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The Common Agricultural Policy of the European Community--  
Principles and Consequences

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## I. Introduction and Conclusions

The adoption of a common agricultural policy (CAP) was incorporated in the Treaty of Rome, which laid the foundation for the European Community. It was listed among the steps that needed to be taken in order to establish a "common market," without customs duties or quantitative restrictions between member states, and a common commercial policy toward third countries. This provision followed from the particular conditions prevailing in agriculture. In the 1950s, the prospective member states had increased the degree of government intervention in agriculture in order to support farm incomes. The purpose of these policies, which were becoming increasingly comprehensive and complex, was both to prevent prices from being depressed by a rapid rise in output and to enable farm incomes to keep pace with other incomes despite the relatively low income elasticity of demand for agricultural products. Given the desire to bring agriculture within the ambit of the common market and to maintain a degree of government intervention in this sector, there was no alternative but to adopt a common policy in order to avoid the distortions that might result from a continuation of separate national agricultural policies.

The CAP, once heralded as a cornerstone of European economic integration, has come under increasing criticism over recent years. By shielding farmers from market forces at a time of rapidly rising productivity, it has generated growing surpluses and imposed a heavy financial burden on the European Community. There is broad awareness in the EC of the problems of the CAP, especially in the area of international trade relations. Moreover, the extent and rapidity of the depreciation of the U.S. dollar since early 1985, have meant an even greater insulation of agricultural prices in Europe from those on world markets. The Community has been engaged, at least since 1984, in a process of reform of the CAP that is gradually gaining momentum. But the reforms to date have not sufficiently reduced the growth of output and it has proved difficult to reach agreement on the course of further reform. Even allowing for the slow response of output to policy changes, it is clear that much remains to be done.

At its meeting of June 29-30, 1987, the European Council of Heads of State or Government confirmed its commitment to further reform by referring to both the international undertakings entered into at the OECD and the 1987 summit meeting of Heads of State or Government of the seven major industrial countries in Venice, and the need for better adjustment of supply to demand through measures enabling the market to play a greater role. However, at a subsequent meeting on December 11-12, 1987, which was held against the backdrop of a budgetary crisis triggered by increases in spending on agricultural support, the European Council failed to agree on specific reform measures and it was decided to continue negotiations at a special meeting on February 11-12, 1988. The purpose of the present paper is to provide some background information on the debate about the CAP.

The problems posed by the CAP, while they have their own characteristics, are by no means unique. It is not just that policies to enable farm incomes to keep pace with other incomes existed in European countries before the inception of the CAP and are common to most industrial countries, but also that, in many instances, broadly similar arrangements have been used to extend support--the latter point is illustrated by the table below.

**Agricultural Producer Support for  
Selected Countries and Major Commodities, 1982-84**

Commodity	Japan	European Community	United States
Grains	State trading	Price supports maintained by inter- vention purchases Variable levy Export refunds	Deficiency payments PIK entitlements CCC inventory operations and commodity loans
Oilseeds	Deficiency payments	Deficiency payments	CCC inventory operations and commodity loans
Dairy	Price supports through government stockholding and trade barriers Some deficiency payments	Price supports maintained by inter- vention purchases Variable import levies Export refunds	Price supports maintained by tariffs, quotas, and government purchases
Livestock	Beef: Quotas Tariff Domestic price stabilization Pork: Variable levy Poultry: Tariff	Price supports maintained by inter- vention purchases Variable import levies Export refunds	Beef: Tariff Other: General (research and development, inspection, etc.)
Sugar	Price stabilization Import levy	Price supports maintained by inter- vention purchases Variable import levies Export refunds Production quotas	Price supports Import quotas

Sources: Annual Report of the Council of Economic Advisers (1987), p. 164, Washington, D.C.

A distinguishing feature of the CAP, however, is its supra-national organization. Thus, given the need to balance not only the sometimes different interests of domestic pressure groups but also those of different nations, a solution to the problems of the CAP seems so much harder to achieve.

The structure of this paper is as follows. Chapter II describes the historical background, the key principles and institutional details of the present system. This chapter shows that agricultural pricing policies aimed at supporting farm incomes were already in place in EC member countries before the inception of the CAP; indeed, in the presence of these policies, the CAP was a logical consequence of the extension of the common market to the agricultural sector. Thus, the flaws of the CAP, which are manifested in the recent financial crisis of the EC, can be traced back to national policies and attitudes toward agriculture.

