

Producer Subsidy Equivalents (PSEs): measures of agricultural support

The diversity and complexity of agricultural policies around the world are enormous. For instance, if each country only pursues one support instrument for each product (the US has 20 different policies which affect wheat farmers), then for 36 products and 105 countries (the scope of the current GATT negotiations approximately) then there would be 4,000 different policies to evaluate. There are real problems with trying to analyse the effects of such diversity and complexity without using some common measure. The most commonly used measure is the Producer Subsidy Equivalent (PSE) which has been adopted by the OECD(1987) as the common measure and is being used, albeit unofficially and without general agreement, as a focus in the GATT negotiations (see above).

PSEs were invented by Josling in work done for the FAO in the early 1970s (Josling, 1973, 1975). The objectives of this work were to:

- i. "identify and measure the extent of producer gain or loss....and the impact of agricultural market policies on consumers";
- ii "measure the extent to which shifts in policies have added to pressure on world markets";
- iii. "explore the usefulness of these measures to monitor the external effect of domestic intervention and stability policies in the light of aims of international adjustment" (Josling, 1975, p5 - 6).

As Peters (1989) says, these measures lay largely untouched until the present concern about world agricultural trade (OECD Trade Mandate Study - leading to OECD,1987, and the GATT negotiations begun in 1986 with the Punta Del Este (Uruguay) declaration of intent.

The basis of the measure (PSE) and the related Consumer Subsidy Equivalent (CSE) is "to what extent does the policy subsidize producers and/or tax consumers" (Josling, 1975, pA1) In measuring these effects of policies, Josling tried to avoid comparisons of prices between countries, concentrating on the effect on national producer returns and consumer costs of the policies in question. However, for EC's variable levy, world import prices are required. In addition, no attempt was made to estimate national or world prices in the absence of any or all government policies - "The approach is thus a marginal one - asking what would be the difference in price of the next unit produced or marketed if the policy were eliminated.

Josling classified policies of countries originally studied (Australia, Canada, EC(6), UK, Japan, USA) as follows:

A. Measures primarily affecting Producers

1. Price support payments (producer per unit subsidies)
2. Diversion payments
3. Input subsidies
4. Storage subsidies
5. Deficiency payments

B. Measures primarily affecting Consumers

1. Domestic Donations
2. Excise taxes
3. Denaturing premia

C. Measures affecting both producers and consumers

1. Tarrifs
2. Marketing certificates
3. Variable levies
4. Transportation subsidies
5. Export credit and subsidies
6. State trading.

Details of the way in which these policies were treated can be found in Josling (1975). In essence, no account was taken of price effects caused by these policies, so that the subsidy equivalents are "gross measures" - Figure 1 - they are derived from Producer and Consumer Subsidy Values

In the straight tax or subsidy situation (top left and top right) the value of the tax (subsidy) is the difference between the producer and consumer price times the quantity actually traded, to give the

Producer Subsidy Value (PSV) or Consumer Subsidy Value (CSV). The ascription of the values to consumers and producers is made largely on the basis of who gets the subsidy or pays the tax in the first instance, and the whole value is then ascribed to that group. Thus a straight producer payment of £x/tonne of wheat would be defined as a PSV (in £m) ignoring the fact that this subsidy might affect market prices and so would actually benefit consumers as well, while a consumer subsidy would be defined as all CSV and no PSV. The bottom two diagrams should be self explanatory. In many other cases, government spending (or receipts) are used as the appropriate value measures.

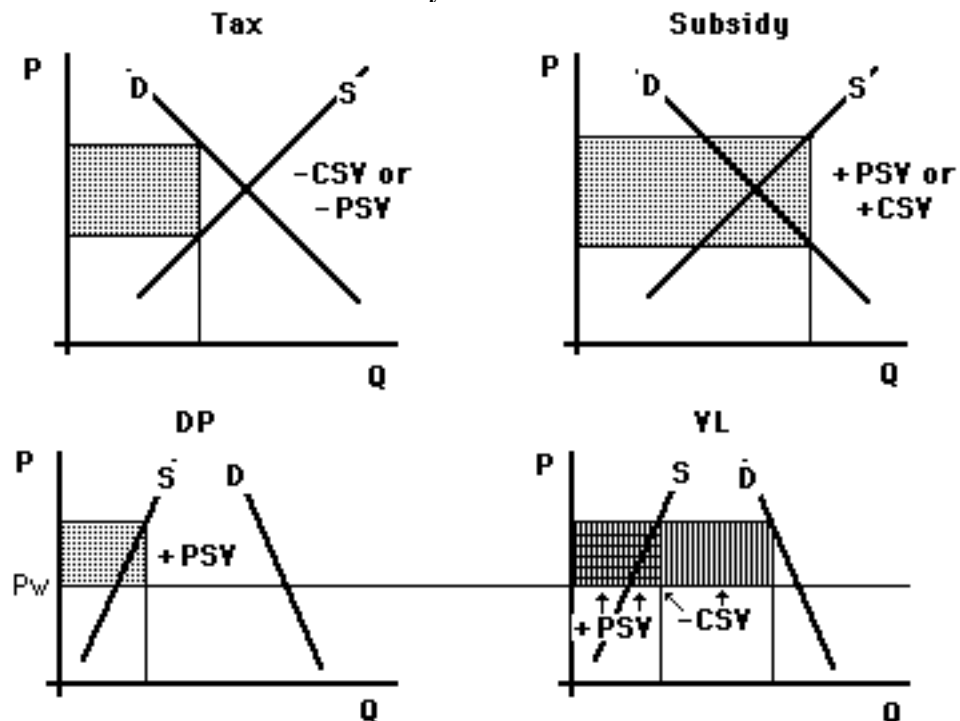
Conversion of PSV and CSV to PSE and CSE measures is then carried out as follows.

$$PSE = (PSV/Total\ Production\ Value) \times 100 - \text{ie is a proportional (\%) measure}$$

$$CSE = (CSV/Total\ Consumption\ Value) \times 100 - \text{" " " "}$$

The basic logic of these calculations is that the PSV should exactly equal the sum of the CSV and the implied tax cost, though be of the opposite sign. Josling calculates both the PSV and the CSV and determines the tax cost as the difference. The same will not be true of the PSE and CSE since these are proportionate figures on the basis of different denominators.

