. The previous examples have all been based on calculations that involve adjusting a border price into farm gate values, requiring in particular a marketing margin adjustment (equation 4.13). Because of commercial sensitivity or lack of consistent and systematic estimates, this information is not always readily available. Table 4.7 provides an example of a price gap calculation based on wholesale prices, which does not rely on marketing margin information (equations 4.14 and 4.15).

189. In the following example, 1.5 million tonnes of sugar beet are transformed into 150 000 tonnes of refined sugar. Almost all domestic consumption of refined sugar is derived from domestic production, with very little imports. It is therefore more appropriate to derive a border price from an alternative source. The example uses an average *FOB* export price from a major exporter as a starting point, with adjustments made for the cost of insurance and freight from the exporting country to the country in question (equation 4.19). This is essentially a derived *CIF* price, which is then subtracted from the domestic wholesale price for refined sugar to obtain a *MPD* at the wholesale level.

190. There are two ways in which this price gap can be translated back to the farm gate level. The first assumes that the *absolute* price gap at the wholesale level is the same as at the farm gate level (Option 1), which results in a *MPD* of LC 125.

191. The second assumes that the price gap between the wholesale and farm gate level is the same in *relative* terms (Option 2). In the example, this results in a *MPD* of LC 63. It also results in a *MPD* that is lower than the first calculation, as it always will do. The difference between the *MPD*s derived from the two options increases as the relative price gap between the wholesale price and the border price increases. The choice between the two options should be made in terms of which one best reflects the market structure of the value chain in the country and therefore requires some knowledge of the situation.

192. In comparison with the previous examples, this method does not require marketing margin data but it does require wholesale price information. Weight and quality adjustments may also be required depending on the commodity being examined.

193. Table 4.8 provides another example of deriving a farm gate level *MPD* from a wholesale price gap, in this case for beef. The country is a net importer of beef, with total beef imports representing one-quarter (25%) of consumption. This allows the use of average import values as the basis for calculating a border price. However, an important characteristic of this market is that domestic production is made up entirely of grain-fed beef, while imports consist of both grain-fed and grass-fed beef. The latter is considered as of lower quality than grain-fed beef and is being available at a lower price.

Table 4.5. WHEAT: Calculation of a MPD for a net exporter

Reference price based on country's own export price, quality and marketing margin adjustments

Symbol	Description	Units	Milling wheat (mill)	Feed wheat (feed)	Total Wheat (WT)	Source / equation
QP	Production	000 T	100	100	200	Data, where $QP_{WT} = QP_{mill} + QP_{feed}$
VP	Value of production	LC million	35	30	65	Data, where $VP_{WT} = VP_{mill} + VP_{feed}$
PP	Producer Price	LC/T	350	300	325	Data or (VP / QP) * 1000
QC	Consumption	000 T	80	20	100	Data, where $QC_{WT} = QC_{mill} + QC_{feed}$
BP	Border Price	LC/T	327	280	289	Data or (VX / QX) * 1000
VX	Value of exports	LC million	7	22	29	Data, where $VX_{WT} = VX_{mill} + VX_{feed}$
QX	Quantity of exports	000 T	20	80	100	Data, where $QX_{WT} = QX_{mill} + QX_{feed}$
QA	Quality adjustment	ratio	-	-	1.05	$(a + b * (1 + \Delta P)) / (c + d * (1 + \Delta P))$
a	share of feed wheat in total production	ratio	-	-	0.50	Data
b	share of milling wheat in total production	ratio	-	-	0.50	Data
c	share of feed wheat in total wheat exports	ratio	-	-	0.80	Data
d	share of milling wheat in total wheat exports	ratio	-	-	0.20	Data
ΔP	quality price differential between milling and feed wheat	ratio	-	-	0.17	Data
MM	Marketing Margin	LC/T	-	-	24	$T_1 + T_2 + S$
S	Processing costs (cleaning and drying)	LC/T	-	-	10	Data
T_1	Handling and transportation wholesale/border	LC/T	-	-	12	Data
T_2	Handling and transportation farm/wholesale	LC/T	-	-	2	Data
RP	Reference Price	LC/T	-	-	279	(BP * QA) - MM
MPD	Market Price Differential	LC/T	-	-	46	PP - RP
Comparison: RP based on average wheat export price						
RP	Reference Price	LC/T	-	-	265	BP - MM
MPD	Market Price Differential	LC/T	-	-	60	PP - RP

Table 4.6. SUGAR: Calculation of a MPD for a net importer

Reference price based on country's own import price, weight and marketing margin adjustments

Symbol	Description	Units	Value	Source / equation
QP_{cane}	Production (raw cane)	000 T	2000	Data
WA	Weight Adjustment (refined sugar extraction rate)	ratio	0.15	Data, where WA = $QP_{refined}$ / QP_{cane}
$QP_{refined}$	Production (refined sugar equivalent)	000 T	300	QP_{cane} * WA
PP_{cane}	Producer Price (raw cane)	LC/T	75	Data
VP	Value of sugar cane production	LC million	150	Data
$PP_{refined}$ (1)	Producer Price (refined sugar equivalent): option 1	LC/T	500	PP_{cane} / WA or
$PP_{refined}$ (2)	Producer Price (refined sugar equivalent): option 2	LC/T	500	(VP / $QP_{refined}$) * 1000
$QC_{refined}$	Consumption (refined sugar equivalent)	000 T	450	Data
$BP_{refined}$	Border Price (refined sugar)	LC/T	400	($VM_{refined}$ / $QM_{refined}$) * 1000
$VM_{refined}$	Value of imports (refined sugar)	LC million	60	Data
$QM_{refined}$	Quantity of imports (refined sugar)	000 T	150	Data
$MM_{refined}$	Marketing Margins (refined sugar)	LC/T	200	S, with $T_1 = T_2$
$S_{refined}$	Processing costs (refined sugar)	LC/T	200	Data
$RP_{refined}$	Reference Price (refined sugar equivalent)	LC/T	200	$BP_{refined}$ - MM
$MPD_{refined}$	Market Price Differential (refined sugar equivalent)	LC/T	300	$PP_{refined}$ - $RP_{refined}$

Table 4.7. SUGAR: Calculation of a MPD for a net importer

Reference price based on other country's export price (a derived import price)
and price gap based on wholesale price

Symbol	Description	Units	Value	Source/equation
QP_{beet}	Production of beet (raw beet)	000 T	1500	Data
WA	Weight Adjustment (refined sugar extraction rate from beet)	ratio	0.10	Data, where WA = $QP_{refined}$ / $QP_{raw\ beet}$
$QP_{refined}$	Production of beet (refined sugar equivalent)	000 T	150	QP_{beet} * WA
PP_{beet}	Producer price (raw beet)	LC/T	15	Data
VP	Value of sugar beet production	LC million	23	Data
$PP_{refined}$ (1)	Producer Price (refined sugar equivalent): option 1	LC/T	150	PP_{beet} / WA or
$PP_{refined}$ (2)	Producer Price (refined sugar equivalent): option 2	LC/T	150	(VP / $QP_{refined}$) * 1000
$QC_{refined}$	Consumption (refined sugar equivalent)	000 T	152	Data
$QM_{refined}$	Quantity of imports (refined sugar)	000 T	2	$QC_{refined}$ - $QP_{refined}$
$WP_{refined}$	Wholesale Price (refined sugar)	LC/T	300	Data
$BP_{refined}$	Border Price (refined sugar)	LC/T	175	FOB_{other} + IF
FOB_{other}	Export price of major exporter (refined sugar)	LC/T	150	Data
IF	Freight from exporting country	LC/T	25	Data
Option 1: Assuming a constant absolute price gap				
$MPD_{refined}$	Market Price Differential (refined sugar equivalent)	LC/T	125	$WP_{refined}$ - $BP_{refined}$
Option 2: Assuming a constant relative price gap				
$MPD_{refined}$	Market Price Differential (refined sugar equivalent)	LC/T	63	$PP_{refined}$ * (1 - $BP_{refined}$ / $WP_{refined}$)

Table 4.8. BEEF: Calculation of a MPD for a net importer

Reference price based on country's own import price, weight and quality adjustments and price gap based on wholesale price

Symbol	Description	Units	Value	Source / equation
QP_{lw}	Production (live weight)	000 T	100	Data
	Production of beef	000 T	98	Data
	Production of veal	000 T	2	Data
WA	Weight Adjustment (ratio of carcass to live weight)	ratio	0,60	Data, where WA = QP_{cw} / QP_{lw}
QP_{cw}	Production (carcass weight)	000 T	60	Data or QP_{lw} * WA
PP_{lw}	Producer Price (live weight)	LC/T	2400	Data
VP	Value of production	LC million	400	Data
PP_{cw} (1)	Producer Price (carcass weight): option 1	LC/T	4000	Data or (VP / QP_{cw}) * 1000
PP_{cw} (2)	Producer Price (carcass weight): option 2	LC/T	4000	Data or PP_{lw} / WA
QC_{cw}	Consumption (carcass weight)	000 T	80	Data
QM_{cw}	Quantity of imports (carcass weight)	000 T	20	QC_{cw} - QP_{cw}
WP_{cw}	Wholesale Price (carcass weight)	LC/T	5000	Data
Comparison: Calculation of a MPD based on border price for grain fed beef only				
BP_{cw}	Border price (carcass weight)	LC/T	4667	(VM_{cw} / QM_{cw}) * 1000
VM_{cw}	Value of imports (carcass weight)	LC million	70	Data
QM_{cw}	Quantity of imports (carcass weight)	000 T	15	Data
	Option 1: Assuming a constant absolute price gap			
MPD	Market Price Differential	LC/T	333	WP_{cw} - BP_{cw}
	Option 2: Assuming a constant relative price gap			
MPD	Market Price Differential	LC/T	267	PP_{cw} * (1 - BP_{cw} / WP_{cw})
Comparison: Calculation of a MPD based on border price of all beef imports				
BP_{cw}	Border price (carcass weight)	LC/T	3500	(VM_{cw} / QM_{cw}) * 1000
VM_{cw}	Value of imports (carcass weight)	LC million	70	Data
QM_{cw}	Quantity of imports (carcass weight)	000 T	20	Data
	Option 1: Assuming a constant absolute price gap			
MPD	Market Price Differential	LC/T	1500	WP_{cw} - BP_{cw}
	Option 2: Assuming a constant relative price gap			
MPD	Market Price Differential	LC/T	1200	PP_{cw} * (1 - BP_{cw} / WP_{cw})

194. The table shows the results of using the wholesale price gaps to estimate the farm gate price gaps under absolute and relative price gap assumptions. These two options are in turn considered using the reference price based on total beef imports and that based on grain-fed beef imports only. Grain-fed imports may be identified in terms of specific tariff lines, or in terms of geographic origin of imports. The example again demonstrates that the assumption of a constant relative price gap results in a lower *MPD* than the assumption of a constant absolute price gap. It also shows that the *MPD* is lower when only grain-fed imports are used, reflecting the higher price of this product in comparison to grain-fed beef. In this sense, a quality adjustment occurs not in terms of a particular formula but in terms of data selection.

195. A final example is provided in Table 4.9, demonstrating all the possible adjustments that can be made in terms of marketing margins, weight and quality. In comparison to the previous example, an important characteristic of the beef market in this example is the relatively significant contribution of veal to total beef and veal production.

196. The country is a net exporter of beef, so that an average *FOB* price can be used to calculate a border price. However, there is a significant difference between the product composition of exports (dominated by veal) and the composition of farm production (dominated by beef), similar to that considered in the first example for wheat (Table 4.4). Consequently, the average export price is not comparable with the domestic producer price.

197. Data regarding processing and transportation costs are needed to allow the marketing margins to be calculated. Along with the weight adjustment, they also indicate further differences between beef and veal production that could be recognised in the calculation of a *MPD*.

198. It is appropriate to calculate separate reference prices for beef and veal by subtracting their own marketing margins from their respective average export prices and applying their respective weight adjustments, following equation 4.13. A reference price for beef and veal is then obtained by weighting the separate reference prices for beef and veal by the shares of production. In the example, this amounts to a reference price of 2 640 in local currency units and a *MPD* of 2 410 in local currency units.

199. For comparison, Table 4.9 also shows the result of using the simple total beef and veal averages to derive a reference price and *MPD* that do not account for the differences between export and production composition. The result is a *MPD* that is lower than that with the quality-adjusted reference price, reflecting the greater proportion of the higher-priced veal in exports than in production.

Table 4.9. BEEF: Calculation of a *MPD* for a net exporter

Reference price based on country's own export price, weight, quality and marketing margin adjustments

Symbol	Description	Units	Beef (B)	Veal (V)	Beef & veal (BF)	Source / equation
QP_{lw}	Production (live weight)	000 T	60	40	100	Data, where $QP_{lw(BF)} = QP_{lw(B)} + QP_{lw(V)}$
WA	Weight Adjustment (ratio of carcass to liveweight)	ratio	0.65	0.55	0.61	Data, where $WA = QP_{cw} / QP_{lw}$
QP_{cw}	Production (carcass weight)	000 T	39	22	61	$QP_{lw} * WA$
PP_{lw}	Producer Price (live weight)	LC/T	3000	3200	3080	Data
VP_{BF}	Value of production	LC million	180	128	308	Data, where $VP_{BF} = VP_B + VP_V$
PP_{cw} (1)	Producer Price (carcass weight): option 1	LC/T	4615	5818	5049	Data or $(VP / QP_{cw}) * 1000$
PP_{cw} (2)	Producer Price (carcass weight): option 2	LC/T	4615	5818	5049	Data or PP_{lw} / WA
QC_{cw}	Consumption (carcass weight)	000 T	20	10	30	Data, where $QC_{cw(BF)} = QC_{cw(B)} + QC_{cw(V)}$
BP_{cw}	Border Price (carcass weight)	LC/T	3975	4753	4276	Data or $VX_{cw} / QX_{cw} * 1000$
VX_{cw}	Value of exports (carcass weight)	LC million	76	57	133	Data, where $VX_{cw(BF)} = VX_{cw(B)} + VX_{cw(V)}$
QX_{cw}	Quantity of exports (carcass weight)	000 T	19	12	31	Data, where $QX_{cw(BF)} = QX_{cw(B)} + QX_{cw(V)}$
MM_{cw}	Marketing Margins (carcass weight)	LC/T	1477	1862	1616	$T_{1(cw)} + T_{2(cw)} + S_{cw}$
S_{cw}	Processing costs	LC/T	785	989	858	Data
$T_{1(cw)}$	Handling and transportation wholesale/border	LC/T	462	582	505	Data
$T_{2(cw)}$	Handling and transportation farm/wholesale	LC/T	231	291	252	Data
$RP_{cw\,(B,V)}$	Reference Price (Beef and veal)	LC/T	2498	2891	-	$BP_{cw} - MM_{cw}$
RP_{cw}	Reference Price (weighted average)	LC/T	-	-	2640	$[RP_{cw(B)} * QP_{cw(B)}/QP_{cw(BF)}] + [RP_{cw(V)} * QP_{cw(V)}/QP_{cw(BF)}]$
MPD	Market Price Differential	LC/T	-	-	2410	$PP_{cw} - RP_{cw}$
Comparison: RP based on beef and veal simple average export price						
RP_{cw}	Reference Price (simple average)	LC/T	-	-	2660	$BP_{cw} - MM_{cw}$
MPD	Market Price Differential	LC/T	-	-	2389	$PP_{cw} - RP_{cw}$

Annex 4.1

Methodology for calculating the border price for milk

Introduction

200. Since fluid milk is not normally a tradable commodity, a border price is not directly observable. Consequently, from the early 1980s through to 2004 the annual reference price for milk in each country was derived from a New Zealand farm gate milk price, adjusted for country differences in milkfat content and transportation costs. In 2005 a new methodology was introduced and has been used to recalculate annual indicators back to 1986.

201. The key idea of the new method is to derive a reference price from border prices of representative, tradable dairy products. This method is based on two assumptions. First, world markets for tradable dairy commodities are competitive. This allows the formation of a single price for each of the solid components (milkfat, protein, lactose, etc.) of raw milk. Second, each type of dairy product contains unique and fixed amounts of each of these solid components of milk.

202. The issue is which tradable dairy products are to be selected. To have a meaningful comparison between domestic and border prices, selected dairy products should be common, tradable products in global dairy markets. From this criterion, butter and skim milk powder (*SMP*) were selected. Reference prices for most countries are calculated using these two products. As a variation of the method, cheese was selected in addition to the above two dairy products if the policy, trade or other factors in particular countries were such that adding additional products would increase the accuracy of the calculation. The reference price for milk in the European Union and Switzerland is calculated using this variation.

Implicit border price of raw milk

Two dairy products case (butter and SMP)

203. Two solid components in dairy products – milkfat and non-fat-solids – are considered. First, the implicit prices of the two components are calculated from the border prices of butter and SMP, and the percentage of fat and non-fat-solids in these two products. The appropriate border prices to use for butter and *SMP* follow the general procedure for selecting a border price for any other commodity, i.e. depending on whether the country is a net exporter or importer of the product (as to whether an *FOB* or *CIF* price is used) and the regularity and quantity of product traded (as to whether the country's own or another country's *CIF* or *FOB* prices are used).

204. The implicit prices of milkfat and non-fat-solids are calculated by solving the following equations.

$$\begin{cases} aX + cY = BP_b \\ bX + dY = BP_s \end{cases} \qquad \text{[A4.1]}$$

where X and Y are the implicit prices of milkfat and non-fat-solids respectively, a and b are the percentage of milk fat in one tonne of butter and *SMP* respectively, c and d are the percentage of non-fat-solids in one

tonne of butter and *SMP* respectively, BP_b and BP_s are butter and *SMP* prices at the border of the country in question respectively.

205. Solving the above equations results in:

$$X = \frac{dBP_b - cBP_s}{ad - bc} \quad [A4.2]$$

and

$$Y = \frac{aBP_s - bBP_b}{ad - bc} \quad [A4.3]$$

206. The implicit border price of raw milk can be written as:

$$BP_m = eX + fY \quad [A4.4]$$

where *e* and *f* are the percentage of milkfat and non-fat-solids in one tonne of raw milk respectively.

207. Using results of *X* and *Y*, BP_m can also be written as:

$$BP_m = \alpha BP_b + \beta BP_s \quad [A4.5]$$

$$\text{where } \alpha = \frac{de - bf}{ad - bc} \text{ and } \beta = \frac{af - ce}{ad - bc} \quad [A4.6]$$

Three dairy products case (butter, SMP and cheese)

208. Where three dairy products are used, three main solid components are considered: milkfat, protein and lactose. From the border prices of the three dairy products and their percentage of milkfat, protein and lactose, the implicit prices of three solid components are calculated. The implicit border price of raw milk can be calculated from these three implicit prices and the percentage of the three solid components in raw milk.

209. In equation form, the implicit raw milk price can be written as:

$$\widehat{BP_m} = eX + nZ + oW \quad [A4.7]$$

where *X*, *Z* and *W* are implicit prices of milkfat, protein and lactose respectively, at the border, and *e*, *n* and *o* are the tonnes of milkfat, protein and lactose contained in one tonne of raw milk respectively.

210. From the information about the composition of the three dairy products, the implicit prices of the three components can be estimated as the solution of the following equations.

$$\begin{cases} aX + hZ + kW = BP_b \\ bX + iZ + lW = BP_s \\ gX + jZ + mW = BP_c \end{cases} \quad [A4.8]$$

where a, *b* and *g* are the percentage of milkfat in one tonne of butter, SMP and cheese respectively; h, i, and j are the percentage of protein in one tonne of butter, SMP and cheese respectively; *k*, *l*, and *m* are the percentage of lactose in one tonne of butter, SMP and cheese respectively; BP_c is the cheese price at the border.

211. Solving the equations leads to:

$$\begin{cases} X = \dfrac{BP_b(im - jl) + BP_s(jk - hm) + BP_c(hl - ik)}{aim + ghl + bjk - ajl - bhm - gik} \\ Z = \dfrac{BP_b(gl - bm) + BP_s(am - gk) + BP_c(bk - al)}{aim + ghl + bjk - ajl - bhm - gik} \\ W = \dfrac{BP_b(bj - gi) + BP_s(gh - aj) + BP_c(ai - bh)}{aim + ghl + bjk - ajl - bhm - gik} \end{cases} \quad \text{[A4.9]}$$

Using the above results, $\widehat{BP}_m$ can be rewritten as:

$$\widehat{BP}_m = \gamma BP_b + \delta BP_s + \varepsilon BP_c \quad \text{[A4.10]}$$

where γ, δ and ε are defined as:

$$\begin{cases} \gamma = \dfrac{e(im - jl) + n(gl - bm) + o(bj - gi)}{a(im - jl) + h(gl - bm) + k(bj - gi)} \\ \delta = \dfrac{e(jk - hm) + n(am - gk) + o(gh - aj)}{b(jk - hm) + i(am - gk) + l(gh - aj)} \\ \varepsilon = \dfrac{e(hl - ik) + n(bk - al) + o(ai - bh)}{g(hl - ik) + j(bk - al) + m(ai - bh)} \end{cases} \quad \text{[A4.11]}$$

Marketing (Processing)[14] margin

212. The above implicit border price includes marketing margins, since it is derived from processed dairy products. Therefore, the margin must be subtracted from the implicit border price in order to obtain the reference price. However, in most countries data on marketing margins is not available from official statistical sources. As a practical alternative, the implicit wholesale price of raw milk is calculated from the wholesale prices of butter and SMP in the same way as the implicit border price of milk was calculated from the border prices of butter and SMP. The processing margin is obtained by subtracting the producer price for manufacturing quality milk from the implicit wholesale price of raw milk. In equation form, processing margin *MM* can be written as:

$$MM = (\alpha WP_b + \beta WP_s) - PP_m \quad \text{[A4.12]}$$

$$\text{where } \alpha = \frac{de - bf}{ad - bc} \text{ and } \beta = \frac{af - ce}{ad - bc} \quad \text{[A4.13]}$$

14. Marketing margin is understood here to include processing margin only and therefore the two terms are used interchangeably.

where WP_b and WP_s are, respectively, butter and SMP prices in the domestic wholesale market and PP_m is the domestic producer price for manufacturing milk.

Implicit reference price for milk

213. The reference price for milk is obtained by subtracting the marketing margin from the implicit border prices of raw milk. Milk reference prices for countries other than the four major exporting countries can be written as:

$$RP_m = (\alpha BP_b + \beta BP_s) - MM \quad \text{for the case of two dairy products} \qquad \text{[A4.14]}$$

and

$$\widehat{RP_m} = (\gamma BP_b + \delta BP_s + \varepsilon BP_c) - MM \quad \text{for the case of three dairy products} \qquad \text{[A4.15]}$$

214. For the major dairy products exporting countries, such as Australia, the European Union, New Zealand and the United States their own processing margins, as defined in equation A4.11, are used to calculate RP_m or $\widehat{RP_m}$. For the majority of other countries the simple average of the marketing margins for Australia, the European Union, New Zealand and the United States is used to calculate milk reference price, while for several non-EU European countries the EU marketing margins are used. This approach is mainly explained by data limitations, however it seems reasonable, since these four countries are the world's major producers and exporters of dairy products and their marketing margins represent a reasonable approximation for other countries.

Work example

215. Table A4.1 provides an example of how the reference price for milk is calculated on the basis of two dairy products, butter and SMP. Using the data on border prices and on content of milkfat and non-fat solids in these two products, implicit border prices for milkfat (X) and non-fat solids (Y) are derived (equations A4.2 and A4.3). An implicit border price of raw milk is then calculated, as a weighted average of X and Y, with weights being the percentages of milkfat (e) and non-fat solids (f) in raw milk (equation A4.4).

216. An alternative way to derive the implicit border price of milk would be to first compute coefficients α and β (shares of border prices of butter and SMP in the milk price) from the percentages of milkfat and non-fat solids content in butter, SMP and raw milk (equation A4.6). The implicit border price of milk is then calculated as a weighted average of the border prices of butter and *SMP* (BP_b and BP_s), with weights being coefficients α and β (equation A4.5). As is shown in Table A4.1, this leads to the same result in terms of the implicit border price of milk.

217. The next step is to calculate the marketing margin. As noted above, for the four major exporters this is done by using the information on domestic (wholesale and producer) prices of milk, butter and SPM and coefficients α and β. For the majority of other OECD countries an average of the marketing margins of the four exporters is applied, and for several non-EU European countries the marketing margins are assumed to be the same as those of the European Union.

218. Finally, an implicit milk reference price is derived by subtracting the calculated marketing margin (*MM*) from the implicit milk border price BP_M and the *MPD* is calculated as the difference between the domestic producer price and the implicit milk reference price (RP_m).

Table A4.1. MILK: Calculation of an implicit Reference Price and MPD

Symbol	Description	Units	Value	Source / equation
PP_m	Producer Price of raw milk	LC/T	400	Data
BP_b	Border Price - Butter	LC/T	3000	Data
BP_s	Border Price - SMP	LC/T	2500	Data
a	Milkfat content in butter	%	81	Data
c	Non-fat solids content in butter	%	1	Data
b	Milkfat content in SMP	%	1	Data
d	Non-fat solids content in SMP	%	86	Data
e	Milkfat content in raw milk	%	4	Data
f	Non-fat solids content in raw milk	%	8	Data
BP_m	Implicit Border Price of raw milk: ***option 1***	LC/T	376	(eX+fY)/100
X	Implicit Border Price of miklfat	LC/T	3668	$(dBP_b-cBP_s)/(ad-bc)*100$
Y	Implicit Border Price of non-fat solids	LC/T	2864	$(aBP_s-bBP_b)/(ad-bc)*100$
BP_m	Implicit Border Price of raw milk: ***option 2***	LC/T	376	$\alpha BP_b + \beta BP_s$
α	Share of butter price in milk price	Ratio	0.05	(de-bf)/(ad-bc)
β	Share of SMP price in milk price	Ratio	0.09	(af-ce)/(ad-bc)
MM	Marketing Margin	LC/T	60	$(\alpha WP_b + \beta WP_s) - PP_m$
RP_m	Reference Price of raw milk	LC/T	316	BP_m - MM
MPD	Market Price Differential	LC/T	24	$PP_m - RP_m$

219. When three dairy products are involved (butter, SMP, and cheese) the calculation follows the same steps. In this case prices for these three dairy products and their content in terms of fat, protein and lactose are considered. Equations related to the three-product case are applied (A4.7 – A4.11 and A4.15).

Chapter 5.

ESTIMATING POLICY TRANSFERS: OTHER TRANSFERS

220. This chapter completes the discussion of policy transfers, focusing on transfers that emerge from policies other than those affecting market prices for agricultural commodities. These policies provide support based on: (a) actual *budgetary transfers*; and (b) *revenue foregone* by the government and other economic agents.

5.1. Budgetary transfers

- Budgetary transfers through all government institutions, both national and sub-national, are included.
- Budgetary transfers associated with the administration of policies (design, implementation and evaluation) are not included in the estimates of support.
- Care should be taken to avoid double counting of support, in particular in treating budgetary transfers associated with market price support policies.
- Budgetary transfers are allocated to calendar years; in cases where agricultural, fiscal and calendar years do not coincide, various procedures are needed to attribute transfers appropriately.

221. Budgetary transfers are the most "visible" policy transfers. They are observed and do not need to be estimated as is the case with the price transfers or support based on revenue foregone. The measurement of direct budgetary transfers is an accounting task, which consists of the appropriate use of information on budgetary spending. This section details the main procedures for accounting for budgetary transfers in support estimation.

5.1.1. Complete coverage of institutions, administrative levels and financing instruments

222. The first step is to identify all budgetary expenditures underlying policies which support agricultural production – whether provided to producers individually, producers collectively, or consumers of agricultural commodities. The principle of complete identification of all publicly financed transfers has three aspects.

- First, all financing through public institutions involved should be captured, paying attention to the fact that implementation and funding of some agricultural measures may be outside the remit of agricultural ministries. This often concerns general services for agriculture, such as agricultural education, research, pest and disease control, or infrastructural development. Another example is agri-environmental measures, which may be implemented by and financed through the ministries and agencies specifically responsible for environmental issues.
- Second, funding from all administrative levels should be covered. Agricultural policy measures are financed at multiple levels of government. For example, in a country with a federal government structure, support from national as well as state, province or prefecture level should be covered, as well as measures that are financed more locally, for example from counties, communes or townships. By convention, all expenditures beneath the national level are termed *sub-national*. Also by convention, EU-level expenditures are considered as the national level, with EU country expenditures (including those made at regional levels) as at the sub-national level. Some EU policies, such as elements of its rural development policy, are co-financed across several levels of

government, with the EU budget financing part of the costs of a programme, augmented by expenditure from an EU country government's budget, with the possibility of additional expenditure by a regional or local government entity within that country.

- Third, all public finance instruments should be covered. In some non-OECD countries, for example Brazil and the Russian Federation, agricultural support may also be financed from the so-called extra-budget funds – instruments which do not formally constitute part of the national budgets. Such funds may be created at the national or regional level and are usually used for implementation of specific programmes.

5.1.2. Accounting of effectively disbursed funds

223. Data on effectively disbursed – as opposed to planned or budgeted funds – should be used. The principle is to capture transfers that actually affect producer revenues. The difference between budgeted and effectively disbursed outlays can be large, for example when emergency assistance is provided over and above the initial budget appropriation, or in the case of deficiency payments, when there is considerable under- or over-spending due to favourable or unfavourable market conditions. It is important to ensure that all spending items are accounted for consistently in terms of amounts effectively disbursed. However, if the estimations are done on an annual basis, such information may not be available in time for the latest year – in this case data on budgeted expenditures are used, which are then adjusted the following year to reflect actual spending.

5.1.3. Treatment of policy administration costs

224. Administration costs include those associated with the design, implementation and evaluation of agricultural policies. It is important to distinguish different types of budgetary expenditures related to administration of agricultural policies:

- Administrative expenditures by ministries, including staff salaries, material, building and other costs.
- Salaries and wages of those employed in research, inspection, extension and other services.
- Payments to banks, insurance companies, producer organisations or commodity boards, to cover their costs associated with implementing support policies.

225. The principle is to exclude administrative expenditures of the ministries from the estimation of support as they represent expenditures on operations common to any public structure and are not policy transfers as such. However, when the policy measure is actually delivering a service that benefits producers individually (e.g. extension) or collectively (e.g. research and inspection), expenditures associated with the delivery of the service, mainly the salaries of extension advisors, inspection officers, researchers, etc., are included in the PSE and the GSSE respectively.

226. In some countries, the government grants to other agencies (public, mixed or private bodies) responsibility for implementing some agricultural policy measures. Commodity boards can be in charge of intervention and storage measures. Producer organisations may be involved in policy implementation. Banks may deliver agricultural investment loans with preferential conditions (generally interest concessions), and in many countries, insurance companies deliver subsidised insurance programmes. Consulting companies or NGOs can help farmers prepare applications for project-based measures.

227. When policies are delivered by semi-public or private companies, the government may compensate them for part or all of the costs associated with implementing the policy measure, in addition to channelling financial support to farmers through these organisations. As in the case of direct delivery by ministry officials, these implementation costs are excluded from the PSE. In the case of investment and insurance programmes, the government may pay for two components: support to farmers (e.g. interest concession on loans, or a subsidy to insurance *premia*), as well as the programme administration costs,

which are transfers to the implementation agencies. Those two cost components are usually identified in the programme. The first one is included in the PSE, while the other is not.

5.1.4. Avoiding double-counting of support: an example of outlays on price regulation

228. In working with budgetary expenditures, special care should be taken to avoid double-counting of support in the PSE. This risk exists when budgetary expenditures underlie support which has already been included elsewhere. The clearest example is budgetary expenditures related to domestic price interventions. Several such expenditures can be distinguished: (a) intervention purchases; (b) export subsidisation (outlays on export subsidies, export credits or food aid); (c) price subsidies (deficiency payments); (d) payments for on-farm stockholding; (e) outlays for public stockholding, which include operational costs of public purchasing agencies and depreciation and disposal costs associated with public stocks; (f) compensatory payments to consumers, e.g. subsidies to the first purchasers of agricultural commodities – mills, dairies, slaughterhouses, etc. − provided to reduce the burden imposed on them by agricultural price support.

229. When the Market Price Differential (*MPD*) and consequently the price transfers are estimated by comparing domestic and border prices, outlays for intervention purchases (group a above) or export subsidies (group b), if they are applied, should not be included in the PSE. The purpose of these expenditures is to raise the level of domestic prices and this support is already captured through the price gap. Inclusion of groups (a) and (b) in the budgetary part of support in this case would create double-counting with price transfers. When the *MPD* is estimated based on per tonne deficiency payments (group c) or per tonne export subsidies (group b) these budgetary items represent direct input into estimation of price transfers, and also should not appear in the budgetary transfers. The groups that should be accounted in the budgetary transfers are: payments for on-farm stockholding (group d), classified in PSE category *A2. Payments based on output*; expenditures on public stockholding (group e), classified in GSSE category *M. Public stockholding*; and compensatory payments to consumers (group f), classified in the CSE as a Transfers to Consumers from Taxpayers (*TCT*).

5.1.5. Attribution of budgetary allocations to calendar years

230. Support estimates are made on a calendar-year basis and, as such, budgetary expenditures should be allocated to calendar years. This may not be straightforward, as some support programmes have cycles that correspond to crop (agricultural) years, while the budgetary funding is based on fiscal years. These calendar, crop and fiscal years may not fully coincide, i.e. they may cover different time laps. The principle is to allocate a payment of a particular crop year to the calendar year to which the production of that crop year is attributed. For example, suppose that a crop year *t* starts in calendar year *t*, and the crop is harvested in that same calendar year *t*. However, payments with respect to crop year *t* are made on the basis of the fiscal year and may fall mostly into calendar year *t+1*. In this case, payments made in calendar year *t+1* (regardless of fiscal year) should be allocated to calendar year *t* because the crop for which the payment was made is attributed to that calendar year. With "decoupled" payments, the rule is extended to cover payments with respect to land in agricultural use at given dates or for environmental actions taken over specific periods. For example, if a payment is based on land in agricultural use or animals held at a given date, it would be assigned to the calendar year in which this date occurs.

5.1.6. Classification of budgetary spending

231. Once all budgetary spending items are identified, adjusted and allocated to appropriate years, they should be classified into the three main categories of support: support to producers individually (PSE), financing of general services to agriculture (GSSE), and support to consumers (CSE). This task is treated in detail in Chapter 3. One specific problem which may be encountered in classifying expenditures is that the budgetary data reported is too aggregated to be directly allocated to a particular category. For example, data may be presented by broad agricultural programmes or by implementing agencies – heterogeneous

groupings that combine various types of expenditures. In such cases, it is important to make an attempt to obtain disaggregated data. If exact information is not available, then some reasonable approximation is required to allocate the spending items to individual policy measures, and hence to the appropriate support category. For example, some assumed percentage shares to distribute the aggregate spending can be used. This involves some error; however it is likely to be smaller than if the amount was omitted entirely.

5.2. Support based on revenue foregone

- Producers can be supported through policy measures whereby governments or other economic agents forego revenue that they would otherwise collect from or charge to producers.
- Typical forms of revenue foregone are tax concessions, preferential lending, debt restructuring, and administered prices for inputs and services.
- A price gap method, similar to that used to estimate MPD, is often the most appropriate method. However, selecting an appropriate reference variable may be difficult.

232. Support may be provided in forms that do not imply actual budgetary transfers, but at the cost of revenue foregone by the government or other economic agents. Such support creates implicit transfers to producers – and should also be identified and quantified. This section presents several types of support based on revenue foregone currently covered in support estimations. Approaches to quantifying the associated policy transfers are also discussed. The measurement of transfers based on revenue foregone is largely an empirical task, involving assumptions and judgement about the appropriate reference against which to measure the transfer. A good understanding is needed of both the implementation mechanisms underlying such policies and the broader economic context.