The controversy about the CAP, however, goes well beyond its rapidly increasing budgetary cost. Chapter III, therefore, deals with the economic effects of the CAP on EC member countries. In this chapter, the short-term effects of "CAP-like" policies are analyzed with the help of a computable general equilibrium model that is numerically specified for Germany. This analysis gives a broad indication of the direction and size of the effects of agricultural support policies on the national economy and the elasticities established by the model can be used to gauge the short-run, direct effects on the German economy of a complete dismantling of the CAP. According to these calculations, consumer prices in Germany would fall by about 5 percent, aggregate employment would increase by around 4 3/4 percent, and GDP would rise by about 3 percent. These effects are larger than those found in studies that use partial equilibrium techniques but are not significantly different from the results of other general equilibrium analyses. The income gains from a dismantling of the CAP imply that the redistribution of income to farmers through price support is grossly inefficient. According to the estimates in the studies surveyed, the transfer of one ECU from consumers and taxpayers to farmers under the CAP entails additional economic costs of about ECU 0.75.

Also, in Chapter III, the longer-run effects of CAP are investigated by examining economic developments in EC member countries over the last two decades or so and comparing these developments to those in non-EC countries. It is demonstrated that the objectives of maintaining the stability and growth of agricultural incomes in EC member economies by means of price support has resulted in the prices of several key agricultural products being at times considerably above "world market" prices or the prices of low-cost suppliers. At the same time, reflecting the restructuring of the agricultural sector toward larger farm sizes and the rapid pace of mechanization, labor productivity in this sector has increased more rapidly than total labor productivity. This has led to a significant increase in the self-sufficiency of the EC in most products covered by the CAP. As a result

of the rapid increase of production relative to consumption, stockbuilding and the EC's agricultural exports have risen rapidly while agricultural imports have grown at a rate below that of total imports. However, despite the price support given under the CAP, agricultural producer prices have declined relative to industrial prices or general price indices in EC economies and relative productivity gains have not been large enough to prevent farm incomes from deteriorating in recent years.

The EC as a group is the leading importer and the second largest exporter of agricultural commodities in the world. Hence, the question of the international effects of CAP is taken up in Chapter IV. It is shown that the CAP has had a depressing effect on the world market prices of a number of agricultural commodities and that its dismantling would turn the EC into a net importer and the LDCs into net exporters of agricultural products. It is also likely that, notwithstanding losses for certain LDCs in the short run, in the longer run a liberalization of trade in agriculture may well increase real incomes in LDCs; moreover, a dismantling of the CAP would also contribute to greater price stability in world markets for agricultural products.

Present proposals for CAP reform by the European Commission and EC member states, however, envisage only gradual changes. Chapter V discusses these proposals and puts them in an historical perspective. It shows that the problem of excess production was discussed even before the formation of the CAP and that its budgetary and international implications were foreseen.

As noted above, the present problems of the agricultural sector in the European Community are deeply rooted in national attitudes and policies. However, while the CAP may not have caused these problems, it has aggravated them by institutionalizing, and making more comprehensive, policies of price support, import levies and export subsidies at a supra-national level. The need for unanimity amongst member states for fundamental changes to the CAP has entrenched these policies. The basic mistake, which is older than the CAP, is the belief that stable and adequate incomes for farmers can be achieved through agricultural price support. As the historical experience has vividly demonstrated, this instrument is neither effective nor efficient. It is not effective because the development of producer prices has not ensured an adequate level of income for small-scale farmers--which is one of the principal objectives of the CAP--but has generated windfall gains for more efficient large-scale farmers. It is not efficient because aiming at stable and adequate incomes for all farmers has led to output and welfare losses for the economy as a whole.

For these reasons, a move away from support of agricultural prices toward more market-oriented solutions would appear highly desirable. In particular, the history of price fixing under the CAP demonstrates that if agricultural support prices exist, the pressures to fix them (well) above market clearing levels are irresistible. Clearly, a move away from price support would need to be compensated by direct income payments toward lower income farmers at least over an adjustment period, and, if considered desirable on social and regional grounds, over the longer term.

Recognition of the burden of agricultural support on the rest of the economy as well as the growing budgetary costs have elicited a greater public interest in the CAP. Equally, the trade frictions caused by export subsidies have underlined the CAP's international implications. For these reasons, the member states appear more determined than hitherto to bring agricultural expenditure under control. Given the wider effects of the CAP both on EC economies and the international community, it is to be hoped that current efforts at reform will be successful.

## II. The Operation of the CAP

This chapter addresses essentially two main questions: (1) How has agricultural policy in EC countries developed over time; and (2) how does the Common Agricultural Policy work? The following section provides some background information on the development of the agricultural sector in the EC. Section 2 reviews the CAP's origins and the principles on which it is based. The institutional setting is described in section 3 and section 4 outlines the financing mechanisms of the CAP.