Figure 1 Definitions of Producer and Consumer Subsidy Values



The OECD have taken this basic approach but have modified the actual calculations somewhat, while the USDA (1988) have also calculated PSEs for a variety of commodities and countries using slightly different assumptions about what policies to include and how to include them. These details need not concern us here, though are clearly important if the figures are to be used as the basis for any international agreement.

The OECDs definition of the PSE is: "the payment which would be required to compensate farmers for the loss of income resulting from the removal of a given policy measure. Expressed as a percentage, it represents that part of the value of output accounted for by assistance of various kinds". In fact, the OECDs values are really the change in total revenues which would follow from elimination of the policy given the small country assumption, which is not the same thing as compensation required.

Although not strictly comparable, Figures 2 & 3 show the estimated PSEs for wheat and dairy for the US, EC and Japan for the years 1968 - 78 (Josling, 1974 and 1981, where EC is for 6 countries only) and for the years 1979 - 1988 (OECD, 1989, which contains the background and updated figures from OECD, 1987, where 87 are preliminary and 88 are estimated).

As would be expected, dairy is generally more heavily supported than wheat, and is generally more consistently supported (showing less fluctuation, while Japan appears, certainly in the 80s to provide

more support than either the EC or the US.

The story of the wheat PSEs illustrates an important point - the relationship between PSEs and world market conditions. During the late 60s, world grain stocks were high and prices depressed, leading to significant support for domestic production everywhere. In the case of the EC, this was at the expense of the consumer (associated with equivalent negative CSEs), while in the US it was largely at the expense of the taxpayer (zero to small positive CSEs). Between 1972 and 1976 world markets improved dramatically as the USSR purchased large amounts of grain following a succession of poor harvests and a change in policy, and PSEs in both the EC and the US declined (even going negative in the EC for three years - a producer tax - as export subsidies became export taxes and world prices exceeded internal support prices) though Japan largely ignored these world market developments. EC and US support increased again (76-78) as world prices fell, as they did again in 84 - 87. The US drought in 88 hardened world market prices again, and support consequently declined.

In contrast, dairy support seems largely independent of world market conditions and varies because of domestic conditions. In all three cases, the cost of this support is largely borne by consumers, for whom there is a corresponding large negative CSE.