5.2.1. Tax concessions

233. Tax concessions are a common type of support to agricultural producers that generate budgetary revenue foregone. Concessions may apply to taxes on income, profits and capital gains, real estate and land. Agricultural producers may be granted preferential treatment on VAT (e.g. applied to purchased inputs), on fuel taxes, or on depreciation methods. Farm operators may benefit from preferential treatment on taxes on payroll. The principle of consistent coverage of all policy measures supporting agriculture means that tax concessions should be included in estimated support when they are agriculture-specific or when agricultural producers are their principal beneficiaries. Tax concessions occur when a fiscal advantage is conferred on a group of individuals, or on a particular activity, by reducing tax liability rather than by direct cash subsidy (James and Nobles, 1992). Tax concessions can come in various forms of special treatment that relate to one of the basic features that characterise the structure of a tax. These can be formulated as follows:

- Exemptions: amounts excluded from the tax base.
- Allowances: amounts deducted from the benchmark to arrive at the tax base.
- Credits: amounts deducted from tax liability.
- Rate relief: a reduced rate of tax applied to a class of tax payers or taxable transactions.
- Tax deferral: a relief that takes the form of a delay in paying tax.

234. Each of these forms imply that some tax revenue is foregone and economic incentives are being provided, in much the same way as would happen with a programme involving budgetary expenditure.

235. The above definition of a tax concession presumes a counterfactual, i.e. the existence of a group of individuals or activity for which no such fiscal advantage is given. The support associated with preferential taxation can therefore be measured by establishing a counterfactual and quantifying the monetary value of the reduction in tax liability against that counterfactual.

236. A complete and reliable quantification of tax concessions is therefore a complex empirical task, requiring a considerable amount of resources and information. Very few countries themselves calculate the value of tax revenue foregone. An approach has been adopted to limit the coverage of tax concessions to those that unambiguously confer benefits on agriculture, and the value of which can be estimated at reasonable cost and with reasonable accuracy.

237. In this context, a special effort has been made to estimate the value of fuel tax concessions to cover all countries where such a policy exists. This choice reflects the fact that this policy occurs in many countries and is relatively easily measured. Other tax concessions covered in the current indicator database relate to income tax (e.g. in Australia, Mexico, Norway and the United States) and to property tax exemption (in Canada). The monetary estimates of related concessions are provided by the countries and are usually based on information from ministries of finance.

238. Agricultural producers are often treated differently from other citizens with respect to social security systems. The differences may concern the principles of participation (voluntary or compulsory), contribution rates, and entitlement. In some cases, this may result in preferential treatment for producers. However, by convention, these issues are not covered within the framework of measured support, because the level of special treatment is difficult to establish. For example, transfers may reflect the demographic structure of the farm population, rather than a concession as such. Therefore, no attempt is made to estimate transfers associated with differentiated social security treatment or with any other social benefits accorded to agricultural producers.

5.2.2. Credit concessions[15]

239. Governments often intervene to reduce the cost of borrowing for agricultural producers. When agricultural producers are able to borrow at favourable terms compared to other borrowers, transfers are created. These need to be considered in the estimation of producer support.

240. As an initial step, it is important to delimit the scope of credit that should be considered. Agricultural producers borrow to meet various needs. For example, they take out loans to finance production, to make long-term investments, or to purchase inputs for current farm operations. They also borrow for personal or family needs: to construct houses, buy cars, educate children, etc. As the support estimates by definition are supposed to capture transfers to farmers related to their activity as agricultural producers, it is logical to consider in the estimates only credit related to production of agricultural commodities and the associated non-commodity outputs. Accordingly, any credit taken by producers that is not linked to their production activity should not be considered in the support estimates.

241. Credit concessions may exist in various forms: as reduced interest rates; extension of repayment periods; debt write-offs; and government guarantees on agricultural loans (these policy instruments are called "credit concessions" throughout this sub-section). These instruments are not mutually exclusive and can be implemented as a package, e.g. an extension of loan repayments may be combined with reduced interest rates or partial debt write-off.

242. Some credit concessions involve budgetary spending. An illustrative example is subsidies for interest rates when the borrowers or the lending banks receive budgetary compensation to cover part of the interest rate due on agricultural loans. In such a case, government spending can be used as a measure of the related policy transfers. However, some of the credit concessions may be based on mechanisms that do not generate budgetary spending. Special conditions may apply for agricultural loans, for example with fixed or minimum interest rates. Credit institutions may also be required to direct a certain amount of credit to agriculture. When governments set the lending conditions and administer credit allocation without

15. This sub-section draws on the consultants' report by Ciaian P, J. Swinnen. and K. Van Herck "Credit concessions in the PSE classification of OECD" (Ciaian et al. 2009).

budgetary compensation to the lenders involved, the associated support needs to be estimated. This sub-section is focussed on such types of credit concessions.

Reduced interest rates

243. Reduced interest rates result from policy actions that allow agricultural producers to borrow financial resources at interest rates below those which prevail in the credit market for loans with similar characteristics. Reduced interest rates result in a lower effective price of agricultural capital to the producer, an increased amount of borrowing, and policy transfers to producers.

244. The measurement of transfers arising from reduced interest rates may differ depending on how the policy is implemented. Interest rates can be reduced by: (i) providing direct interest rate subsidies to market interest rates (to borrowers directly or in the form of budgetary compensation to lenders for interest foregone); (ii) direct lending through public lending institutions at a reduced interest rate; (iii) transferring capital to lending institutions at a low cost for further on-lending at reduced rates; or (iv) fixing interest levels administratively and imposing an obligation on credit institutions that a certain share of their funds is reserved for agricultural lending.

245. In the case of an interest rate subsidy (Case i) there is explicit government spending which corresponds to a policy transfer. In contrast, support through direct public lending (case ii) or government preferential on-lending (Case iii) is typically based on budgetary revenue foregone. Finally, an administratively fixed rate (Case iv) can be coupled with government transfers to lending institutions to compensate them for the associated loss in interest. Thus, as in Case i, these budgetary allocations represent a policy transfer. However, if lenders are not (or only partly) compensated but obliged to lend at the administratively fixed rate, policy transfers take the form of revenue foregone (as in Cases ii and iii). In this case, the revenue is foregone by private lenders and not the government. Logically, the credit institution will tend to cross-subsidise the compulsory lending through other types of loans. This situation is not typical of economies with well-functioning credit markets, but may occur in less developed economies where formal lending to agriculture would hardly exist without government intervention.

246. When a reduced interest rate is based on any form of revenue foregone (Cases ii, iii, and under some conditions Case iv), it can be assumed that support is equal to the differential between the market and preferential interest rates. Measuring this support could be similar to the approach used to estimate the price gap for the market price support in the PSE; that is, comparing the preferential interest rate to some reference (opportunity cost) rate. The total transfer in a given year Y therefore will be equal to the interest rate differential at a point in time t multiplied by the amount of outstanding loans at this same point in time t and accumulated over the year:

$$TPL_Y = \sum_t \left(i_t^r - i_t^p\right) \times L_t \qquad [5.1]$$

where
- TPL_Y policy transfers from preferential lending accumulated over year Y
- i_t^r reference interest rate at point in time t in year Y
- i_t^p preferential interest rate at point in time t in year Y
- L_t value of outstanding preferential credit at point in time t in year Y

247. A simple illustration of this calculation is presented in Box 5.1. In order to accurately capture the annual value of TPL, the values of foregone interest related to a reduced-interest credit scheme should be estimated at a number of time points, since the outstanding loan value and the reference interest rate change over time. All variables must be of the same periodicity, e.g. monthly. This is demanding in terms of data requirements. Monthly data on the amount of outstanding loans are not always available and more often reported on a quarterly or annual basis. In this case, it is possible to interpolate these data to monthly values

based on two known points in time. If data on outstanding debt is not available, information on the amount of new issues of preferential loans may be used. The amount of outstanding credit can be estimated by using these data and information on the standard time structure of such loans.

Box 5.1. Calculation of transfers arising from reduced interest rates: a simple example

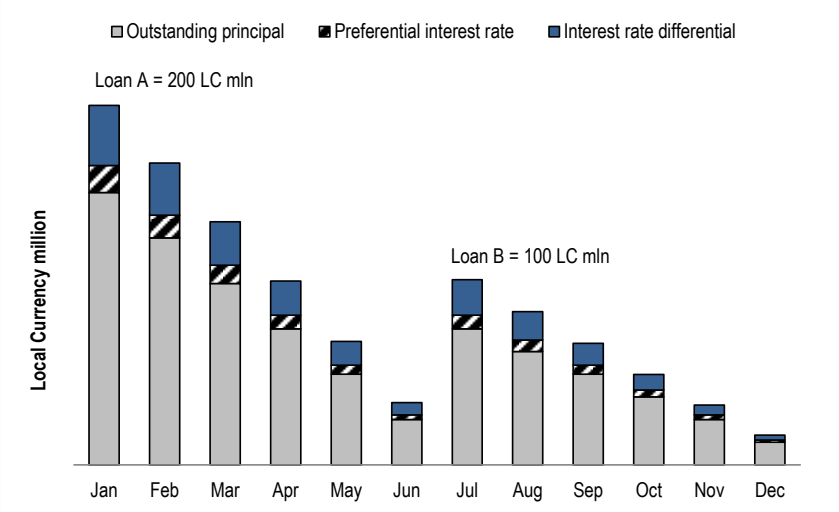
Assume a programme which provides farmers six-month loans at a reduced interest rate, for example for the purchase of fertiliser or fuel. The first issue of credit is made in January (Loan A = 200 million local currency units) and the second in July (Loan B = 100 million local currency units). The monthly reference interest rate fluctuates during the year (between 3.1% and 3.7%), while the preferential rate remains constant (at 1%). These assumptions are summarised in Table 5.1.

Table 5.1. Calculation of transfers resulting from reduced interest rates

		Amount of outstanding principal	Monthly market interest rates	Monthly preferential interest rate	Interest rate differential	Monthly transfer from preferential interest rate
		LC million	%	%	%	LC million
Loan A	Jan	**200**	3.2%	1.0%	2.2%	4.4
	Feb	167	3.3%	1.0%	2.3%	3.8
	Mar	133	3.4%	1.0%	2.4%	3.2
	Apr	100	3.5%	1.0%	2.5%	2.5
	May	67	3.6%	1.0%	2.6%	1.7
	Jun	33	3.7%	1.0%	2.7%	0.9
Loan B	Jul	**100**	3.6%	1.0%	2.6%	2.6
	Aug	83	3.5%	1.0%	2.5%	2.1
	Sep	67	3.4%	1.0%	2.4%	1.6
	Oct	50	3.3%	1.0%	2.3%	1.2
	Nov	33	3.2%	1.0%	2.2%	0.7
	Dec	17	3.1%	1.0%	2.1%	0.4
Total annual transfer, LC million						25

The black areas in Figure 5.2 show the monthly values of the interest subsidy to borrowers, calculated as the difference between the monthly reference and preferential rates, multiplied by the amount of outstanding credit in a given month. The monthly values of the interest subsidy change during the year depending on the amount of outstanding loan and fluctuations in the reference interest rate. The total transfer over the year is the sum of monthly transfers, equalling to 25 million local currency units.

Figure 5.2 Transfers from reduced interest rates in a concessional credit scheme



Box 5.2. Considerations concerning the choice of a reference interest rate

Compared to many other economic sectors, agriculture is characterised by a large number of small-scale production units. This implies relatively high unit transaction costs in agricultural lending. To account for the difference in transaction costs associated with lending to small borrowers, the average interest rate for loans to small entrepreneurs could be used as a reference interest rate. The disadvantage of this approach is that this information is less accessible and more labour-intensive, but it may provide a more accurate reference than, for example, an inter-bank lending rate.

An alternative approach could be to use the interest rates for agricultural loans which do not participate in the support scheme. However, the interest rate for non-participating loans may not be representative when the reduced interest rate scheme is targeted to certain types of agricultural producers (e.g. small farmers), so that the profile of participating and non-participating producers is different. Small producers may be under-represented and large producers over-represented in a non-participating group. If the transactions cost of lending to small and large agricultural producers differs, the interest rate of non-participating agricultural loans will be biased.

Credit market imperfections have two additional implications for the choice of the reference interest rate: (i) risk-adjusted loan pricing and (ii) non-price components of loan contracts that weaken the comparability of different interest rates (e.g. between agricultural interest rates and non-agricultural interest rates).

Market imperfections lead to risk-adjusted loan pricing. Various groups of borrowers might be associated with different levels of risk. This means that the interest rate charged differs amongst groups according to their risk levels and depending on the ability of lenders to distinguish borrowers by risk groups. The differential loan pricing allows lenders to address moral hazard and adverse selection problems.[1] In general, the risk-adjusted interest rate lowers risk to lenders. The risks associated with agricultural production normally differ from the non-agricultural sectors. Agricultural production includes various sector-specific characteristics, such as a significant lag between time of purchasing inputs and time of selling outputs, complex management environment (e.g. lengthy biologically-based production, spatial dispersion of production, complex monitoring, existence of contractual relationships, etc.) and strong climatic effect on outcomes. This may lead to differentiated loan pricing in the agricultural sector with respect to other sectors of the economy. Theoretically, risk-adjusted pricing has important implication for the choice of the appropriate reference interest rate. It should incorporate the same risk component as the risk incorporated in the interest rate faced by supported agricultural producers in the absence of support policies.

The interest rate is not the sole component of the loan contract. The latter includes various non-price provisions. Lenders address potential adverse selection and moral hazard of borrowers by using loans with various requirements depending on the type of borrower. These non-price requirements of loan contracts reduce the comparability of interest rates among different loans. As in the case of risk-adjusted loan pricing, in the absence of support policies the reference rate should ideally be coupled with similar non-price provisions as the loans. An important component of a loan contract is collateral (other non-price provisions are reporting requirements, constraints on additional borrowing, insurance requirement, etc.). Lenders routinely require collateral in the form of land or other fixed assets as a condition for providing loans. This reduces the lenders' risk. As a result, different levels of collateralisation of loans may lead to different interest rates. Studies have shown that in the presence of adverse selection, moral hazard and costly enforcement, the effect of loan collateralisation on the interest rate charged is important. To address the potential adverse behaviour of borrowers and to control the risk, lenders adjust both the size of the collateral and the interest rate according to the type of borrowers. This results in differentiated loan contracts reflecting the type of borrowers and the levels of the associated risk. As a consequence, both elements differ across groups of borrowers implying that theoretically one should take into account non-price components of loan contracts to obtain comparable loan rates among borrowers groups and sectors.

1. In the presence of asymmetric information, lenders do not have sufficient knowledge about borrowers' goals and actions as well as about the risk of the project being financed. This normally leads to market failures and credit rationing. Any information on borrowers helps lenders to address these market failures. Lenders can use various characteristics of borrowers to distinguish between different types of borrowers – their sectoral specialisation (agriculture, industry, etc.), ownership structure (state-owned, private, etc.), average profitability, etc. Different groups of borrowers might be associated with different levels of risk, with different levels of average profit and will be offered different loan contracts. This means that the loan rate charged by lenders will differ among these groups. The most profitable groups, from the bank's perspective, will be offered a loan first and rationed credit might ultimately be offered to one group only, the least profitable group (Riley 1987).

Source: Ciaian, Swinnen and Van Herck, 2009.

248. The notion of a reference interest rate is conditional. Credit is not a homogeneous "product": its price depends on specific characteristics of the loans, such as the risk levels and the transactions cost of lending to different borrowers (or their groups). Credit markets – and agricultural credit markets in particular – cannot be characterised as perfect, or complete, or non-distorted by policies. There is no reference interest rate in the sense of some ideal undistorted and comparable monetary price. In this context, it would be more appropriate to consider the reference interest rate as a real-world opportunity cost of borrowing. Certainly, the choice of such opportunity cost strongly depends on the richness of

information on credit markets. The selection of the reference interest becomes inevitably an empirical task, where the goal is to find from the existing information on interest rates, the rate which would most closely reflect the opportunity cost of the borrowing in terms of its time structure and the borrower profile. Box 5.2 discusses possible approaches for selecting the reference interest rate.

Extension of repayment periods

249. Extension of the repayment period implies that the loan can be paid back over a longer period of time. Generally, this policy is applied to deal with accumulated overdue debts in the agricultural sector or as a form of financial relief to producers that have suffered adverse events (e.g. natural disasters or exceptional economic circumstances).

250. The extension of a loan repayment is equivalent to the disbursement of additional credit to the borrower. Typically, this concession concerns the principal debt, while the borrower continues to be liable for payment of the interest on outstanding debts. No transfers are created; the borrower continues to cover the cost of credit, although for a larger amount of debt.

251. Even if no policy transfers arise from the extension of the repayment period as such, it is still important to consider this policy within the PSE framework. The extension of repayment periods, as a government policy measure, usually concerns government-supported loans which have other concessions built in, such as reduced interest rates. Estimates of the related support in this case would be similar to that for reduced interest rates, i.e. they would consist of evaluating the interest subsidy for the debt spanning over an extended period. Information on the new debt repayment terms (overall amount of debt involved, new loan term and interest rates applied) would be required.

Debt write-off

252. A debt write-off implemented as a government policy measure typically would imply that the government takes over a non-repaid debt and the producer becomes the owner of the capital which corresponds to the forgiven debt. The debt write-off can cover principal debt, interest and/or penalty. It may concern liabilities for a current year, e.g. following a natural calamity, or related to a chronic debt accumulated over several years, e.g. due to some systemic financial difficulty of farmer groups or of the whole sector.

253. The debt write-off is equivalent to producers receiving a payment. The amount of the written off debt may be officially announced and therefore known. Nevertheless, it is important to know what components are included in the announced value in terms of the principal debt, foregone interest, and penalties. Thus, on top of the principal debt, interest may also be forgiven, giving rise to additional transfers consisting of interest foregone on the written-off debt. If the forgiveness concerns overdue debt, penalties may also be written off. If the announced value corresponds only to the principal debt, while it is known that the conditions of the write-off also provide for the forgiveness of the interest rate and penalties, an estimation of the latter two components may be necessary in order to capture all the transfers associated with this policy.

254. Bringing together the three types of transfers that may arise from the debt write-off gives the following formula:

$$TPW_Y = \sum_t \left(i_t \times W_t\right) + p + W_Y \qquad [5.2]$$

where TPW_Y policy transfers from debt write-off implemented in year Y

i_t reference interest rate at point in time t

p value of written-off penalties

W_t value of written-off debt at point in time t

W_Y total value of written off debt

t any point in time within the period over which the written-off debt has been accumulating

255. The term $\sum_t \left(i_t^r \times W_t\right)$ is the value of interest foregone on the written-off debt over the period this debt has been accumulating, p is the total amount of penalties forgiven on the written-off debt over the period this debt has been accumulating, and W_Y is the total amount of the written-off principal debt. The formula can be reduced to one or two terms if the other component(s) are not included in the write-off scheme.

256. A specific issue which arises with respect to the debt write-off is the attribution of support in time. When forgiveness relates to the debt of only one year, it seems straightforward to allocate the associated transfer to that year. The allocation in time becomes less obvious when the write off covers debt which has been accumulating over a number of years. A simple logic would be to attribute the transfer to the year when the write-off was implemented (the debt taken off the balance sheets of the debtors concerned). In fact, this is the year in which the policy affects producer decisions; e.g. as a result of this measure, producers were able to make new borrowings or to leave the business after cleaning their balance sheet.

257. The estimation of transfers from debt forgiveness requires, therefore, information on implementation details of the write-off scheme, notably whether it concerns a principal loan, or interest, or penalties, or some combination of the three. In the case where the write-off concerns a multi-year debt, it is important to know its time structure and how the amount of overdue debt has changed across the years.

5.2.3. Administered input prices

258. Agricultural producers may also be supported through the administration of prices for inputs and services such as energy, irrigation water and transportation. Governments may impose upper price limits for inputs and services provided to agricultural buyers. Some inputs (e.g. electricity) may be supplied by state monopolies, which practise differentiated pricing, whereby agricultural buyers are charged prices below levels set for other users. Such policies are similar in nature to the provision of input subsidies. The associated transfer to producers per unit of input purchased is equivalent to the price reduction accorded to them compared to the price paid by a "reference" (alternative) buyer of the same input. This approach has been used in estimation of implicit support through reduced prices for electricity provided to agricultural producers in the Russian Federation. The associated transfer (*TPEP*) is estimated as follows:

$$TPEP_Y = \left(PE_{in} - PE_{ag}\right) \times W_{ag} \qquad [5.3]$$

where $TPEP_Y$ – transfers to producers from preferential electricity price over a year *Y*

PE_{in} – average price per kwt/hour of electricity charged to industrial users in year *Y*

PE_{ag} – price per kwt/hour of electricity charged to agricultural users in year *Y*

W_{ag} – kwt/hours of electricity provided to agricultural users in year *Y*

259. The estimation of the implicit price discount depends on the establishment of a "reference buyer" and the extent to which prices charged to different buyers can be compared. Data quality and availability mean that estimating the value of transfers through the use of price gaps is not always possible. For example, in the case of support for water in agriculture, it is difficult to find a price charged to other sectors for water that has the same characteristics as water used for agriculture, e.g. in terms of quality, reliability or timing.

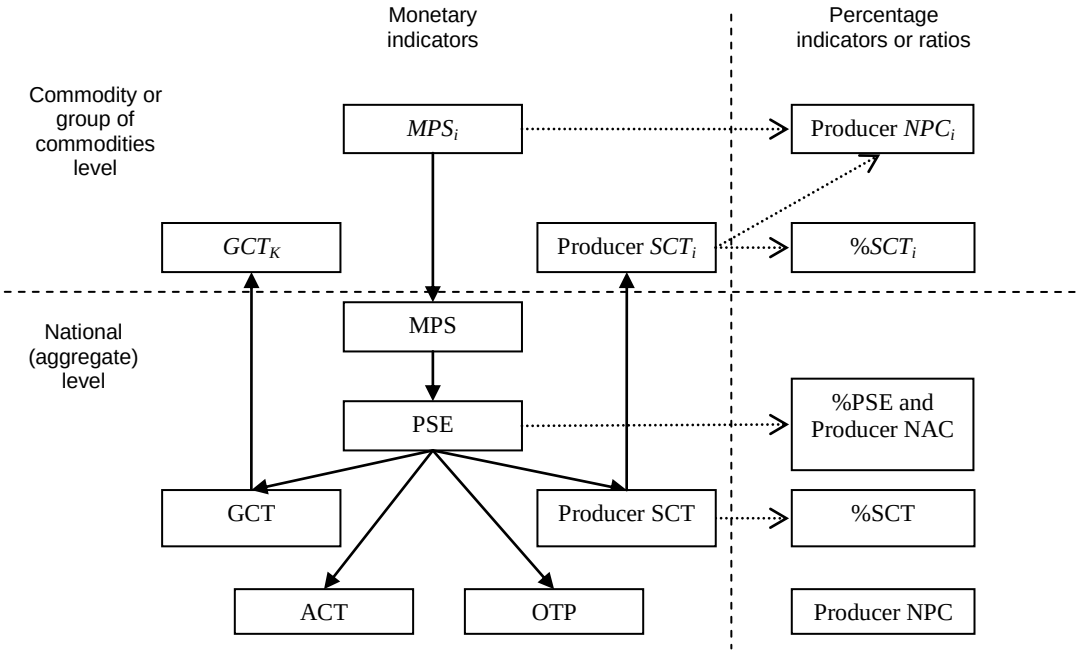
Chapter 6.

CALCULATING INDICATORS OF SUPPORT TO PRODUCERS

260. Indicators of support to individual producers are the most widely used of all the indicators. The procedure for calculating producer support indicators is summarised in Diagram 6.1. The process begins by calculating Market Price Support (MPS_i) for a number of individual commodities from which a national (aggregate) MPS value is extrapolated (section 6.1). This is then combined with the value of other transfers arising from policies that support individual producers to derive a value for the Producer Support Estimate (PSE) at the national level (section 6.2). From this value, the relative indicators, the %PSE and producer Nominal Assistance Coefficient (producer NAC) are derived (section 6.3).

261. As explained in Chapter 2, the PSE can be separated into four components representing different degrees of commodity specificity, i.e. transfer provided on the basis of single commodities e.g. wheat (Single Commodity Transfers, SCT), a group of commodities, e.g. cereals (Group Commodity Transfers, GCT), all commodities (All Commodity Transfers, ACT), or without obligation on the part of recipients to produce commodities (Other Transfers to Producers, OTP). Transfers to single commodities or groups of commodities are further distinguished at the individual commodity (Producer SCT_i) or groups of commodities level (GCT_K) (section 6.4). From these values, the relative indicators, the producer Nominal Protection Coefficient (producer NPC_i) and $\%SCT_i$, can be derived for individual commodities and at the national level (sections 6.5 and 6.6).

Diagram 6.1. Procedure for calculating indicators of support to producers



6.1. Market Price Support (MPS)

***Market Price Support (MPS)**:* The annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, arising from policy measures that create a gap between domestic market prices and border prices of a specific agricultural commodity, measured at the farm gate level.

- MPS values are calculated for a set of individual commodities, which are selected according to rules for the inclusion or exclusion of each commodity.

262. The conceptual basis for calculating MPS is described in sections 4.1 and 4.2. This section explains the procedure to calculate a national (aggregate) MPS based on MPS values for individual commodities.

6.1.1. MPS for individual commodities

263. The process begins by calculating MPS values for individual commodities constituting a representative sample. A standard set of individual commodities is first considered – wheat (WT), maize (MA), barley (BA), sorghum (SO), oats (OT), rye (RY), rice (RI), rapeseed (RS), soybean (SB), sunflower (SF), refined sugar (RS), milk (MK), beef and veal (BF), sheepmeat (SH), wool (WL), pigmeat (PK), poultry (PT) and eggs (EG). These are termed the "standard MPS commodities" (SMC) (see Table 6.1).

264. These commodities were chosen initially because they represented a significant proportion of agricultural production in a large number of OECD countries, and support policies were mainly targeted to them. A standard set of commodities allows comparisons between countries not only at the national (aggregate) level but also at the individual commodity level or for subsets of commodities.

265. The MPS values calculated for individual commodities are used to obtain the national (aggregate) MPS for a country using the extrapolation method (explained below). In order to reduce the associated estimation error, the individual commodities for which MPS is calculated should represent a significant share of the total value of agricultural production in a country. In general, efforts are made to ensure that the sum of the value of production of the individual commodities for which MPS is calculated represents at least 70% of the total value of agricultural production on average over the previous three years. If production of a standard MPS commodity is very small, i.e. less than 1% of total value of production, MPS is *not* calculated for this commodity. If the sum of the value of production for the standard MPS commodities with the individual shares above 1% is less than 70% of the total value of agricultural production in a country, additional commodities are added until this threshold is reached. The combined group of commodities for which MPS is calculated, both standard and additional, are termed "all MPS commodities" (AMC). [16] *Note that this procedure for defining a representative set of commodities relates only to the MPS calculation. Other transfers (budgetary and revenue foregone) cover all agricultural commodities produced in the country.*

16. The aggregate share of "All MPS commodities" is above or close to the 70% threshold in the majority of countries for which the OECD estimates support. However, this share is relatively low for Turkey (53% in 2013) and Korea (56% in 2013). In these countries the standard MPS commodities comprise a much smaller proportion of the total agricultural output than in other monitored countries, while the structure of the remaining production is substantially diversified. As a result, the inclusion of additional MPS commodities above those in the standard set has relatively limited marginal effect on the overall coverage share.

Table 6.1. Individual commodities for which MPS is calculated in OECD and non-OECD countries

	All Commodities																																																				
	All MPS Commodities (AMC)																																																				Non-MPS commodities
	Standard MPS Commodities (SMC)																		Additional MPS Commodities																																	
Country	WT[1]	MA	RY	BA	SO	OA	RI	RS	RP	SF	SB	MK	BF	SH	WL	PK	PT	EG	AP	AV	BN	BS	CC	CF	CO	CT	CU	CV	FL	FX	FV	GA	GP	GR	LN	MN	OR	PB	PE	PL	PN	PO	PP	PR	RB	SP	SW	TB	TM	WI	WM	WO	XE
																			Other Commodities (OC)																																	
OECD countries																																																					
Australia	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x								x																											x
Canada	x	x		x		x			x		x	x	x			x	x	x			x									x					x				x			x											x
Chile	x	x						x				x	x			x	x		x															x															x				x
EU27	x	x		x		x	x	x	x	x	x	x	x	x		x	x	x											x													x							x	x			x
Iceland												x	x	x	x	x	x	x																																			x
Israel	x											x	x	x			x	x	x	x		x				x					x		x	x			x	x			x	x							x				x
Japan	x			x			x	x			x	x	x			x	x	x	x				x				x							x		x								x		x	x					x	x
Korea				x			x				x	x	x			x	x	x					x									x											x										x
Mexico	x	x		x	x		x	x			x	x	x			x	x	x			x			x																									x				x
New Zealand	x	x		x		x						x	x	x	x	x	x	x																																			x
Norway	x			x		x						x	x	x	x	x	x	x																																			x
Switzerland	x	x		x		x		x	x			x	x	x		x	x	x																																			x
Turkey	x	x		x				x		x		x	x	x			x	x	x							x								x								x						x	x				x
United States	x	x		x	x		x	x			x	x	x	x	x	x	x	x								x																											x
Non-OECD countries																																																					
Brazil	x	x					x	x			x	x	x			x	x							x		x																											x
China	x	x					x	x	x		x	x	x	x		x	x	x	x							x															x												x
Indonesia		x					x	x			x	x	x			x	x	x				x		x	x			x												x					x								x
Kazakhstan	x	x		x			x			x		x	x	x		x	x	x								x																x											
Russia	x	x	x	x		x		x		x		x	x			x	x	x																								x											x
South Africa	x	x						x		x		x	x	x		x	x	x	x															x			x				x												x
Ukraine	x	x	x	x		x		x		x		x	x			x	x	x																								x											x

1. Wheat is considered a single commodity but may be a composite of durum wheat and common wheat, as in the case of the European Union.
2. For OECD and non-OECD countries - average share for 2008-10.

AP – Apples
AV – Avocados
BA – Barley
BF – Beef and veal
BN – Dried beans
BS – Bananas
CC – Chinese cabbage
CF – Coffee
CO – Cocoa beans
CT – Cotton
CU – Cucumbers
CV – Cassava
EG – Eggs
FL – Plants and flowers
FX – Flaxseed
FV – Other fruit and vegetables
GA – Garlic
GP – Grapefruit
GR - Grapes
LN – Lentils
MA – Maize
MK – Milk
MN – Mandarins
OA – Oats
OR – Oranges
PB – Pepper
PE – Dry peas
PK – Pigmeat
PL – Palm oil
PN – Peanuts
PO – Potatoes
PP – Red pepper
PR – Pears
PT – Poultry
RB – Rubber
RI – Rice
RP – Rapeseed
RS – Raw sugar
RY – Rye
SB – Soybeans
SF – Sunflower
SH – Sheep meat
SO – Sorghum
SP – Spinach
SW – Strawberries
TB – Tobacco
TM – Tomatoes
WI – Wine
WL – Wool
WO – Welsh onion
WT – Wheat

266. Table 6.2 presents a country which produces only seven of the fifteen standard commodities – wheat, i.e. barley, oats, milk, beef and veal, poultry and eggs – so that MPS cannot be calculated for the other nine standard commodities. Further, the value of production for both poultry and eggs is below 1% of the total value of production, and so MPS is not calculated for these two commodities either.

Table 6.2. Selection of individual commodities for MPS estimation (example)

	Value of production LC million	Shares in production (%)	
		Individual	Cumulative
Wheat	515	22	22
Maize	0	0	22
Barley	139	6	28
Oats	52	2	30
Rice	0	0	30
Rapeseed	0	0	30
Soybean	0	0	30
Sunflower	0	0	30
Sugar	0	0	30
Milk	400	17	47
Beef (including veal)	250	11	58
Sheepmeat	0	0	58
Wool	0	0	58
Pigmeat	0	0	58
Poultry	18	0.8	..
Eggs	16	0.7	..
Standard MPS commodities (SMC), sub-total (excluding poultry and eggs)	1 356	58	..
Cotton	180	8	66
Potatoes	160	7	73
Additional MPS commodities, sub-total	340	15	..
All MPS commodities (AMC)	1 696	73	..
Non-MPS commodities (XE)	629	27	100
Total value of agricultural production (VP)	2 325	100	..

LC: Local currency.

267. The five standard commodities for which MPS is calculated represent 58% of the total value of agricultural production. Additional commodities are thus needed to reach the 70% threshold. In this example, cotton and potatoes have important shares in the value of production. By adding these two commodities, the MPS is calculated for six commodities that together represent 73% of the total value of agricultural production. Table 6.1 shows the individual commodities for which MPS is calculated (both

standard and additional MPS commodities) for OECD and several non-OECD countries, as well as the aggregate share of these commodities in the total value of agricultural production.

268. Having defined the list of commodities, the next step is to estimate the MPS for each commodity. The process involves the estimation of Market Price Differentials (MPDs), but first it is required to determine whether there are policies in place which create a price gap between domestic market and border prices of the commodity in question. If such policies are in place, an *MPD* is estimated based on the procedures explained in section 4.4. If there are no such policies in place for the commodity in question, the *MPD* for this commodity is set at zero. Note that commodities for which MPS is *not calculated* are different from those for which *MPD* is *set at zero*: the former are those with a share of production of less than 1%; the latter do not have policies affecting their market price.[17] Once the MPDs have been estimated for selected commodities, the Excess Feed Cost (EFC) and then the Market Price Support (MPS) are calculated (as described in section 4.2).

269. Tables 6.3 and 6.4 illustrate the procedure for calculating MPS and EFC for individual commodities. When "data" is indicated as a source in the last column, the variable comes from an original data input. The data required for the calculations are summarised in Chapter 10. The *MPD* is set to zero in the case of oats and potatoes, as no policies are in place that change the market price received by producers of these commodities. *The quantity of feed consumed by livestock producers includes only domestically produced feed* (as explained in section 4.2).

Box 6.1. Description of a PSE country file

The OECD calculates the indicators of support for each country within individual PSE Excel file (with the EU27 treated as one country).[1] There are four standard types of worksheets within each country file:

(1) A worksheet named "TOTAL" in which most of the national (aggregate) indicators are calculated, such as the PSE, GSSE, CSE and TSE, as well as the %PSE, producer NAC, %CSE and consumer NAC. This worksheet contains all policy transfers included in the estimation of support for a country, shown under the appropriate PSE, GSSE and CSE categories. Labels are also attached to each transfer, as defined in sub-section 3.3.3.

(2) A worksheet named "SCT GCT" in which the individual commodity producer SCT values are combined to calculate national (aggregate) producer SCT and %SCT indicators. This worksheet is also used to identify the Group Commodity Transfers (GCT), and calculate All Commodity Transfers (ACT) and Other Transfers to Producers (OTP) based on the labels given to each policy measure in the worksheet "TOTAL".

(3) A group of standard worksheets named "XX SCT" in which the Producer Single Commodity Transfers (producer SCT) and %SCT indicators are calculated for each commodity, including a worksheet for "non-MPS commodities" named "XE SCT".

(4) A group of standard worksheets named "XX MPS" in which MPS is calculated for each commodity, where XX is a two-letter commodity abbreviation, e.g. WT stands for wheat and MK for milk. This worksheet also contains the data and formulas for calculating the Consumer Single Commodity Transfers (consumer SCT) as well as the producer NPC and consumer NPC, for the commodities concerned.

The tables presented in Chapters 6, 7 and 8 are based on the structure of the country-specific PSE files described above, which are available in the indicator database (www.oecd.org/agriculture/pse) along with the country-specific documentation (*Definitions and Sources*), providing definitions of data series used and sources.

The country data are combined using a SAS programme to derive indicators at the total OECD level (see Chapter 9).