### 1. The evolution of the agricultural sector

The agricultural production of the Community consists almost exclusively of temperate zone products with livestock products--meat, eggs, and dairy products--accounting for about half of production and crop products for the other half. The balance between the two broad categories of products varies among member countries: in "northern" countries livestock farming contributes roughly 60 percent to output, in "southern" countries about 40 percent, and in France, which straddles the two geographical areas, there is rough balance. Like other major industrial areas, the EC has experienced a sharp decline in the relative importance of agricultural activity; this has happened in all member states, although the pace of adjustment has differed among them. At the same time, however, labor productivity in agriculture has risen rapidly, at high rates in the 1960s and early 1970s and at somewhat lower, but still significant, rates since then. These productivity gains have resulted in a growth of production much larger than the growth of demand and have contributed to rising degrees of self-sufficiency in many important agricultural products.

These developments have brought about a profound change in the structure of agriculture. With an exodus from the land, there has been not only an increase in the average size of holdings, but also in the relative importance of large farms. This development, however, has differed significantly among countries, and the average size of holdings has continued to vary considerably. Holdings have remained largest in the United Kingdom and smallest in Italy and Greece. The divergence in average farm sizes in the Community has further complicated pricing policies under the CAP. While prices have maintained the profitability of the larger and more efficient farms, which account for the bulk of output, for many small farms recent pricing policies have been associated with a stagnation or reversal of the income gains in the early period of the CAP.

### 2. Origins and principles of the CAP

The objectives and the main features of the CAP were stated in Articles 39 and 40 of the Treaty of Rome. Five objectives were adopted: raising productivity, ensuring a fair standard of living for

the agricultural community, stabilizing markets, food security, and reasonable prices for consumers. 1/ Depending on the product concerned, the CAP would entail common rules on competition, compulsory coordination of the various national market organizations, or a European market organization. 2/ The measures to which the common organization thus established might resort would be, in particular, regulation of prices, aids for the production and marketing of the various products, storage and carry-over arrangements, and common arrangements in the area of exports and imports to underpin the price regime.

This set of measures, which continues to characterize the CAP, was in accordance with the policies pursued earlier by the Community's founding member states. Then, as now, the authorities wanted to support farm incomes by means of indirect support measures to stabilize producer prices, while at the same time improving productivity through structural policies. The common element of the arrangements for price support was the (gradually increasing) reliance on minimum prices. This was enforced chiefly through intervention in the market by specialized entities, either public bodies or bodies set up by professional organizations. In the course of the 1950s, as the rapid growth of output made it increasingly difficult for markets to clear at prices considered equitable by the authorities, the number of products covered was extended and the "organization of the market" was made more comprehensive. In some countries, the latter included the payment of export subsidies. The policies for structural improvement also varied a great deal among countries, but the common characteristics were public investment in infrastructure, including transportation and education, and subsidized credits for investment. 3/

These policies of direct intervention were motivated by how agriculture developed in the first ten years or so after the end of the second World War. The recovery of output after 1945 was remarkable. In 1957/58, agricultural output was 28 percent above its pre-war level, despite a 20 percent reduction in the work force and a slight reduction in the acreage under cultivation. The gains in productivity were brought about not just by a sharp increase in the use of chemical fertilizers but also by significant modernization through investment, as exemplified by the surge in the number of tractors and the accompanying

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1/ The present paper does not discuss the rationale for these objectives, assuming that supporting farmers in the EC or elsewhere is a matter of social choice.

2/ Market organization is the collective name of the rules and regulations adopted by the authorities to influence the supply of and demand for a particular commodity.

3/ For some detail on the policies pursued by individual countries prior to the adoption of the CAP, see Service des Publications des Communautés Européennes, Recueil des Documents de la Conférence Agricole des Etats Membres de la Communauté Economique Européenne, Stresa, July 3-12, 1958. (Referred to as Stresa papers in subsequent footnotes.)

decline in the number of draught animals. By 1959, the total population of the EC-6 was some 20 percent higher than its pre-war level; but there was nonetheless an increase in per capita agricultural output compared with the last few years before the second World War.

The level of supply achieved for individual commodities deserves attention. In particular, it may be noted that in the second half of the 1950s, supply in the EC-6 of such important commodities as potatoes, sugar, vegetables, pork, and dairy products was already as high as demand, or even slightly exceeded it (Table 1). The message conveyed by these data is twofold. First, they strongly suggest that the CAP's contribution to food security in the Community has been less important than is often claimed. Second, they show the extent to which clearing the markets for certain products already posed a problem at the time when the foundations for the CAP were being laid.