Figure 2. Wheat PSEs

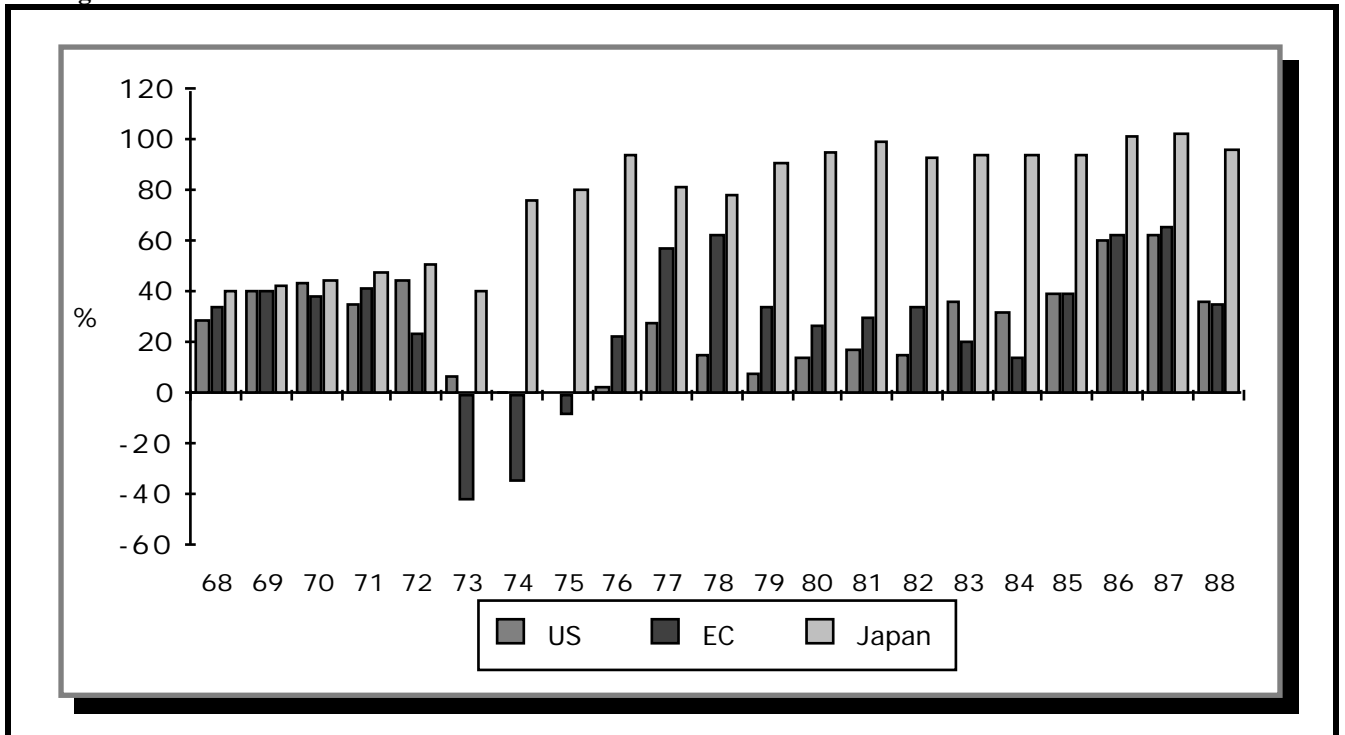
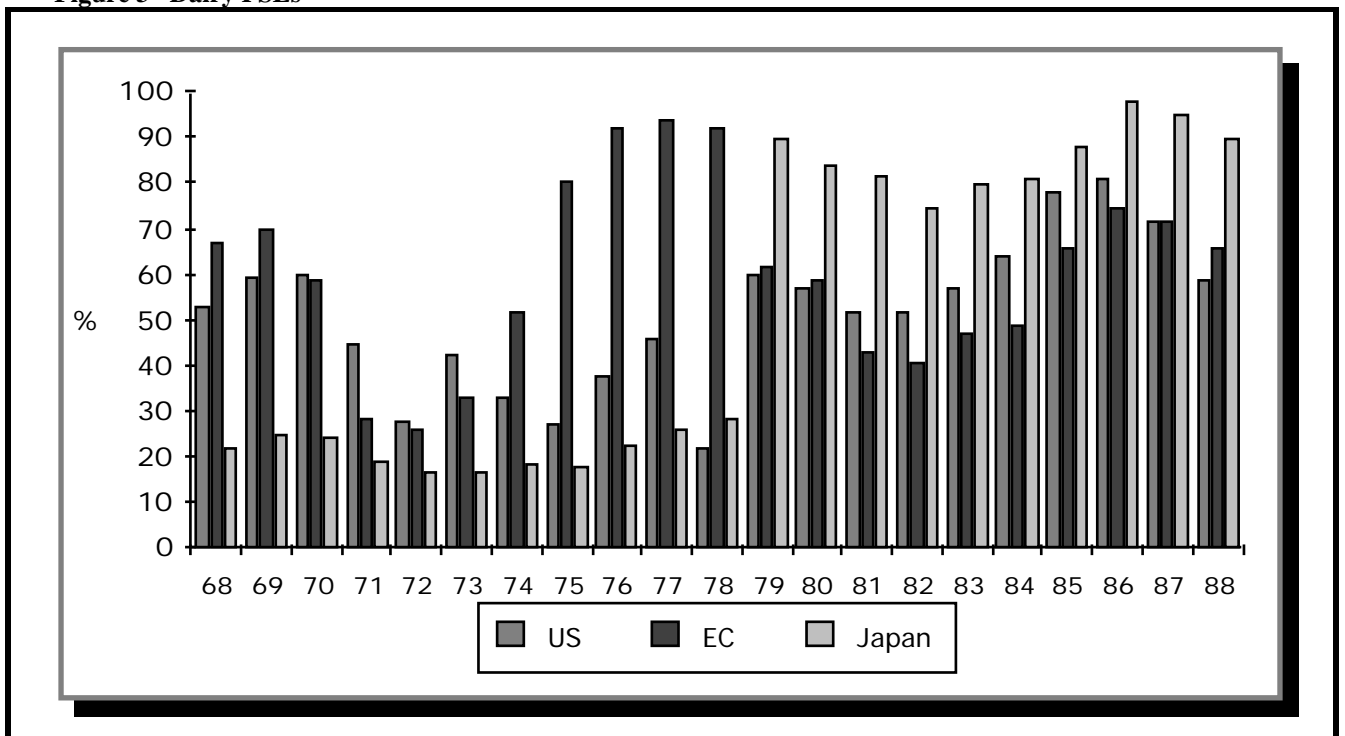
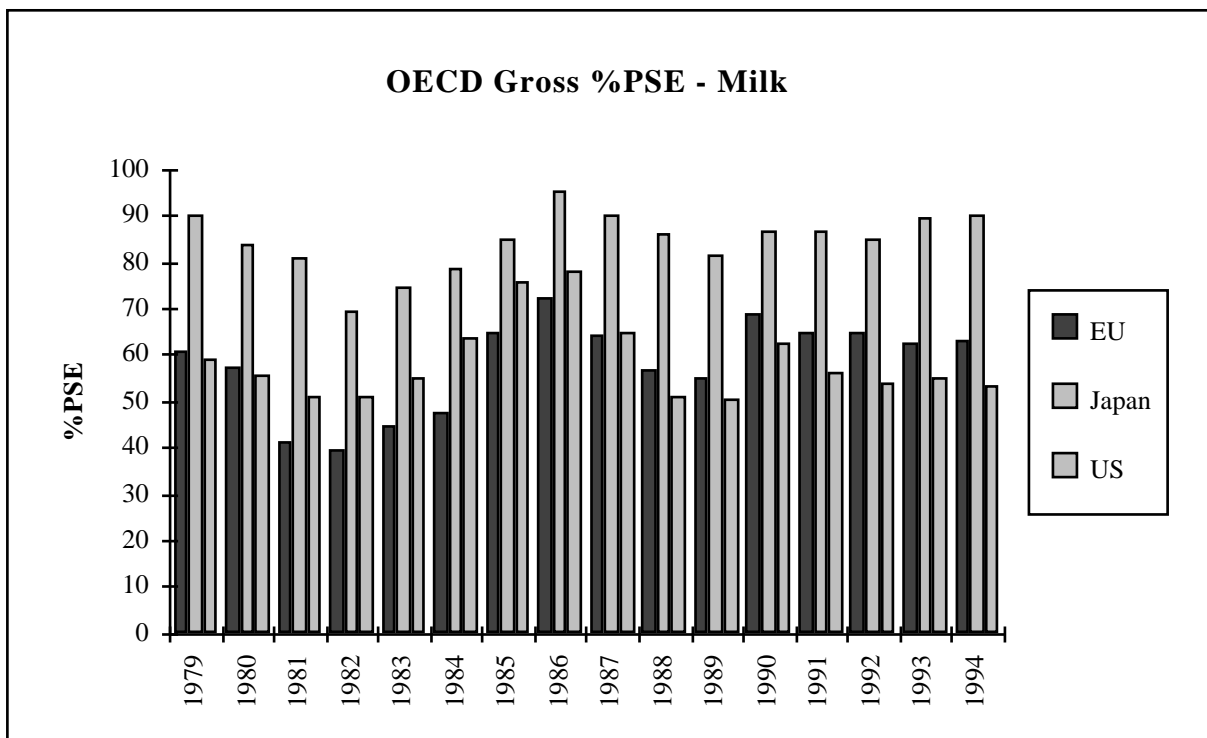
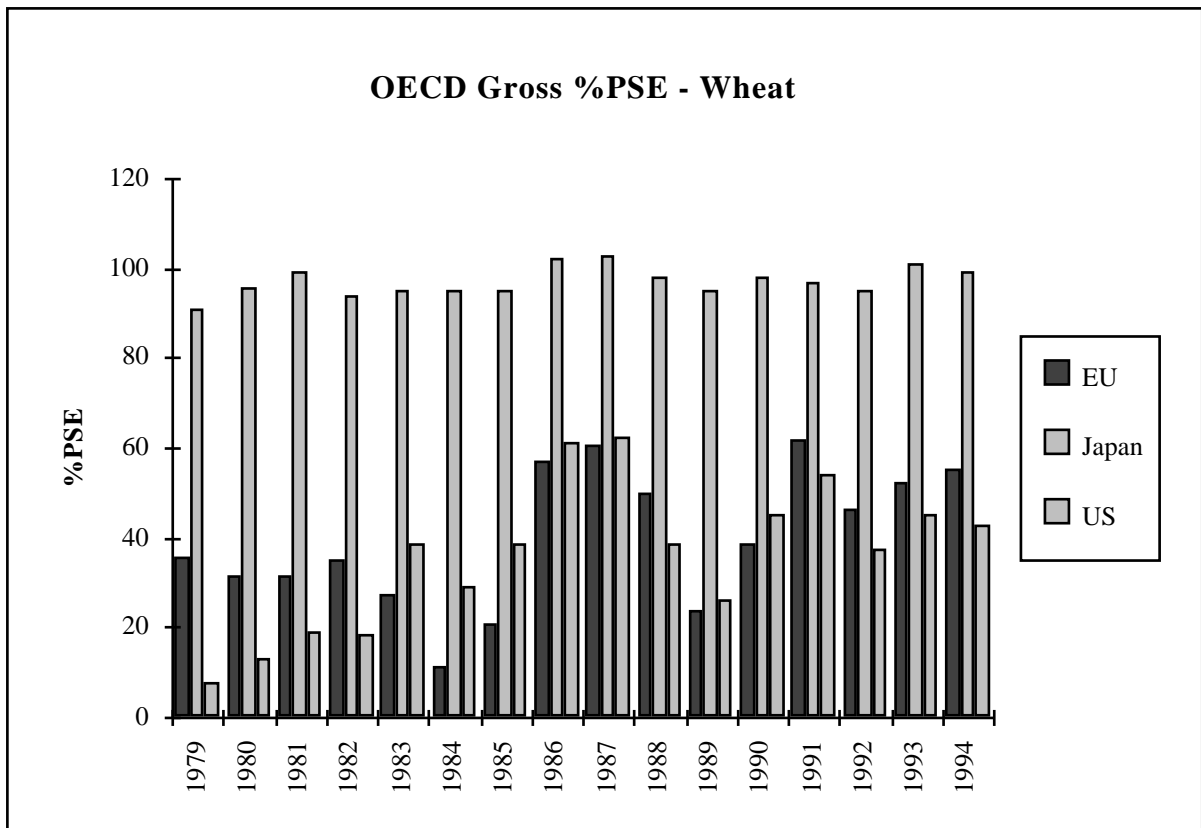