1. Separate PSE files are additionally available for EU27 aggregation.

17. *MPD* is also set to zero in some cases when it takes a negative value (Box 4.2).

Table 6.3. Calculation of MPS for individual commodities (example)

Symbol	Description	Units	Wheat	Barley	Oats	Milk	Beef	Cotton	Potatoes	Source / equation
QP_i	Level of production	000 T	250	110	50	200	100	360	160	Data
VP_i	Value of production (at farm gate)	LC million	515	139	52	400	250	180	160	Data or (QP_i * PP_i)
QC_i	Level of consumption	000 T	200	160	200	300	75	400	120	Data or (QP_i + QM_i - QXi + STK_i)
QM_i	Imports	000 T	50	40	155	100	0	55	0	Data
QX_i	Exports	000 T	80	0	0	0	25	0	60	Data
STK_i	Stock change	000 T	-20	10	-5	0	0	-15	20	Data
PP_i	Producer price (at farm gate)	LC/T	2,060	1,260	1,040	2,000	2,500	500	1,000	VP_i / QP_i or data
RP_i	Reference price	LC/T	1,890	1,200	1,040	1,350	2,000	450	1,000	Data
MPD_i	Market Price Differential	LC/T	170	60	0	650	500	50	0	PPi - RPi
TPC_i	Transfers to producers from consumers	LC million	34	7	0	130	38	18	0	If QC_i > QP_i then MPD_i *QP_i, otherwise MPD_i *QC_i
TPT_i	Transfers to producers from taxpayers	LC million	9	0	0	0	13	0	0	If QC > QP then 0, otherwise MPD *(QP - QC)
LV_i	Price levies	LC million	20	0	0	0	10	0	0	Data
EFC^{LV}_i	Excess Feed Cost	LC million	-	-	-	13	9	-	-	Table 6.4
MPS_i	**Market Price Support**	**LC million**	**23**	**7**	**0**	**117**	**31**	**18**	**0**	**TPC_i + TPT_i - LV_i - EFC^{LV}_i**

Table 6.4. Calculation of EFC for livestock commodities (example)

Symbol	Description	Units	Wheat	Barley	Oats	Total EFC for commodity	Source / equation
$QC_{i\ feed\ (milk)}$	Quantity of feed crop i used for milk production	000 T	50	70	30	-	Data
MPD_i	Market Price Differential for feed crop i	LC/T	170	60	0	-	Table 6.3
$EFC_{i\ (milk)}$	**Excess Feed Cost for milk**	**LC million**	**9**	**4**	**0**	**13**	**MPD_i * $QC_{feed\ i\ (milk)}$**
$QC_{i\ feed\ (beef)}$	Quantity of feed crop i used for beef production	000 T	40	40	10	-	Data
MPD_i	Market Price Differential for feed crop i	LC/T	170	60	0	-	Table 6.3
$EFC_{i\ (beef)}$	**Excess Feed Cost for beef**	**LC million**	**7**	**2**	**0**	**9**	**MPD_i * $QC_{feed\ i\ (beef)}$**

6.1.2. National (aggregate) MPS

270. Once MPS values have been calculated for individual commodities, a national (aggregate) MPS can be derived. This procedure is called "MPS extrapolation" and is based on the assumption that the ratio between the national (aggregate) MPS and the total value of production is equal to the ratio between MPS and the value of production for the commodities for which MPS has been calculated. This is expressed as:

$$\frac{MPS_C}{VP_C} = \frac{\sum_{i \in AMC} MPS_i}{\sum_{i \in AMC} VP_i} \qquad [6.1]$$

Where MPS_C – national (aggregate) *MPS* for country *C*

VP_C – value of agricultural production in country *C*

$\sum_{i \in AMC} MPS_i$ – *MPS* for all commodities for which *MPS* has been calculated (*AMC*)

$\sum_{i \in AMC} VP_i$ – value of production for all commodities for which *MPS* has been calculated

271. Therefore the formula for estimating the national (aggregate) *MPS* for a country is:

$$MPS_C = \frac{\sum_{i \in AMC} MPS_i}{\sum_{i \in AMC} VP_i} \times VP_C \qquad [6.2]$$

272. This procedure is shown for the example country in Table 6.5. The values of MPS for each individual commodity are added together, including those for which it is zero (giving 195 million in local currency units). The result is divided by the value of production for these commodities, including those for which MPS is zero, and multiplied by the total value of production. The extrapolation yields a national (aggregate) MPS of 268 million in local currency units.

Table 6.5. Calculation of national (aggregate) MPS (example)

Symbol	Description	LC million	Source / equation
VP_C	Total value of production (at farm gate)	2 325	Table 6.2
VP_{AMC}	Value of production of all MPS commodities	1 696	Sum of VP_i of all MPS commodities
MPS_{WT}	Wheat MPS	23	Table 6.3
MPS_{BA}	Barley MPS	7	Table 6.3
MPS_{OT}	Oats MPS	0	Table 6.3
MPS_{MK}	Milk MPS	117	Table 6.3
MPS_{BF}	Beef MPS	31	Table 6.3
MPS_{SMC}	Standard MPS commodities, sub-total	177	Sum of MPS_i of standard MPS commodities
MPS_{CT}	Cotton MPS	18	Table 6.3
MPS_{PO}	Potato MPS	0	Table 6.3
MPS_{AMC}	All MPS commodities, sub-total	195	Sum of MPS_i of All MPS commodities
MPS_C	**Market Price Support**	**268**	**MPS_{AMC} / VP_{AMC} * VP_c**

273. The extrapolation procedure involves measurement bias, because it implies that for commodities for which MPS is not explicitly calculated the ratio of their aggregate MPS to their aggregate value of production is the same as for the commodities for which MPS is calculated. If the latter commodities are supported to a higher degree than the non-MPS commodities this would result in an over-estimation of the aggregate (national) MPS, while if the MPS commodities are supported to a lesser degree that the non-MPS commodities, the opposite would be true. As noted earlier, in order to reduce the error involved in the extrapolation procedure, it is important to ensure that the MPS commodities make up a sufficient share of the total country's agricultural production.

6.1.3. MPS for "other commodities"

274. For individual countries, the OECD presents the estimated MPS values for each of the MPS commodities and the residual – an aggregate MPS value for non-MPS commodities – is shown as "MPS for other commodities" (MPS_{XE}). It is found by subtracting the value of MPS for all MPS commodities from the national (aggregate) *MPS*:

$$MPS_{XE} = MPS_C - \sum_{i \in AMC} MPS_i \qquad [6.3]$$

where: MPS_{XE} – total value of MPS for non-MPS commodities

MPS_C – national (aggregate) MPS for country *C*

$\sum_{i \in AMC} MPS_i$ – sum of MPS for all MPS commodities

275. To standardise the presentation of support indicators for the OECD total, the estimated MPS values are presented for the standard commodities only and the residual "MPS for other commodities" (MPS_{OC}) is found by subtracting the value of MPS for the standard commodities from the national (aggregate) *MPS*:

$$MPS_{OC} = MPS_C - \sum_{i \in SMC} MPS_i \qquad [6.4]$$

where: MPS_{OC} – total value of MPS for commodities other than standard MPS commodities

MPS_C – national (aggregate) MPS for country *C*

$\sum_{i \in SMC} MPS_i$ – sum of MPS for the standard MPS commodities (*SMC*)

276. These two calculations are shown in Table 6.6.

Table 6.6. Calculation of MPS for Other Commodities (example)

Symbol	Description	LC million	Source / equation
MPS_C	Market Price Support, national aggregate	268	Table 6.5
MPS_{SMC}	MPS for Standard MPS commodities	177	Table 6.5
MPS_{OC}	MPS for Other commodities	90	MPS_C - MPS_{SMC}
MPS_{AMC}	MPS for All MPS commodities	195	Table 6.5
MPS_{XE}	MPS for Non-MPS commodities	72	MPS_C - MPS_{AMC}

6.2. Producer Support Estimate (PSE)

***Producer Support Estimate (PSE)*:** The annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policies that support agriculture, regardless of their nature, objectives or impacts on farm production or income.

- PSE values are calculated by adding to the MPS the value of transfers to producers from other policies.

277. To calculate the PSE for a country, the value of transfers to producers from other agricultural policies is added to the country (aggregate) *MPS* obtained in Section 6.1:

$$PSE_C = MPS_C + \sum BOT = \sum PSE(sub)Category \qquad [6.5]$$

where: PSE_C – PSE for country *C*

MPS_C – national (aggregate) *MPS* for country *C*

BOT – aggregate budgetary and other transfers to producers from policies for country C

$\sum PSE(sub)Category$ – sum of PSE (sub)categories to which policies are classified from *A* to G.

278. To ensure transparency and to assist with the calculation of other indicators, the name of each policy measure and the resulting value of transfer are listed under the PSE categories and sub-categories to which they have been classified according to the process set out in section 3.3 (Table 6.7). A selection of the policy measures discussed in sub-section 3.3.4 as worked examples are used here to illustrate. A broad policy measure is listed more than once when transfers relate to different commodities or when groups of commodities can be identified, e.g. Agricultural Stabilization Act and crop insurance payments.

Table 6.7. Calculation of PSE (example)

Description	LC million	Source / equation
Producer Support Estimate (PSE)	**684**	**A.1 + (A.2 + B + C + D + E + F + G)**
A. Support based on commodity outputs	**324**	**A.1 + A.2**
A1. Market Price Support (MPS)	268	Table 6.5
A2. Payments based on output	56	Sum of payments in A.2
Agricultural Stabilization Act - Wheat	10	Data
Agricultural Stabilization Act - Milk	20	Data
Agricultural Stabilization Act - Other crops	10	Data
Loan deficiency payments	6	Data
Milk Price Supplement for Cheese Production	10	Data
B. Payments based on input use	**105**	**B.1 + B.2 + B.3**
B1. Variable input use	25	Sum of payments in B.1
Fuel tax rebates	10	Data
Irrigation maintenance payments	15	Data
B2. Fixed capital formation	60	Sum of payments in B.2
Property tax exemptions	15	Data
Interest rate concession	30	Data
Capital grants for on-farm infrastructure	15	Data
B3. On-farm services	20	Sum of payments in B.3
Extension and advisory services	10	Data
Pest and disease control	5	Data
FarmBis	5	Data
C. Payments based on current A/An/R/I, production required	**70**	**Sum of payments in C**
C1. Based on current revenue/income	15	Sum of payments in C.1
Income tax concessions	15	Data
C2. Based on current area/animal numbers	55	Sum of payments in C.2
Crop insurance payments - Wheat	10	Data
Crop insurance payments - Barley	5	Data
Crop insurance payments - Oats	5	Data
Organic crop farming	30	Data
Agri-environmental grass premium	5	Data
D. Payments based on non-current A/An/R/I, production required	**50**	**Sum of payments in D**
Structural payment to milk producers	50	Data
E. Payments based on non-current A/An/R/I, production not required	**110**	**E.1 + E.2**
E1. Variable rates	60	Sum of payments in E.1
Counter Cyclical Payments	60	Data
E2. Fixed rates	50	Sum of payments in E.2
Single Payment Scheme	50	Data
F. Payments based on non-commodity criteria	**25**	**F.1 + F.2 + F.3**
F1. long-term resource retirement	15	Sum of payments in F.1
Afforestation	5	Data
Conservation Reserve Program	10	Data
F2. a specific non-commodity output	10	Sum of payments in F.2
Payments for Hedges and Rustic Groves	5	Data
Payments for Floral Fallow	5	Data
F3. other non-commodity criteria	0	Sum of payments in F.3
G. Miscellaneous payments	**0**	**Sum of payments in G**

6.3. Percentage PSE (%PSE) and Producer Nominal Assistance Coefficient (producer NAC)

Percentage PSE (%PSE): PSE as a share of gross farm receipts.

***Producer Nominal Assistance Coefficient* (producer NAC):** The ratio between the value of gross farm receipts (including support) and gross farm receipts valued at border prices (measured at farm gate).

279. The *%PSE* is calculated by dividing the PSE by the value of gross farm receipts (*GFR*), and multiplying the result by 100:

$$\%PSE_C = \frac{PSE_C}{GFR_C} \times 100 = \frac{PSE_C}{VP_C + BOT_C} \times 100 \qquad [6.6]$$

280. *GFR* represents the value of production (*VP*), to which are added Budgetary and Other Transfers (*BOT*). Working through this formula in the example results in a *%PSE* of 25% (Table 6.8).

Table 6.8. Calculation of PSE and Producer NAC (example)

Symbol	Description	Units	Value	Source / equation
VP_C	Total value of production (at farm gate)	LC million	2 325	Table 6.5
PSE_C	Producer Support Estimate	LC million	684	Table 6.7
MPS_C	Market Price Support	LC million	268	Table 6.7
BOT_C	Budgetary and Other Transfers to Producers	LC million	416	Table 6.7 (A2+B+C+D+E+F+G)
GFR_C	Gross Farm Receipts	LC million	2 741	$VP_C + BOT_C$
$\%PSE_C$	**Percentage Producer Support Estimate**	**%**	**25**	**$100 * PSE_C / GFR_C$**
Producer NAC_C	**Producer Nominal Assistance Coefficient**	**Ratio**	**1.33**	**$GFR_C / (VP_C - MPS_C)$ or $1 + \%PSE_C / (100 - \%PSE_C)$**

281. The producer *NAC* is calculated by dividing the value of gross farm receipts by the value of production at border prices. Expressed algebraically:

$$producerNAC_C = \frac{GFR_C}{VP_C - MPS_C} \qquad [6.7]$$

282. The value of production at border prices is obtained by subtracting the value of MPS from the total value of production, e.g. LC 2 325 million in the example. The producer *NAC* is mathematically related to the *%PSE*, and can be alternatively derived as:

$$producerNAC_C = 1 + \frac{\%PSE_C}{(100 - \%PSE_C)} \qquad [6.8]$$

283. Working through this formula in the example results in a producer *NAC* of 1.33.

6.4. Indicators of producer support based on the degree of commodity specificity

- The PSE can expressed as the sum of four mutually exclusive category indicators of support transfers, relating respectively to a single commodity (SCT), a group of commodities (GCT), all commodities (ACT), and whether commodity production is not required (OTP).

284. The PSE can be broken down into four separate indicators of support based on the degree to which policy measures deliver support on a commodity basis: i.e. support provided to a single commodity, a group of commodities, all commodities, or whether producers are not required to produce commodities to receive support (Table 6.9).

Table 6.9. Indicators of producer support based on the degree of commodity specificity

Indicator	Relationship with PSE categories
I. Producer Single Commodity Transfers (producer SCT)	Sum of all single commodity transfers in PSE categories A, B, C and D
— Commodity i (1 to n) (producer SCT_i)[1]	- Includes only specific policy measures for commodity *i*
II. Group Commodity Transfers (GCT)	Sum of transfers to groups of commodities in PSE categories B, C, and D
— Group k (1 to m) (GCT_k)	- Includes only specific policy measures for group *k*
III. All Commodity Transfers (ACT)	Sum of transfers to all commodities in PSE categories B, C, and D
IV. Other Transfers to Producers (OTP)	Sum of transfers in PSE categories E, F and G
Total PSE (I+II+III+IV)	Sum of transfers to single, group and all commodities and other transfers (producer SCT+GCT+ACT+OTP)

1. For policy measures applying to groups of commodities, the PSE/CSE database for each country contains complete information on the list of commodities included in groups (see also Annex 6.1).

285. *These four categories are mutually exclusive in the sense that payments included in one category are not included in others*, e.g. transfers to wheat in the producer SCT are not included in transfers to cereals as a group in the GCT category. In this way, *there are no overlaps between the categories, and they therefore add up to the total PSE*.

286. The first step in calculating these indicators is to attribute each policy measure to one of these four categories, and then within the producer SCT and GCT categories to specific commodities or groups of commodities respectively. This is part of the process of labelling policy measures as detailed in sub-section 3.3.3. The following four sub-sections explain further details about these indicators.

287. Table 6.10 shows how this attribution is made for policy measures in the example. The two letter symbol in the column titled "Single commodity" indicates the commodity to which support is provided. These are policies whereby receipt of the transfer requires the production of that designated commodity. MPS is by definition included in the producer SCT, as it captures the transfers associated with policies affecting the price of a particular commodity. The label "AC" is given to policy measures which place no restrictions on the commodity produced but require the recipient to produce some commodity of their choice. Policy measures in the last three PSE categories (E, F and G) are labelled "OTP" because by definition these provide transfers that either do not require commodity production or their commodity specificity is unknown.

Table 6.10. Attribution of PSE policies to commodities (example)

Description	All transfers	Attribution to commodities								
		Single commodity (SCT)		Group of commodities (GCT)			All commodities (ACT)		Other transfers to producers (OTP)	
	LC million	Acronym	LC million	Group name	Acronym	LC million	Acronym	LC million	Acronym	LC million
Producer Support Estimate (PSE)	**684**	-	**394**	-	**-**	**35**	-	**120**	-	**135**
A. Support based on commodity outputs	**324**	**-**	**-**	-	-	-	**-**	**-**	-	-
A1. Market price support	268	**-**	**-**	-	-	-	**-**	**-**	-	-
1. MPS commodities	195	-	-	-	-	-	**-**	**-**	-	-
Wheat MPS	23	WT	23	-	-	-	**-**	**-**	-	-
Barley MPS	7	BA	7	-	-	-	**-**	**-**	-	-
Oats MPS	0	OA	0	-	-	-	**-**	**-**	-	-
Milk MPS	117	MK	117	-	-	-	**-**	**-**	-	-
Beef and veal MPS	31	BF	31	-	-	-	**-**	**-**	-	-
Cotton MPS	18	CT	18	-	-	-	**-**	**-**	-	-
Potato MPS	0	PO	0	-	-	-	**-**	**-**	-	-
2. Non-MPS commodities	72	XE	72	-	-	-	**-**	**-**	-	-
A2. Payments based on output	56	-	-	-	-	-	**-**	**-**	-	-
Agricultural Stabilization Act - wheat	10	WT	10	-	-	-	**-**	**-**	-	-
Agricultural Stabilization Act - milk	20	MK	20	-	-	-	**-**	**-**	-	-
Agricultural Stabilization Act - other crops	10	XE	10	-	-	-	**-**	**-**	-	-
Loan defficiency payment - wheat	6	WT	6	-	-	-	**-**	**-**	-	-
Milk Price Supplement for Cheese Production	10	MK	10	-	-	-	**-**	**-**	-	-
B. Payments based on input use	**105**	-	-	-	-	-	**-**	**-**	-	-
B1. Variable input use	25	-	-	-	-	-	**-**	**-**	-	-
Fuel tax rebates	10	-	-	-	-	-	AC	10	-	-
Irrigation maintenance payments	15	-	-	-	-	-	AC	15	-	-
B2. Fixed capital formation	60	-	-	-	-	-	-	-	-	-
Property tax exemptions	15	-	-	-	-	-	AC	15	-	-
Interest rate concession	30	-	-	-	-	-	AC	30	-	-
Capital grants for on-farm infrastructure	15	-	-	-	-	-	AC	15	-	-
B3. On-farm services	20	-	-	-	-	-	-	-	-	-
Extension and advisory services	10	-	-	-	-	-	AC	10	-	-
Pest and disease control	5	-	-	-	-	-	AC	5	-	-
FarmBis	5	-	-	-	-	-	AC	5	-	-
C. Payments based on current A/An/R/I, production required	**70**	-	-	-	-	-	-	-	-	-
C1. Based on current revenue/income	15	-	-	-	-	-	-	-	-	-
Income tax concessions	15	-	-	-	-	-	AC	15	-	-
C2. Based on area/animal numbers	55	-	-	-	-	-	-	-	-	-
Crop insurance payments - wheat	10	WT	10	-	-	-	-	-	-	-
Crop insurance payments - barley	5	BA	5	-	-	-	-	-	-	-
Crop insurance payments - oats	5	OA	5	-	-	-	-	-	-	-
Organic crop farming	30	-	-	Crops	GCT1	30	-	-	-	-
Agri-environmental grass premium	5	-	-	Other crops	GCT5	5	-	-	-	-
D. Payments based on non-current A/An/R/I, production required	**50**	-	-	-	-	-	-	-	-	-
Structural payment to milk producers	50	MK	50	-	-	-	-	-	-	-
E. Payments based on non-current A/An/R/I, production not required	**110**	-	-	-	-	-	-	-	-	-
E1. Variable rates	60	-	-	-	-	-	-	-	-	-
Counter cyclical payments	60	-	-	-	-	-	-	-	OT	60
E2. Fixed rates	50	-	-	-	-	-	-	-	-	-
Single Payment Scheme	50	-	-	-	-	-	-	-	OT	50
F. Payments based on non-commodity criteria	**25**	-	-	-	-	-	-	-	-	-
F1. Long-term resource retirement	15	-	-	-	-	-	-	-	-	-
Afforestation	5	-	-	-	-	-	-	-	OT	5
Conservation reserve program	10	-	-	-	-	-	-	-	OT	10
F2. A specific non-commodity output	10	-	-	-	-	-	-	-	-	-
Payments for hedges and rustic groves	5	-	-	-	-	-	-	-	OT	5
Payments for floral fallow	5	-	-	-	-	-	-	-	OT	5
F3. Other non-commodity criteria	0	-	-	-	-	-	-	-	-	-
G. Miscellaneous payments	**0**	-	-	-	-	-	-	-	-	-

6.4.1. Producer Single Commodity Transfers (producer SCT)

***Producer Single Commodity Transfers* (producer SCT):** the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policies linked to the production of a single commodity such that the producer must produce the designated commodity in order to receive the transfer.

288. A national (aggregate) producer *SCT* can be found by summing up all transfers arising from policies that have been attributed to single commodities (*SC*):

$$producerSCT_C = MPS_C + \sum BOT_{SC} \qquad [6.9]$$

where: $\sum BOT$ – national aggregate budgetary and other transfers to producers from policies that have been labelled as based on a single commodity (*SC*).

289. This is general the sum of all transfers in category A, plus transfers in categories C, B and D labelled as going to single commodities. Based on Table 6.10, the value of producer *SCT* is LC 394 million. Note that this total includes LC 72 million of transfers to commodities other than MPS commodities (*XE*).

290. On a similar basis, a producer *SCT* can be calculated for individual commodities (Table 6.11):

$$producerSCT_i = MPS_i + \sum BOT_i \qquad [6.10]$$

where: $\sum BOT_i$ – budgetary and other transfers to producers from policies that have been labelled as based on commodity *i*

291. As for MPS, a producer *SCT* for other commodities representing non-MPS commodities is found by subtracting the sum of producer *SCT* for all MPS commodities from the national (aggregate) value:

$$producerSCT_{XE} = producerSCT_C - \sum_{i \in AMC} producerSCT_i \qquad [6.11a]$$

where: $\sum_{i \notin AMC} producerSCT_i$ – sum of transfers to producers for all MPS commodities

while a producer *SCT* for other commodities representing commodities other than standard MPS commodities is found by subtracting the sum of producer *SCT* for the standard MPS commodities from the national (aggregate) value:

$$producerSCT_{OC} = producerSCT_C - \sum_{i \in SMC} producerSCT_i \qquad [6.11b]$$

where: $\sum_{i \notin SMC} producerSCT_i$ – sum of transfers to producers for the standard MPS commodities

Table 6.11. Calculation of producer SCT (example)

Symbol	Description	LC million												Source / equation
		Wheat	Barley	Oats	Milk	Beef	Cotton	Potatoes	All MPS commodities (AMC)	Standard MPS commodities (SMC)	Non -MPS commodities (XE)	Other commodities (OC)	National (aggregate) (C)	
MPS_i	A1. Market price support	23	7	0	117	31	18	0	195	177	72	90	268	Table 6.3
PO_i	A2. Payments based on output	10	0	0	30	0	6	0	46	40	10	16	56	Table 6.10 (Sum of PO_i for single commodities)
PO_1	Agricultural Stabilization Act	10	-	-	20	-	-	-	30	30	10	10	40	Table 6.10
PO_2	Storage Payments	-	-	-	-	-	6	-	6	0	0	6	6	Table 6.10
PO_3	Milk Price Supplement for Cheese Production	-	-	-	10	-	-	-	10	10	0	0	10	Table 6.10
PI_i	B. Payments based on input use	0	0	0	0	0	0	0	0	0	0	0	0	Table 6.10
PC_i	C2. Payments based on current A/An, production required, single commodity	10	5	5	0	0	0	0	20	20	0	0	20	Table 6.10 (Sum of PC_i for single commodities)
PC_1	Crop insurance payments	10	5	5	-	-	-	-	20	20	0	0	20	Table 6.10
PHR_i	D. Payments based on non-current A/An/R/I, production required	0	0	0	50	0	0	0	50	50	0	0	50	Table 6.10 (Sum of PHR_i for single commodities)
PHR_1	Structural payment to milk producers	-	-	-	50	-	-	-	50	50	0	0	50	Table 6.10
Producer SCT_i	**Producer Single Commodity Transfers**	**43**	**12**	**5**	**197**	**31**	**24**	**0**	**311**	**287**	**82**	**106**	**394**	**$MPS_i + PO_i + PI_i + PC_i + PHR_i$**

6.4.2. Group Commodity Transfers (GCT)

***Group Commodity Transfers* (GCT):** the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policies whose payments are made on the basis that one or more of a designated list of commodities is produced, i.e. a producer may produce from a set of allowable commodities and receive a transfer that does not vary with respect to this decision.

292. The value of Group Commodity Transfers for a country is calculated by adding together the value of transfers that have been attributed to groups of commodities:

$$GCT_C = \sum BOT_{GCT} \qquad [6.12]$$

where: $\sum BOT_{GCT}$ – aggregate budgetary and other transfers to producers from policies that have been labelled as based on a group of commodities (*GCT*)

293. Based on Table 6.10, this comes to LC 35 million.

294. On a similar basis, a GCT_k can be calculated for specific groups of commodities, where:

$$GCT_k = \sum BOT_k \qquad [6.13]$$

where: $\sum BOT_k$ – budgetary and other transfers to producers from policies that have been labelled as based on a commodity group *k*.

295. There are nine standard commodity groups (Table 6.12). If the policy measure is targeting a group of commodities not covered by any of these nine groups, an additional group may be created to reflect actual support policies. Detailed country lists of commodity groups included in the GCT are provided in Annex 6.1. Transfers allocated to the different groups within the GCT are mutually exclusive, e.g. transfers to the *grains* group are not included in transfers to a *grains and oilseeds* group.

Table 6.12. Calculation of GCT (example)

Symbol	Group Commodity Transfers (GCT)	LC million	Share of national (aggregate) GCT %
GCT_1	All crops	30	86
GCT_2	All arable crops	0	0
GCT_3	Grains	0	0
GCT_4	Oilseeds	0	0
GCT_5	Other crops	5	14
GCT_6	All fruits and vegetables	0	0
GCT_7	All livestock	0	0
GCT_8	Ruminants	0	0
GCT_9	Non-ruminants	0	0
GCT_{10}	Non-standard commodity group n	0	0
GCT_{11}	Non-standard commodity group m	0	0
GCT_C	**National (aggregate) GCT**	**35**	**100**

296. Table 6.12 illustrates the allocation of transfers to the different groups based on the attribution done in Table 6.10. In this case, all the policy measures are targeted to the standard groups, so that no additional groups are required.

6.4.3. All Commodity Transfers (ACT)

All Commodity Transfers (ACT): the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policies that place no restrictions on the commodity produced but require the recipient to produce some commodity of their choice.

297. The value of All Commodity Transfers for a country is calculated by adding together the value of transfers that have been attributed to all commodities (*AC*):

$$ACT_C = \sum BOT_{AC} \qquad [6.14]$$

where: $\sum BOT_{AC}$ – aggregate budgetary and other transfers to producers from policies that have been labelled as based on all commodities (*AC*)

298. Table 6.10 shows that there were nine policies attributed to ACT. Summing up the value of transfers from these seven policies gives an *ACT* estimate of LC 120.

6.4.4. Other Transfers to Producers (OTP)

Other Transfers to Producers (OTP): The annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policies that do not require any commodity production at all.

299. Other transfers to producers are calculated by summing together the total values of transfers from policies that are classified into the PSE categories E, F and G.

$$OTP_C = PSEcategory(E) + PSEcategory(F) + PSEcategory(G) \qquad [6.15]$$

300. In the example, there are six such policies, providing LC 135 million in support to producers.

6.5. Producer Nominal Protection Coefficient (producer NPC)

Producer Nominal Protection Coefficient **(producer NPC):** The ratio between the average price received by producers at the farm gate (including payments per tonne of current output and excluding price levies per tonne of current output), and the border price, measured at the farm gate.

- Producer NPC values may be calculated at the individual commodity and national (aggregate) levels.

6.5.1. Producer NPC for individual commodities

301. The producer NPC for an individual commodity can be derived in two ways. First, domestic and border prices can be compared, where the domestic price is the producer price plus the per unit transfers received from payments based on output minus the price levies based on output:

$$producerNPC_i = \frac{\left(PP_i + \frac{PO_i}{QP_i} - \frac{LVO_i}{QP_i} \right)}{RP_i} \quad [6.16]$$

where: PP_i – producer price of commodity *i*

PO_i – sum of payments to commodity *i* based on output (PSE sub-category A.2)

QP_i – quantity produced of commodity *i*

LVO_i – price levies based on output for commodity *i*

RP_i – reference price of commodity *i*

302. The numerator in equation 6.16 adds the payments based on output to producer price in order to account for any direct supplements to producer price over and above market price support measures. Similarly, it removes the price levies based on output to account for any direct reductions of producer price. Table 6.13 illustrates the calculation of producer NPC for individual commodities. Producer NPC values for individual commodities vary from 1.59 for milk to 1.00 in for oats and potatoes.

6.5.2. Producer NPC for a country

303. Once producer NPC values have been calculated for each individual commodity, a national (aggregate) NPC can be derived. As prices and quantities cannot be aggregated for different commodities, the producer NPC for a country is calculated using the value of transfers:

$$producerNPC_C = \frac{(VP_C + PO_C - LVO_C)}{(VP_C - TPC_C - TPT_C)} \quad [6.17]$$

where: VP_C – total value of production for country *C*

PO_C – total sum of transfers in PSE sub-category A.2 for country *C*

LVO_C – price levies based on output for country C

TPC_C – total Transfers to Producers from Consumers for country *C*

TPT_C – total Transfers to Producers from Taxpayers for country *C*

304. While the *VP*, *PO* and *LVO* values are known at the national level, values for *TPC* and *TPT* have to be calculated. Following the assumption and procedure for deriving a national (aggregate) MPS, these values are derived by extrapolating from *TPC* and *TPT* for the individual commodities according to:

$$TPC_C = \frac{\sum_{i \in AMC} TPC_i}{\sum_{i \in AMC} VP_i} \times VP_C \text{ and } TPT_C = \frac{\sum_{i \in AMC} TPT_i}{\sum_{i \in AMC} VP_i} \times VP_C \quad [6.18]$$

where: $\sum_{i \in AMC} TPC_i$ – sum of *TPC* for all commodities for which MPS has been calculated

$\sum_{i \in AMC} TPT_i$ – sum of *TPT* for all commodities for which MPS has been calculated

$\sum_{i \in AMC} VP_i$ – sum of *VP* for all commodities for which MPS has been calculated

305. Table 6.14 shows the calculation of a national (aggregate) producer NPC, which at 1.20 is exactly the same as the aggregate producer NPC for All MPS commodities.

306. The producer NPC for individual commodities can also be calculated based on the transfer values method, by substituting the appropriate values for the individual commodity into equation 6.17.

Table 6.13. Calculation of producer NPC for individual commodities (example)

Symbol	Description	Units	Wheat	Barley	Oats	Milk	Beef	Cotton	Potatoes	Source / equation
QP_i	Level of production	000 T	250	110	50	200	100	360	160	Table 6.3
PP_i	Producer price (at farm gate)	LC/T	2,060	1,260	1,040	2,000	2,500	500	1,000	Table 6.3
VP_i	Value of production (at farm gate)	LC million	515	139	52	400	250	180	160	Table 6.3
RP_i	Reference Price (at farm gate)	LC/T	1,890	1,200	1,040	1,350	2,000	450	1,000	Table 6.3
PO_i	A2. Payments based on output	LC million	10	0	0	30	0	6	0	Table 6.11
POT_i	Payments based on output per tonne	LC/T	40	0	0	150	0	17	0	PO_i / QP_i
LVi	Price levies of which:	LC million	20	0	0	0	10	0	0	Table 6.3
LVO_i	Producer levies based on output	LC million	0	0	0	0	0	0	0	data
$LVOT_i$	Producer levies based on output per tonne	LC/T	0	0	0	0	0	0	0	LVO_i / QP_i
TPC_i	Transfers to producers from consumers	LC million	34	7	0	130	38	18	0	Table 6.3
TPT_i	Transfers to producers from taxpayers	LC million	9	0	0	0	13	0	0	Table 6.3
Producer NPC_i	**Producer Nominal Protection Coefficient**	**Ratio**	**1.11**	**1.05**	**1.00**	**1.59**	**1.25**	**1.15**	**1.00**	**$(PP_i + POT_i - LVOT_i) / RP_i$ or $(VP_i + PO_i - LVO_i) / (VP_i - TPC_i - TPT_i)$**

Table 6.14. Calculation of a national (aggregate) producer NPC (example)

Symbol	Description	Units	All MPS commodities (AMC)	National (aggregate) (C)	Source / equation
VP_i	Value of production (at farm gate)	LC million	1,696	2,325	Table 6.2
PO_i	A2. Payments based on output	LC million	46	56	Table 6.13 and Table 6.11
LVO_i	Price levies based on output	LC million	0	0	Table 6.13
TPC_i	Transfers to producers from consumers	LC million	226	310	$TPC_C = TPC_{AMC} / VP_{AMC} * VP_C$
TPT_i	Transfers to producers from taxpayers	LC million	21	29	$TPT_C = TPT_{AMC} / VP_{AMC} * VP_C$
Producer NPC	**Producer Nominal Protection Coefficient**	**Ratio**	**1.2**	**1.2**	**$(VP_i + PO_i - LVO_i) / (VP_i - TPC_i - TPT_i)$**

6.5.3. Producer NPC for other commodities

307. A producer NPC for "other commodities" is also calculated. This is estimated based on the value method in equation 6.17 rather than the price method in equation 6.16. To obtain the necessary values for other commodities representing non-MPS commodities, values for all commodities for which MPS has been calculated are subtracted from the national (aggregate) value:

$$producerNPC_{XE} = \frac{\left((VP_C - \sum_{i \in AMC} VP_i) + (PO_C - \sum_{i \in AMC} PO_i) - (LVO_C - \sum_{i \in AMC} LVO_i)\right)}{\left((VP_C - \sum_{i \in AMC} VP_i) - (TPC_C - \sum_{i \in AMC} TPC_i) - (TPT_C - \sum_{i \in AMC} TPT_i)\right)} \quad [6.19a]$$

while for other commodities representing commodities other than standard MPS commodities, values for the standard MPS commodities for which MPS has been calculated are subtracted from the national (aggregate) values:

$$producerNPC_{OC} = \frac{\left((VP_C - \sum_{i \in SMC} VP_i) + (PO_C - \sum_{i \in SMC} PO_i) - (LVO_C - \sum_{i \in SMC} LVO_i)\right)}{\left((VP_C - \sum_{i \in SMC} VP_i) - (TPC_C - \sum_{i \in SMC} TPC_i) - (TPT_C - \sum_{i \in SMC} TPT_i)\right)} \quad [6.19b]$$

308. Table 6.15 illustrates how this calculation is performed. Note that in this instance the producer NPC for other commodities is lower than the national (aggregate) producer NPC because the producer NPC derived for the standard commodities is higher than that for national average.

6.6. Percentage Producer Single Commodity Transfers (%SCT)

***Percentage Producer Single Commodity Transfers* (%SCT):** the commodity SCT transfers as a share of gross receipts for the specific commodity.