Agricultural surpluses were somewhat of an international issue in the late 1950s. The very rapid expansion of production after the second World War had been given additional impetus during the so-called Korea boom. When the boom subsided, prices generally began to decline significantly and the view gained ground that production had overshot its equilibrium level and policies needed to be adjusted in order to eliminate surpluses. In the OEEC and the FAO there were discussions on the policy changes that might be needed, especially in cases involving dumping. At the conference held to prepare the ground for the CAP, which took place in Stresa in 1958, the Community's member states were divided as to the appropriate policy response. Some contended in substance that surpluses could not be an issue because of the equilibrating role of market forces, while others argued that there was an issue because some countries did not give such forces sufficient scope and resorted to subsidies, notably for exports, to keep surpluses under control. <sup>1/</sup> Nonetheless, a common position was reached. Among the points on which there was general agreement, the Final Resolution mentioned that "A balance must be sought between production and potential outlets in the light of export and import possibilities and of a specialization adapted to the natural conditions within the Community and to its economic structure." And it was said that such a policy should "render possible the application of a price policy which will avoid over-production while enabling goods to remain or to become competitive." <sup>2/</sup>

The general policies governing the CAP were further elaborated upon in the detailed operational proposals submitted by the Commission in June 1960. One particular interesting point made in this context concerned the relationship between the Community's common price level

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<sup>1/</sup> Stresa papers, p. 182 and pp. 189-192.

<sup>2/</sup> Stresa papers, p. 222. English version was taken from excerpts quoted in Commission of the European Communities, The Agricultural Situation in the Community, 1986 Report, p.17.



and world market prices. It was explained that, in the interest of producers and consumers, the Community's markets needed to be shielded from excessive price fluctuations on world markets. Two reasons were given. First, conditions in the Community differed greatly from those in the large exporting countries outside Europe. Second, world market prices were often distorted by government intervention. That was why agricultural prices in the Community could generally not be the same as those registered on world markets but should be stabilized at a slightly higher level. <sup>1/</sup> This was recognized to amount to a contradiction in the area of trade policy inasmuch as measures to restrict the influence of international competition conflicted with the overall aim of expanding the Community's external trade, including that in agricultural products. The conclusion was drawn that this would require the Community to be flexible in the pursuit of its aims. <sup>2/</sup>

### 3. The institutional setting

By 1986, the market organizations set up to implement the EC's agricultural policies covered about 91 percent of output. In most cases, price support takes broadly the following form. <sup>3/</sup> There is a "target" price--called "guide" price or "norm" price for certain products--which should normally be the upper end of the range within which prices fluctuate in response to market forces. At the lower end of this range is the "intervention" price, i.e., the price at which specialized public agencies are obliged to buy whatever quantities are offered to them. Intervention prices are thus for all practical purposes minimum guaranteed prices. Intervention prices are normally well above those prevailing on world markets. Protection against cheaper imports into the Community of products covered by the CAP is provided by setting a minimum import price, generally known as the "threshold" price but referred to as "sluice-gate" price or "reference" price for some products. The threshold price is set at a level such that, including transportation costs within the Community, import prices are roughly equal to target prices. Variable levies are used to prevent imports from undercutting the threshold. Similarly, variable subsidies, known as "refunds", are used to help exporters to overcome the handicap of lower world market prices. The system of variable levies and subsidies can also serve to shield the Community against world market prices, that

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<sup>1/</sup> Communauté Economique Européenne, Commission, Propositions Concernant l'Elaboration et la Mise en Oeuvre de la Politique Agricole Commune en Vertu de l'Article 43 du Traité Instituant la Communauté Economique Européenne, COM(60)105, Part II, (June 30, 1960) p. 21.

<sup>2/</sup> Ibid, p. 26.

<sup>3/</sup> A more comprehensive description is contained in Appendix I. For details of the arrangements in force for individual commodities covered by the CAP, see Commission of the European Communities, Green Europe, "General Description of the Mechanisms of the Community Agricultural Market", Part I (March 1985) and Part II (April 1985).

are higher than those at home, and it has been used to this effect in some of the brief episodes of relatively high external prices. <sup>1/</sup>

One of the principles of the CAP is that institutional prices should be uniform throughout the Community in order to avoid trade distortions. However, with more frequent exchange rate changes, adherence to the principle of one price became increasingly difficult. If a common price level is to be maintained in the face of exchange rate changes within the Community, administered prices will have to be adjusted in inverse proportion to the exchange rate changes against the ECU which is used as the unit of account in the area of agricultural pricing. Specifically, a country with an appreciating currency will have to reduce its prices, while a country with a depreciating currency will have to raise prices. As shown by events, most member states have been unwilling to abide strictly by this rule. After an adjustment period, a common price level was achieved in mid-1967, but was upset in the course of 1969 following parity changes by two member states. After having been restored briefly, it was again disrupted and its re-establishment has proved a contentious and elusive goal ever since.