Figure 3 Dairy PSEs



References

OECD (1994) National Policies and Agricultural Trade, (and subsequent annual issues) Paris - in Gilchrist Library
 USDA, ERS. Government Intervention in Agriculture, Measurement, Evaluation and Implications for Trade Negotiations, April, 1987.



note: from 1986 onwards, EU is 12, not 10 countries.

What will cause the PSE to change??

- Changes in the “world price” - typically denominated in \$US
- Changes in the relevant exchange rates (\$US vs. domestic currency)
- Changes in domestic market price (policy induced)
- Changes in domestic quantities produced (though unless these are induced as movements along the supply curve, these should not change the PSE%, should they?)
- Changes in other government support spending.

The diagram below shows how the OECD breaks down changes in the PSE (illustrated here with the change in the EU PSE for all commodities between 1994 and 1995 (from **OECD, Ag. Policies, Markets & Trade, Monitoring and Evaluation, 1996**))

The OECD defines **Gross PSE** as being the sum of:

	Output Quantity (Q) times the difference between the domestic producer price (Pp) and the world or reference price in national currency (PWnc) :	Q * (Pp - PWnc)
+	Direct payments:	+ DP
-	Levies (implicit taxes) on Production:	-LV
+	Other budgetary support for agriculture:	+OS

The Net PSE results from adjusting the gross PSE to take account of feed costs for livestock products (because livestock producers pay the supported prices for their feed ingredients)