- %SCT values may be calculated for individual commodities, and at national (aggregate) level.

309. The general method for calculating the %*SCT* follows that for the %*PSE*, although fewer categories of support are involved in the calculation.

6.6.1. %SCT for individual commodities

310. The %*SCT* for an individual commodity is found by dividing the value of producer *SCT* for that commodity by gross receipts (*GR*) for that commodity and multiplying the result by 100:

$$\%SCT_i = \frac{producerSCT_i}{GR_i} \times 100 = \frac{producerSCT_i}{VP_i + producerSCT_i - MPS_i} \times 100 \quad [6.20]$$

311. *GR* is calculated as the sum of market receipts (*VP*) and policy transfers to that commodity. As for the %*PSE*, *MPS* is subtracted to avoid double-counting, since price transfers to producers are included in both the producer *SCT* and *VP* values.

312. Table 6.16 demonstrates this procedure. %*SCT* values range from 0% for potatoes through to 41% for milk. Note that oats, which had a producer NPC of 1.00 because it does not receive transfers through market price support or payments based on output, receives support through sub-category *C.2. Payments based on A/An, production required* and therefore has a %SCT of 9%.

Table 6.15. Calculation of a producer NPC for Other Commodities (example)

Symbol	Description	Units	National (aggregate) (C)	All MPS commodities (AMC)	Standard MPS commodities (SMC)	Non -MPS commodities (XE)	Other commodities (OC)	Source / equation
VP_i	Value of production (at farm gate)	LC million	2,325	1,696	1,356	629	969	VP_C and VP_{SMC}: Table 6.2 $VP_{XE} = VP_C - VP_{AMC}$ $VP_{OC} = VP_C - VP_{SMC}$
PO_i	A2. Payments based on output	LC million	56	46	40	10	16	Table 6.11
LVO_i	Price levies based on output	LC million	0	0	0	0	0	Table 6.13
TPC_i	Transfers to producers from consumers	LC million	310	226	208	84	102	TPC_C and TPC_{SMC}: Tables 6.13 and 6.14 $TPC_{XE} = TPC_C - TPC_{AMC}$ $TPC_{OC} = TPC_C - TPC_{SMC}$
TPT_i	Transfers to producers from taxpayers	LC million	29	21	21	8	8	TPT_C and TPT_{SMC}: Tables 6.13 and 6.14 $TPT_{XE} = TPT_C - TPT_{AMC}$ $TPT_{OC} = TPT_C - TPT_{SMC}$
Producer NPC	**Producer Nominal Protection Coefficient**	**Ratio**	**1.20**	**1.20**	**1.24**	**1.19**	**1.15**	**$(VP_i + PO_i - LVO_i) / (VP_i - TPC_i - TPT_i)$**

Table 6.16. Calculation of %SCT for individual commodities (example)

Symbol	Description	Units	Wheat	Barley	Oats	Milk	Beef	Cotton	Potatoes	Source / equation
VP_i	Value of production	LC million	515	139	52	400	250	180	160	Table 6.3
$PSCT_i$	Producer Single Commodity Transfers	LC million	43	12	5	197	31	24	0	Table 6.11
MPS_i	A1. Market Price Support	LC million	23	7	0	117	31	18	0	Table 6.3
PO_i	A2. Payments based on output	LC million	10	0	0	30	0	6	0	Table 6.11
PI_i	B. Payments based on input use	LC million	0	0	0	0	0	0	0	Table 6.11
PC_i	C2. Payments based on current A/An, production required (single commodity)	LC million	10	5	5	0	0	0	0	Table 6.11
PHR_i	D. Payments based on non-current A/An/R/I, production required (single commodity)	LC million	0	0	0	50	0	0	0	Table 6.11
GR_i	Gross Receipts for individual commodity	LC million	535	144	57	480	250	186	160	$VP_i + (PSCT_i - MPS_i)$
$\%PSCT_i$	**Percentage Producer Single Commodity Transfer**	**%**	**8**	**8**	**9**	**41**	**12**	**13**	**0**	**$100 * PSCT_i / GR_i$ or $100 * PSCT_i / (PSCT_i + VP_i - MPS_i)$**

Table 6.17. Calculation of a national (aggregate) %SCT and a %SCT for Other Commodities (example)

Symbol	Description	Units	National (aggregate) (C)	All MPS commodities (AMC)	Standard MPS commodities (SMC)	Non -MPS commodities (XE)	Other commodities (OC)	Source / equation
VP_i	Value of production	LC million	2,325	1,696	1,356	629	969	VP_C and VP_{SMC}: Table 6.2 $VP_{XE} = VP_C - VP_{AMC}$ $VP_{OC} = VP_C - VP_{SMC}$
$PSCT_i$	Producer Single Commodity Transfers	LC million	394	311	287	82	106	Table 6.11
MPS_i	A1. Market Price Support	LC million	268	195	177	72	90	Table 6.11
PO_i	A2. Payments based on output	LC million	56	46	40	10	16	Table 6.11
PI_i	B. Payments based on input use	LC million	0	0	0	0	0	Table 6.11
PC_i	C2. Payments based on current A/An, production required (single commodity)	LC million	20	20	20	0	0	Table 6.11
PHR_i	D. Payments based on non-current A/An/R/I, production required (single commodity)	LC million	50	50	50	0	0	Table 6.11
GR_i	Gross receipts	LC million	2,451	1,812	1,466	639	985	$GR_C = VP_C + PSCT_C - MPS_C$ $GR_{AMC} = VP_{AMC} + PSCT_{AMC} - MPS_{AMC}$ $GR_{SMC} = VP_{SMC} + PSCT_{SMC} - MPS_{SMC}$ $GR_{XE} = GR_C - GR_{AMC}$ $GR_{OC} = GR_C - GR_{SMC}$
$\%PSCT_i$	**Percentage Producer Single Commodity Transfer**	**%**	**16**	**17**	**20**	**13**	**11**	**$100 * PSCT_i = PSCT_i / GR_i$ or 100 * PSCTi / (PSCTi + VPi - MPSi)**

6.6.2. %SCT for a country

313. A national (aggregate) *%SCT* is obtained using the same formulas as for individual commodities except that the values represent the national (aggregate) values:

$$\%SCT_C = \frac{producerSCT_C}{GR_C} \times 100 = \frac{producerSCT_C}{VP_C + producerSCT_C - MPS_C} \times 100 \quad [6.21]$$

314. Table 6.17 presents the results for this calculation.

6.6.3. %SCT for other commodities

315. The %SCT for other commodities representing non-MPS commodities can be found by using the producer *SCT* and *GR* values for the all MPS commodities and for the country as a whole:

$$\%SCT_{XE} = \frac{(producerSCT_C - \sum_{i \in AMC} producerSCT_i)}{(GR_C - \sum_{i \in AMC} GR_i)} \times 100 \quad [6.22a]$$

while for other commodities representing commodities other than standard MPS commodities by using the producer *SCT* and *GR* values for the standard MPS commodities and for the country as a whole:

$$\%SCT_{oc} = \frac{(producerSCT_C - \sum_{i \in SMC} producerSCT_i)}{(GR_C - \sum_{i \in SMC} GR_i)} \times 100 \quad [6.22b]$$

316. Table 6.17 also shows the calculation of the %Producer SCT for other commodities.

Annex 6.1.

Commodity groups applied in estimates for OECD countries

317. This annex, sourced from *Agricultural Policy Monitoring and Evaluation 2013: OECD Countries and Emerging Economies*, provides illustrative information on the commodity groups identified in OECD countries. This grouping is based on a common (generic) set of groups which are most commonly found in the policies applied within OECD countries, but leaves flexibility to reflect specific national policy mixes. The generic groups are treated as a menu. The selection of groups for a country should provide an opportunity to categorise all programmes summed up as transfers to groups of products, and may vary from year to year as new programmes are added and continuing programmes may be modified.

Australia

- ***All crops:*** includes mostly disaster payments and weed strategy payments;
- ***Fruit and vegetables:*** disease control and eradication payments;
- ***All livestock:*** payments related to animal identification and control and disease control and eradication;
- ***Ruminants:*** disease control and eradication payments.

Canada

- ***All crops:*** includes any policy that is available to producers of any grain or oilseed crop.
- ***All livestock:*** includes policies directed at producers of livestock, including cattle, pigs, dairy, and poultry. Some examples are the BSE Recovery Program (2003), and the Feed Freight Assistance Program (until 1995).
- ***All commodities except supply managed:*** Includes Canada's major agricultural support policies available to all products with the exception of milk, poultry or eggs, including the stabilisation component of the Canadian Agricultural Income Stabilisation (CAIS) programme (started 2003) and the Net Income Stabilization Account (NISA) programme (1994-2002).

Chile

- ***All crops:*** Transfers to improve seeds, to provide on-farm services to control fruit disease, and to improve sanitary conditions for plants.
- ***All livestock***: All on-farm services to prevent and control animal disease and improve sanitary conditions

European Union

- ***All crops:*** Any policy that is available to producers of any crop, such as measures for irrigation, pest control or environmentally friendly crop farming and payments for seed production.

- ***All arable crops:*** This group is only used for measures such as payments for crop rotation, as most area payments under Agenda 2000 were restricted to COP (see below).

- ***Cereals, oilseeds and protein crops (COP):*** Any policy that is available to producers of any COP crop, such as set-aside payments and Agenda 2000 area payments after 2003.

- ***Grains:*** Payments per hectare of cereals, with a rate per ha for any cereal different from that for oilseeds or protein crops. They were introduced by the 1992 reform. In 2004, these payments became part of the COP group.

- ***Oilseeds:*** Payments per hectare of oilseeds, with a rate per ha for any oilseed different from that for cereals or protein crops.

- ***Protein crops:*** payments per hectare of protein crops, with a rate per ha for any protein crops different from that for cereals or oilseeds.

- ***All fruit and vegetables:*** measures for the whole fruit and vegetable sector, such as measures for orchard improvement.

- ***Other crops:*** Payments to crops other than COP, including grass and forage crops.

- ***All livestock:*** Policies directed at producers of livestock, including cattle, pigs, dairy, and poultry. Examples are measures for disease control, breeding improvement, compensating losses or manure handling, as well as some regional payments.

- ***Ruminants:*** Payments for beef, sheep and goats such as less-favoured area payments before 2000, which were paid per livestock unit and sustainable animal breeding payments.

- ***Non-ruminants:*** No payment is made specifically to non-ruminants in EU member states.

- ***Milk and beef:*** Payments to the dairy sector, which cannot be associated to either milk production of meat production, such as investments in stables.

Iceland

- ***All livestock:*** Includes policies directed at producers of livestock, including cattle, pigs, dairy, and poultry. An example is the animal breeding programme.
- ***Ruminants:*** Policies directed at producers of cattle, dairy and sheepmeat.

- ***Milk and beef:*** Payments to the dairy sector which are related to disaster payments

Israel

- ***All crops:*** Payments for soil conservation practices.
- ***All grains:*** Payments for rain-fed grain growers and investment grants to introduce more advanced technologies in grain production.
- ***All livestock:*** Investment grants to improve efficiency of livestock production.
- ***Fruit excluding citrus:*** Investment grants to implement technologies saving water and labour.
- ***Oranges and grapefruit:*** Investment grants to implement technologies saving water and labour.
- ***Vegetables:*** Investment grants to implement technologies saving water and labour.
- ***Beef and sheep****:* Payments per area grazed to maintain cattle, sheep and goats on pastures in peripheral regions and payments to establish basic infrastructure in grazing areas.

Japan

- ***All crops:*** Direct payment for environmentally friendly farming.
- ***All arable crops***: Includes direct (income based) payments to core farmers.
- ***Livestock:*** Includes policy directed at producers of livestock, including cattle, pigs, dairy, and poultry. Animal disease control programme is an example.
- ***Wheat, barley and soybeans:*** Policy that was available to producers of wheat, barley and soybeans, but which ended in 2008.

Korea

- ***All crops:*** Payments based on input use such as fertilizer, seeds and pesticides. In more recent years (starting from 1999), this group includes also pest and disease control payments, payments for set-aside, direct payment for environment-friendly farming practices, paddy-field environmental conservation payment and direct payment for landscape preservation.
- ***All livestock:*** Policies directed at producers of livestock, including cattle, pigs, dairy, and poultry. The transfers in this category include three programmes: direct payment for environmentally-friendly livestock practices, payments for management of livestock waste, and credit concessions to livestock farmers.
- ***Beef and pigmeat:*** Payments in the meat quality enhancement programme. It is the payments per head of animal to encourage good quality beef and pigmeat.
- ***Beef and milk:*** Payments in the cattle reproduction programme which includes artificial insemination.

Mexico

- ***All crops:*** Includes any policy that is available to producers of any grain or oilseed crop. Most of the policies in this group belong to ALIANZA.

- ***Grains***: Technical assistance program of ALIANZA, which ended in 2002.

- ***All livestock:*** Policies directed at producers of livestock, including cattle, pigs, dairy, and poultry. Some examples are ALIANZA programs such as the Livestock Improvement, and the Genetic Improvement.

- Several smaller groups of commodities are as follows: ***"Maize and beans",*** "***Fruits", "Sorghum, maize and oilseeds", "Alternative crops", "Citruses" and "fruit, flowers, industrial crops, and alternative crops".*** Some of these payments are sub-national under ALIANZA. None of these payments have been provided recently, except for "***Maize and beans***".

New Zealand

- ***All livestock:*** Payments on animal disease control programmes that seek to safeguard the health of the agricultural animal population. These programmes include export quality assurance for live animals, the reduction of production-limiting diseases, disease surveillance and disease eradication. This payment represented 100% of GCT since 1993, when the payments for the other group (sheep meat, wool, beef and milk) were completely stopped.

- ***Sheep meat, wool, beef and milk:*** Labour subsidy programme, fertilizer price subsidy programme, livestock incentive scheme, land development and encouragement loan scheme, interest concession programme from the rural bank and finance corporation, debt discounting write-off programme from the rural bank and finance corporation, the debt write-off programme for producer boards. The payments for this category were completely stopped in 1992 as the reform of these sectors was accomplished.

Norway

- ***Grains:*** Payments based on output, payments per hectare of grains, transport subsidies, and regional subsidies.

- ***All fruit and vegetables***: Support for energy saving in greenhouses, investment support for greenhouses and storehouses and packaging of horticultural products, and various area payments for potatoes, vegetables, fruits and berries.

- ***All livestock:*** Payments to producers of livestock, including cattle, pigs, dairy, and poultry. Examples are deficiency payments, per head payments, and the vacation and temporary substitute scheme for livestock producers, as well as some regional payments.

- ***Ruminants***: Per head payments for grazing animals.

- ***Tubers***: Various payments to root crops, including under the acreage and cultural landscape scheme.

- ***Feed crops:*** All subsidies to coarse feed, including acreage support to mountain farming, and support to meadow seed storage.

Switzerland

- ***All livestock:*** Includes policies that are available to livestock raised in difficult conditions (livestock in mountain areas, 1986-98; livestock in difficult conditions, 1999-2006). At a later stage this group includes also payments for animal welfare (payments for animal housing systems, from 1996; payments for keeping animal outdoors, from 1999).

- ***Ruminants:*** Base area payment for grassland (1993-98) and payments for roughage eating animals (from 1999). The programme consists of per head payments available to all producers for ruminants (beef, sheep and goats, horses, lamas, alpacas, etc.).

- ***All crops:*** Payments based on input use such as fertilizer, seeds and pesticides; however, the most important part of transfers within this group was the payments for integrated production (1992-98).

- ***Arable crops:*** Transfers to this group are mainly the base area payment to arable land applied in the 1992-98 period.

- ***Grains:*** Mainly the base premium for coarse grains (1986-2000), relatively small amounts of payments were for extensive production of grains (1992-98).

- ***Oilseeds:*** Area payments for oilseeds (from 1999).

- ***Grains and oilseeds:*** Area payments for extensive grains and rapeseed cultivation (from 1999).

- ***All crops except wine:*** Payments for crop production on steep slopes.

- ***All crops, cattle and sheep:*** Payments for Ecological Compensation and Extensive Meadows

Turkey

- ***All Crops:*** Primarily includes support for input use, such as fertiliser subsidies, pesticide subsidies, hybrid seed subsidies and support for natural disasters.

- ***Grains***: Area feed crops premium.

- ***All livestock:*** Transfers to livestock producers in the form of input support, such as support for feed, capital grants, livestock replacement and control of disease.

- ***Milk, beef and sheep meat:*** Support to producers of cattle, dairy and sheep for animal replacement due to natural disasters through the Livestock Replacement Programme and for pasture improvement.

- ***Wheat, sugar, cotton, sunflower***: Payments under the On-Farm Development Support Programme, terminated in 2005.

- ***Hazelnuts and tobacco***: Payments under the Transition Programme.

United States

- ***All crops:*** Primarily includes payments for environmental conservation and protection purposes. Examples of programmes in this group include the *Conservation Security Program* and *Crop Disaster Payments Program*.

- ***All non-insured crops***: Payments under the Non-insured Crop disaster Assistance Program.

- ***Ruminants:*** Support to producers of cattle, dairy and sheep under the *Feed Assistance Program* and the *Grassland Reserve Program*.

- ***All livestock***: Payments under the Livestock Indemnity Program

- ***Trees and vineyards***: Payments under the Tree and Vineyard Disaster Payments Program.

Brazil

- ***All arable crops***: Insurance subsidy within the Crop Guarantee programme (Garantia-Safra).

- ***All livestock***: Rural Insurance Premium Subsidy for livestock

China

- ***All crops***: Price subsidies to fertilisers and other chemical inputs; per unit of land payments to compensate farmers for an increase in prices of inputs such as fertilisers, pesticides, plastic films and diesel; subsidies for improving soil organic matter levels; subsidies for the construction of small-sized water facilities; subsidy to reduce the fee burden on agricultural irrigation water; budgetary expenditures to assist construction of small irrigation facilities; payments to protect agricultural water and soil production resources; payments for soil conservation.

- ***Grains***: A number of policy measures targeting grain producers, such as per unit of land direct payments to grain producers; payments for an extension of new varieties of grains; insurance subsidies for grain producers; payments for the development of large-scale production of grains; payments to support the development of high-quality grain production in 13 main grain producing provinces.

- ***Wheat, maize, soybean***: Per unit of land payments to encourage application of new varieties of selected crop seeds.

- ***Livestock***: Payments within the Standardized Livestock Raising Pilot Programme; subsides for the prevention and control of animal epidemics; payments to protect grassland and pasture; payments for the extension of new varieties of livestock.

Indonesia

- ***All crops***: Subsidy paid to state-owned fertiliser manufacturers to compensate for the sale of certain fertiliser products to farmers at the government-determined Highest Retail Price. Since 2008 it also includes budgetary expenditures on the Direct Fertiliser Aid programme, which distributes organic and NPK fertilisers at no cost to farmers who participate in field schools.

Kazakhstan

- ***All crops***: Seeds subsidy, fuel subsidy, mineral fertiliser and chemicals subsidy, compensation on interest of sowing and harvesting loans, multi-year loans for sowing and harvesting, credit for individual farmers for field works, loans based on funds from local governments, pledge-free financing programme, feed subsidy, credit provided through credit associations, credit based on funds from local governments, credit for investment projects, rural micro-credit to individual borrowers, credit to micro-credit organisations, subsidy for transportation of irrigation water, write-off of tax arrears to state farms producing elite seeds (arrears as of 1 January 2000).

- ***Grains***: Credit through farmer co-operatives (production services), payments per hectare of grains.

- ***Oilseeds***: Payments per hectare of oilseeds.

- ***Other crops***: Compensation of crop insurance indemnities.

- ***Fruit and vegetables:*** Seed subsidy (for the establishment of perennial fruit plantations and vineyards), support for the establishment and maintenance of perennial fruit plantations and vineyards, direct public investment in horticulture projects, credit for investment projects (greenhouses), concessions associated with leasing of greenhouses, payments per hectare of vegetables and melons, payments per hectare of fruit and berries.

- ***All livestock:*** *Ad hoc* drought measure, support for purchase of pedigree livestock, commercial loans for livestock production, credit based on funds from local governments, credit for investment projects (livestock reproduction farms), credit to micro-credit organisations, credit for purchase of breeding stock and feeds, compensation for loss from animal culling due to epizootics, write-off of tax arrears to state farms that raise pedigree livestock.

- ***Milk and beef:*** Investment in construction of industrial milk and meat production facilities, credit for acquisition of pedigree beef and milk cattle.

- ***Feed crops***: Payments per hectare of other crops.

Russian Federation

- ***All crops***: Fertiliser and agricultural chemicals subsidy (from 1993), subsidies for quality seeds and sowing, crop insurance subsidy, regional interest rate subsidy (2001-2004) and non-specified variable input and fixed-cost subsidies for the crop sector (from 2005), as well as payments for improvement of agricultural land and compensation for natural disasters.

- ***Other crops***: Seed subsidy, expenditures for preparation of low-productive arable land for cultivation of fodder crops, for maintenance of crop plantations.

- ***All livestock***: Pedigree programme, mixed feed subsidy, and non-specified variable input and fixed-cost subsidies for the livestock sector, development of family livestock farms

- ***Vegetables***: Energy subsidy for greenhouses (between 1992 and 2004).

- ***Poultry and pig meat***: Public grants for the construction and reconstruction of poultry and pig complexes (in 2003).

South Africa

- ***Horticulture***: Water quota subsidy between 1994 and 1998.

- ***Beef and veal, sheep***: Purchase loans for stock feed, subsidies for transportation of livestock and fodder, sinking of boreholes in times of drought for livestock, water transport, as well as fire damage subsidy, payments under the *Interim Natural Grazing Recovery Scheme* and subsidies for conversion of marginal lands.

Ukraine

- ***All crops***: Fertiliser subsidies and seed subsidies.

- ***Other crops***: Payments for support for orchards, vineyards and berry fields.

- ***Grains*** Programmes covering disaster relief (in 2003-04) and a chemical subsidy (in 2003).

- ***All livestock***: Fish meal subsidy (between 1986 and 1988) and payments to individual producers within the *Programme for Support to Animal Husbandry*, partial reimbursement of the cost of construction of livestock farms and complexes

- ***All except milk and meat***: Payments based on "VAT accumulation" mechanism (from 1999).

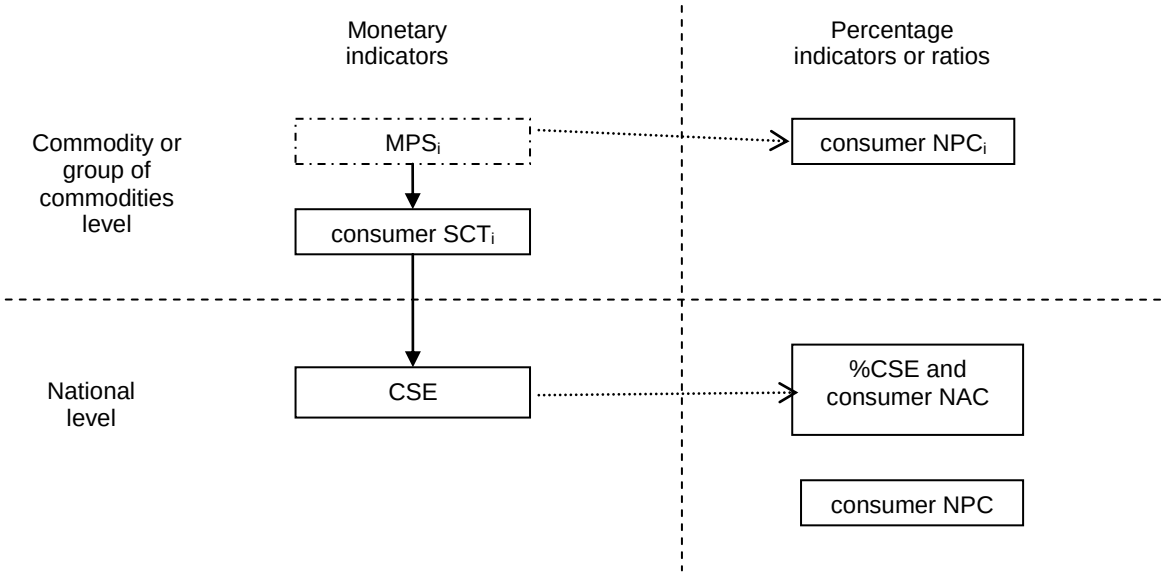
- ***Grains and oilseeds***: Interest-free cash advances for purchase of inputs (between 1994 and 1997), debt write-off on state commodity credit, and transfers arising from the restructuring of debt on state commodity credit.

Chapter 7.

CALCULATING INDICATORS OF SUPPORT TO CONSUMERS

318. In a similar way to Chapter 6, this chapter details the method for bringing the relevant transfers together to calculate the indicators of consumer support. The process begins by using the transfers calculated for Market Price Support (MPS_i) to obtain consumer single commodity transfers for individual commodities (consumer SCT_i). These are then used to calculate a Consumer Support estimate (CSE) for the country as a whole. From these nominal indicators, the relative indicators of support can then be derived, including consumer Nominal Protection Coefficients for individual commodities (consumer NPC_i) and a country (consumer NPC), as well as %Consumer Support Estimate (%CSE) and consumer Nominal Assistance Coefficient (consumer NAC).

Diagram 7.1. The procedure for calculating indicators of support to consumers



7.1. Consumer Single Commodity Transfers (consumer SCT) for individual commodities

Consumer Single Commodity Transfers **(consumer SCT):** The annual monetary value of gross transfers to consumers of agricultural commodities, measured at the farm gate level, arising from policies linked to the production of a single commodity.

- Consumer SCT values are calculated for individual commodities by adding compensatory budget payments to consumers to price transfers from consumers (PTC)

319. The process begins by calculating a consumer SCT value for each of the individual commodities for which MPS has been calculated in sub-section 6.1.1.

$$consumerSCT_i = TCT_i - (TPC_i + OTC_i) + EFC_i^{CR} \quad [7.1]$$

where: TCT_i – Transfers to Consumers from Taxpayers for commodity *i*

TPC_i – Transfers to Producers from Consumers of commodity *i*

OTC_i – Other Transfers from Consumers of commodity *i*

EFC_i^{CR} – Excess Feed Cost of commodity *i* (crop commodities only)

320. *TCT* are budgetary payments to consumers that are given for the specific purpose of compensating them for the higher prices they pay for agricultural products that result from policies that support producer prices. An example of such transfers is subsidies to the first purchasers of agricultural commodities such as mills, dairies or slaughterhouses. The *TCT* is obtained from the information on budgetary expenditures.

321. The sum of the other three components in equation 7.1 corresponds to Price Transfers from Consumers (*PTC*), explained in detail in section 4.3.

322. The information and analysis used to calculate MPS in sub-section 6.1.1 is used as the basis for carrying out these calculations, i.e. the same values for *MPD*, production, consumption, etc. are used: in the example, the *MPD* is zero in the case of oats and potatoes. As for MPS, the *TPC* value is generally the largest component of a consumer SCT for a commodity. However, instead of being added as a value transferred as support to producers, it is subtracted as a value transferred away from consumers. If consumption is greater than production, then consumers also pay the *MPD* on the remaining volume of consumption, supplied from imports (*OTC*).

323. Table 7.1 demonstrates the procedure for calculating consumer SCT for individual commodities based on the example introduced in Chapter 6. Note that the sum of *EFC* for the individual commodities (LC 22 million) in this calculation is the same as that calculated for MPS (Table 6.4), except that in this case it is added back into transfers from consumers rather than subtracted from transfers to producers.

Table 7.1. Calculation of consumer SCT for individual commodities (example)

Symbol	Description	Units	Wheat	Barley	Oats	Milk	Beef	Cotton	Potatoes	Source / equation
QP_i	Level of production	000 T	250	110	50	200	100	360	160	Data
QC_i	Level of consumption	000 T	200	150	200	300	75	400	120	Data or ($QP_i + QM_i - QX_i + STK$)
$QC_{feed\ i}$	of which quantity of crop i consumed for feed	000 T	90	110	40	-	-	-	-	Data
MPD_i	Market price differential	LC/T	170	60	0	650	500	50	0	Table 6.2
TCT_i	Transfer to consumers from taxpayers	LC million	0	0	0	50	0	10	0	Data
TPC_i	Transfers to producers from consumers	LC million	34	7	0	130	38	18	0	If $QC_i > QP_i$ then $MPD_i * QP_i$ otherwise $MPD_i * QC_i$
OTC_i	Other transfers from consumers	LC million	0	2	0	65	0	2	0	If $QC_i > QP_i$ then $MPD_i * (QCi - QP_i)$ otherwise 0
EFC^{CR}_i	Excess Feed Cost (for feed crops only)	LC million	15	7	0	-	-	-	-	$MPD_i * QC_{feed\ i}$
Consumer SCT_i	**Consumer Single Commodity Transfers**	**LC million**	**-19**	**-2**	**0**	**-80**	**-38**	**-10**	**0**	**$TCT_i - (TPC_i + OTC_i) + EFC^{CR}_i$**

7.2. Consumer Support Estimate (CSE)

***Consumer Support Estimate (CSE)*:** The annual monetary value of gross transfers from (to) consumers of agricultural commodities, measured at the farm gate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impacts on consumption of farm products.

- CSE values are calculated by adding all TCT values, extrapolated TPC and OTC values, and EFC values

324. Once consumer SCT values have been calculated for individual commodities, a national (aggregate) CSE value can be calculated by a similar method:

$$CSE_C = TCT_C - (TPC_C + OTC_C) + EFC_C \qquad [7.2]$$

325. The national (aggregate) value of transfers to consumers from taxpayers is found by adding together the value of *TCT* for all the individual commodities for which MPS has been calculated with any additional *TCT* that are provided to consumers of non-MPS commodities, that is:

$$TCT_C = \sum_{i \in AMC} TCT_i + TCT_{XE} \qquad [7.3]$$

326. National (aggregate) values for *TPC* and *OTC* are derived by extrapolating from *TPC* and *OTC* for the individual commodities according to:

$$TPC_C = \frac{\sum_{i \in AMC} TPC_i}{\sum_{i \in AMC} VP_i} \times VP_C \text{ and } OTC_C = \frac{\sum_{i \in AMC} OTC_i}{\sum_{i \in AMC} VP_i} \times VP_C \qquad [7.4]$$

where: $\sum_{i \in AMC} TPC_i$ – *TPC* for All MPS commodities

$\sum_{i \in AMC} OTC_i$ – *OTC* for All MPS commodities

$\sum_{i \in AMC} VP_i$ – value of production for All MPS commodities

327. The national (aggregate) EFC value is found by adding together the value of EFC for the individual *feed crop commodities* for which MPS has been calculated (see also Box 4.1):

$$EFC_C = \sum_{i \in AMC} EFC_i^{CR}$$

328. Table 7.2 demonstrates this procedure.

Table 7.2. Calculation of CSE (example)

Symbol	Description	LC million	Source / equation
VP_C	Total value of production (at farm gate)	2,325	Table 6.2
VP_{AMC}	Value of production of MPS commodities	1,696	Table 6.2
TCT_C	Transfers to consumers from taxpayers	70	$TCT_{AMC} + TCT_{XE}$
TCT_{AMC}	Transfers to consumers from taxpayers for MPS commodities	60	Table 7.1 (sum of TCT_i for All MPS commodities)
TCT_{XE}	Transfers to consumers from taxpayers for non-MPS commodities	10	Data
TPC_C	Transfers to producers from consumers	310	$TPC_{AMC} / VP_{AMC} * VP_C$
TPC_{AMC}	Transfers to producers from consumers of MPS commodities	226	Table 7.1 (sum of TPC_i for All MPS commodities)
OTC_C	Other transfers from consumers	95	$OTC_{AMC} / VP_{AMC} * VP_C$
OTC_{AMC}	Other transfers from consumers of MPS commodities	69	Table 7.1. (sum of OTC_i for All MPS commodities)
EFC_C	Excess Feed Cost (for feed crops only)	22	Table 7.1 (sum of EFC^{CR}_i for MPS crop commodities)
CSE	**Consumer Support Estimate**	**-313**	**$TCT_C - TPC_C - OTC_C + EFC_C$**

7.3. Percentage CSE (%CSE) and Consumer Nominal Assistance Coefficient (consumer NAC)

Percentage CSE (%CSE): CSE as a share of consumption expenditure on agricultural commodities (at farm gate prices), net of taxpayer transfers to consumers.

***Consumer Nominal Assistance Coefficient* (consumer NAC):** The ratio between the value of consumption expenditure on agricultural commodities (at farm gate prices) and that valued at border prices (measured at farm gate).

- %CSE and consumer NAC values are calculated at national (aggregate) level

329. The *%CSE* for a country is calculated by dividing the CSE by the value of consumption expenditure, i.e. value of consumption less transfers to consumers from taxpayers (*TCT*), and multiplying the result by 100. Value of consumption is adjusted for *TCT* because it effectively reduces consumer expenditure. This is expressed as:

$$\%CSE_C = \frac{CSE_C}{VC_C - TCT_C} \times 100 \qquad [7.5]$$

where: VC_C – value of consumption in country *C*

330. The national (aggregate) value of consumption is found by extrapolating the sub-total value of consumption for All MPS commodities as follows:

$$VC_C = \frac{\sum_{i \in AMC} VC_i}{\sum_{i \in AMC} VP_i} \times VP_C = \frac{\sum_{i \in AMC} (PP_i \times QC_i)}{\sum_{i \in AMC} VP_i} \times VP_C \qquad [7.6]$$

where: $\sum_{i \in AMC} VC_i$ – value of consumption for All MPS commodities

$\sum_{i \in AMC} VP_i$ – value of production for All MPS commodities

331. The value of consumption for an individual MPS commodity is derived by multiplying the producer price by the quantity of consumption. It differs from the value of production to the extent that commodities are imported or exported. Working through this formula in the example results in a %CSE of -12% (Table 7.3)

332. The consumer NAC is calculated by dividing the value of consumption by the value of consumption at border prices. Expressed algebraically:

$$consumerNAC_C = \frac{VC_C}{VC_C + CSE} \qquad [7.7]$$

333. The consumer NAC is mathematically related to the %CSE, and can be alternatively derived as:

$$consumerNAC_C = 1 - \frac{\%CSE_C}{(100 - \%CSE_C)} \qquad [7.8]$$

334. Working through this formula in the example results in a consumer NAC of 1.14.

7.4. Consumer Nominal Protection Coefficient (consumer NPC)

Consumer Nominal Protection Coefficient **(consumer NPC):** The ratio between the average price paid by consumers (at farm gate) and the border price (measured at farm gate).

- Consumer NPC values may be calculated for individual commodities and at national (aggregate) level.

335. As for the producer NPC, the consumer NPC indicator is first calculated at the individual commodity level. The results are then used to derive a national (aggregate) consumer NPC.

7.4.1. Consumer NPC for individual commodities

336. The consumer NPC for an individual commodity is derived by comparing domestic and border prices, where the domestic price is the consumer price. *Note that the consumer price is equal to producer price, which follows from the definition of consumer as a first-stage buyer of agricultural commodity.*

$$consumerNPC_i = \frac{PP_i}{RP_i} \qquad [7.9]$$

where: PP_i – consumer price of commodity *i*

RP_i – reference price of commodity *i*

337. The difference between the consumer and producer NPC is that the latter includes the per unit value of output support that is provided to producers through policies which do not affect market prices (sub-category *A.2 Payments based on output*). Table 7.4 illustrates the calculation of consumer NPC for individual commodities.