The resistance to an instantaneous adjustment of agricultural prices following exchange rate changes is related to inflation and income distribution. When imported and domestically produced products are imperfect substitutes, as is usually the case in manufacturing, a modification of the exchange rate makes its way progressively through the economy and has an immediate impact only on imported inputs. When imported and domestically produced products are close substitutes, as in agriculture, however, the adjustment is much faster and affects the entire price of the product, not just the imported inputs. The Community-wide institutional prices in force under the CAP further increase the impact effect of a devaluation on inflation. It is to mitigate the impact effect that France initiated in 1969 the policy of phasing in the price increase, which implied of course that price unity was no longer being maintained. Countries with strong currencies are concerned about the immediate, and politically highly visible, income loss inflicted upon farmers by a revaluation. As long as there are annual Community-wide price increases, the adjustment can be made less painful by letting farmers forego price increases instead of reducing support prices. For this reason, i.e., to obtain the time needed for

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<sup>1/</sup> The mechanisms adopted for the products covered by the CAP do not give agriculture full protection against foreign competition. For example, to secure the acceptance of the CAP by its trading partners, the Community agreed that oilseeds and so-called cereal substitutes enter the EC without import duties or quantitative restrictions. The Community is dissatisfied with this state of affairs. In particular, the large and growing imports of cereal substitutes as feedstuffs are believed to be partly responsible for the excess supply of dairy products. The Community appears certain to ask for a review of this regime in the context of the Uruguay Round.

the common ECU price level to rise by a margin considered adequate, Germany became the second country, a few months after France, that insisted on delaying agricultural price adjustments after an exchange rate change.

In the absence of offsetting measures, breaches of price unity would unavoidably lead to major trade distortions. These would be all the greater because farmers in countries with devalued currencies would be in a position to sell unlimited quantities to intervention agencies of countries with revalued currencies. To avoid this, trade was made subject to Monetary Compensatory Amounts (MCAs). They serve as import levies and export subsidies for countries with revalued currencies, where domestic prices exceed the common price level, and they serve as import subsidies and export levies for countries with devalued currencies, where domestic prices are below the common price level. MCAs are called positive in the first case and negative in the second. 1/

Experience suggests that there is a trade-off between the rate of increase in the common price level decided at the annual review and the accompanying decisions on the dismantling of MCAs. From 1983 onward, the annual price increases became smaller because of both the slowing of inflation and the wish to contain the growth of output. This led to significant resistance to the dismantling of positive MCAs. (The countries with positive MCAs were Germany, where they peaked in April-May 1983 when they had to offset a monetary gap of 13 percent, the Netherlands and, for a time, the United Kingdom.) To facilitate the return to price unity, it was decided in March 1984 to change over to a system of negative MCAs only, at least until the end of the marketing year 1986/87 (March 1987). This was done by moving the reference point for the calculations from the ECU to the strongest currency in the system, i.e., in practice the deutsche mark. The system was not only adopted for the MCAs to be created on the occasion of future currency realignments, but it was also decided to convert most of the positive MCAs into negative ones. 2/ The consequence of moving from the ECU to the strongest EMS currency--officially referred to as the switch over to the Green ECU--was of course to give the common price level an upward tilt.

The main problem posed by the MCA system is the distorting impact it may have on the competitiveness of each member state's agricultural sector. As shown by the levels sometimes reached by MCAs, this is far

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1/ The computation of MCAs at different stages and the changes undergone by the system are explained in Appendix II and with the help of some simplified examples.

2/ This still left Germany with positive MCAs which it found impossible to dismantle because, as prices were kept roughly stable in terms of ECUs at the subsequent annual reviews, this would have called for price reductions in deutsche mark.

from a negligible issue (the level of MCAs is indicated by the size of the applied monetary gaps which they are designed to offset; Table 2). If a devaluation within the EMS enables a country to raise agricultural prices by more than the prices paid by farmers for their inputs, this will increase the competitiveness of that country's agricultural sector by making farming more profitable. If, on the other hand, a country does not raise support prices commensurately with the devaluation, this may reduce the competitiveness of the agricultural sector, in particular because of the higher cost (in domestic currency) of imported inputs. In the latter case, it is of course the agricultural sectors of the strong currency countries that improve their relative position. It is therefore not surprising that the decisions about MCA: should be on the agenda of the Community's Ministers of Finance at the time of EMS realignments. 1/

#### 4. Public expenditure on agriculture

Public expenditure on agriculture in the Community is undertaken by the European Agricultural Guidance and Guarantee Fund (EAGGF), which is the financial arm of the CAP, and by national authorities. In the years when the CAP was being put into place, the EAGGF gradually assumed the financial responsibilities for the policies pursued under the CAP. After the completion of this period of transition, and at least since January 1970, the EAGGF and the national authorities have had distinct areas of financial responsibility. However, new member states go through transitional periods of their own in the course of which the gradual implementation of the CAP is accompanied by an increase in the role played by the EAGGF.

The EAGGF is, in effect, the collective name used for most of the appropriations for agriculture in the Community's common budget. 2/ The CAP also generates budget revenue, notably through levies on imports, but this is not set against agricultural expenditure and is part of the Community's own resources. As an exception, co-responsibility levies imposed on producers are considered part and parcel of intervention and enter as negative items in the calculation of the relevant expen-

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1/ Of course, MCAs for those countries which do not participate in the Exchange Rate Mechanism of the EMS, and for Italy which has temporarily opted for larger fluctuation margins, have to be adjusted continuously.