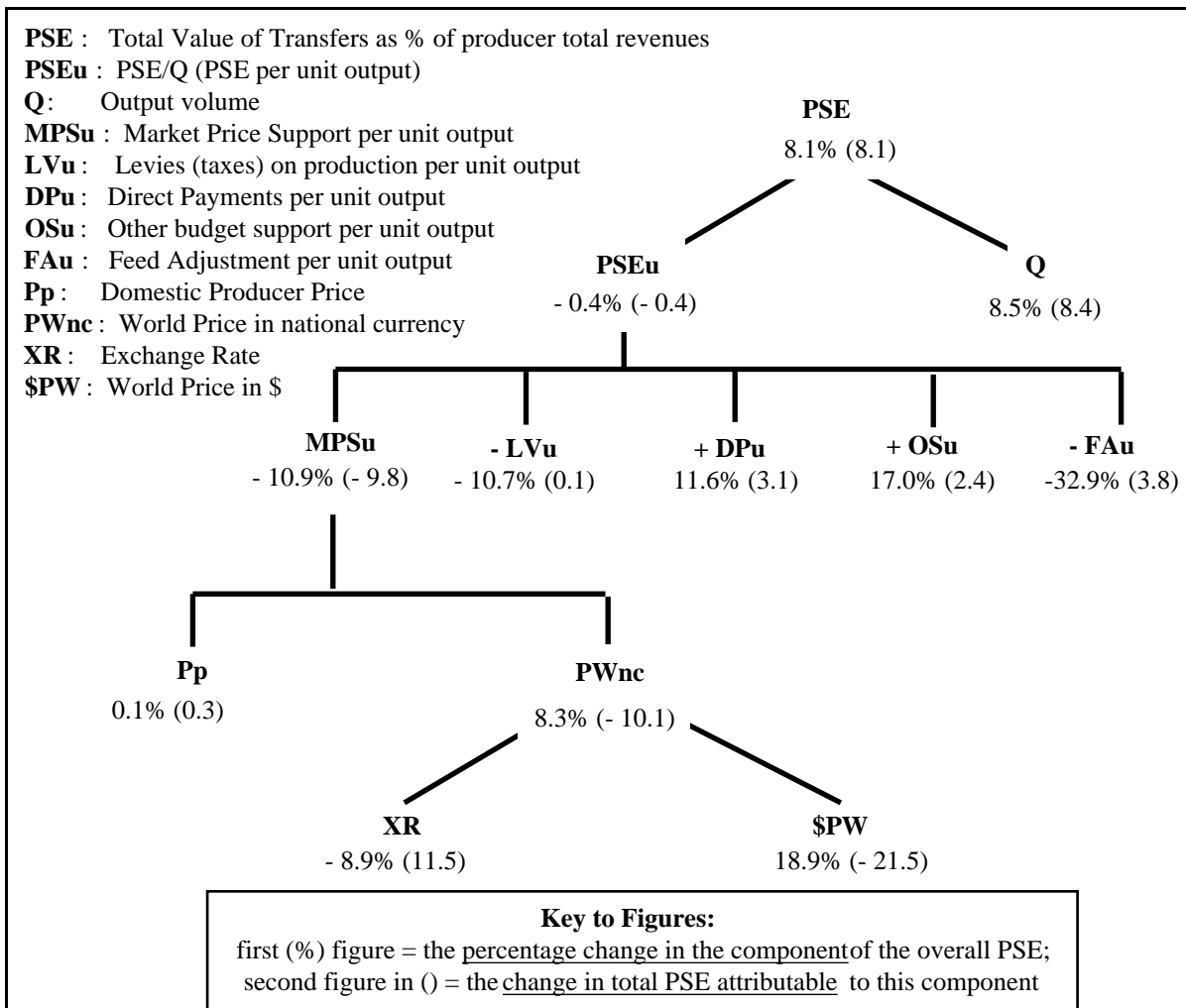
$$\text{Net PSE} = \text{Gross PSE} - \text{Feed Adjustment (FA)}$$

PSEs are also reported on a % basis (the usual form in which they are reported and referred to): which expresses the PSE as a percentage of the total revenues received by the farm sector ($Q * Pp + DP - LV$)

$$\%PSE = \{PSE / [Q * Pp + DP - LV]\} * 100$$

The OECD also use a **per unit PSE**, (**PSEu**) defined as the PSE per unit quantity produced (**PSE/Q**)

Following from these definitions, it is possible to breakdown the changes in PSE into its component parts as shown in the following diagram for the EU (1996)



Thus, between 1994 and 1995, the EU PSE increased by 8.1%. This overall increase resulted from an increase in the quantities produced (and supported) by 8.5% (leading to an increase in the PSE of 8.4 percentage points) and a reduction in the PSE per unit (PSEu) of 0.4% (leading to a reduction in total PSE of 0.4 percentage points - where 8.4 - 0.4 = 8.1 because of rounding errors!). In turn, the 0.4% reduction in per unit PSE was made up of the changes shown in Market Price Support per unit (MPSu as Pp-PWnc); Levies on Production per unit (LPu); Direct Payments per unit (DPu); Other support per unit (OSu); Feed Adjustment per unit (FAu). In turn, the Market Price Support per unit is made up of changes in the domestic producer price (here shown as increasing in the EU by 0.1% (equivalent to a change in the PSE of 0.3 points)) and changes in the world price in national currency terms (which rose by 8.3%, thus reducing the PSE by 10.1 points, other things being equal.) The world price change, in turn, resulted from a decrease in the exchange rate of 8.9% and an increase in \$ world prices by 18.9%, collectively reducing the PSE by 21.5-11.5 or 10 points.

Producer Subsidy Equivalents (PSEs) and the Costs of the CAP

1. The OECD produce more or less well-defined PSE calculations for the EC as a whole for a set of commodities: **Wheat** , Common Wheat, Durum Wheat, **Coarse Grains, Maize**, Barley, Oats, Rice, **Oilseeds, Soybeans**, Rapeseed, Sunflower, **Sugar** (refined equivalent), Sugar Beet, **Milk, Beef & Veal , Pigmeat , Poultrymeat, Sheepmeat**, Wool, **Eggs**. The following paragraphs outline a simple procedure used to estimate, roughly, the corresponding PSE values per member state, and in addition relate these PSE measures to more conventional measures of producer (farm) gain as producer surplus.

The OECDs definition of the PSE is: "the payment which would be required to compensate farmers for the loss of income resulting from the removal of a given policy measure. Expressed as a percentage, it represents that part of the value of output accounted for by assistance of various kinds". In fact, the OECDs values are really the change in total revenues which would follow from elimination of the policy given the small country assumption, which is not the same thing as compensation required.