7.4.2. Consumer NPC for a country

338. As prices and quantities cannot be aggregated over a variety of different commodities, the consumer NPC for a country is calculated based on the value of transfers:

$$consumerNPC_C = \frac{VC_C}{\left(VC_C - TPC_C - OTC_C\right)} \qquad [7.10]$$

where: VC_C – total value of production for country *C*

TPC_C – total Transfers to Producers from Consumers for country *C*

OTC_C – total Other Transfers from Consumers for country *C*

339. The consumer NPC for individual commodities can also be calculated based on the transfer values method, by simply substituting in the appropriate values for the individual commodity into the equation 7.10. This is also shown in Table 7.4.

340. Table 7.5 shows the calculation of a national (aggregate) consumer NPC, which at 1.18 is exactly the same as the aggregate consumer NPC for All MPS commodities. Note that the national (aggregate) consumer NPC is lower than the producer NPC of 1.20 – the difference is due to the payments based on output received by producers, which represent transfers from taxpayers and not from consumers.

7.4.3. Consumer NPC for other commodities

341. A consumer NPC for "other commodities" can also be calculated. This is based on the value method rather than the price method as an average price for the set of "other commodities" cannot be calculated. To obtain the necessary values for other commodities representing non-MPS commodities, values for all MPS commodities for which MPS has been calculated are subtracted from the national (aggregate) values:

$$consumerNPC_{XE} = \frac{(VC_C - \sum_{i \in AMC} VP_i)}{\left((VC_C - \sum_{i \in AMC} VC_i) - (TPC_C - \sum_{i \in AMC} TPC_i) - (OTP_C - \sum_{i \in AMC} OTP_i)\right)} \quad [7.14a]$$

For other commodities representing other than standard MPS commodities, values for the standard MPS commodities for which MPS has been calculated are subtracted from the national (aggregate) values:

$$consumerNPC_{OC} = \frac{(VC_C - \sum_{i \in SMC} VP_i)}{\left((VC_C - \sum_{i \in SMC} VC_i) - (TPC_C - \sum_{i \in SMC} TPC_i) - (OTP_C - \sum_{i \in SMC} OTP_i)\right)} \quad [7.14b]$$

342. Table 7.6 illustrates how this calculation is performed. Note that in this instance the resulting consumer NPC for other commodities (1.14) is lower than the national (aggregate) consumer NPC (1.18) because the consumer NPC derived for the standard commodities (1.21) is higher than that for national average.

Table 7.3. Calculation of %CSE and consumer NAC

(example)

Symbol	Description	Units	Value	Source / equation
VP_C	Total value of production (at farm gate)	LC million	2,325	Table 6.2
VP_{AMC}	Value of production of MPS commodities	LC million	1,696	Table 6.2
VC_C	Total value of consumption (at farm gate)	LC million	2,628	$VC_{AMC} / VP_{AMC} * VP_C$
VC_{AMC}	Value of consumption of MPS commodities	LC million	1,917	Table 7.4 (sum of VC_i of All MPS commodities)
CSE_C	Consumer Support Estimate	LC million	-313	Table 7.2
TCT_C	Transfers to consumers from taxpayers	LC million	70	Table 7.2
$\%CSE_C$	**Percentage Consumer Support Estimate**	**%**	**-12**	**$CSE_C / (VC_C - TCT_C) * 100$**
Consumer NAC_C	**Consumer Nominal Assistance Coefficient**	**Ratio**	**1.14**	**$VC_C / (VC_C + CSE_C)$**
				$1 - \%CSE_C / (100 + \%CSE_C)$

Table 7.4. Calculation of consumer NPC for individual commodities

(example)

Symbol	Description	Units	Wheat	Barley	Oats	Milk	Beef	Cotton	Potatoes	Source / equation
QC_i	Level of consumption	000 T	200	150	200	300	75	400	120	Table 7.1
PP_i	Producer price (at farm gate)	LC/T	2 060	1 260	1 040	2 000	2 500	500	1 000	Table 6.3
RP_i	Reference Price (at farm gate)	LC/T	1 890	1 200	1 040	1 350	2 000	450	1 000	Table 6.3
TPC_i	Transfers to producers from consumers	LC million	34	7	0	130	38	18	0	Table 7.1
OTC_i	Other transfers from consumers	LC million	0	2	0	65	0	2	0	Table 7.1
VC_i	Value of consumption (at farm gate)	LC million	412	189	208	600	188	200	120	**$PP_i * QC_i$**
Consumer NPC_i	**Consumer NPC_i**	**Ratio**	**1.09**	**1.05**	**1.00**	**1.48**	**1.25**	**1.11**	**1.00**	**PP_i / RP_i or**
										$VC_i / (VC_i - TPC_i - OTC_i)$

Table 7.5. Calculation of a national (aggregate) consumer NPC (example)

Symbol	Description	Units	All MPS commodities (AMC)	National (aggregate) (C)	Source / equation
VC_i	Value of consumption (at farm gate)	LC million	1,917	2,628	Table 7.3
TPC_i	Transfers to producers from consumers	LC million	226	310	Table 7.2
OTC_i	Other transfers from consumers	LC million	69	95	Table 7.2
Consumer NPC_i	**Consumer NPC_i**	**Ratio**	**1.18**	**1.18**	**VC_i / (VC_i - TPC_i - OTC_i)**

Table 7.6. Calculation of consumer NPC for Other Commodities (example)

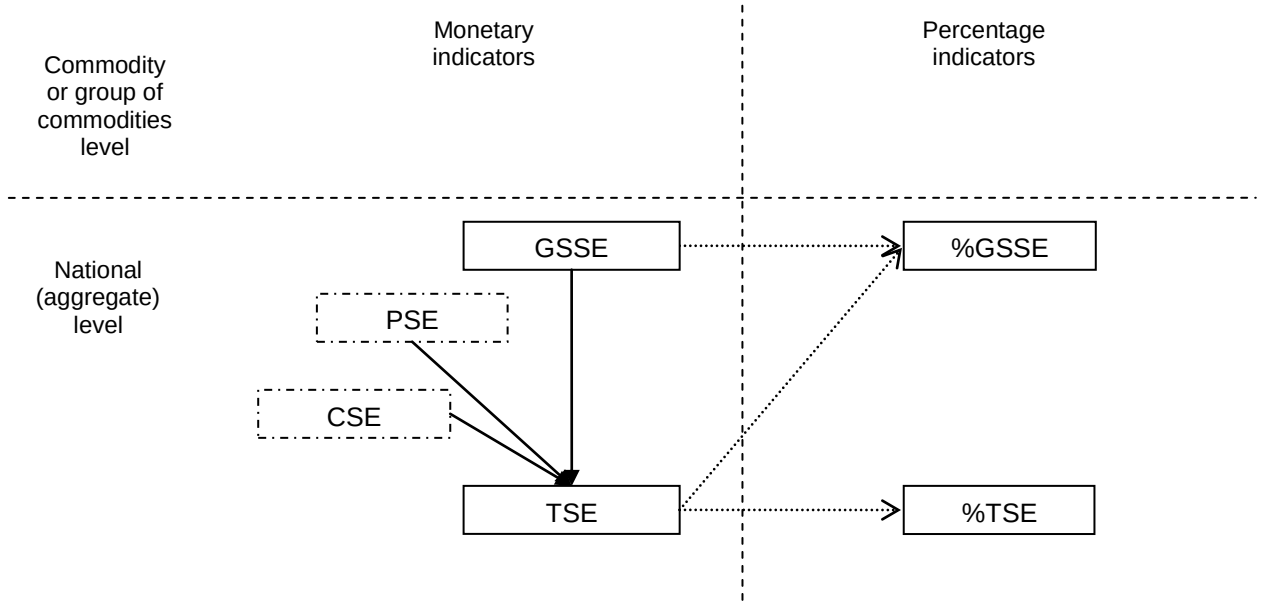
Symbol	Description	Units	National (aggregate) (C)	All MPS commodities (AMC)	Standard MPS commodities (SMC)	Non -MPS commodities (XE)	Other commodities (OC)	Source / equation
VC_i	Value of consumption (at farm gate)	LC million	2,628	1,917	1,597	711	1,031	VC_C: Table 7.5; VC_{AMC}, VC_{SMC}: Table 7.4 $VC_{XE} = VC_C - VP_{AMC}$ $VC_{OC} = VC_C - VP_{SMC}$
TPC_i	Transfers to producers from consumers	LC million	310	226	208	84	102	TPC_C: Table 7.5; TPC_{AMC}, TPC_{SMC}: Table 7.4 $TPC_{XE} = TPC_C - TPC_{AMC}$ $TPC_{OC} = TPC_C - TPC_{SMC}$
OTC_i	Other transfers from consumers	LC million	95	69	67	26	28	OTC_C: Table 7.5; OTC_{AMC}, OTC_{SMC}: Table 7.4 $OTC_{XE} = OTC_C - OTC_{AMC}$ $OTC_{OC} = OTC_C - OTC_{SMC}$
Consumer NPC_i	**Consumer NPC_i**	**Ratio**	**1.18**	**1.18**	**1.21**	**1.18**	**1.14**	**VC_i / (VC_i - TPC_i - OTC_i)**

Chapter 8.

CALCULATING INDICATORS OF SUPPORT TO GENERAL SERVICES AND TOTAL SUPPORT TO AGRICULTURE

343. This chapter explains the calculation of indicators that measure support provided to producers through general services to agriculture, and that provided to the sector as a whole. The procedure for calculating these indicators is summarised in Diagram 8.1. The process begins by calculating the General Service Support Estimate (GSSE) (section 8.1). This is combined with the value of transfers calculated in the PSE and CSE to calculate the Total Support Estimate (TSE), with care taken to avoid double-counting of transfers (section 8.2). From these two absolute indicators, the relative indicators of support, the %GSSE and the %TSE are derived (section 8.3). As indicated by Diagram 8.1, these indicators are only calculated at the national (aggregate) level and not at the commodity or group of commodities level.

Diagram 8.1. The procedure for calculating indicators of consumer support



8.1. General Services Support Estimate (GSSE)

General Services Support Estimate **(GSSE):** The annual monetary value of gross transfers arising from policy measures that create enabling conditions for the primary agricultural sector through the development of private or public services, institutions and infrastructure regardless of their objectives and impact on farm production and income, or consumption of farm products. It includes policies where primary agriculture is the main beneficiary, but does not include any payments to individual producers. GSSE transfers do not directly alter producer receipts or costs, or consumption expenditures.

- GSSE values are calculated by summing the values for policy measures in categories H to N (Box 3.4)

344. The GSSE measures the value of transfers provided through policies that support producers collectively rather than as individual producers. The GSSE can be estimated as:

$$GSSE_C = \sum GSSECategory \qquad [8.1]$$

where: $GSSE_C$ – GSSE for country *C*

$GSSECategory$ - total value of transfers to GSSE category (from H to N; see Table 8.1)

345. A numerical example is presented in Table 8.1. In order to aid transparency and to assist in analysing the composition of the GSSE, the name of each policy and the resulting value of transfer are listed under the GSSE categories (from H to N) to which they have been classified according to the process set out in section 3.4.

Table 8.1. Calculation of GSSE (example)

Description	LC million	Source / equation
General Services Support Estimate (GSSE)	**140**	**H + I + J + K + L + M**
H. Agricultural knowledge and innovation system	**55**	**H1 + H2**
H1. Agricultural knowledge generation	**20**	**Sum of payments in H1**
Funding of agricultural research (institutes, grants)	13	Data
Gene banks	7	Data
H2. Agricultural knowledge transfer	**35**	**Sum of payments in H2**
Agricultural education (vocational schools, universities)	25	Data
Generic training and extension services provided to farmers (e.g. accounting rules, pesticide application)	10	Data
I. Inspection and control	**20**	**I1 + I2 + I3**
I1. Agricultural product safety and inspection	**7**	**Sum of payments in I1**
Inspection of domestically produced primary commodities	7	Data
I2. Pest and disease inspection and control	**3**	**Sum of payments in I2**
Plant pest control and eradication (control on fields)	2	Data
Animal disease control and eradication	1	Data
I3. Input control	**10**	**Sum of payments in I3**
Seed quality control	5	Data
Certification of machinery used in agriculture	5	Data
J. Development and maintenance of infrastructure	**38**	**J1 + J2 + J3 + J4**
J1. Hydrological infrastructure	**15**	**Sum of payments in J1**
Rehabilitation of irrigation infrastructure	15	Data
J2. Storage, marketing and other physical infrastructure	**13**	**Sum of payments in J2**
Construction of market facilities related to handling and marketing of primary agricultural products (e.g. silos)	4	Data
Feeder roads	9	
J3. Insitutional infrastructure	**5**	**Sum of payments in J3**
Cadastral services (agricultural land reclamation)	5	Data
J4. Farm restructuring	**5**	**Sum of payments in J4**
Early retirement schemes	5	Data
K. Marketing and promotion	**22**	**K1 + K2**
K1. Collective schemes for processing and marketing	**7**	**Sum of payments in K1**
Commodity grading schemes	3	Data
Organisation of producer groups	4	Data
K2. Promotion of agricultural products	**15**	**Sum of payments in K2**
Market campaign to promote country's products	15	Data
L. Cost of public stockholding	**5**	**Sum of payments in L**
Intervention storage of cotton	5	Data
M. Miscellaneous	**0**	**Sum of payments in M**

8.2. Total Support Estimate (TSE)

***Total Support Estimate* (TSE):** The annual monetary value of all gross transfers from taxpayers and consumers arising from policies that support agriculture, net of the associated budgetary receipts, regardless of their objectives and impacts on farm production and income, or consumption of farm products.

- TSE values may be calculated in two ways, i.e. by summing over different recipients, or over different sources

346. Two methods exist to calculate the TSE for a country, and both are used to help to ensure that all indicators of support are correctly calculated (Table 8.2). The first method sums up the transfers distinguished by recipient, i.e. transfers ***to producers*** (*PSE*), transfers ***to general services*** (*GSSE*) and transfers ***to consumers*** from taxpayers, i.e. consumer subsidies (*TCT*):

$$TSE_C = PSE_C + GSSE_C + TCT_C \qquad [8.2]$$

347. The second method sums up the transfers distinguished by source, *i.e.* transfers ***from consumers*** (*TPC* + *OTC*) and transfers ***from taxpayers*** ((*PSE* – *TPC*) + *GSSE* + *TCT* – *OTC*), as shown in equitation 8.3 (algebraically it can be reduced to equation 8.2):

$$TSE_C = (TPC_C + OTC_C) + (((PSE_C - TPC_C) + GSSE_C + TCT_C) - OTC_C) \qquad [8.3]$$

Table 8.2. Calculation of TSE (example)

Symbol	Description	LC million	Source / equation
PSE_C	Producer Support Estimate	684	Table 6.7
$GSSE_C$	General Services Support Estimate	140	Table 8.1
TCT_C	Transfers to consumers from taxpayers	70	Table 7.2
TSE_C	**Total Support Estimate**	**894**	**$PSE_C + GSSE_C + TCT_C$**
TFC_C	Transfers from consumers	405	$TPC_C + OTC_C$
TPC_C	Transfers to producers from consumers	310	Table 7.2
OTC_C	Other transfers from consumers	95	Table 7.2
TFT_C	Transfers from taxpayers	584	$PSE_C - TPC_C + GSSE_C + TCT_C$
BR_C	Budget revenues	95	$= OTC_C$
TSE_C	**Total Support Estimate**	**1,084**	**$TFC_C + TFT_C - BR_C$ or $(TPC_C + OTC_C) + (PSE_C - TPC_C + GSSE_C + TCT_C) - OTC_C$**

348. It should be noted that both methods for calculating the TSE involve the assumption that the total value of transfers from consumers to others (*OTC*) is received as budget revenue.

8.3. Percentage GSSE (%GSSE) and Percentage TSE (%TSE)

***Percentage GSSE (%GSSE*):** Transfers to general services (GSSE) as a share of TSE.

Percentage TSE (%TSE): TSE as a share of GDP.

349. Two relative indicators of support are derived from absolute values of *GSSE* and *TSE*. The %GSSE indicates the importance of support to general services within total support. It is calculated as the percentage share of the *TSE*:

$$\%GSSE_C = \frac{GSSE_C}{TSE_C} \times 100 \qquad [8.4]$$

350. The %TSE indicates the level of total support to agriculture relative to a country's gross domestic product (*GDP*). The %TSE is found as a percent share of the value of GDP:

$$\%TSE_C = \frac{TSE_C}{GDP_C} \times 100 \qquad [8.5]$$

351. Table 8.3 presents the results of these calculations. The %GSSE is estimated at 16% while the %TSE is estimated at 1.48%.

Table 8.3. Calculation of %GSSE and %TSE (example)

Symbol	Description	Units	Value	Source / equation
$GSSE_C$	General Services Support Estimate	LC million	140	Table 8.1
TSE_C	Total Support Estimate	LC million	894	Table 8.2
$\%GSSE_C$	**Percentage General Services / Support Estimate**	**%**	**16%**	**$GSSE_C$ / TSE_C * 100**
GDP_C	Gross Domestic Product	LC million	60,500	Data
$\%TSE_C$	**Percentage Total Support Estimate**	**%**	**1.48%**	**TSE_C / GDP_C * 100**

Chapter 9.

CALCULATING INDICATORS OF SUPPORT FOR THE OECD AS A WHOLE

352. This chapter explains the procedure for calculating indicators of support for the OECD as a whole through the aggregation of support indicators for individual OECD countries. Two steps must be followed. First, monetary transfers and values of production are converted from national currencies into a common currency. Once this is done, two methods are used to aggregate the country values together, in order to validate the results. Once absolute indicators have been estimated at the OECD level, the relative indicators can be derived.

9.1. Conversion into a common currency

353. To obtain OECD total support indicators, the value of transfers and production in national currencies must be converted into a common currency. The choice of the common currency has an important impact on the results in terms of how the absolute indicators: (a) compare between countries, and (b) change from year to year. For this reason, OECD total support indicators are calculated in both US dollars and in Euros. However, the relative indicators are the same whatever common currency is chosen.

354. The conversion of local currency values into US dollar values is done as follows:

$$MV_C^{USD} = \frac{MV_C^{LC}}{XR^{LC/USD}} \qquad [9.1]$$

where: MV_C – monetary value, whether transfers or value of production, for country C

USD – US dollars

LC – local currency

$XR^{LC/USD}$ – exchange rate between local currency and USD

355. In the case of the PSE, for example, it becomes:

$$PSE_C^{USD} = \frac{PSE_C^{LC}}{XR^{LC/USD}} \qquad [9.1a]$$

356. The Euro values are derived as:

$$MV_C^{EUR} = MV_C^{USD} \times XR^{EUR/USD} \qquad [9.2]$$

where: $XR^{EUR/USD}$ – exchange rate between Euro and USD

357. Again, in the case of the PSE, it becomes:

$$PSE_C^{EUR} = PSE_C^{USD} \times XR^{EUR/USD} \qquad [9.2a]$$

9.2. Aggregation to OECD totals

358. Once the values of transfers and production have been converted into US dollars and Euros, aggregation into OECD totals is carried out. There are two complementary methods of performing the aggregation for the PSE (Diagram 9.1).

359. The first ("left-hand side") aggregation uses the PSE categories; the second ("right-hand side") uses the four indicators of commodity specificity that are derived from the PSE, i.e. summing together the producer single commodity transfers (SCT), groups of commodities transfers (GCT), all commodities transfers (ACT) and other transfers to producers (OTP). The two methods act as a cross-check validating the result of the aggregation, *i.e.* the OECD total PSE.

360. Each of these two methods can be applied in two ways: (a) aggregating monetary transfers into the OECD total at the (sub) category level and then deriving the indicators (labelled "for database" in Diagram 9.1); and (b) re-calculating the absolute indicators at the national level, this time in a common currency, and aggregating them into an OECD total (labelled "for cross-checking" in Diagram 9.1). The former provides all the necessary details to break down the OECD total absolute indicators into their components, such as PSE categories or indicators of commodity specificity. For this reason, it is used to derive the OECD total PSE, and is explained in detail below for each of the two methods. In practice, the second possibility is also used to cross-check the results of both methods.

9.2.1. Aggregation based on PSE categories

361. In this method, the PSE sub-categories and categories are summed up for all countries. Using values expressed in US dollars as the example, this can be expressed as:

$$PSE(sub)Category_{OECD}^{USD} = \sum PSE(sub)Category_{C}^{USD} \quad [9.3]$$

362. For example, in the case of PSE category A, payments based on commodity outputs (*CO*) are:

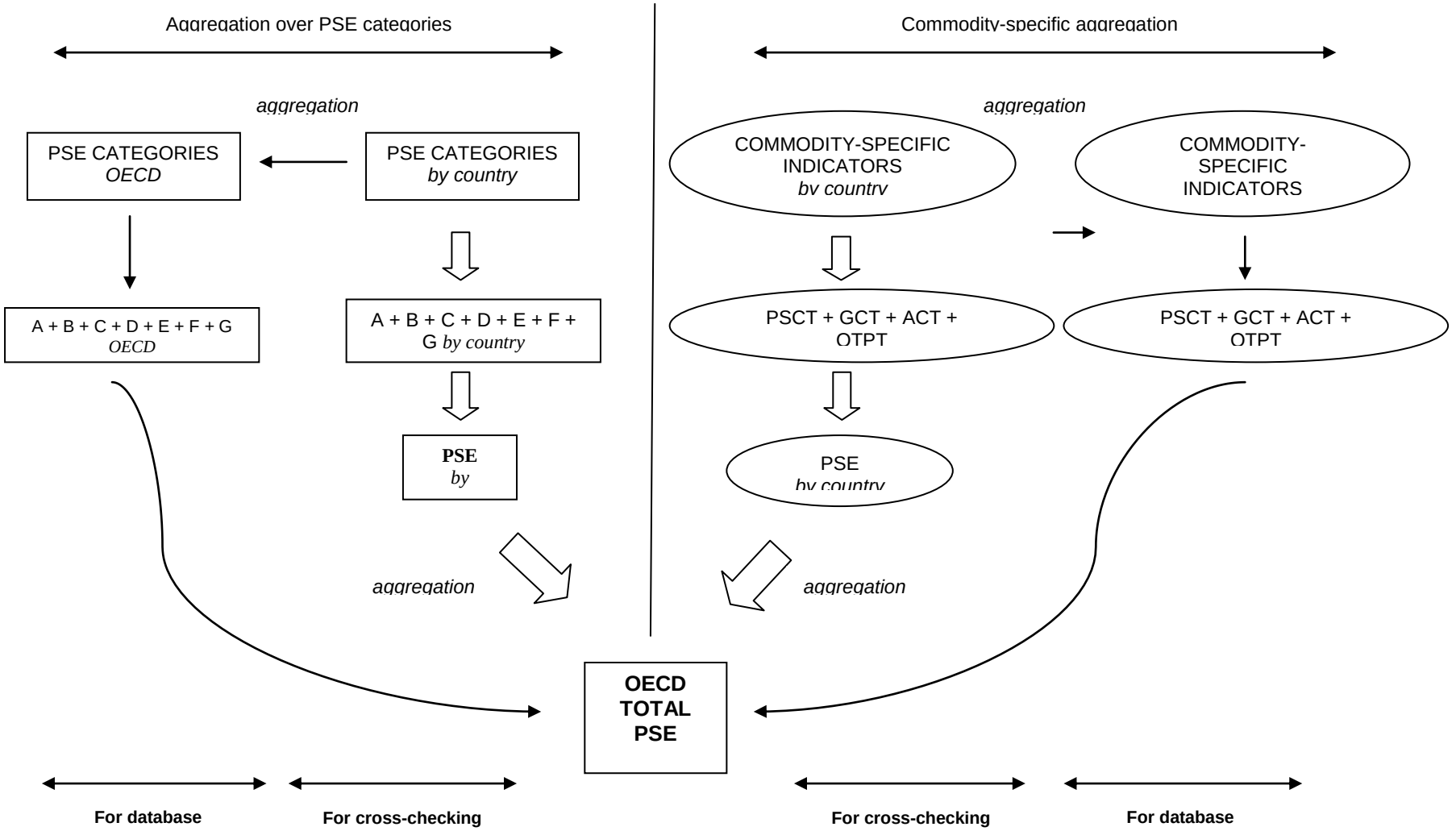
$$CO_{OECD}^{USD} = MPS_{OECD}^{USD} + PO_{OECD}^{USD} = \sum MPS_{C}^{USD} + \sum PO_{C}^{USD} \quad [9.4]$$

363. Once all country sub-categories and categories have been aggregated together, the OECD total PSE is calculated using the same formula as for individual countries:

$$PSE_{OECD}^{USD} = \sum PSECategory_{OECD}^{USD} \quad [9.5]$$

364. A similar procedure is followed for deriving the OECD total GSSE and CSE indicators, i.e. OECD values are first calculated for each of the various GSSE categories and for the various categories of transfers in the CSE, before being added together to derive the OECD total GSSE and CSE indicators.

Diagram 9.1. The procedure for calculating the OECD total PSE



9.2.2. Aggregation based on degree of commodity specificity

365. In this method, the four indicators of commodity specificity are aggregated over countries. This method does not apply to GSSE and CSE. The procedure begins by calculating an OECD total producer SCT value for each of the standard MPS commodities as follows:

$$producerSCT^{USD}_{SMC,OECD} = \sum producerSCT^{USD}_{SMC,C} \quad [9.6]$$

where: *SMC* – standard MPS commodity

366. An OECD total producer SCT for Other Commodities (producer SCT_{OC}) is also calculated by a similar process:

$$producerSCT^{USD}_{OC,OECD} = \sum producerSCT^{USD}_{OC,C} \quad [9.7]$$

367. From equations 9.6 and 9.7, the OECD total producer SCT is:

$$producerSCT^{USD}_{OECD} = \sum_{sc} producerSCT^{USD}_{SMC,OECD} + producerSCT^{USD}_{OC,OECD} \quad [9.8]$$

368. The OECD total GCT, ACT and OTP indicators are similarly calculated:

$$GCT^{USD}_{OECD} = \sum GCT^{USD}_{C} \quad [9.9]$$

$$ACT^{USD}_{OECD} = \sum ACT^{USD}_{C} \quad [9.10]$$

$$OTP^{USD}_{OECD} = \sum OTP^{USD}_{C} \quad [9.11]$$

369. Once all four indicators of commodity specificity are calculated, they can be summed to an OECD total PSE as follows:

$$PSE^{USD}_{OECD} = producerSCT^{USD}_{OECD} + GCT^{USD}_{OECD} + ACT^{USD}_{OECD} + OTP^{USD}_{OECD} \quad [9.12]$$

370. The final step is to compare and validate the results. If both methods result in the same OECD total PSE, the TSE for the OECD as a whole is calculated. Once the absolute indicators have been computed at the OECD level, the relative indicators are calculated, using the various formulas contained in Chapters 6, 7 and 8.

Chapter 10.

DATA AND INFORMATION REQUIREMENTS FOR CALCULATING THE INDICATORS

371. This chapter lists the data and information requirements for calculating the indicators of support, drawing on the methodology detailed in the previous chapters of Part II. Its purpose is to assist those involved in calculating indicators, whether Secretariat staff, Member country governments, independent researchers, etc., in gathering the necessary information which may be needed from a wide range of sources.

372. The indicators are calculated on an annual basis. The time scale (i.e. the number of years) over which the indicators are calculated will, accordingly, increase the quantity of information required.

10.1. Requirements for calculating price transfers

373. Information required on the ***domestic market***:

- Value and volume of production information for individual commodities and total agriculture at the farm gate level.
- Producer (farm gate) prices, clearly indicating the unit that it is based on. For consistency within the transfer calculation, either the value of production is found by multiplying quantity by price, or alternatively the value is divided by quantity to derive a producer price.
- In the case of cereals that are used for feed, separate production and prices are required for product used as feed and that used for food, e.g. the PP for wheat is often the weighted average price of wheat used for feed and wheat used for food.
- Consumption data is also required. This can be obtained directly, or as a result of adding the volume of production and imports and subtracting imports, ensuring that the same product weight basis is used.
- Quantities of product used for feed use in the livestock sector – divided into type of feed and the livestock commodities which involve use of the feed.

374. Sources that can be used to obtain information related to ***marketing margins*** include:

- Estimations published by national authorities. However, such data are relatively rare, since the information is often commercially sensitive.
- Estimations obtained on a regular but often ad hoc basis from national authorities, commodity boards, major cooperatives, industry organisations or major private processing companies. For example, OFIVAL in France has estimated the processing costs of abattoirs based on survey data.
- Estimating the marketing margin as the difference between the producer price and an average wholesale price in the country considered. However, this type of estimation leads to very variable margins, and it may be appropriate to use a moving average margin for several years. This option is less preferable than the previous two.

- Using marketing margins available in other countries if no domestic information is available. This is the case when the milk reference price is estimated in importing countries, which is adjusted by subtracting the average margin in four main exporting countries (Annex 4.1). EU marketing margins for certain products are used for several non-EU European countries.

375. ***Trade data*** includes:

- Values and volumes for both exports (*FOB*) and imports (CIF) of agricultural commodities and products.
- Tariff schedule for the country – to understand the profile of tariffs imposed on imports.
- Export subsidy budgetary information.
- Exchange rates – information on official exchange rates, on an annual basis, and, if relevant, on a monthly basis so that any seasonal calculations can be made.

10.2. Requirements for calculating budgetary and other transfers

376. Data on ***budgetary transfers*** related to the implementation of agricultural policies is based on official budgetary information on the execution of national budgets and reports by relevant agencies. The majority of this information is publicly available on the internet sites of the ministries of finance, agriculture and central banks of the countries concerned. Administrative databases which provide detailed information on current expenditures by programmes also exist within the ministries, often on a monthly basis. These help to adequate allocation of payments to calendar years. However, this information is not publicly available.

377. Care should be exercised when budgetary information is compiled from several sources. Some sub-national expenditures may be reported both independently and as part of the expenditures made at higher administrative levels. Another case warranting caution in order to avoid double-counting is where data on the budgetary outlays is compiled through combination of sources reporting the public spending by agencies and by specific programmes/activities. It is generally preferable to use a single source of budgetary information; however, this does not often provide sufficient detail on the budgetary spending, thus making it necessary to use several sources. It is therefore important to understand the composition of the budgetary data reported in various sources used. Sources on agricultural budgetary spending may be found in the country-specific documentation (*Definitions and Sources*) available on OECD public website www.oecd.org/agriculture/pse.

378. Estimation of ***support based on revenue foregone*** demands recourse to official documents describing the relevant mechanisms. For example, to estimate transfers related to preferential lending, official documents (regulations) are required describing the conditions of lending, including time terms of loans, repayment schedules and interest rates applied. In the case of debt rescheduling, all relevant government decisions outlining the conditions and schedules for repayments should be used. Information on preferential interest rates is usually available from the Ministry of Agriculture and banks involved in preferential lending. Information on market (reference) interest rates is usually published by the central banks. Ministries and agencies dealing with macro-economic issues typically provide various price and financial data.

379. Support based on revenue foregone presents a particular difficulty in terms of achieving consistency across countries (e.g. as is the case of tax concessions) because these transfers are not always measured or reported.

Chapter 11.

INTERPRETING THE INDICATORS

380. The OECD indicators of agricultural support can be used to assess both the level and the composition of support that arise from policies supporting agriculture.[18] The level of producer support and its composition is the information most commonly utilised. This chapter shows how the indicators can be used to interpret developments in the level of producer support, and how the composition of producer support can be shown in terms of the categories (and sub-categories) into which policies are classified and the labels attached to these policies, including the degree of commodity specificity. The level and composition of support to the agricultural sector as a whole can be evaluated through the TSE.

11.1. Interpreting the level of support

- The three main indicators of support to individual agricultural producers are %PSE, producer NAC and producer NPC (Box 2.1).
- In order to interpret the level of support, these relative indicators are preferred to monetary indicators, particularly when comparing changes over time and between countries.
- The %PSE indicates the extent to which transfers increase gross farm receipts.
- The contribution analysis helps explain the annual changes in producer support by identifying the source of changes in the various components.

11.1.1. Level of producer support – national (aggregate) level

381. Three main indicators are used to show the level of support provided to individual agricultural producers at the national (aggregate) level: %PSE, producer NAC, and producer NPC. These percentage and ratio indicators show, in aggregate, the importance of agricultural support relative to producer receipts or border prices. Such relative indicators are generally used in preference to the monetary indicators, since they are not affected by the size and the structure of the agricultural sector as a whole, by the relative importance of commodities within the sector, or by the rate of inflation. They thus allow greater comparability over time, across countries and between commodities within a country (Box 11.1).

382. A %PSE of 20% means that the estimated total value of policy transfers to individual producers from consumers and taxpayers represents 20% of total gross farm receipts[19], or, alternatively, that 20% of gross farm receipts come from transfers due to policy measures supporting producers. A %PSE of 0% indicates that the estimated aggregate value of transfers to individual producers from consumers and

18. The most recent set of indicators found in the indicator database should be used to build a database series (www.oecd.org/tad/support/psecse). The current set of indicators is significantly different from those published in the late 1980s and early 1990s. To maintain consistency, the indicators have been recalculated back to 1986 whenever a significant change in methodology has occurred

19. Recall that gross farm receipts is the value of production, plus Budgetary and Other Transfers provided to producers (*i.e.* VP + BOT).

taxpayers is zero.[20] A %PSE cannot be higher than 100%, at which level all farm receipts come from policy measures, with no returns from the market.

Box 11.1. Use of %PSE in evaluating annual changes in agricultural support for the OECD area as a whole

The PSE, the total monetary value for the estimated policy transfers to producers, is expressed in the local currency of each country. It must be converted into a common currency to allow aggregation into total PSE for the OECD area as a whole. Consequently, the year-on-year variation in the total level of transfers denominated in a single currency will result from both changes in the level of transfers measured in each national currency and exchange rate movements.

The OECD total value of agricultural policy transfers to producers, as measured by the PSE, increased slightly in USD – from USD 257 billion in 2006 to USD 258 billion in 2007 (OECD, 2008b). In contrast, when expressed in Euros, the OECD total PSE declined markedly – from EUR 205 billion in 2006 to EUR 189 billion in 2007. What can one conclude about the change in the level of support between 2006 and 2007 based on these differing results?

The most appropriate measure to compare changes in the level of support in the OECD as whole is the %PSE, which expresses the value of policy transfers as a share of gross producer receipts. The latter represent the market value of agricultural output to which are added transfers to producers from taxpayers.

The %PSE solves the problem of exchange rate choice because the same exchange rates are used to convert both the denominator and the numerator into a single currency. Consequently, the %PSE is the same regardless of the currency.

As a relative measure, the %PSE also provides a sense of the importance of policy-induced transfers in the sector and is also appropriate for comparisons among OECD countries.

The %PSE is a relative indicator and its value also depends on changes in the value of agricultural output. In this respect, a reduction in support may not always lead to a smaller %PSE if the fall in the value of output is greater than the reduction in support. A fall in output value (and volume) may have various causes, for example, natural factors, such as a climate-related disaster, or an outbreak of animal disease. A reduction in the output value may also theoretically reflect policy developments. This fall may, for example, be associated with the reduction in the level of support as a result of policy reform, and/or a change in composition of support, such as a shift away from payments directly coupled to output.

The changes in the %PSE tend to be sensitive to the initial level of the indicator, i.e. at high levels of %PSE a given reduction in the absolute PSE will lead to a smaller change in the %PSE, compared to when the initial level of the %PSE is low.

383. A producer NAC of 1.2 indicates that the estimated aggregate value of transfers to individual producers from consumers and taxpayers in the country increases gross farm receipts by 20% above what they would be if production is valued at border prices and with no other support. A producer NAC of 1 indicates that the estimated aggregate value of transfers to individual producers from consumers and taxpayers is zero. A producer NAC of 4 indicates that gross farm receipts are four times, or 300%, higher than if production is valued at border prices (Box 11.2).