2/ For a detailed presentation of the EAGGF see, Commission of the European Communities, European Agricultural Guidance and Guarantee Fund, Significance and Functioning, (1986) Brussels.

diture. 1/ The EAGGF is divided into two "sections": Guarantee and Guidance. Guarantee, which accounts for more than 90 percent of spending, includes the expenditure incurred by the market organizations in the member states for price stabilization, which comprises the refunds on exports to non-member countries and the cost of intervention. 2/ The Guidance section finances measures of a structural nature, be they schemes available to individual farmers or general programs, notably those undertaken to modernize agriculture in a regional context. There is a major financial difference between the two sections: Guarantee expenditure is determined by the interaction of market developments and the policies in force under the CAP, it is therefore not entirely bound by the appropriations entered in the common budget. Guidance expenditure, in contrast, is firmly under the control of the budget authorities. The question of the total costs of the CAP, both financial and economic, and its distribution among members will be taken up in the next chapter.

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1/ There has been a co-responsibility levy for milk since 1977, with a supplementary one to penalize those who exceed the production quotas introduced in 1984. A co-responsibility levy was introduced for cereals in 1986. The revenue raised by the co-responsibility levy for milk amounted to some ECU 0.6 billion in 1985, about 3 percent of total expenditures of the EAGGF.

2/ Costs of intervention arise when the expenditures for intervention purchases and stockpiling are larger than the revenue from sales out of stocks.

### III. The Effects of CAP on EC Member Countries 1/

#### 1. Overview

It has been argued that the CAP has maintained agricultural prices in EC countries above world market prices; that it has encouraged production of certain products to the extent that net importers of these products have become net exporters; that it has failed to maintain the income of small farms while at the same time giving rise to large windfall profits for large farms; and, finally, that it has contributed to larger agricultural net exports (and stockbuilding) by the EC than would have occurred in its absence. All this, it is asserted, has had negative effects on economic welfare in EC member countries.

An empirical test of these hypotheses and the quantification of the effects of the CAP is, however, fraught with difficulties. Ideally, one would like to establish some counterfactual standard against which to measure actual developments. By comparing actual developments with some counterfactual set of circumstances, (a "free market" for example), the effects of the CAP on the member countries' economies could be isolated. A few attempts at this have been made; 2/ but, in view of the complexity of the undertaking, it is not surprising that they have been less than fully satisfactory.

Widely used and simple techniques to study the effects of economic policies are to compare developments in economic variables before and after the implementation of measures or to compare developments between economies affected and those not affected ("control group") by these measures. However, in addition to more general objections that can be raised against these techniques, 3/ there are two particular difficulties which may distort the analysis: First, before the inception of the CAP, the EC countries already had national policies in place designed to support the agricultural sector. A comparison of economic developments before and after the inception of CAP, therefore, tends to pick up the effects of the implied changes in agricultural policies (if any) rather than the net economic costs or benefits of the CAP which can only be evaluated against a "free market" counterfactual case. Second, other major agricultural producers also give support to

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1/ Unless otherwise indicated, the analysis for the EC focuses on the Community of 10, i.e., excluding Portugal and Spain which joined only recently.

2/ See Appendix III for a survey of existing studies.

3/ Obviously, a major shortcoming of the first technique is the assumption that in the period of investigation no factors other than the introduction of the CAP influenced economic developments. The second technique rests on the equally unrealistic assumption that differences between CAP member countries and the control group result only from differences in agricultural policies.

their agricultural sectors; a comparison of developments in the CAP with those in a "control group" would therefore highlight the effects of different policies between country groups rather than the full influence of the CAF.

In light of these unresolved analytical difficulties, the present paper takes a rather pragmatic approach to assessing the effects of the CAP on its members. In the next section, the short-term effects of "CAP-like" policies are traced with the help of a computable general equilibrium model that is numerically specified for an EC economy. The main questions investigated are: (1) how do policy measures under the CAP affect output, employment, and trade flows in agriculture and other sectors of the economy; and (2) what is the net effect of these measures on economic welfare? Results of the model simulations give a broad indication of the direction and size of the effects of agricultural support policies on the national economy. The discussion is then continued in section 3, where empirical evidence on longer-run trends (which, of course, are of a "non ceteris paribus" nature) are analyzed in the light of the model simulations. Thus, while the simulation and historical analysis may appear unsatisfactory when used in isolation, some inferences on the effects of the CAP on EC economies can probably be obtained by the combination of the two approaches.

## 2. A simple model

An important objective of the CAP is to ensure stable and adequate incomes for farmers. The principal instrument for achieving this objective is agricultural producer price support. The pursuit of this policy, it is asserted, has led to agricultural producer prices in the EC that have at times been significantly above world market prices (for a discussion of this see section 3).