ELEMENTS OF PSE CALCULATIONS:

In essence, PSEs take no account of price effects caused by policies, so that the subsidy equivalents are "gross measures" - they are derived from Producer and Consumer Subsidy Values

In the straight tax or subsidy situation, the value of the tax (subsidy) is the **difference between the producer and consumer price times the quantity actually traded**, to give the Producer Subsidy Value (PSV) or Consumer Subsidy Value (CSV). The ascription of the values to consumers and producers is made largely on the basis of who gets the subsidy or pays the tax in the first instance, and the whole value is then ascribed to that group. Thus a straight producer payment of £x/tonne of wheat would be defined as a PSV (in £m) ignoring the fact that this subsidy might affect market prices and so would actually benefit consumers as well, while a consumer subsidy would be defined as all CSV and no PSV. In many other cases, government spending (or receipts) are used as the appropriate value measures.

Conversion of PSV and CSV to PSE and CSE measures is then carried out as follows.

PSE = (PSV/Total Production Value) x 100 - ie is a proportional (%) measure

CSE = (CSV/Total Consumption Value) x 100 - " " "

The basic logic of these calculations is that the PSV should exactly equal the sum of the CSV and the implied tax cost, though be of the opposite sign. The same will not be true of the PSE and CSE since these are proportionate figures on the basis of different denominators.

2 The data used are for those commodities in bold in the list above, where Coarse Grains includes everything except maize and where oilseeds include all others except soybeans. The source for these data is: OECD, Tables of PSEs and CSEs, 1979 - 1990, Paris, 1991, with the 1990 data used here.

3. To produce the country by country breakdown, the Gross PSE (i.e. not taking account of the feed cost adjustment for the livestock PSEs) is apportioned between the member states according to the 1990 shares of total production of these commodities. The total PSE distribution is adjusted for differences in MCAs and in the national policy measures included in the OECD's PSE calculations. These latter adjustments are not by any means exact although they should be reasonably indicative of the national differences around the EC average. The effect of the adjustment can be seen as the difference between the "Raw total" and the "Total PSE" lines.

4. Also estimated are the conventional economic measures of Farming Income Gains and Consumer (User) costs associated with the CAP at the EC level, again apportioned between countries on the basis of production and consumption shares. These calculations do include the adjustments necessary to account for feed grain costs and benefits, where the 'consumer' costs are adjusted to remove the cost to livestock producers of the higher feed prices. This estimation allows identification of the "Transfer Efficiency" of the 1990 policy, defined here as the proportion of PSE (which is really an approximation of the gross consumer and taxpayer costs of the policy) which might be expected to accrue to the farming sector as Farming Income Gain (i.e. as an addition to the Gross Value Added or industry gross margin). According to these calculations, the CAP in 1990 was only 66% efficient in this sense.

5. The basis of these calculations is a simple model of the CAP for the identified commodities based on USDA elasticity assumptions (responsiveness of supply and demand to price changes), and also on USDA estimates of world price changes following a) unilateral EC liberalisation and b) multilateral liberalisation. Otherwise the model uses the basic data provided in the OECD PSE tables.

6. Based on these estimates, the benefits and costs of the CAP compared with multilateral free trade can also be identified (Chart 2). Notice that Denmark, France (just) and Ireland are the major gainers from the policy as of 1990, while all other countries lose to a greater or lesser extent. The losses identified for the Mediterranean countries are grossly exaggerated in these calculations because of the exclusion of wine and olive oil from the commodity list and also because these calculations ignore the substantial structural support policies which are of special relevance to these countries. In addition, any transition policies, policies have been ignored, which would otherwise serve to ameliorate these losses.

7. The wide differences in the distribution of the resource cost (difference between farming gains and consumer plus taxpayer costs) between member states results from the fact that these calculations distribute the tax costs of the policy according to the GDP shares among the member states (as a close approximation to the means by which the Community finances work). However, the UK gets a "rebate" from the EC budget (financed by the other member states) on account of the disparity between budgetary contributions and EC budget spending in the UK, in large part due to the CAP, originally negotiated under the Fontainebleau agreement. This agreement is currently set according to 66% of the difference between Britain's percentage contribution to revenue (excluding customs duties and agricultural levies) and its percentage share of EC allocated expenditure. If this rebate were to be included in these calculations, the disparity between the UK and other member states would, of course, be reduced¹.

¹ There was some pressure to re-open negotiations on (and thus reduce or eliminate) this budgetary rebate prior to the December, 1992 European Council in Edinburgh. Six member states had formally registered their opposition to the rebate. It was this Council which fixed the outline of the EC Budget over the period 1993 - 1999, (the so-called "Delors II Budget Package"). However, a combination of skillful Presidency by the UK and the sensitivity of other member states to the British problems of ratification of Maastricht led to a shelving of the complaints and thus the rebate continues.

Table III.1: OECD PSE and related measures by member state of the European Union.