384. Producer NPC measures the level of domestic market protection; it compares domestic market and border price and adds in the value of support provided through payments based on output. A producer NPC of 1.2 for a country indicates that domestic producer prices are on average 20% above border prices for the same commodities. A producer NPC of 1 indicates that prices received by producers are on average

20. This does not necessarily mean that there are no transfers to individual producers from consumers and taxpayers within the country; it could be that transfers to producers through support policies in one sector are offset by transfers from producers that result from policies which implicitly tax producers in another sector. This may occur, for example, when the oilseed sector is supported through import tariffs and direct deficiency payments, while the grain sector is taxed through export duties (resulting in negative policy transfers).

the same as border prices.[21] A producer NPC of 4 indicates that farm-gate prices are on average four times, or 300%, higher than border prices.

Box 11.2. Comparing changes in the %PSE and producer NAC

While the %PSE and producer NAC are complementary measures that always move in the same direction, the %PSE is more sensitive to changes in support levels when support is low relative to receipts, whereas the NAC is more sensitive to changes in market receipts when support is high. In order to understand changes in policy support over a broad range of support levels, both measures should be considered.

The %PSE is the share of the PSE in total receipts, and so measures the ratio of the PSE to total receipts, including both market receipts and support transfers:

$$\%PSE = \frac{PSE}{Y + PSE}$$

where Y equals market receipts at border prices, *i.e*. excluding market price support (i.e. VP – MPS). The PSE includes MPS, so Y excludes it to avoid double-counting. The %PSE approaches the value of 100 as the PSE gets large relative to Y. When the PSE is large relative to market receipts, changes in the PSE will move the %PSE by a relatively small amount, since the change in PSE impacts both the numerator and denominator of the ratio that defines the %PSE. As a result, the %PSE is relatively insensitive to PSE changes when the PSE is significantly larger than Y. For example, a %PSE value of 75 indicates a situation where the PSE is three times the level of market receipts. To reduce the %PSE from 75 to 66, i.e. by nine percentage points, either the PSE has to reduce by half, or market receipts must increase by 50%

The producer NAC is the extent to which receipts come from the market place, and so measures the ratio of total receipts to market receipts:

$$producerNAC = \frac{Y + PSE}{Y}$$

The NAC approaches a value of 1 as the PSE becomes small relative to market receipts. When the PSE is large relative to Y, changes in the PSE will change the NAC by the same magnitude, but changes in market receipts can bring about large changes in the NAC (consider the denominator of the equation to see why this is so). For example, for the same situation described above where the PSE is three times the level of market receipts (a %PSE of 75%), the NAC has a value of 4, reflecting a situation where total receipts are 400% of the market receipts. Increasing market receipts by 50% would reduce the NAC to 3, a reduction of 100 percentage points and 25% of the value of the indicator.

385. Table 11.1 and Figure 11.1 illustrate how the changes in the level of support to producers over time can be shown for a country through the PSE expressed in monetary terms (in local and common currencies), in percentage terms and through related producer support indicators, NAC and NPC (Box 11.3).

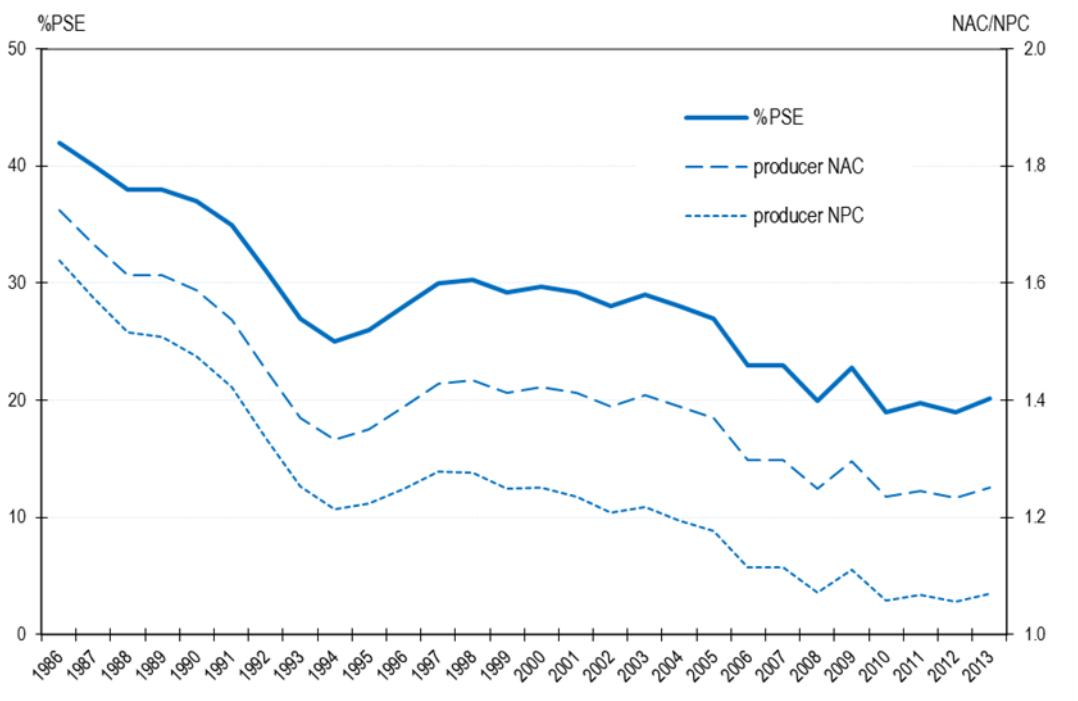
386. The indicators show that, while the aggregate value of transfers to producers (PSE) in national currency has increased, the level of producer support, as a share of gross farm receipts (%PSE), has fallen from 40% in 1986-88 to 20% in 2011-13 – a decline of one-half. In 1986-88, transfers arising from support policies increased farm receipts by 67% above what they would have been if production is valued at border prices. By 2011-13, farm receipts were only 25% higher due to support policies. The producer NPC indicates that prices received by producers were on average 40% higher than border prices in 1986-88. By 2011-13, the gap had fallen by 75%, so that prices received by producers are now on average only 10% higher than border prices.

21. As for the %PSE and producer NAC, a producer NPC of 1 for a country does not necessarily mean that all producers are receiving prices equivalent to border prices; it could be that producer prices for some commodities are higher than border prices, while they are lower for others.

Table 11.1. Indicators of producer support (example)

Indicators	1986-88 average	2011-13 average
PSE (Local Currency million)	7,500	8,000
PSE (USD million)	6,200	6,500
PSE (EUR million)	5,500	5,300
%PSE	40	20
Producer NAC	1.67	1.25
Producer NPC	1.4	1.1

Figure 11.1. Evolution of %PSE, producer NAC and producer NPC (example)



Box 11.3. Showing changes in support over time

Two methods are used to show changes in both the level and composition of support over time. These are done in either tabular or graphical form. The first method is to simply show an annual series of indicators over an extended time period. Viewing developments over the long term allows both general trends and year-to-year fluctuations to be observed.

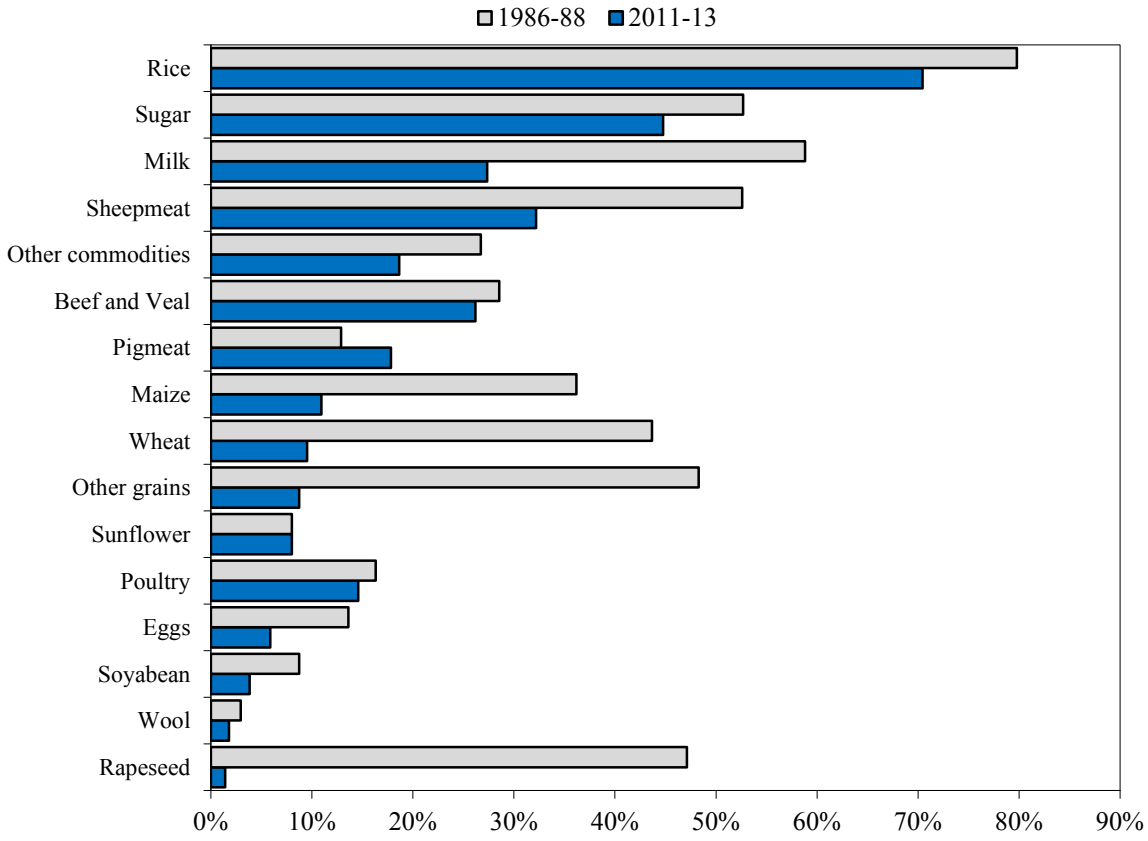
The second method involves comparing three-year averages and the selection of an appropriate base period from which to reference changes. A three-year average reduces some of the year-to-year variability in support levels that arise due to fluctuations in world prices, exchange rates, etc. For OECD countries generally, the reference period is 1986-88; a period of relatively high support, and the WTO Uruguay Round base period for domestic support reduction commitments for developed countries; this predates most of the substantial agricultural reforms that have taken place. Consequently, in presenting the results in the annual *Agricultural Policies in OECD Countries* in tabular form, a column with the indicator values for the 1986-88 period is included alongside the most recent three-year period. In graphical form it shows two columns or bars, one representing 1986-88 and the other the most recent period.

For other countries, different base periods may be more appropriate. For example, for monitored non-OECD countries such as Brazil, China, Russian Federation, South Africa and Ukraine, the period 1991-93 is considered to be a more appropriate benchmark given the radical political and economic changes that took place in these countries in the late 1980s and early 1990s. For Mexico, it is also sometimes more appropriate to compare with the 1991-93 period, given the negative support levels that existed in the mid-1980s when farmers were effectively "taxed" by government policies.

11.1.2. Level of producer support – commodity level

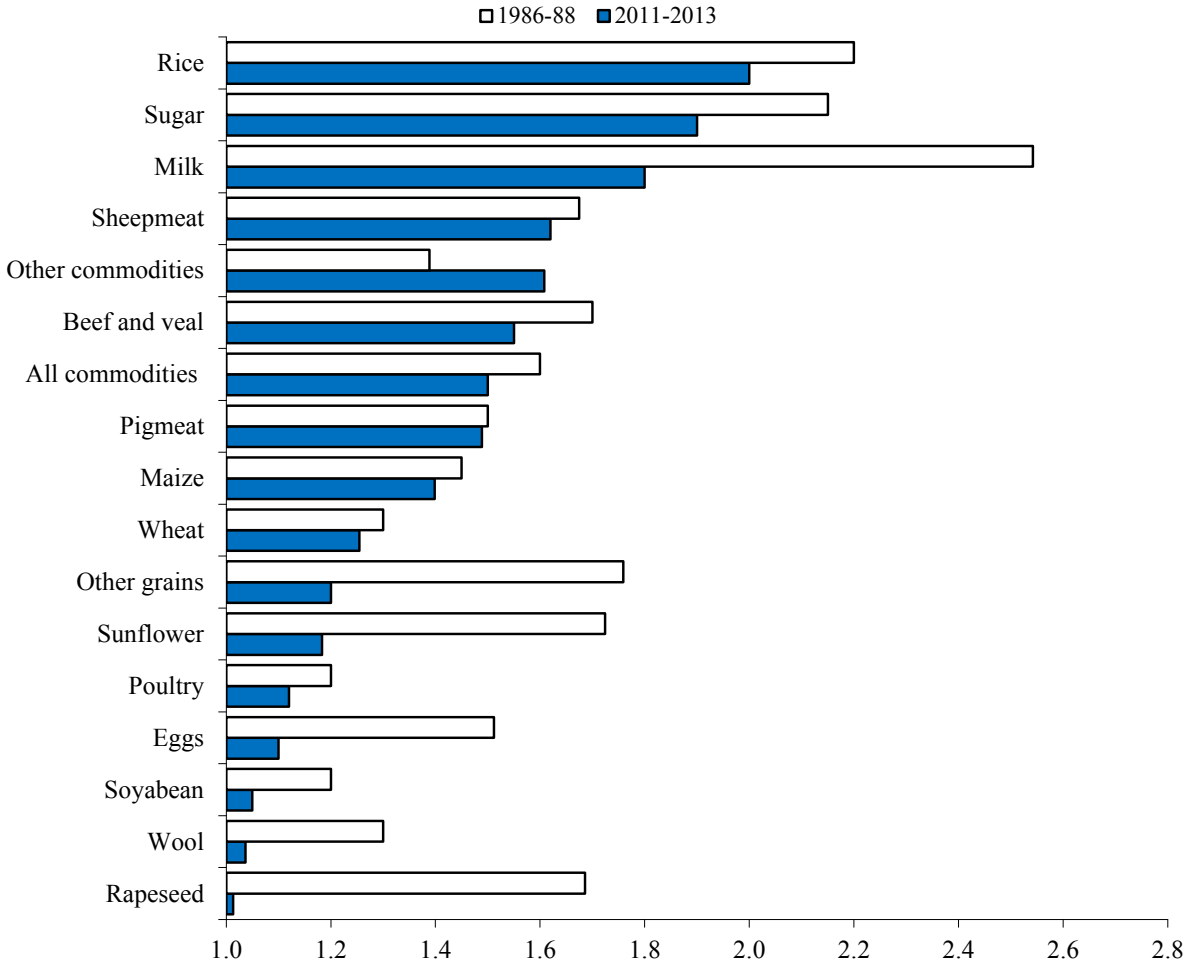
387. The previous sub-section examined indicators of producer support at the country or national (aggregate) level. Two indicators of the level of support are calculated at the individual commodity level: %SCT and producer NPC. The %SCT measures the extent to which production of an individual commodity is required to receive support. Comparing %SCT values across a range of commodities provides an indication of the degree to which support is directly linked to production of these specific commodities. Figure 11.2 shows how the results can be presented for a country, showing changes in the %SCT from a base period. It can be quite clearly seen that in the long term the reduction in transfers to a single commodity has not been uniform across commodities.

Figure 11. 2. Producer %SCTs by commodity (example)



388. A producer NPC can also be calculated at the individual commodity level. As discussed above, the producer NPC shows the level of domestic market protection by comparing domestic prices (including direct per tonne payments) to border prices. The reduction in the level of price support is shown by the producer NPC for each commodity. A producer NPC of 20% indicates that domestic prices for a given commodity are on average 20% above border prices. Again, these can be graphed for each commodity, and between time periods (Figure 11.3).

Figure 11.3. Producer NPCs by commodity (example)



Commodities are ranked according to 2011-13 NPC values.

11.1.3 Level of producer support – contribution analysis

389. While percentage and ratio indicators can provide a good picture of the level of support to producers and how this level has changed over time, they do not explain why the changes have occurred. In-depth policy analysis requires some examination as to what has caused the change in support levels.

390. Changes in support levels may be due to several factors, the most obvious being variations in agricultural policy settings. However, changes in international conditions can also make an important contribution to measured fluctuations in the PSE, even in the absence of changes in domestic agricultural policy settings. The variability of border prices for agricultural commodities and changes in exchange rates are often the most important contributors to fluctuations in the Market Price Support component of the PSE (Box 11.4).

Box 11.4. Why does the PSE change when world prices change?[1]

Support levels as measured in the PSE framework tend to fluctuate over time, a large part of which can be attributed to fluctuations in the MPS component of the PSE.

The calculation of the MPS for a given commodity is based on the gap between the producer price (at the farm gate) and the border price equivalent (adjusted for marketing margins) in the country concerned. The major source of fluctuations in the MPS is the variability of world market prices for agricultural commodities. Another source is variability of exchange rates, as world market prices (at the border) and domestic prices have to be expressed in the same currency.

The PSE indicator reflects the nature of policy and the changes in support due to policy. It is tempting to think that the indicators should remain constant if policy settings have not changed. However, by picking up the variability of world market prices and exchange rates, the PSE rightly reflects the policy design characteristics that lead to a dependence of support levels on market developments. Fluctuations in policy transfers arise from fixed domestic support prices that are sustained through border instruments and that impede the full transmission of changes in world market prices to the domestic market. In the absence of price support policies, the producer price would be aligned with the border price (adjusted for marketing margins), and would therefore move up and down with changes in world market prices and exchange rates.[2]

There are different policies regarding the transmission of world market changes to the domestic market, and the MPS properly reflects such differences. For example, if an importing country has only an ad valorem tariff, then its domestic market price moves up and down with the world market price (although domestic prices remain higher than those on the world market) and hence the PSE would show no fluctuation (as long as no other policy instruments had changed), since the gap between border and domestic prices remains constant.

The fact that over time the MPS in the above case behaves differently than that of a country maintaining a constant domestic support price with some border mechanism to sustain it, is an appropriate reflection of differences in policy implementation. Similarly, a country providing a deficiency payment (a payment based on output) to maintain a constant domestic target price makes smaller budget expenditures when the border price is high (including due to exchange rate variations), and vice versa. In this case, the PSE calculations will show a variable level of domestic output payments, rather than of MPS.

In brief, the PSE is an indicator of the transfers associated with agricultural policies, including those resulting from keeping producer prices in the domestic market stable while world market prices and exchange rates fluctuate. The indicator provides an equivalent measurement of all types of policies that insulate producer prices from market fluctuations. In particular, the method treats market price support and deficiency payments in the same way.

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1. For a more elaborate discussion on this topic see Tangermann, 2005.

2. In the reality of complex market situations, pass-through of a given change in the border price to the domestic market may take some time. However, this does not change the fundamental point that in the absence of price support policies or other barriers, domestic market prices would fluctuate along with international prices and exchange rates.

391. The ***contribution analysis*** carried out by the OECD helps to interpret changes in the level of producer support from one year to another by mathematically isolating the impact of both the explicit and implicit components of agricultural support. It answers the question "what would be the impact of a policy component if all other policies were held fixed, *ceteris paribus*?" For example, what is the contribution of exchange rate to the observed change in the reference price? The analysis can be conducted for a given country or for the OECD as a whole, and can include one, several or all commodities. This discussion focuses on contribution analysis for individual countries and the OECD as a whole. The contribution analysis is carried out separately for the PSE and MPS elements, as shown below.

392. For individual countries, the contribution analysis is based on data expressed in national currency. To aggregate the PSE to an OECD level, a common currency must be chosen (section 9.1), leading to a systematic dependence on the currency chosen.

393. To mitigate this dependence, the contribution analysis calculates the annual percentage change in the OECD total PSE as an index of individual country PSE changes (in national currencies) weighted by the shares of the country PSEs in the OECD total PSE in the previous year. Similarly, the annual

percentage change in the OECD total MPS is a weighted average of country MPS changes, with the weights being the shares of country MPS in the OECD total MPS in the previous year. An important feature of this weighting scheme is that countries (and commodities) are weighted according to their contributions to the total PSE (and MPS), rather than by their contribution to the value of production.

394. The elements of ***the PSE contribution analysis*** follow from the definition:

$$PSE_C = MPS_C + BOT_C \qquad [11.1]$$

where: PSE_C – Producer Support Estimate for country *C*

MPS_C – Market Price Support for country *C*

BOT_C – Budgetary and Other Transfers to producers for country *C*

395. The %change in the PSE can be decomposed into contributions from MPS, and budgetary and other transfers to producers respectively:

$$\%\Delta PSE_C^t = \frac{PSE_C^t - PSE_C^{t-1}}{PSE_C^{t-1}} \times 100$$

$$= \left(\frac{MPS_C^t - MPS_C^{t-1}}{PSE_C^{t-1}} \times 100 \right) + \left(\frac{BOT_C^t - BOT_C^{t-1}}{PSE_C^{t-1}} \times 100 \right) \qquad [11.2]$$

where: t – current period (year)

$t-1$ – previous period (year)

396. The first half of the equation is the contribution from MPS, while the second half is the contribution from Budgetary and Other Transfers to producers. The calculations can be done at the national (aggregate) level because all variables are expressed as monetary transfers.

397. The ***contribution from the total MPS*** to the %change in the PSE can be further decomposed into two elements: MPS per unit of output and quantity produced as follows.

$$\%\Delta MPS_C^t = \frac{MPS_C^t - MPS_C^{t-1}}{PSE_C^{t-1}} \times 100$$

$$= \left(\frac{\sum_i (MPSu_{C,i}^t - MPSu_{C,i}^{t-1}) \times \frac{QP_{C,i}^t + QP_{C,i}^{t-1}}{2}}{PSE_C^{t-1}} \times 100 \right) + \left(\frac{\sum_i (QP_{C,i}^t - QP_{C,i}^{t-1}) \times \frac{MPSu_{C,i}^t + MPSu_{C,i}^{t-1}}{2}}{PSE_C^{t-1}} \times 100 \right) \qquad [11.3]$$

where: $MPSu_{C,i}$ – unit MPS for country *C* and commodity *i*

$QP_{C,i}$ – quantity produced for country *C* and commodity *i*

398. The first half of equation 11.3 calculates the contribution to the change in MPS arising from the change in the MPS per unit of output (MPSu); the second half calculates the contribution arising from the change in quantity produced (QP). The calculations are done at the individual commodity level and then summed up to the total level, because quantities cannot be meaningfully aggregated, e.g. tonnes of wheat and tonnes of beef.

399. Equation 11.3 holds only if MPSu and QP elements exist for all commodities. However, for the aggregate "non MPS commodity" (MPS_{XE}) there are no representative prices available. As a consequence neither MPSu nor QP exists for this category (section 6.1.3) and MPS_{XE} cannot be included in the formulae above[22]. To ensure that the decomposition elements in equation 11.3 add up correctly to the overall contribution from the total MPS, $\%\Delta MPS_C^t$ (and hence cover all commodities) the following adjustment is made:

$$\%\Delta MPS_C^t = \frac{MPS_C^t - MPS_C^{t-1}}{PSE_C^{t-1}} \times 100$$

$$= \frac{1}{(1-s)}\left(\frac{\sum_i (MPSu_{C,i}^t - MPSu_{C,i}^{t-1}) \times \frac{QP_{C,i}^t + QP_{C,i}^{t-1}}{2}}{PSE_C^{t-1}} \times 100 \right) + \frac{1}{(1-s)}\left(\frac{\sum_i (QP_{C,i}^t - QP_{C,i}^{t-1}) \times \frac{MPSu_{C,i}^t + MPSu_{C,i}^{t-1}}{2}}{PSE_C^{t-1}} \times 100 \right) \quad [11.4]$$

where: s – share of the MPS_{XE} in the contribution from the total MPS

400. The ***contribution from budgetary and other transfers*** to the %change in the PSE can be further decomposed into the different categories of the PSE classification (based on output, input use, etc.) as follows:

$$\%\Delta BOT_C^t = \frac{BOT_C^t - BOT_C^{t-1}}{PSE_C^{t-1}} \times 100$$

$$= \left(\frac{PO_C^t - PO_C^{t-1}}{PSE_C^{t-1}} \times 100 \right) + \ldots + \left(\frac{PM_C^t - PM_C^{t-1}}{PSE_C^{t-1}} \times 100 \right) \quad [11.5]$$

where: PO_C – Payments based on output for country C

PM_C – Miscellaneous payments for country C

22. This also concerns fruit and vegetables in the case of Israel and flowers in the case of the European Union as there are no representative prices for these two commodities. The adjustments that follow take these two specific cases into account.

401. ***The MPS contribution analysis*** is based on the sub-total MPS value for the set of MPS commodities only (it excludes the MPS_{XE} as no representative prices are available for this category[23]). The methodology is similar to that described for the PSE above and utilises country-level data expressed in national currencies. However, instead of decomposing the total, MPS calculations are done at the individual commodity level and then aggregated into an index, using as weights the shares of MPS values for individual commodities (MPS_i) in the aggregate value of MPS commodities (MPS_{AMC}) in the previous period. This allows for a better understanding of the average contribution of MPS elements across MPS commodities.

402. The elements of the MPS contribution analysis derive from the calculation of MPS as the level of production multiplied by a per unit MPS, measured as the difference between producer and border price of an agricultural commodity measured at the farm gate and adjusted for excess feed costs:

$$MPS_i = QP_i \times MPSu_i \quad [11.6]$$

$$MPSu_i = PP_i - RP_i + \frac{EFC_i}{QP_i} \quad [11.7]$$

where: $MPSu$ – per unit MPS

403. At the individual commodity level, the formula is:

$$\%\Delta MPS_i^t = \frac{MPS_i^t - MPS_i^{t-1}}{MPS_i^{t-1}} \times 100$$

$$= \left(\frac{QP_i^t - QP_i^{t-1}}{abs(MPS_i^{t-1})} \times \frac{MPSu_i^t + MPSu_i^{t-1}}{2} \times 100 \right) + \left(\frac{MPSu_i^t - MPSu_i^{t-1}}{abs(MPS_i^{t-1})} \times \frac{QP_i^t + QP_i^{t-1}}{2} \times 100 \right) \quad [11.8]$$

where: i – individual commodity

$abs(MPS)$ – absolute value of MPS

404. The first half of equation 11.6 calculates the contribution to the change in MPS arising from the change in quantity produced; the second half calculates the contribution arising from the change in MPSu. To ensure mathematical consistency in the rare instances where MPS is negative in the reference period, the absolute value of MPS^{t-1} is applied in the denominator of the decomposition.

405. The resulting percentage changes are then aggregated to a weighted average for all MPS commodities using as weights the previous-year shares of individual commodity MPS in the sub-total MPS for MPS commodities. Using commodity MPS shares as weights gives more importance to commodities with higher MPS. An alternative weighting could be based on value of production, but this would not reflect the pattern of support which is the focus of this exercise. Expressed algebraically:

$$\overline{\%\Delta MPS_C^t} = \sum \left(\frac{MPS_i^{t-1}}{\sum_{i \in AMC} MPS_i^{t-1}} \times \%\Delta MPS_i \right) \quad [11.9]$$

23. This also concerns fruit and vegetables in the case of Israel and flowers in the case of the European Union as there are no representative prices for these two commodities.

where: $\overline{\%\Delta MPS_C^t}$ – average change of the MPS across commodities for country C

406. The calculation may result in a very high percentage change in MPS for some countries, due to either: (a) a significant change in MPS, or (b) a modest change in MPS, but a very small MPS in the base year. In the latter case, the result needs to be interpreted with care. This potential shortcoming is also present in the calculations for PSE, but is more likely to occur here because the MPS for some countries is very small or close to zero.

407. The % change in ***the reference price can be decomposed*** into the contribution of exchange-rate changes and the reference price defined in US dollars:

$$RP_i^{LC} = XR \times RP_i^{USD} \quad [11.10]$$

where: RP^{LC} – reference price in local currency

RP^{USD} – reference price in US dollars

XR – exchange rate between local currency and US dollars

408. This assumption is reasonable for countries where US dollars represent a high share of international transactions. For other countries, another currency such as the Euro would be more representative. Nevertheless, "arbitrarily" choosing the US dollar facilitates cross-country comparisons. At the commodity level, the formula is:

$$\%\Delta RP_i^t = \frac{RP_i^t - RP_i^{t-1}}{RP_i^{t-1}} \times 100$$

$$= \left(\frac{XR_i^t - XR_i^{t-1}}{RP_i^{t-1}} \times \frac{RP_i^{USD,t-1} + RP_i^{USD,t}}{2} \times 100 \right) + \left(\frac{RP_i^{USD,t} - RP_i^{USD,t-1}}{RP_i^{t-1}} \times \frac{XR_i^t + XR_i^{t-1}}{2} \times 100 \right) \quad [11.11]$$

where: RP – reference price

RP^{USD} – reference price converted to US dollars

409. As in the decomposition for MPS in equation 11.8, the results can be aggregated to a weighted average for all MPS commodities, using as weights the MPS of each commodity in the previous year[24]. Expressed algebraically:

$$\%\Delta RP_C^t = \sum \left(\frac{MPS_i^{t-1}}{\sum_{i \in AMC} MPS_i^{t-1}} \times \%\Delta RP_i \right) \quad [11.12]$$

410. The results of this contribution analysis are presented each year in the *Agricultural Policies in OECD Countries* reports (see, for example OECD, 2007; OECD, 2008b).

24. The MPS of each commodity was chosen as weights so that the results were directly comparable with the MPS decomposition where the same weights are used.

11.1.4. Expressing the level of support in real terms

411. The PSE and TSE values, expressed in national currencies in nominal terms reflect, over time, also general inflation. Further, conversion of these indicators into the US dollars or Euros and their aggregation via these rates may lead to very different findings regarding support trends, depending on whether the value of the US dollar (or the Euro) appreciates or depreciates relative to the local currency (as illustrated in Box 11.1). In years when the value of the dollar declines, aggregate PSEs expressed in dollars tend to rise, and fall if expressed in Euros.

412. Insofar as TSEs and PSEs for different years constitute transfers between farmers, taxpayers and consumers over time, it is appropriate to express these indicators in real terms. This is accomplished by deflating them by an index that accounts for inflation, such as the GDP price index, and aggregating them across the OECD area using purchasing power parities (PPPs) calculated according to the gross domestic product (GDP) of the various countries. Using this procedure, it is estimated that the PSE for the OECD area as a whole dropped in real terms by nearly 20% between 1986 and 1999, and by more than by 25% between 1999 and 2009. However the results of the most recent period should be considered in the context of rising world prices (Butault, 2011). The OECD does not undertake these calculations on an annual basis, but periodically calculates and publishes the results.

11.2. Interpreting the composition of support

- Policy support to agriculture in OECD countries has altered significantly in composition since the mid-1980s.
- The composition of producer support can be shown in terms of PSE categories and sub-categories and labels, which focus on the implementation criteria of the policies.
- The composition of support to general services (GSSE) can be shown in terms of broad policy areas.
- The composition of total support to agriculture (TSE) can be shown in terms of who pays and who receives the transfers arising from policies.

11.2.1. Why analyse the composition of support?

413. When the indicators were first developed by the OECD in the mid-1980s, the vast majority of support was provided through policies that created transfers to producers through higher market prices or payments based on output. This allowed the focus of attention to be on the total level of support provided. Modern agricultural policy has increased in complexity, with the introduction of new policy objectives and new approaches to policy support undertaken to meet requirements imposed by multilateral commitments such as the WTO Uruguay Round commitments and Panel Decisions. Thus, as policies in OECD countries have been reformed over time, the issue of the composition of support has become more important.

414. Policies intended to have a reduced impact on production decisions, while still supporting farm income or the farm sector as a whole, have become more important. Policies increasingly deliver transfers not on the basis of commodity production (whether past or present) or input use, but on other bases such as farmed area, or overall farm income or non-commodity criteria. Many policies now provide transfers on the basis of a mixture of "current and past prices and production", often with constraints imposed on the conditions under which farmers are eligible for payments. This requires making a better distinction between support to commodity production as such, or to inputs used to produce them, and support to the farm as an entity or the agricultural sector as a whole. These changes in policy implementation have led to the development of new PSE categories (Table A2.1), a new focus on the composition of the PSE as a means of understanding the effects, and the development of new tools and methods to analyse them (Chapter 12).

415. Policy developments in Switzerland illustrate this concern. The level of producer support in Switzerland, as measured by the %PSE, has fallen from 78% to 53% between 1986-88 and 2011-13 –

seeming to indicate relatively modest progress towards policy reform. However, over this period, Switzerland has made significant changes to its agricultural support policies. While relatively high tariffs and tariff rate quotas remain in place, Switzerland has abolished all state guarantees for prices and sales. It has also reformed the way in which direct payments are provided to farmers, replacing most of the previous programmes with two main types of payments: General Direct Payments, mainly granted in the form of area and headage payments on condition that farmers comply with a set of environmental farm management practices (some of those payments are provided only to disadvantaged – mountain and hilly – areas) ; and Ecological Direct Payments, mainly granted to compensate farmers for undertaking voluntarily additional environmental or animal welfare practices.

11.2.2. Composition of producer support – PSE categories

416. The composition of support is reflected in the PSE by the share of support that falls into each of the PSE categories or sub-categories (see Box 3.2 for definitions of the seven PSE categories and various sub-categories). The PSE category values can be expressed as shares of the PSE, with the sum of the category shares equalling 100%. Alternatively, they can be expressed as shares of gross farm receipts, summing to the %PSE. This latter approach has the advantage of showing both the level and composition of support together. Table 11.2 and Figure 11.4 illustrate how the composition of support to producers can be shown for a country.

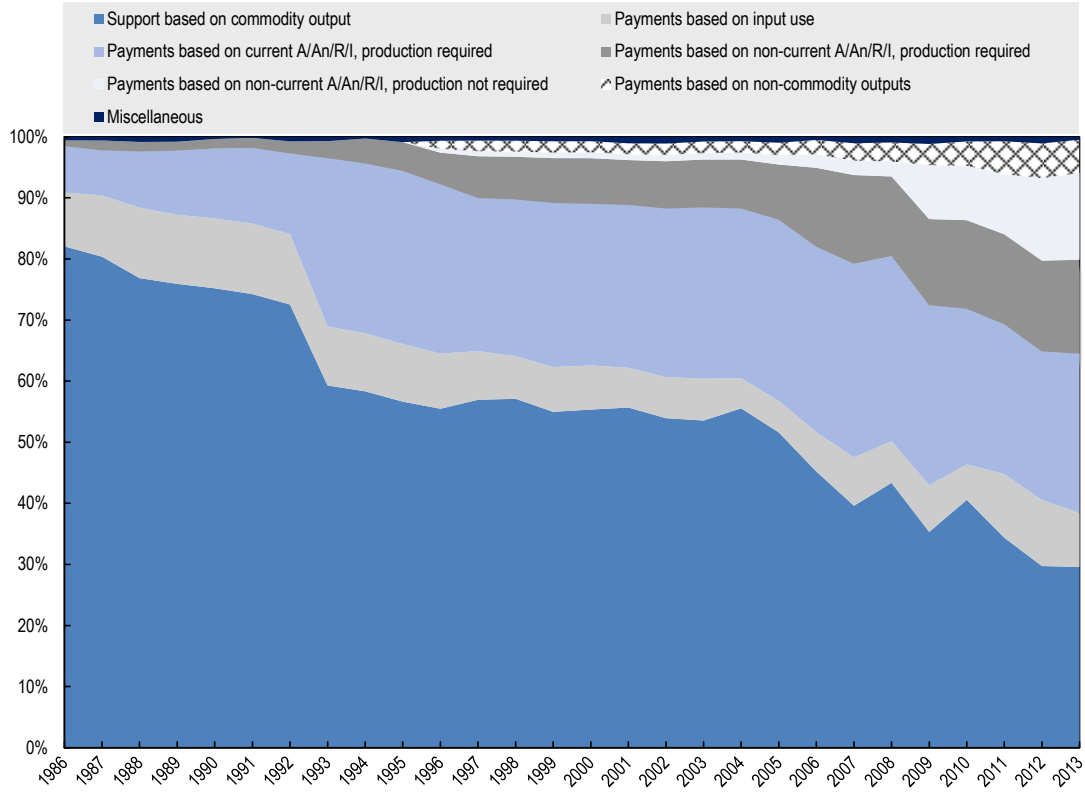
Table 11.2. Composition of PSE (example)

PSE Categories	LC million		Share of PSE		Share of Gross Farm Receipts	
	1986-88 average	2011-13 average	1986-88 average	2011 -13 average	1986-88 average	2011-13 average
A. Support based on commodity output	6,000	2,500	80%	31%	32%	6%
B. Payments based on input use	750	800	10%	10%	4%	2%
C. Payments based on current A/An/R/I, production required	600	2,000	8%	25%	3%	5%
D. Payments based on non-current A/An/R/I, production required	100	1,200	1%	15%	1%	3%
E. Payments based on non-current A/An/R/I, production not required	0	1,000	0%	13%	0%	2%
F. Payments based on non-commodity criteria	0	440	0%	6%	0%	1%
G. Miscellaneous	50	60	1%	1%	0%	0%
Total PSE	7,500	8,000	100%	100%	40%	20%

417. Table 11.2 and Figure 11.4 show that while the level of producer support (%PSE) has fallen by half, significant improvements have also been made in shifting away from support based on commodity outputs, which is the most production-distorting. In 1986-88, 80% of producer support arose from policies providing support based on commodity output (category A). By 2011-13, the importance of output-based support had fallen considerably, comprising 31% of producer support. On the other hand, payments based on current parameters (category C) had risen significantly, from 8% of gross farm receipts in 1986-88 to 25% in 2011-13. Payments based on non-current parameters and not requiring production (category E), while non-existent in 1986-89, now represent 13% of producer support. Also, payments based on non-commodity criteria have been introduced and reached 6% of producer support.