Domestic agricultural prices that are kept above world market prices by a combination of tariffs, quantitative restrictions, variable levies, and subsidies have direct effects on consumers and producers as well as on government budgets. These effects are usually explained in terms of a simple (partial equilibrium) demand and supply framework. For a small importing country, that is a country which cannot influence the world market price of the products it imports, domestic prices higher than world market prices usually imply a loss to consumers (measured in terms of consumer surplus) which exceeds the sum of the gains of producers and the government (in the form of tariff revenue). Thus, there is a net welfare loss to the country (the so-called deadweight loss). Alternatively, for a small exporting country, the sum

of the consumer loss and the government export subsidy payment usually exceeds the gains for producers; this, too, implies a net welfare loss to the country. 1/

But there are also indirect effects of agricultural price support. In particular, more factors and inputs will be absorbed by the agricultural sector than would otherwise be the case. Production and exports (and/or stockbuilding) of agricultural products rise while imports fall. Factor and input prices increase, reflecting higher demand from the agricultural sector, and raise costs for other sectors of the economy. Consequently, industries producing other tradable goods could lose sales to foreign competitors in both domestic and foreign markets and producers of nontraded goods, such as certain service industries, could pass on their higher costs to the consumer. This, and the higher prices for agricultural products, could raise the general level of costs and prices, thereby exacerbating the loss of external competitiveness. Overall economic efficiency, and economic welfare, could suffer too as marginal products between agricultural and nonagricultural sectors differ. Thus, it is quite likely that agricultural pricing policy is not an efficient instrument for the transfer of income to farmers. Moreover, it is also possible that the effects of the CAP may impinge unfavorably on the attainability of general policy objectives--such as price stability, full employment, or trade equilibrium--in EC member countries.

These hypotheses are analyzed with the help of a simple, numerically specified, computable general equilibrium model. 2/ Since a detailed modeling of all EC economies and their interaction with the rest of the world is beyond the scope of this study, the following analysis focuses on one country, but assumes that agricultural price changes are simultaneously implemented in all EC member countries. Given its economic weight within the EC and its importance for the rest of the world, Germany was chosen. The design of the model used in the

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1/ See Appendix III for a more detailed discussion of the measurement of economic welfare effects of the CAP, and the limitations of the partial equilibrium analysis.

2/ Several attempts have been made in the literature to estimate the effects of the CAP on economic welfare in EC countries (see Appendix III for a survey of recent studies). The models used in these studies can be characterized as either partial or general equilibrium models. While partial equilibrium models focus on demand and supply conditions in one or more sectors of the economy and assume that other sectors are not affected by changes in agricultural policy, general equilibrium models explicitly take account of sectoral interdependencies in production.



present paper is orthodox and firmly based on conventional microeconomic theory. 1/ It emphasizes the role of relative prices and substitution possibilities in explaining trade flows and the commodity composition of domestic activity. The essential postulates governing producer and consumer behavior are profit and utility maximization. The model distinguishes four productive sectors (agriculture, industry, traded and nontraded services), four types of final demand (investment, government consumption, private consumption and exports) either from domestic sources or imports, and three types of primary inputs (labor, capital and land). It is numerically specified using a 1980 input-output table for Germany and parameter estimates culled from the literature. The simulations trace the short-term effects (i.e., over a 1-2 year period) of a 5 percent increase in agricultural prices--the annual average increase in agricultural support prices in the EC in national currency terms in 1980-87--under several assumptions about the economic environment. 2/ In particular, it is assumed that (i) fixed capital stocks in industries are immobile internationally and between domestic industries; (ii) real wages are fixed with employment adjusting endogenously; 3/ (iii) real domestic absorption (household consumption expenditure, investment expenditure, and government expenditure) is maintained unchanged by domestic macroeconomic policies; and (iv) the nominal exchange rate remains unchanged. An environment of this type may be considered as depicting the short-run constraints facing an economy when there is a change in agricultural policies. In the longer run, of course, many of these assumptions would have to be relaxed.

The simulation indicates a rather strong response to the 5 percent change in the price of agricultural products. Output in agriculture increases by 2 percent, employment by 4 percent, and exports by

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1/ The model is in the tradition of so-called Johansen models and follows closely the version developed by Dixon et al (1982). A full description of the model and discussion of the simulation results is given in Appendix IV.

2/ It is assumed that producer and consumer prices move in line--in other words, retail and processing margins are constant. This is, of course, a simplification and may lead to an overstatement of the effects of changes in support prices. The price changes are assumed to apply throughout the EC. Effects on world trade and world market prices are captured by modelling export supply and import demand responses for the whole EC area. Possible reactions by other countries to the change in EC policy, however, are not taken into account. For simplicity, the simulated policy is assumed to be revenue neutral for the government. As experience has shown, however, the CAP is a burden on government budgets. This assumption, therefore, is likely to introduce a downward bias in the cost estimates of the CAP.