PSE (m. ecu)	BeLu	Dk	Fr	FRG	Gr	Ir	It	Ne	P	Sp	UK	EC
Beef & Veal	563	359	3078	3557	137	915	1992	906	190	858	1717	14271
Pigmeat	342	492	739	1270	59	63	520	637	95	696	384	5298
Mutton & Lamb	20	7	632	166	419	316	289	60	93	825	1258	4085
Poultry Meat	91	66	837	294	79	29	524	274	108	428	553	3283
Eggs	28	13	144	147	25	6	112	104	16	99	121	815
Milk	826	1004	5599	6253	404	1196	2445	2391	335	1320	3183	24955
Wheat	112	268	2530	1215	218	50	679	69	24	366	1060	6593
Maize	6	0	976	149	142	0	477	0	50	238	0	2037
Other Coarse Grains	37	268	1234	1089	121	66	409	15	42	634	400	4315
Soybeans	0	0	41	1	7	0	376	0	0	3	0	428
Other Oilseeds	7	160	1084	682	84	2	377	5	8	235	287	2929
Sugar	169	90	719	709	48	34	241	203	0	157	206	2578
Raw total	2200	2727	17613	15531	1743	2679	8442	4665	961	5858	9169	71588
Total PSE	2113	2551	17407	14767	2046	2482	9002	4761	1057	6709	8688	71583
Total Farming Gain:	1345	1752	11445	10010	1208	1819	5740	2921	648	3944	6078	46910
Trans. Efficiency (%)	64	69	66	68	59	73	64	61	61	59	70	66
Policy Offset (m. ecu)	372	437	2799	2414	258	378	1239	773	144	853	1407	11076
Trade Offset (m.ecu)	408	465	2786	2552	229	345	1177	824	132	828	1301	11046
Resource Cost (m.ecu)	443	-663	-286	2151	253	-912	4040	183	471	1460	3615	10757
Tax Cost (m.ecu)	840	450	5033	5845	438	198	4886	1258	474	2506	4952	26878
Cons Cost (m. ecu)	949	640	6131	6312	1002	711	4885	1846	647	2908	4763	30794
Prodn. Value (m. ecu)	5318	6863	40186	35247	3824	5087	19175	10633	2207	14490	19693	162722
As % prodn. value:												
PSE	40	37	43	42	54	49	47	45	48	46	44	44
Farming Income Gain:	25	26	28	28	32	36	30	27	29	27	31	29
Policy Offset	7	6	7	7	7	7	6	7	7	6	7	7
Trade Offset	8	7	7	7	6	7	6	8	6	6	7	7
Tax Cost	16	7	13	17	11	4	25	12	21	17	25	17
Consumer Cost:	18	9	15	18	26	14	25	17	29	20	24	19
Resource Cost:	8	-10	-1	6	7	-18	21	2	21	10	18	7
CSE:	28	20	26	30	38	23	39	28	44	33	37	31
Tax & Consumer Cost:	34	16	28	34	38	18	51	29	51	37	49	35

8. These estimates also allow the identification of the 'waste' included in the PSE (see chart 3). There are essentially three parts to the waste: i) the "Policy Offset" which measures the extent to which world prices are depressed as a result of the CAP itself (through encouraging exports and discouraging imports); ii) the "Trade Offset" as the extent to which other countries protective policies also reduce world prices; iii) the "Resource Cost" as the partial (i.e first-round) economic efficiency costs associated with distorting markets in the EC. This last (resource) cost appears here as rather small at the EC level (only some 7% of total production value (of these commodities) in the EC). The earlier and more sophisticated Newcastle CAP model (now sadly corrupt beyond repair), which was developed on a country by country basis, produced estimates of resource costs rather more substantial than this (roughly equivalent to the tax cost of the policy). This suggests that the simplification of modelling the system at the European rather than the member state level results in a substantial under-estimation of this cost.

Figure 1: Farming Income Gains compared with PSE - European Union, 1990

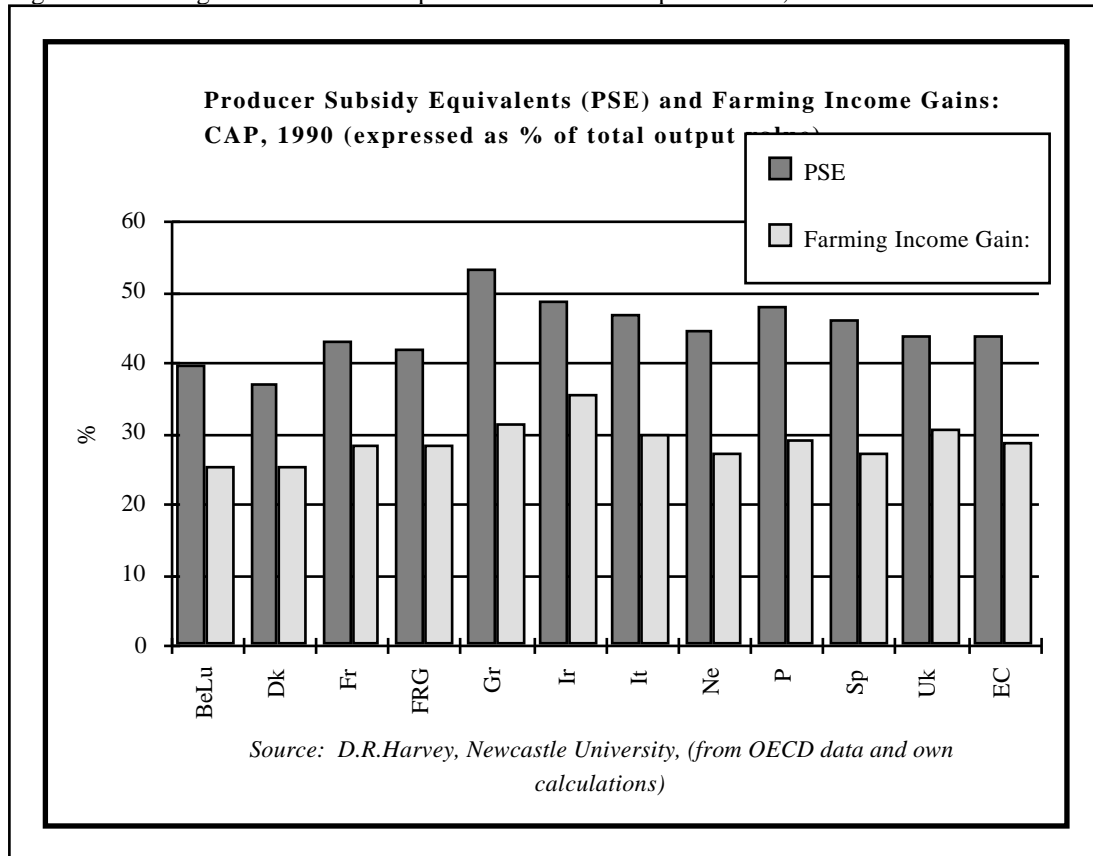


Figure 2. Farming Income Gains and Consumer Costs (as % of output value)