418. In a similar way to the PSE, the producer SCT indicator can be broken down into the various policy categories. As the producer SCT indicator is made up of a smaller number of categories (i.e. it excludes categories of support which require no commodity production — E and F — and miscellaneous payments), the usual breakdown is into three components at the sub-category level: MPS (sub-category A.1), Payments based on output (sub-category A.2), and Other SCT (in categories B, C and D) – mostly payments based on area or animal numbers.

Figure 11.4. Composition of PSE (example)



11.2.3. Composition of producer support – labels

419. When policies are classified in the various PSE categories, they may also be labelled according to certain policy characteristics relating to the provision of support. Labels (see sub-section 3.3.3 for full definitions) can be used to produce different aggregations of payments, emphasising a specific implementation criteria used in the policies applied, in addition to those reflected by the PSE categories:

- With or without current commodity production limits and/or limits to payments (L).
- With variable or fixed payment rates (V/F).
- With or without input constraints (C).
- Based on area, animal numbers, receipts or income (A/An/R/I).
- Based on a single commodity, group of commodities or all commodities (SC/GC/AC).
- With or without commodity exceptions (E).

420. The composition of support classified by label can again be presented in either graphical or tabular form. However, using labels to create tables or figures requires attention to the scope of the data shown with respect to the PSE. Labels create subsets of either the PSE itself or PSE categories, and when used in combination, create subsets of subsets. For example, a table showing the share of support with production and payment limits for the PSE as a whole, and another table showing the share of support with

production and payment limits for the subset of support based on area (another possible label) can be visually similar, even though they would contain very different numbers with a different interpretation.

11.2.4. Composition of producer support – degree of commodity specificity

421. Particular attention is required in using the label which indicates the degree of commodity specificity of policies – that is, the share of Single Commodity Transfers (producer SCT), Group Commodity Transfers (GCT) and All Commodity Transfers (ACT) in the PSE. Like the other composition elements, these can be expressed as a share of PSE (adding to 100%) or as a share of gross farm receipts (adding to %PSE). These can also be shown in tabular or graphical form. Table 11.3 and Figure 11.5 illustrate how the composition of producer support based on the degree of commodity specificity can be shown for a country.

Table 11.3. Breakdown of PSE by degree of commodity specifity (example)

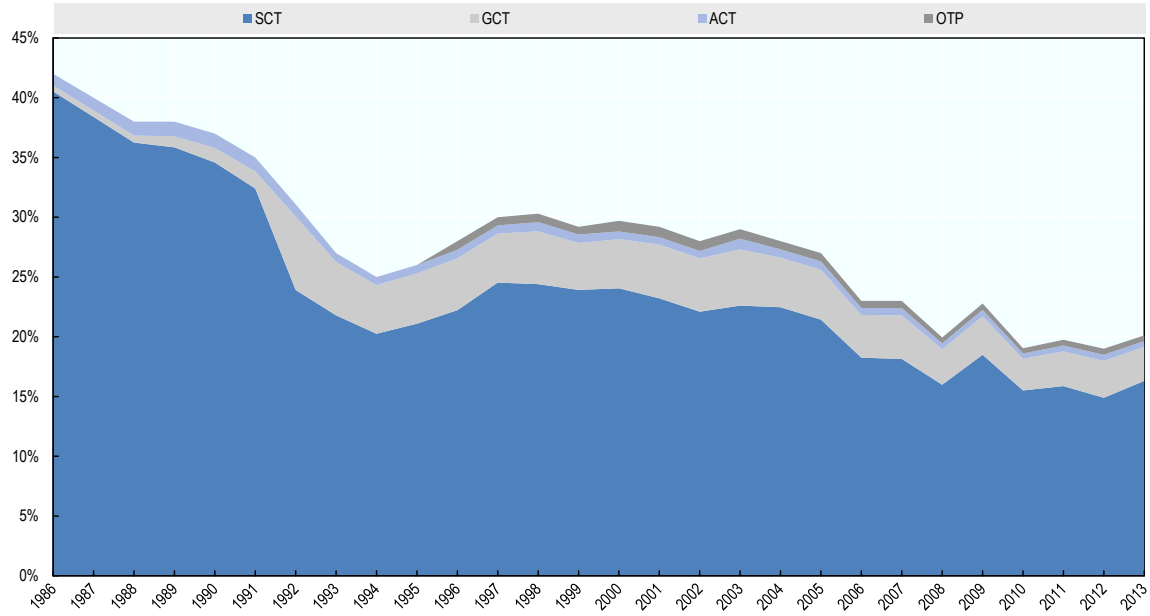
PSE Categories	LC million		Share of PSE		Share of gross farm receipts	
	1986-88 average	2011-13 average	1986-88 average	2011-13 average	1986-88 average	2011-13 average
Single Commodity Transfers (SCT)	7,200	4,000	96%	50%	39%	10%
Group Commodity Transfers (GCT)	100	1,200	1%	15%	1%	3%
All Commodity Transfers (ACT)	200	400	3%	5%	1%	1%
Other Transfers to Producers	0	2,400	0%	30%	0%	6%
Total PSE	7,500	8,000	100%	100%	40%	19%

422. SCT made up 50% of the PSE in 2011-13, a reduction from 96% in 1986-88. GCT, where producers have the option to produce any of a specified group of commodities as part of programme eligibility, made up 15% of the PSE in 2011-13 compared to 1% in 1986-88. Transfers provided under the headings ACT and OTP place no restriction on commodities that farmers choose to produce, the latter also not requiring farmers to produce at all.[25] Together, these two made up 35% of the PSE in 2011-13, up from 2% in 1986-88. The commodity specificity composition of producer support in the example shows a progression in policy support away from SCT, first towards GCT, and then more recently towards OTP transfers.

25. OTP transfers, while not requiring production, may at the same time limit production choices should production actually take place. This occurs when OTP transfers involve prohibitions on the production of certain commodities (this policy implementation characteristic is designated by the label "with commodity exceptions").

Figure 11.5. PSE level and commodity specificity (example)

In per cent of gross farm receipts



11.2.5. Composition of support to general services

423. As for the PSE, the policies that are combined to calculate the GSSE are grouped into categories of expenditure (see section 3.4 for an explanation of the categories). The breakdown is made on the basis of specific activity or type of service, rather than implementation criteria. Table 11.4 illustrates how the composition of support to general services can be shown for a country.

Table 11.4. Composition of GSSE by category (example)

GSSE Category	1986-88 average		2011-13 average	
	LC million	Share of GSSE	LC million	Share of GSSE
Agricultural knowledge and innovation system	400	50%	200	10%
Inspection and control	50	6%	400	20%
Development and maintenance of infrastructure	120	15%	800	39%
Marketing and promotion	170	21%	450	22%
Cost of public stockholding	60	8%	200	10%
Miscellaneous	0	0%	0	0%
Total GSSE	800	100%	2,050	100%

424. The example reflects the relative importance of the various GSSE categories and how they have changed over time. For example, spending on Public Stockholding has fallen, reflecting a reduction in the budgetary costs of maintaining MPS to producers, or a move away from a policy of food security/stocks. At the same time, a higher share is being spent on Marketing and Promotion. A number of example countries are increasing spending on Infrastructure to improve the efficiency of the sector in response to increased competition. Support for Agricultural Schools and for Research and Development has been fairly stable as a share of GSSE expenditure. The share of Inspection Services is fairly low in most countries, but has

generally increased, reflecting greater policy focus on food safety and the rising costs of protecting sanitary and phyto-sanitary standards given the increase in trade.

11.2.6. Composition of total support to agriculture

425. *There are two ways in which the composition of total support can be shown – the first shows **to*** which economic group the transfer is provided; the second shows ***from*** which economic group the transfer originates, i.e. who is bearing the cost of the support policies (illustrated in Table 8.2).

426. In terms of recipients, the TSE can be separated into three components: the PSE, the GSSE, and transfers to consumers from taxpayers. The third component measures the value of transfers received by consumers and not transfers *from* consumers in terms of higher prices, i.e. it is only one specific component of the CSE. Table 11.5 illustrates how the composition of total support can be broken down for a country.

Table 11.5. Composition of TSE by recipient of transfer (example)

Recipients	1986-88 average		2011-13 average	
	LC Million	Share of TSE	LC Million	Share of TSE
PSE	7,500	77%	8,000	79%
GSSE	800	8%	2,050	20%
Transfers to consumers from taxpayers	1,500	15%	50	1%
TSE	9,800	100%	10,100	100%

427. In interpreting policy developments, the share of GSSE in total support is emphasised, i.e. the %GSSE, which shows the importance of transfers that are not received by individual farmers within overall support. GSSE transfers do not depend on any individual farmers' decisions to produce goods or services, or use factors of production, and they do not affect farm receipts directly. In the example given, it can be stated that support for general services provided to agriculture increased from 8% of total support in 1986-88 to 20% in 2011-13.

428. The TSE can also be separated into three different components, i.e. transfers from consumers, transfers from taxpayers and budget revenues. The third component is negative, recognising that a part of the transfers from consumers is received by government in terms of tariff revenue, which offsets some of the taxpayer cost. Table 11.6 illustrates how this composition of total support can be shown for a country.

429. In most OECD countries, consumers have traditionally borne the largest share of the cost of total support. Policy reforms have almost always emphasised a desire to reduce the consumer cost of agricultural policies, and to offset the reduction in producer returns by increased budgetary payments. This would be shown by a decrease in the value of transfers from consumers and an increase in transfers from taxpayers. As can be seen in Table 11.6, this is exactly what has happened in the example. The composition of total support reinforces the changes previously seen in the composition of producer support.

Table 11.6. Composition of TSE by source of transfer (example)

Sources	1986-88 average		2011-13 average	
	LC million	Share of TSE	LC million	Share of TSE
Transfers from consumers	7,500	77%	5,300	53%
Transfers from taxpayers	2,800	29%	5,000	50%
Budget revenues	-500	-5%	-200	-2%
TSE	9,800	100%	10,100	100%

11.3. Some common misunderstandings of the indicators

430. Since their introduction in the mid-1980s, the OECD indicators have become an established reference on support levels in agriculture. The popularity of these indicators is largely explained by the relative simplicity of the underlying concepts, international comparability, broad country coverage and availability of annual updates. The PSE indicator in particular attracts much public attention and receives wide media coverage. However, the popularity of the indicators may mean that they are sometimes misunderstood, and numerical results are misinterpreted. This section highlights some common misunderstandings of the indicators, focussing specifically on the PSE as the most widely referenced indicator.

431. One simple *misunderstanding is that the PSE includes budgetary payments only*. This is the case when it is (wrongly) understood that a country's PSE of, say, USD 100 billion implies that this sum has been entirely financed from the government budget. This misunderstanding is further promoted if the PSE is said, as sometimes done in the media, to represent "subsidies" to farmers. It is important to bear in mind that the PSE value, in addition to budgetary expenditures, includes other transfers, which do not require actual monetary disbursements. Market Price Support is one form of such transfers, being "financed" by domestic consumers who buy agricultural commodities at prices above the international levels. Implicit support to agricultural producers may also be provided through concessions on taxes, interest rates, or input prices. Such support usually involves no flow from government funds, but nevertheless represents real transfers. They are expressed in monetary terms, and are accounted for in the PSE indicator together with the budgetary payments. On the other hand, some expenditures in the agricultural budget are not included in the PSE in order to avoid double counting with non-budgetary support, or because they are not included in the PSE by definition (such as, for example, administration costs). Budgetary disbursements make up only a portion of the total PSE, which also includes elements other than actual budgetary disbursements.

432. Misconceptions also occur concerning the "gross transfer" nature of the PSE. This leads to a typical *misunderstanding that the PSE shows additional producer income*. It may be tempting to conclude that farm incomes increase by the amount of support provided, e.g. that a PSE of USD 100 billion means that farm income is higher by that amount due to support policies. Yet, this is not the case. Gross policy transfers (the PSE) reflect the provision of support, while producer income is an effect of support (and of other factors). The relation between gross transfers and producer income can be complex, and is likely to vary over time as farmers react to introduced measures. Some of the gross transfers made to support producers may be lost due to transfer inefficiencies closely related to market distortions caused by the support policies. Typical cases are higher expenditure on variable inputs or increased cost of land and quotas. The extent to which gross policy transfers are translated into farm income can vary significantly, e.g. according to the types of policies used to support agriculture, but it will be lower than the increase in gross farm receipts as measured by the indicators. For example, OECD analysis (OECD 2001) shows that the income effect of MPS can be as low as 25%, meaning that only 25 cents of each additional dollar provided as MPS is actually retained by farmers as "income" while the rest is captured by input suppliers or is lost in economic inefficiencies such as resource misallocation.

433. It is also important to understand clearly that *the PSE should not be considered as an indicator of trade distortions*. The PSE is an aggregate measure of transfers resulting from a wide variety of policies, all of which may have different effects on quantities produced and consumed, and hence on trade. For example, a payment to farmers that does not require production is likely to have much smaller effect on supply and demand of products than Market Price Support which results in the same gross transfer to farmers. Without taking a close look at the composition of support from different types of policies, it is impossible to say anything about the trade implication of a given PSE. It is perfectly possible that a country with a constant PSE over time has changed its policy composition in a way that significantly reduces the trade distortion resulting from support provided to its farmers.

434. Bearing in mind that any changes in support lead to economic adjustments is important in order to avoid another *mistake,* i.e. *to suggest that aggregate producer gross receipts would decline by the PSE value if all agricultural policies were removed*. For the OECD as a whole, this value was equivalent to USD 258 billion (EUR 194 billion) in 2013. As emphasised throughout this Manual, the PSE captures support to producers in current world market conditions. These conditions are themselves affected by current agricultural policies and would change following the removal of all agricultural policies. In particular, prices and quantities, and therefore producer gross receipts could be expected to adjust.

435. In order to avoid misinterpretations of the PSE, it is therefore important to keep in mind that it is *not* an indicator of the *impacts* of policy measures. The analysis of policy impacts involves moving beyond the PSE framework to policy simulation modelling, which gives an indication of the effects of changes in the PSE on production, incomes, trade, and environment. Chapter 12 describes the OECD policy models and how the PSE analysis feeds into these.

436. The previous examples related to conceptual misunderstandings of the PSE. The indicator may also be misinterpreted if insufficient attention is paid to the economic and policy context, especially when interpreting variations in the PSE over time.

437. One *misinterpretation* of this kind *is to consider that a change in the PSE necessarily implies change in policy settings*. As noted, support — in particular Market Price Support that is based on the gap between producer and border prices — is measured against current market conditions. When border prices change due to variations in world market prices or exchange rates, domestic producer prices may not follow (because measures are in place that prevent them from doing so) and hence the Market Price Support element in the PSE will change. Such variation in the PSE is nevertheless an appropriate reflection of the nature of market price support policies. It indicates that these policies, e.g. the border regime in place, insulate domestic markets from changing world market conditions, and provide an amount of support that varies over time in relation to the world price. This "working" of price policies is similar to that of deficiency payments, whose size also fluctuates depending on market conditions, resulting in an equivalent change in the PSE.

438. It would be *equally erroneous to conclude that an unchanging PSE necessarily implies no change in policies*. In fact, the policy settings may change, but the overall amount of policy transfers to producers, as measured by the PSE, may not. For example, in order to pursue new objectives, *e.g*. agri-environmental sustainability, government may introduce new payments to producers. However, this increase may well be offset by a reduction in the Market Price Support component if supported prices are cut simultaneously, with the result that the PSE value remains unchanged. This should be kept in mind in particular when evaluating a country's progress in policy reform over time. *The PSE number alone is not sufficient to indicate progress (or lack of it) in policy reform.* This is in particular the case when the reform is more characterised by re-instrumentation of support (towards less production and trade-distorting forms) than by reduction in the overall support level. The changes in the PSE composition, i.e. in the shares of various policy measures constituting the PSE, are as important an indication of the reform process as the aggregate PSE level.

439. In conclusion, attention to the underlying concepts and to the overall policy context is essential in interpreting the PSE. As has been shown in this Chapter, all dimensions of the PSE — its level, its composition in terms of support categories and commodity specificity, and the factors driving annual and long-term changes – should be considered when evaluating developments in producer support.

Annex 11.1.

Comparing the OECD indicators of support to producers with other measures of support

440. In addition to the OECD indicators, there are a range of other measures which can be used to calculate support provided to agriculture. These have various strengths and limitations, and the choice among such measures depends on both practical considerations such as data availability and on the nature of the issues to be analysed.

Comparison with other economic measures

441. Four widely known measures are used in various studies to estimate support: the nominal rate of protection (NRP), the nominal rate of assistance (NRA), the effective rate of protection (ERP) and the effective rate of assistance (ERA). An overview of recent studies using these indicators is contained in Box A11.1. The NRP measures the increase in gross receipts from the sale of the commodity; the NRA measures the increase in gross receipts including support not linked to the sale of the commodity. The ERP measures the increase in the value added from the sale of the commodity, i.e. taking into account the price of inputs; the ERA measures the increase in value added from both the sale of the commodity and support not linked to the sale of the commodity.

442. Consequently, the measures can be distinguished with regard to the breadth and depth of policy coverage, and the economic value used for measuring the level of support (Table AII.1). In terms of policy coverage, assistance measures (NRA and ERA) are *broader* than protection measures (NRP and ERP) in the sense that they include a wider range of support policies for a particular sector than just policies that affect output prices. The NRA builds on the NRP by including, for example, payments based on area or animal numbers.

Table A11.1. Policy coverage of other measures of support

Policies affecting the price of intermediate inputs included (depth)	Sectoral policies included (breadth)	
	Policies affecting the market price (e.g. tariffs)	plus other support policies (*e.g.* input subsidies)
No	NRP	NRA
Yes	ERP	ERA

443. Effective measures (ERP and ERA) are *deeper* than nominal measures (NRP and NRA) in the sense that they also take into account the impact of government policies which support (or tax) the input sectors, thus affecting the cost of intermediate inputs and hence the net or "effective" level of support in terms of returns. The ERP deepens the NRP by taking into account the protection provided through border policies on intermediate inputs, e.g. tariffs raising farmers' input costs. However, the ERP is not as broad as the NRA in terms of the sectoral support policies included. The ERA is the most comprehensive measure. The effective measures take into account assistance on production and inputs used. They measure the assistance to the activity rather than to the product itself.

444. All four indicators are ratios, meaning that they measure relative support. As a basis for measuring relative support, nominal indicators are calculated on a *producer receipt basis*, with the level of

support being the increase in producer receipts in the presence of the policies relative to receipts valued at border prices. In comparison, effective measures are calculated on a *value-added basis*, with the level of support being the change in value-added relative to the estimate of value-added at border prices.[26] Effective coefficients may be negative, indicating that the protection/assistance offered on the final product is more than offset by the impact of protection/assistance on intermediate inputs.

445. The main advantage of effective measures is that they show the potential impact of government intervention on resource allocation since resources move between alternative activities not according to gross revenue but in accordance with the return to factors employed in that sector. The superiority of effective measures over nominal measures is more pronounced the more important are input policies, and the smaller is the share of value-added in producer returns (Josling and Tangermann, 1989). However, the calculation of effective measures requires detailed input-output coefficients which can be difficult to find, as well as a greater range of sectors for which policy measures need to be found and transfer values determined.

446. Comparing the OECD indicators with these four standard producer support measures, it can be observed that all OECD support indicators are nominal rather than effective measures of support (although excess feed costs of livestock producers are subtracted from PSE). The advantage of the nominal over effective support indicators is that they need less data, and are therefore more suited to annual policy monitoring.

447. The OECD's NPC and NAC are concepts analogous to the NRP and NRA. The distinction between the two pairs of indicators is in the algebraic expression of the measured ratios. The NPC is a simple ratio between producer[27] and border price, while the NRP is a ratio between the Market Price Differential (producer price minus border price) and the border price. The NRP therefore is equal to NPC minus unity, and the NRA is NAC minus unity. The names of the indicators point at this distinction – the NPC and NAC are called "coefficients", while NRP and NRA are called "rates".

448. The OECD's PSE is close to NRA, in that in addition to output based support it includes other policies, among which are subsidies on the use of fertiliser, chemicals and other inputs. However, similarly to the NRA, the PSE does not account for support to the input sector linked to agricultural input prices, e.g. import tariffs on inputs, and so the PSE, and its derived indicator the %PSE, are measures of nominal and not effective support. The %PSE is also close to NRA in the sense that both are "rate" measures, as discussed above. The %PSE has the Market Price Support component in its numerator, which in turn is based on the Market Price Differential between domestic and border prices.

449. The %PSE, however, stands apart from all support indicators discussed here, with respect to the basis it uses for measuring the level of support. Both nominal support indicators (NRP and NRA, and the NPC and NAC), and effective support indicators (ERP and ERA), use producer receipts, or the value-added in the case of effective support indicators, which are valued at border prices. In contrast, the %PSE relates support to producer receipts valued at domestic (producer) prices.

26. Value-added is the difference between the value of final production and the value of the intermediate inputs entering into production.

27. Recall that OECD's producer NPC adds unit output payments to producer price (equation 6.16).

Box A11.1 Support indicators in non-OECD agricultural policy studies

The NPR, EPR, NRA and ERA indicators are frequently used in policy analysis, particularly in studies that focus on policy distortions and their associated production, trade and welfare impacts. Closely related to trade tariffs, the NPR and EPR concepts were initially used in studies on trade protection, with early references going back more than a century. However, these indicators became known most widely through works of Balassa (1965), Corden (1971), and Vernon *et al*. (1965), and the many empirical studies during the 1960s and 1970s which they inspired. These studies had significant impact on the GATT process, and the analytical instruments it applied continue to be used today. To provide a comprehensive overview of the studies that estimate and use the support indicators would be too onerous a task; it is however worthwhile highlighting some of the more recent works.

The World Bank has long been involved in the measurement of agricultural policy distortions given their interest in analysing policy impacts on poverty and development. The most comprehensive study, led by Krueger, Schiff and Valdés, was published in 1991-92 in the five-volume *The Political Economy of Agricultural Pricing Policy* (Krueger *et al*, 1991 and 1992). This study covered the period of 1950-1992 and included 18 developing countries in Latin America, Africa and Asia. It sought to analyse the scale of policy distortions in agriculture, in particular those affecting producer prices. The analysis distinguished between price distortions arising from agricultural and non-agricultural policies (such as industrial protection and exchange-rate misalignment). Capturing these two different policy sources of distortions, the study estimated what it named the "direct" and "indirect" NPRs, as well as the aggregate of the two, called the "total" NPR. The latter corresponded to the concept of effective protection because it captured protection of both agricultural and non-agricultural prices. A key conclusion of this study was that agricultural producers in developing countries were considerably taxed by both agriculture-specific and non-agricultural policies, with taxation from the latter often outweighing taxation from agricultural interventions as such. This analysis was later continued in the World Bank's regional policy studies on Latin America (Valdés 1996) and transition economies (Valdes *et al*. 2000), which estimated NPR, EPR and ERA indicators for countries in these regions during the period of profound policy reforms in the 1990s.

In 2006, the World Bank launched a large project entitled *Distortions to Agricultural Incentives* (DAI) and led by Kym Anderson (www.worldbank.org/agdistortions). One of the objectives was to analyse how policy biases against agriculture have changed since the Krueger-Schiff-Valdés study. The analysis was extended to a wider range of countries, including 44 major developing countries and the European transition economies. The project has broad analytical scope and, following the approach of the Krueger-Schiff-Valdés study, seeks to differentiate and quantify various sources of policy distortions in agriculture. A methodology was developed to calculate a set of policy indicators based on the NPR, EPR and NRA concepts. The initial findings of this study were published in the World Bank's *2008 World Development Report* (WB 2007). The authors conclude that the broad macroeconomic and agricultural reforms in the 1980s and 1990s reduced overall both the agricultural and non-agricultural policy taxation of producers. This aggregate result, however, masks continued taxation of export-oriented sectors, and high levels of protection in some import-competing sectors in developing and transition economies.

In recent years, a number of research groups have become involved in estimating the PSEs for developing countries. These studies were largely prompted by the resumption of multilateral trade negotiations within the WTO, and by the fact that the Doha round has placed particular focus on the concerns of developing countries. These studies complemented work by the OECD to extend the PSE analysis to key developing economies, such as Brazil, Chile, China, Indonesia and South Africa (OECD 2005a, OECD 2008c, OECD 2005b, OECD 2012, OECD 2006b).

Tian, Zhang and Zhou (Tian *et al*. 2002) and Cheng (2001) produced PSE estimates for China, and Gulati and Narayanan (2003) for India. Some of this research fed into a larger study by the International Food Policy Research Institute (IFPRI), which estimated the PSEs for India, Indonesia, China and Vietnam (Orden *et al.* 2007). IFPRI's study used the OECD methodology and also introduced approaches to deal with specific issues in estimating support for developing countries. These issues include the weak links of some agricultural sub-sectors with external markets, and the difficulties in defining the appropriate opportunity cost for domestic production so as to measure support levels. The IFPRI study also attempted to deal with the problem of diversity in regional policies, as well as exchange-rate distortions. Based on the results for the four countries, IFPRI found that previous policy taxation of the agricultural sectors was reduced, and since the end of the 1990s has turned into support. This result is broadly consistent with OECD and World Bank analysis.

Comparison with the WTO Aggregate Measurement of Support

450. OECD indicators are often compared to the measures of support developed to establish and monitor the implementation of the domestic support reduction commitments under the WTO Uruguay Round Agreement on Agriculture (URAA). In particular, the PSE is often compared to the Aggregate Measurement of Support (AMS). Because the AMS was developed from the concept of the PSE, both indicators are constructed in a similar way. Both: include market price support, budgetary outlays and revenue foregone by governments; account for national and sub-national support; deduct agriculture specific levies or fees paid by producers; and are measured on an annual basis.

451. However, while the AMS is conceptually based on the PSE, it has been developed in the context of international trade negotiations. Consequently, the AMS has some unique characteristics which are not necessarily based on purely economic criteria. As with the four economic measures discussed above, distinctions between the PSE and the AMS can be made in terms of policy coverage and economic value used to measure support (Diakosavvas, 2002).

452. In terms of policy coverage, the AMS is a narrower concept than the PSE, being designed to cover only domestic policies considered trade-distorting. In contrast to the PSE, the AMS does not include support to producers provided through:

- trade policies, e.g. tariffs and export subsidies, because these policies are covered under the market access and export competition disciplines of the URAA, and the AMS includes an estimate of market price support only when an administered price exists
- programmes that meet the specific production limiting requirements of Article 6, paragraph 5 of the URAA, the "Blue Box"
- policies that meet the criteria of Annex 2 of the URAA, the "Green Box"[28]
- certain development programmes including investment and input subsidies in developing countries under Special and Differential Treatment (Article 15 of the URAA)
- policy support that would otherwise be included but are excluded because the level of product-specific or non-product-specific domestic support falls below a specified *de minimis* level, 5% for developed and 10% for developing countries of the value of production (Article 6, paragraph 4 of the URAA).

453. In terms of economic value, the PSE is a measure of actual "current" support to agricultural producers, while the AMS is not. Although both indicators include Market Price Support, there are important differences in the way that they are calculated. In the PSE, MPS is calculated using current prices, i.e. domestic producer and reference prices pertaining to the year in question. In the AMS, MPS is calculated using domestic administrative support prices and a fixed reference price, defined as border prices in domestic currency in a base period, generally the three-year 1986-88 average. The value of MPS calculated in the AMS does not provide a figure for the support actually being received by producers.

454. In comparison to the PSE, the AMS is therefore narrower in scope and does not measure "current" support to agricultural producers. Given the different purposes for which the two methodologies were developed, the indicators are bound to differ, and caution should be exercised when comparing them. While the WTO methodology is a legal device for negotiating and monitoring domestic support commitments, the OECD methodology aims at obtaining a comprehensive economic picture of the actual level and composition of agricultural support.

28. It should be noted that policies excluded from the AMS because they meet the requirements of paragraph 2 (General Services) of the Green Box are also ***not included*** in the PSE, and are instead ***included*** in the GSSE.

Chapter 12.

USING THE INDICATORS IN OECD POLICY MODELLING

455. This chapter describes how the OECD uses the indicators in policy simulation modelling. The main purpose of this chapter is to assist other modellers who are, or may be considering, using the support indicators in their models by informing them of OECD practice. Policy modelling is undertaken by the OECD as part of its work to move from analysing the policy effort, as shown by the indicators, to measuring and understanding policy effects, i.e. how support policies impact on production, trade, etc. Policy simulations in a sector as complex as agriculture often require a variety of different models. Three different models are currently used by the Secretariat, and this chapter discusses the various modelling techniques as well as some of the main assumptions, limitations and results of each.

12.1. Policy Evaluation Model (PEM)

- The PEM is a partial equilibrium model that was specifically developed to simulate the impact of support on economic variables, such as production, trade and welfare, by incorporating (*inter alia*) factor demand and supply equations.
- PEM covers the major cereal and oilseeds crops, milk and beef production in six OECD countries/regions, of which the European Union is one.
- Each PSE category (and some sub-categories) is modelled by price wedges in the output or input market in which they are considered to have first impact or effect.

456. The main purpose of the Policy Evaluation Model (PEM) is to bridge the gap between the PSE information, which categorises and quantifies agricultural support, and the impact of policies by providing an analytical instrument to measure the economic effects of support on production, trade, prices, income and welfare. The approach taken is to combine the PSE data with basic information on production technology and assumptions about elasticities of supply and demand, based on an extensive literature review, in order to relate the level of different types of policy transfers as classified in the PSE to the economic effects of interest. The results can be presented in the form of indicators such as a production impact ratio, iso-production, iso-trade and iso-income indices (discussed below; Martini R. 2011), or as part of a complete policy scenario analysis as was done in case studies of policy reforms, e.g. the European Union (OECD 2004 and 2011), Korea (OECD 2007) and Japan (OECD 2009).

457. The key advantage of this approach is that it recognises that the initial incidence of the agricultural policies classified in each of the seven PSE categories based on different implementation criteria is in the various factor (input) and output markets. For example, payments based on area planted affect first the land market, and then the rest of the parts of the production system through the interactions that occur between markets. Market price support enters the commodity market first as a differential between the domestic and world price, and then affects factor markets through derived demands and other commodities through cross-elasticities. Policies providing the same level of transfer can have very different effects according to what market they impact first, their so-called initial incidence. The PEM contains representations of markets for several important PSE commodities (wheat, coarse grains, oilseeds, rice, milk, beef), and representations of factor markets including land, hired labour, purchased inputs, and farm capital. By creating a model that can properly reflect these initial incidences, the PEM captures the most economically significant differences in implementation that the PSE categories are intended to highlight (Table 12.1). The outcome is a model that fits the sort of information contained in the PSE database.

Table 12.1. How different PSE categories may be represented in PEM

PSE classification	First incidence of support in price wedge between
A1. Market price support (MPS)	Domestic (producer and consumer) and the world price
A2. Payments based on commodity output	Domestic producer and domestic consumer prices
B1. Payments based on variable input use (without input constraints0	Domestic supply price and demand price - not specific to any one commodity. Applies equally to all purchased inputs except fertiliser and hired labour.
B2. Payments based on fixed capital formation	Supply and demand price for farm-owned inputs, rent per hectare received by land owners and rent per hectare paid by land users; - not specific to any one commodity
C. Payments based on current area, animal numbers, Receipts or income (A/An/R/I), without input constraints.	Area: Rent per hectare received (by landowners) and rent per hectare paid (by land users). This wedge may be the same for different crops, or it may be different.*
	Animal numbers: Supply and demand price for cows (milk) or domestic producer and domestic consumer price (beef).
	Receipts or income: Supply and demand price for farm-owned inputs, rent per hectare received by land owners and rent per hectare paid by land users. It is not specific to any one commodity
D. Payments based on non current A/An/R/I, production required	Rent per hectare received by land owners and rent per hectare paid by land users. It is not specific to any one commodity and applies to all land uses based on the "production exceptions" label.
E. Payments based on non current A/An/R/I, production not required	Rent per hectare received by land owners and rent per hectare paid by land users. It is not specific to any one commodity and applies to all land uses based on the "production exceptions" label.

* In the model, landowners are distinguished from land users to provide a basis for distributing the economic effects of policy changes. In reality, not all cropland is rented. The per hectare rent for land not rented needs to be interpreted as a shadow price reflecting the opportunity costs of using land in one or another of the crops under study here in some other use

PSE sub-categories B.2 Payments based on fixed capital formation and B.3 Payments based on-farm services are not included in the model. These are heterogeneous groups whose effects are not straightforward and cannot be represented in a generic way.

458. The PEM provides a stylised representation of production, consumption, and trade of aggregates of major cereal and oilseeds crops, milk, and beef production in six OECD countries or regions: Canada, the European Union,[29] Japan, Mexico, Switzerland, and the United States. The commodity modules of PEM were all developed according to a common structure, with some specifics added to deal with dairy quota and pricing systems where they exist. Policy experiments are carried out using a structure where these individual modules are linked through world price and trade effects.

459. Commodity supply is represented through a system of factor demand and factor supply equations. Except for the Rest of World module, where supply functions are directly specified, there are equations representing demand and supply responses for at least four categories of inputs (factors) used to produce these commodities in the studied countries. The factor demand equations reflect the usual assumptions of profit maximisation constrained by the production relationship. Thus, the

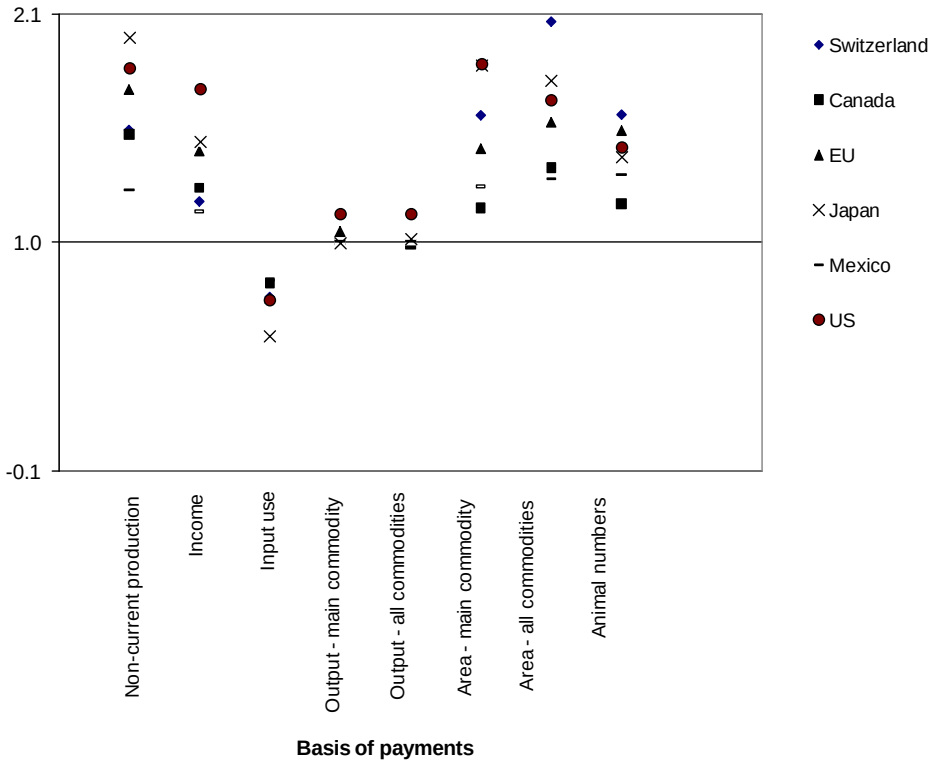
29. The European Union is treated as a single region in PEM, with common market, but production differentiated between the EU-15 and the 12 new Member States.

commodity supply for each of the six OECD countries or regions is embedded in the equations that determine equilibria in these input markets. Supply response corresponding to a medium-term adjustment horizon of around five years is reflected in the values assumed for the price elasticities of factor supplies and the parameters measuring the substitutability of factors in production as well as the factor shares.

460. No factor is assumed to be completely fixed in production, but land and other farm-owned factors are assumed to be relatively more fixed (have lower price elasticities of supply) than purchased inputs. Likewise, no factor is assumed to be mobile, but purchased inputs are assumed to be relatively more mobile (have higher price elasticities of supply) than farm-owned factors.

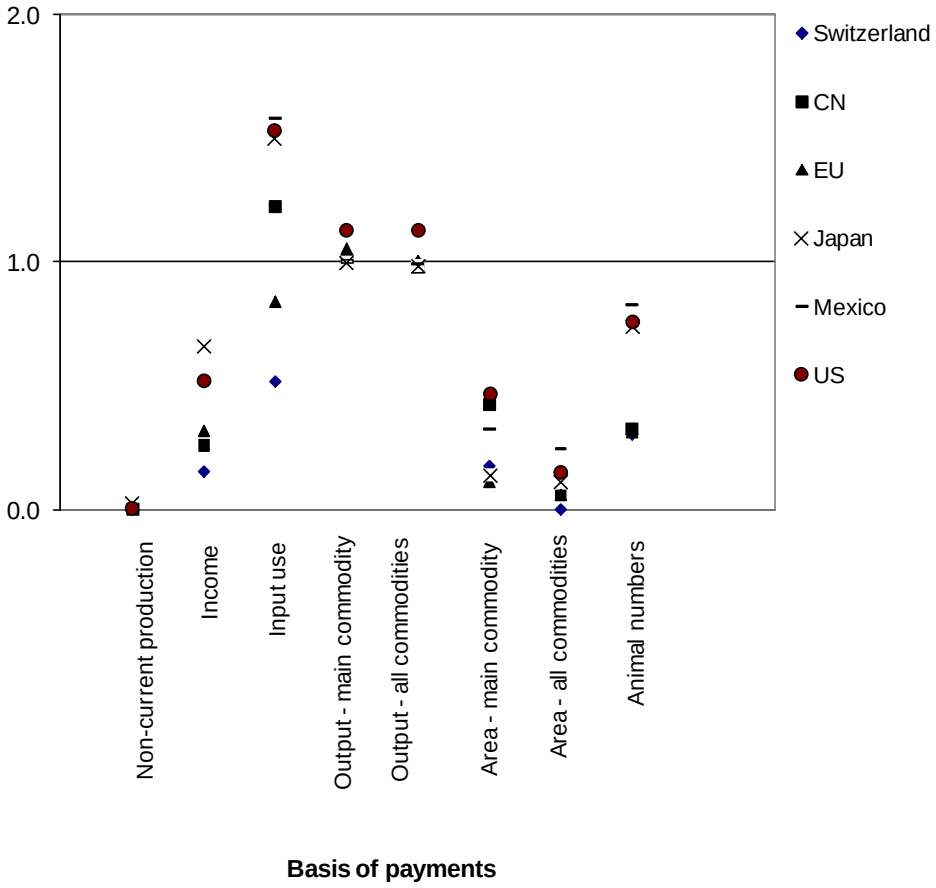
461. While the magnitude of the effects varies by country, the PEM shows a certain consistency in the ranking of the potential economic effects of policies in different PSE categories. Using the MPS as a basis of comparison (where 1 equals the impact of MPS), payments based on input use (with no constraints attached to their use) or based on output are generally more distorting of production while payments based on area, animal numbers or income are less so. Payments based on non-current production are the least distorting (Figure 12.1). This pattern is consistent for relative effects on trade and prices, and inversely so for effects on farm income (Figure 12.2).

Figure 12.1. Relative policy impacts on domestic production



Source: OECD PEM model.

Figure 12.2. Relative policy impacts on farm welfare

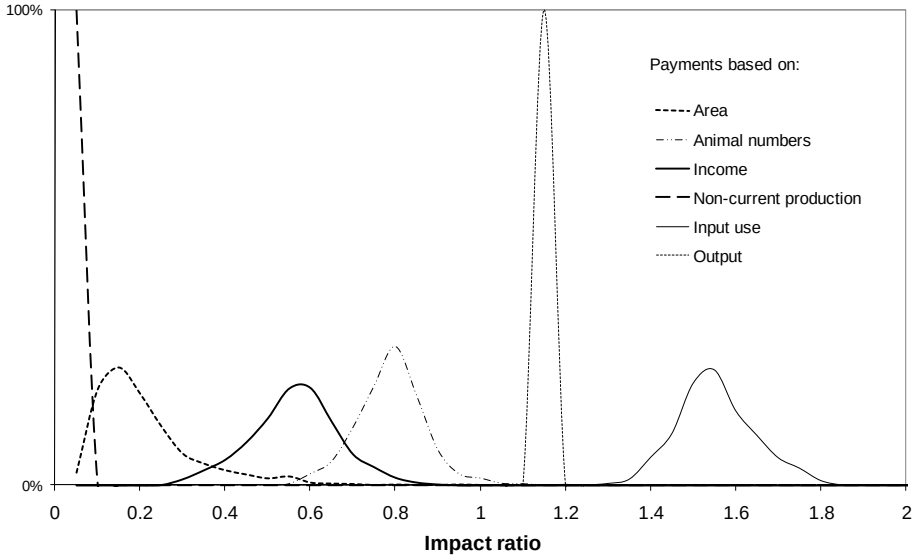


Source: OECD PEM model.

462. Since the model is designed to be as agnostic as possible in terms of its structure (using a simple Constant Elasticity of Substitution production function and basic supply and demand functions), the values for the elasticities chosen are the main drivers of these results. This raises the questions of how accurate the choices made for elasticity parameters are, and how misleading the model is if the wrong parameter values are used. The approach taken to answering these questions has been to use a Monte Carlo method, systematically varying these estimates and observing the resulting changes in model results. This identifies both the robustness of the model to parameter choices, and the relative importance of different parameter types in determining the results. This approach produces graphs which show the possible range of impact ratios (as compared with MPS) for each policy. A smaller overlap in the probability distributions of each policy's impact ratio indicates a greater level of robustness of the model.

463. Figure 12.3 shows these graphs for the case of the United States as an example. These results indicate that, in the case of the United States, the effects of input support and payments based on non-current production are all very likely different from each other, while the effects of payments based on area or farm income or animal numbers could conceivably be the same.

Figure 12.3. Probability distribution of impact ratios for production quantity: United States

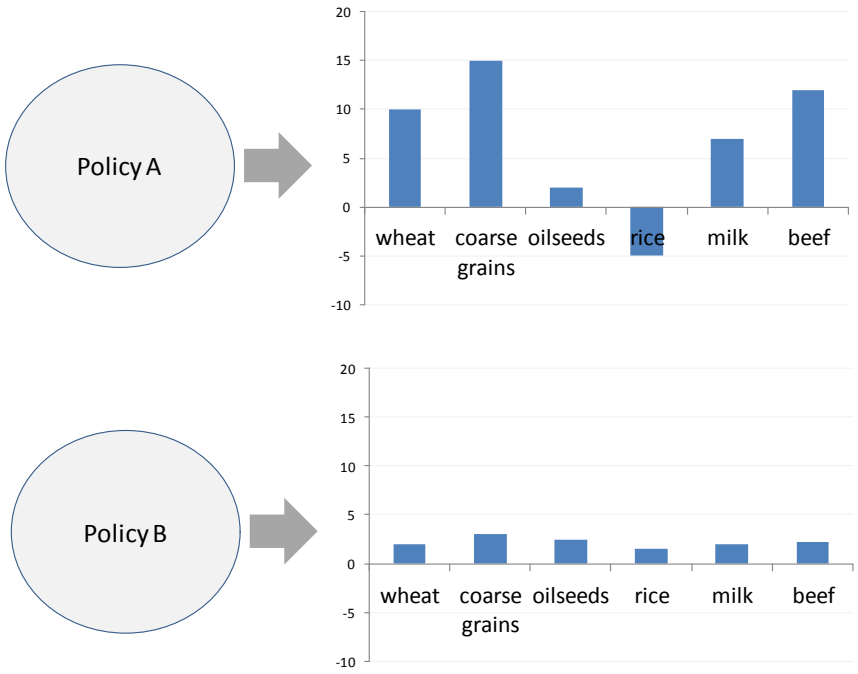


Source: OECD PEM model.

464. OECD has made a significant effort to develop further model-based indices which can compare the long-term trends of policy performance. The concept of the indices is similar to the Trade Restrictiveness Index (TRI) defined as the uniform tariff that is equivalent in welfare terms to the protection provided by a given set of varying trade policies. But PEM based indices go beyond simple average tariffs and account of varying supply responses emanating from changes in the structure of protection. It takes advantage of the detailed PSE data classified into different support categories according to the way the associated policy is implemented. The indices cover the 23-year period between 1986 and 2008, for six OECD countries plus the European Union. Three different choices for the construction of a fixed-definition measure using a TRI-like approach are explored: 1) producing equal increase in farm income; *income impact index*, 2) resulting in the same production level; *production impact index* and 3) resulting in the same volume of net trade; *trade impact index*.

465. Consider two policies, A and B, which have different impacts on production as estimated by the model (Figure 12.4). The different impacts will have to do with the level of support provided by each policy and how they are implemented. For example, Policy A may be deficiency payments offered to different commodities at different rates. Policy B may be a broad payment to all farms, perhaps not requiring production. How do we compare the effects of these two polices? Policy A has a generally larger impact, but not always, and in some cases may have a negative impact. Policy B has a generally smaller but more uniform impact.

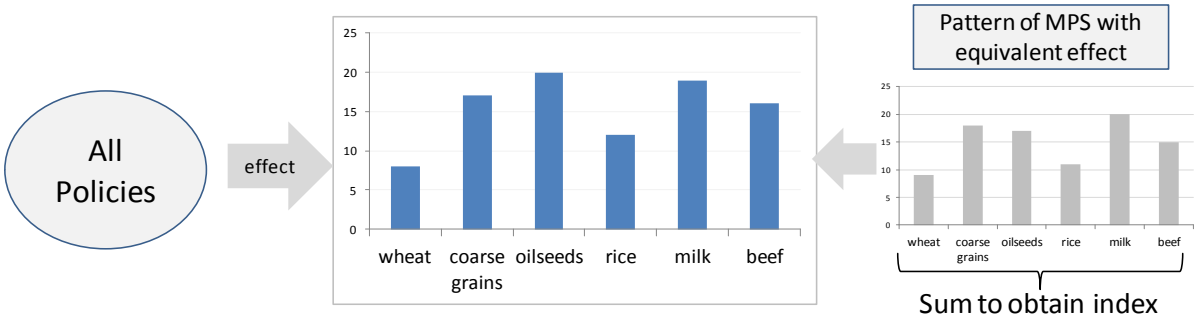
Figure 12.4. Hypothetical impact of two policies



466. Formal comparison requires a way to describe the patterns of impact shown in Figure 12.4 in a way that is consistent for all years and all countries. The approach taken here is to choose another policy to become a yardstick for comparison, and determine how that policy must be applied to reproduce the same pattern of impact as for Policy A (or B). For example, the amount of MPS can be found that, when applied to wheat will have the same production impact on wheat as does Policy A, the amount of MPS for coarse grains, and so on. This yields a quantity of MPS for each commodity such that, when applied in the model, results in the same pattern of production as was the case for Policy A. Importantly, this does not change how Policy A is represented in the model, nor its effect—it is simply a means to characterise the outcome of the policy. If this process is repeated for Policy B, then the amount of MPS required to reproduce its impact versus that for Policy A becomes a way of comparing the two policies. That is, the greater is the amount of MPS required to replicate the effects of the policy, the larger is the estimated effect of the policy.

467. Now imagine that Policy A, instead of being a single policy, represents the entire policy set in the country, and the impacts shown in Figure 12.4 show the net impact of all the policies operating together. In this case, the overall effect is a function of both the *level* and *composition* of support as it is not made up of a single policy. The same procedure may be applied for finding the level of MPS for each commodity, such that the same overall result is obtained (Figure 12.5). Simply summing up the amount of MPS for each commodity yields a total level of MPS that serves as a measure of the impact of the policy set. In this case, the level of MPS is not measuring individual policies, but the effect of the whole policy set including the interactions that take place between them. This approach allows for the *ex post* assessment of policies on a comparable basis over time and across countries.

Figure 12.5. Hypothetical policy set



468. This allows the key analytical questions motivating this analysis to be tackled: *"how have policies changed over time?"* and *"what has been the effect of these changes?"* First, however, the "policy effect" that is to be measured must be identified. The example above discussed the production impact, but one could choose as well trade, welfare or other possible impacts. In each case, the pattern and size of the impact will be different, as will the level of MPS that reproduces it.

469. Since there is no level of MPS that can replicate all the different impacts of the policy set at the same time, each type of impact must be calculated separately. In this chapter, three indices are produced: one based on net trade, one on production and one on farm income. These are called respectively: *trade-impact index, production-impact index* and *income-impact index*.

470. How is the value of this index calculated in practice? The objective is to find the amount of MPS that has the same effect as the overall policy set for a particular outcome. To do this in the model, that outcome (the level or production, trade, or farm income) is held fixed. Then, all policies are simultaneously eliminated (the level of support offered by each policy is set to zero). Because a policy outcome in the model is not allowed to change in response to this policy change, the level of MPS, acting as the reference policy, must adjust so that the model remains in equilibrium at the level of production, trade, or income that was held constant. That is, as all support is removed and the level of MPS in the model adjusts to hold fixed the policy outcome of interest. How much MPS is required to do so serves as the measure of the effect of the policy set.[30]

471. An advantage of this approach is that the resulting indicator is a measure of the net, joint impact of all policies in the policy set. It is not built with individual conversion factors between specific policies and MPS, and its calculation requires no change in how a policy is implemented in the model or how its impacts are interpreted. As it is calculated simultaneously and not on a commodity-by-commodity or policy-by policy basis, it takes into account all the interactions between policies and markets that are represented in the model. MPS is a useful numeraire because it is flexible, easily measurable, and already dominates overall support.

472. Formally, the production-impact index is the amount of MPS, MPS^{*} that solves the implicit equation:

30. In the case of production and trade, the pattern of production and trade for each commodity must be the same before and after the policy shock. Farm income in the model accrues from returns to several different inputs that are owned by the household. In order to hold constant farm income, equations representing the change in producer surplus for all these elements are introduced, and their total for each commodity is held constant. Thus the distribution of overall farm income by commodity is maintained, but the distribution of the various *sources* of income may change.

$$Q_i^s(MPS, BP \mid \phi) = Q_i^s(MPS^*, 0 \mid \phi), \quad [12.1]$$

where: Q_i^s quantity supplied of commodity *i*

BP budgetary payments

ϕ vector of other elements in the model that influence Q_i^s.

473. In the case of the trade-impact index, the net volume of trade in the model is defined as:

$$T_i = \left(Q_i^s(MPS, BP \mid \phi) - Q_i^d(MPS, BP \mid \gamma)\right), \quad [12.2]$$

Where: T_i net volume of trade

Q_i^d quantity demanded defined similarly to quantity supplied in equation 12.1.

γ vector of other elements in the model that influence Q_i^d

474. The trade-impact index is defined as the amount MPS* such that, holding T_i constant:

$$T_i = \left(Q_i^s\left(MPS_i^*, 0 \mid \phi\right) - Q_i^d\left(MPS_i^*, 0 \mid \gamma\right)\right), \quad [12.3]$$

475. The income-impact index is the amount MPS^* that holds total producer surplus (PS_j) accruing from farm-owned inputs (plus quota rent) constant:

$$\sum_j PS_j(MPS, BP \mid \phi) = \sum_j PS_j(MPS^*, 0 \mid \phi). \quad [12.4]$$

476. All commodities have a "farm-owned" input and all use land, which is assumed here to be owned by the farmer. An animal herd is a farm-owned input in the production of beef and milk, and the quota reserved for milk has an element of welfare in the form of quota rent.[31]

477. As discussed above, the PSE is used to calculate a number of different indicators, each of which serving a particular purpose in presenting the data contained in the PSE. These same transformations may be made to the indices developed here, which in their basic form are essentially the same as the PSE. That is, it may be converted to different proportional measures similar to the NPC, NAC and %PSE to aid in the interpretation of results.

478. For any aggregate of commodities, where P_i is the border price, Q_i is the level of production, and MPS_i and PO_i are transfers due to market price support and commodity output support, respectively, the trade-impact index can be converted into a comparable measure by expressing it in *ad valorem* form (that is, as a percentage of the value of production):

31. The assumption that land is owned by farmers is a simplifying one that aids comparisons across countries. In some countries, virtually all land is owned by farmers, while in others, rental of land forms a significant share. What is uncertain is 1) whether landowners are targets of policy or not, and 2) of the land that is rented, what proportion of the landowners are themselves farmers or others that are targets of agricultural policies?

$$\text{trade - impact ad - valorem index} = \frac{\sum_i Q_i P_i + MPS^*_i}{\sum_i Q_i P_i} \qquad [12.5]$$

479. The resulting measures are shown along with the NPC and NAC, which have a similar *ad valorem* interpretation (Figure 12.6). The trade-impact index in ad-valorem form is expected to fall between the NAC and the NPC. Why? The NPC includes only those policies which directly influence producer price. The NAC includes all policies, weighting them all equally (NAC formula is given in equation 6.7 and 6.8). The trade-impact index includes all policies, but with an adjustment that expresses the result in terms of MPS, one of the most distorting forms of support. Therefore, the trade-impact *ad valorem* index should in most cases lie above the NPC as it contains additional policies that do have some impact on producer price (and therefore trade), and it should lie below the NAC because it weights these policies according to the degree to which they affect prices and trade.

480. Think of the distance between the NAC and the NPC as the measure of uncertainty of the effect of domestic budgetary policies on trade. If domestic policies do not affect trade at all, the NPC is a complete measure of trade impact of policies. If domestic policies impact trade in the same manner as MPS, then the NAC measures the trade impact of policies. The trade-impact ad-valorem index resolves this uncertainty by identifying the point of equivalency of MPS and other domestic policies, showing whether domestic policy is more or less equivalent to MPS, and how that changes over time as the policy mix changes.

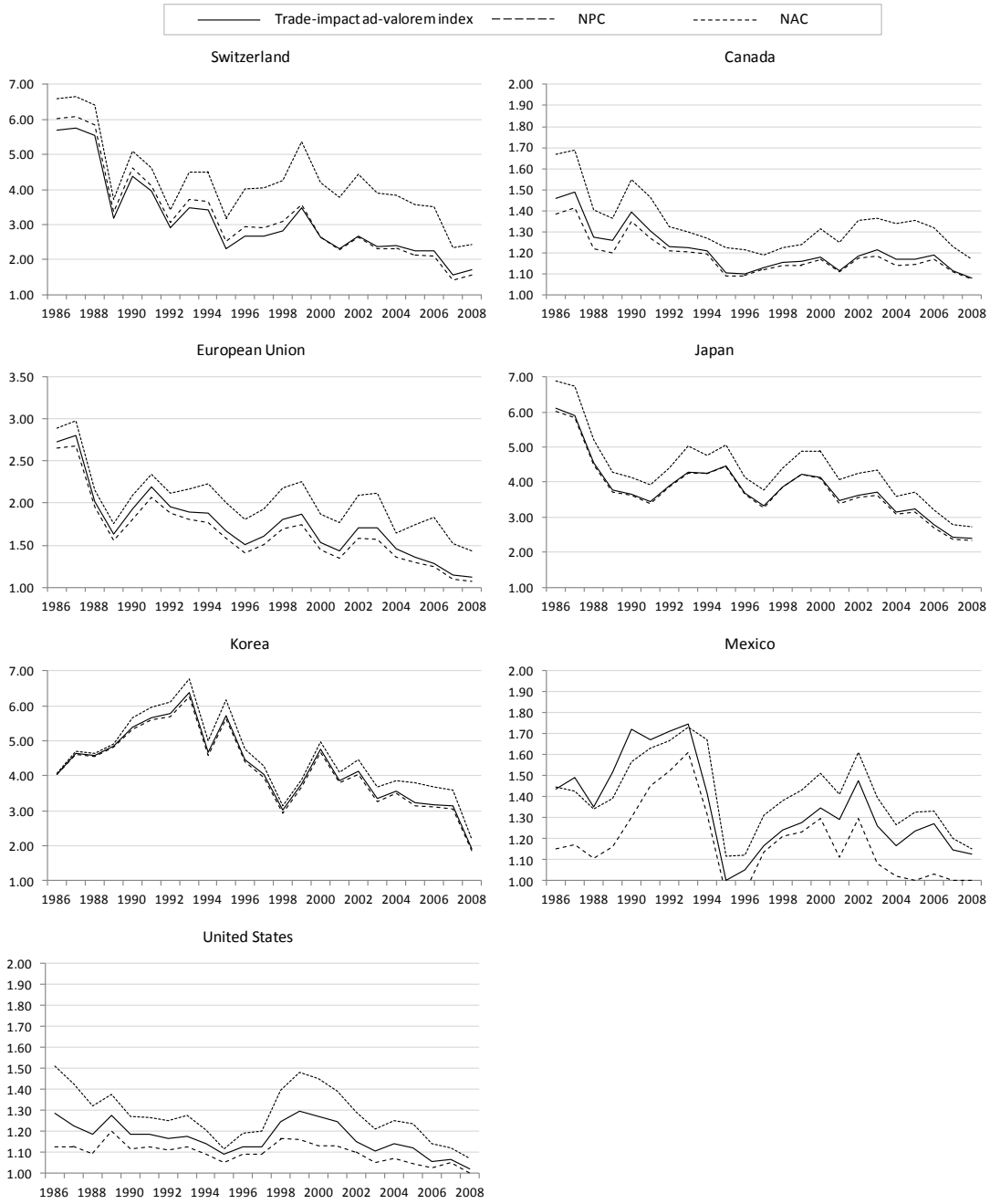
481. The trade-impact index is trending downward for all countries studied (Figure 12.6). This reflects reforms reducing the overall trade distortiveness of the policy set (in particular in Switzerland and the European Union[32]), and lower overall support relative to the size of the sector. The trade-impact *ad valorem* index tracks the NPC more closely than the NAC in most cases. An exception is the United States, where budgetary payments are relatively important, in particular around the year 2000, and which pull the trade-impact index upward for those years.[33] Overall, the trade-impact *ad valorem* index for the United States rests approximately one-third of the distance between the NPC and the NAC until 2006, after which it approaches more closely the NPC. Lower Loan Rate payments seem to be behind this shift as higher prices reduce the impact of this programme.

482. The production-impact index in most cases looks very similar to the trade-impact index. This is because the difference between the production and trade impact of a given policy depends mainly on the way they impact domestic consumption. If two policies are equally production distorting, any difference in how they affect trade will come down to how they impact domestic consumption. In particular, MPS and payments based on commodity output have the same impact on producer prices and production, but MPS has the additional effect of increasing domestic prices paid by the consumer, and so dampens domestic consumption. As a result, MPS is more trade-distorting than payments based on commodity output, though a given level of support provided by the two policies will have similar production effects.

32. For consistency over the time period, policies unique to the new member states (EU-12) are not included in the analysis. In practice, this makes little difference in the results.

33. What would cause the trade-impact *ad valorem* index to be closer to the NAC? High levels of deficiency payments or payments based on variable input use would be more distorting and therefore "weight" higher in the calculation of the trade-impact index, raising its value and bringing it closer to the NAC. Other kinds of market distortions such as production-restricting quotas can have large impacts but do not have direct budgetary impacts. These policies can influence the index, to the point where it could lie outside the range defined by the NPC and the NAC.

Figure 12.6 Trade-impact *ad valorem* index, NPC and NAC, 1986-2008



Note: Each chart in this figure has a different scale for the vertical axis. While this improves the visibility of changes over time for each country, it can make comparisons of absolute magnitude across countries difficult. In particular, note that Canada, the United States and Mexico are on the same (low) scale with values between one and two, while Switzerland, Japan, and Korea are on the same (high) scale, with values between one and seven. The European Union is on a scale in between these two.

Source: OECD Policy Evaluation Model.

483. The production-impact *ad valorem* index should lie above the trade-impact *ad valorem* index in most cases, and it should not correspond to the NPC quite as well as did the trade-impact *ad valorem* index (Figure 12.7). The production-distortiveness of policy in Switzerland has declined more rapidly than has

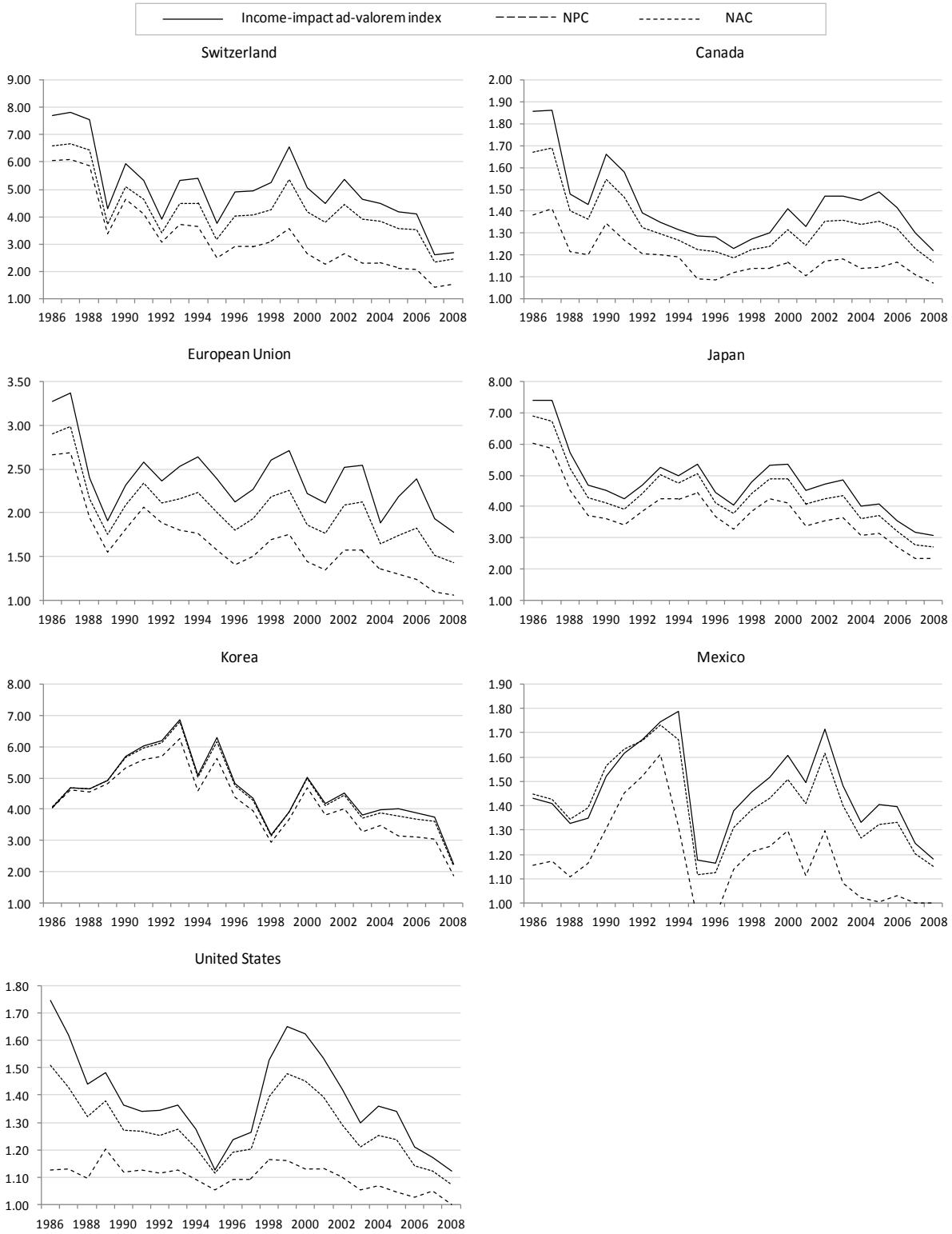
trade distortiveness. In other countries, the difference between the two indices is not large. This lends support to the idea that the distinction between production or trade "Market distortion" does not add much to the policy debate.

Figure 12.7. Production-impact, trade-impact and NPC, 1986-2008

Ad valorem index

Source: OECD Policy Evaluation Model.

Figure 12.8. Income-impact *ad valorem* index, 1986-2008



Source: OECD Policy Evaluation Model.

484. Putting the income-impact index into *ad valorem* form allows comparison with the NPC and NAC. As long as payments based on input use do not form a significant portion of total support, the income-impact tariff-equivalent should lie above both the NPC and the NAC. This is again due to the fact that MPS, upon which the index is based, is generally less efficient at transferring income, and so a greater amount is required to obtain the same level of income as the existing policy package.

485. The income-impact *ad valorem* index measures the implicit transfer efficiency of the policy set by measuring its impact on farm household income. Where the trade-impact *ad valorem* index was compared with the NPC, the NAC is a more natural basis of comparison for the income-impact ad-valorem index. It will typically exceed the NAC, and the extent to which it does so is a function of the transfer-efficiency of the policy set. As a limit case, the income-impact *ad valorem* index will coincide with the NAC when the transfer efficiency of the policy set is equal to the transfer efficiency of MPS. Similarly, when comparing the income-impact index with the PSE, it should in general exceed the PSE. A greater divergence indicates greater transfer efficiency of the existing package of support measures. In this way improvements in the transfer efficiency of policies over time can be evaluated.

486. There is some evidence that re-instrumentation of policies have improved their effectiveness in improving farm incomes. In the European Union, the income-impact *ad valorem* index has been stable over most of the study period, having value in 2008 essentially the same as for 1989, even though the NAC has declined significantly, from 1.75 in 1989 to 1.5 in 2008, or 25 percentage points. In all the other study regions, the index declined to varying degrees (and with much variability) over the study period. In the United States, disaster payments made in the early 2000s raised the income-impact *ad valorem* index to a greater extent than the increase in the NAC, as these payments were highly transfer efficient and formed a significant share of support in those years. The same occurred in Canada, where a series of disaster payments made between 2002 and 2005 drove up the index.

12.2. Modelling environmental policies

- Since PEM has a high level of spatial aggregation, a Stylised Agri-environmental Policy Impact Modelling (SAPIM) framework has been developed to simulate the environmental impacts of a broader range of policies at the farm level, with heterogeneous land quality and environmental sensitiveness of land. However, SAPIM does not include policy price effects and the model exists only for a limited number of countries.
- Successful modelling of agri-environmental policies, such as environmental cross-compliance, agri-environmental payments and conservation auctions, requires additional information to that contained within the support indicator database.

487. In addition to modelling the economic effects of policies on farm production, farm income, trade, etc., economic simulation models can be used to capture the complex linkages between agricultural policies and their environmental effects. The OECD modelling toolkit provides two options for doing this.

488. PEM can be used to analyse the environmental effects of agricultural support policies, since it already contains several stylised PSE-related policies and allows treatment of land use and input use (such as fertiliser) at a sector level. PEM was applied to analyse the environmental effects of agricultural support policies recorded in PSE database as part of OECD Review of Agricultural Policies in Switzerland (OECD 2015a). The environmental module converts market effects such as changes in production, land use, and fertiliser and chemical use to a set of environmental effects including greenhouse gas emission and nitrogen balance.

489. The main difficulty in carrying out analysis of environmental impacts with PEM is the high level of spatial aggregation of the model. Both agricultural productivity and the site-specificity of many environmental effects, such as biodiversity, water pollution and soil erosion, show significant heterogeneity due to spatial variation in the natural resource base and conditions. To address this problem in the study on agricultural policies in Switzerland (OECD 2015a), the Swiss module of PEM was disaggregated into three

geographical areas: plain, hilly and mountain regions. OECD (2015b) documents in detail the regional disaggregation and environmental impact assessment of PEM in Switzerland.

490. Alternatively, farm-level models can provide an excellent basis for examining farmer's input use and land allocation choices under heterogeneous land productivity and heterogeneous environmental sensitiveness of land. Consequently, the OECD Secretariat has developed a Stylised Agri-environmental Policy Impact Modelling (SAPIM) framework: a farm-level model that analyses joint production of commodity and non-commodity outputs as well as negative externalities under heterogeneous land quality. The set of agricultural policies that can be analysed is broader with SAPIM than with PEM, ranging from existing policy instruments such as crop area payments, environmental cross-compliance schemes and agri-environmental payments. It can also model the delivery mechanism for policies, such as for example whether a flat-rate payment is used or price discrimination is used by having farmers bid into a programme. The disadvantage of SAPIM relative to PEM is that, being a farm-level model, price effects of policies are not taken into consideration endogenously. Furthermore, SAPIM has been developed only for a small subset of OECD countries (Finland, Japan, Switzerland, and United States). The limited coverage is due to the tailoring required for each country based on the environmental policies in place and the environmental issues that are most relevant to that country.

491. The information on support measures contained within the indicator database is useful in determining the environmental impact of agricultural support policies. For example, in both PEM and SAPIM, an area payment will be associated to land as a factor of production, and may or may not be specified on the basis of commodity production on the land. A reduction in area payments will then have a different impact on the environment than would a reduction in market price support associated with prices paid to farmers for a specific commodity.

492. However, the indicator database in its current version does not lend itself to modelling agri-environmental policies. These policies are characterized by an "input constraint" label, indicating whether the input constraint is voluntary, and whether it has an environmental objective. However, these same policies can be classified under categories B through to F depending on the implementation criteria for provision. Even if the modeller knows that a programme is agri-environmental, the input constraint label provides no information on the type of input being constrained and on the level of constraint. Consequently, the analyst cannot distinguish between a policy limiting the stocking rate on pasture and one limiting fertiliser use. Furthermore, for modelling purposes one would need to quantify the constraints to determine their environmental impact, which cannot be done.

493. In conclusion, information contained in the PSE can be used as a starting point to model the impact of agricultural policies on the environment, either at the sector level (PEM) or at the farm level (SAPIM). Additional information on implementation details is required to model the impact of agri-environmental policies on the environment.

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