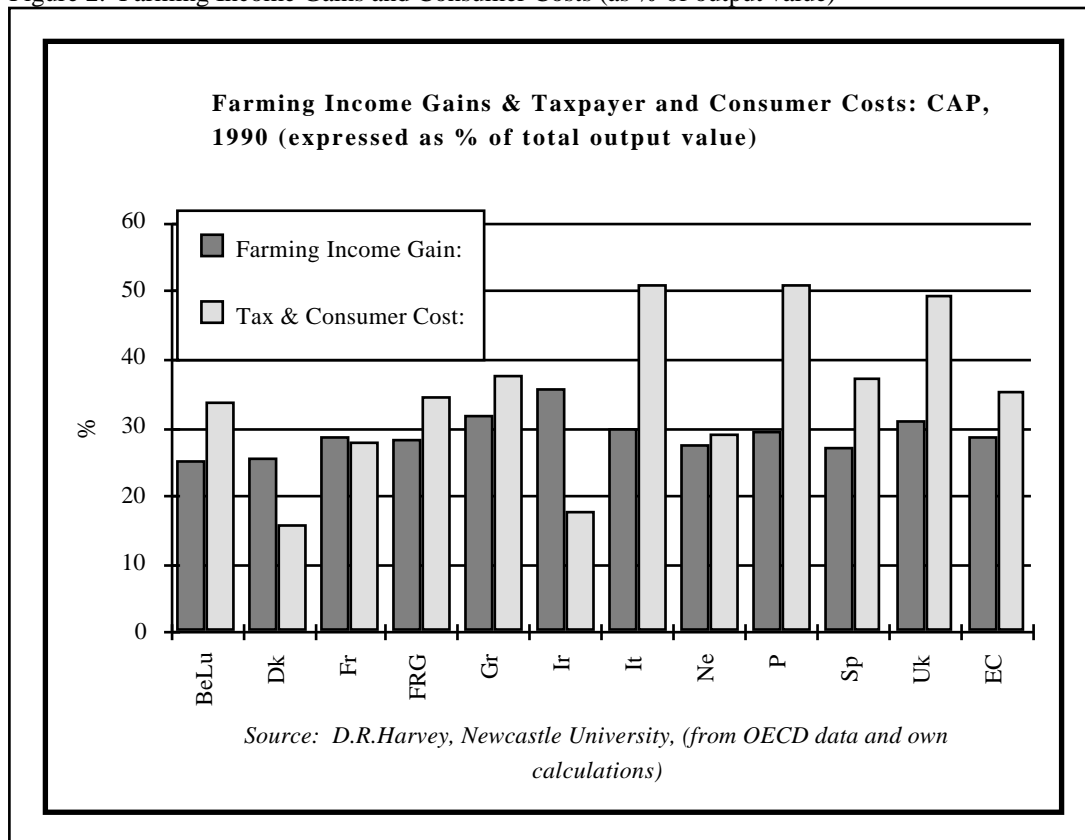
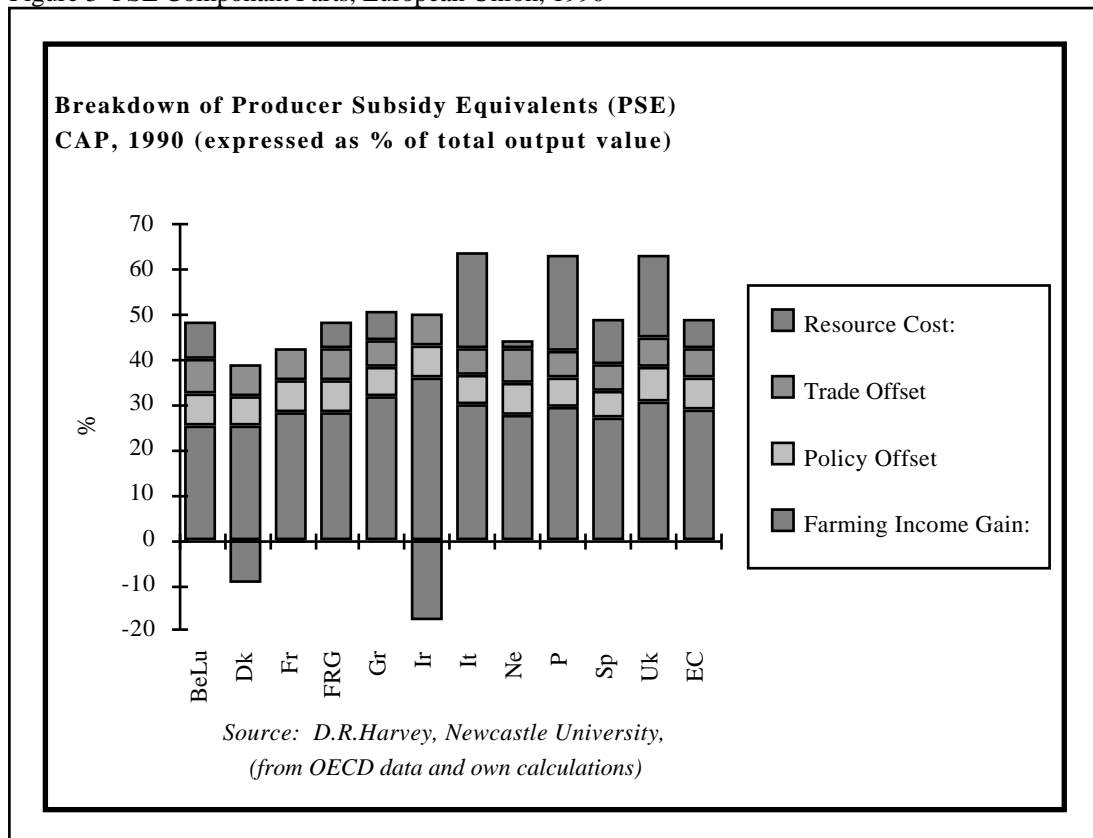


Figure 3 PSE Component Parts, European Union, 1990



Reference:

Harvey and Hall (1989) PSEs, Producer Benefits and Transfer Efficiency of the CAP and Alternatives DP3/89, Dept. Ag. Econ and Fd. Mktg. October