3/ Real wages are generally regarded as rigid in the short-run in European countries but relatively flexible in the U.S. and Japan. For empirical evidence for selected European countries see Klau and Mittelstädt (1986).

26 percent. 1/ The gains to agriculture are, however, at the expense of other economic sectors. The increase in domestic agricultural prices raises the nominal wage level (via higher consumer prices) by almost 1 1/2 percent. Owing to higher labor costs and costs for agricultural inputs, the international competitiveness of industry and the traded services sector declines: exports in each of these sectors drop by roughly 5 percent. As a result, output declines by about 2 percent in industry and by about 1 percent in traded services, and employment falls by 2 1/2 and 1 3/4 percent, respectively. The nontraded services sector, however, remains relatively unaffected, given its ability to pass on higher costs to consumers.

The net macroeconomic effects of these sectoral developments are significantly negative. The consumer price level increases by almost 1 1/2 percent owing chiefly to higher agricultural prices. Aggregate employment falls by 1 1/4 percent as the agricultural sector is not capable of fully absorbing the labor released from the industrial and nontraded services sectors. The trade balance deteriorates by about 3/4 percent of GDP, despite lower imports, owing to the sharp fall in industrial and services exports. As a consequence, there is a decline in GDP of about 3/4 percent. 2/

Since the model is linear in percentage changes, the above results, together with an estimate of the level of total agricultural protection, can be used to give a rough assessment of the short-run, direct effects of a complete liberalization of agricultural trade in the case of Germany. A recent OECD study (OECD, 1987a) estimated the level of total protection afforded agriculture in the EC at 43 percent. According to the model, a reduction in total protection of this magnitude would lower consumer prices in Germany by about 5 percent, increase aggregate employment by roughly 4 3/4 percent, and raise GDP by about 3 percent. 3/

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1/ Note that export supply emerges in the model as the difference between domestic output and consumption. Exports are then subsidized so that export markets clear. The model analysis does not take into account stockbuilding as an alternative to exporting.

2/ The thrust of these results is supported by recent studies by Breckling et al (1987) for Germany, France, Italy, and the U.K. and by Kirkpatrick (1987) for Germany.

3/ It should be noted that these results abstract from second-round effects that may arise from the trading partner countries' supply and demand responses to a change in policies by the EC. A recent study by Burniaux and Waelbroeck (1985), which is surveyed in Appendix III, uses a Computable General Equilibrium model of the major regions of the world to assess the long-run effects. These authors estimate that a dismantling of the CAP today would increase real GDP in EC countries by 2.7 percent in 1995.

These results are, of course, only indicative of the effects of CAP-like agricultural policies. They abstract from adjustment costs and depend on numerous model assumptions and parameter estimates. It should also be noted that the results are influenced by the specific parameter values chosen from German economic data. Nevertheless, they appear to give a useful guide to interpreting the historical data which are discussed in the following section.

### 3. The historical evidence

The first part of this section deals with the impact of the CAP on resource allocation in the real economy. There are two groups of questions to be addressed here. First, how has the CAP affected the agricultural sector itself? To shed some light on this question, EC prices of certain agricultural products are compared with world market prices, and recent calculations of implicit subsidy rates in the EC and elsewhere are presented. Cost-price developments, the self-sufficiency of the EC in key agricultural products, and changes in average farm sizes are also discussed. Second, how has the CAP affected resource allocation between the agricultural sector and other sectors of the economies of EC members? A tentative answer to this question can perhaps be obtained by looking at the development of the value added in the agricultural sector relative to GNP, the ratio of agricultural employment to total employment, trade in agricultural products in relation to total trade, and real incomes in the agricultural sector in EC member and other economies.

The second part of this section, which deals with the financial costs and economic welfare effects of the CAP, presents the results of several studies on this subject.

#### a. Price developments

The objective of maintaining the stability and growth of agricultural incomes in EC member economies by means of price support has resulted in the prices of several key agricultural products being at times significantly above "world market" prices or the prices of low-cost suppliers. In Table 3, the ratios of domestic (EC) prices to "world market" prices in common currencies (sometimes referred to as coefficients of nominal protection) are calculated for several key

agricultural products. <sup>1/</sup> These coefficients give a broad picture of the degree of protection afforded the domestic producers. For most of the selected commodities domestic prices were on average substantially above world market prices during the 1970-85 period, far more than can possibly be explained by dealers' margins or transportation costs. The estimated coefficients also indicate that the degree of protection has varied significantly over time. This reflects exchange rate movements and varying demand and supply conditions on the international markets for these commodities, which produced divergent movements of domestic and international prices in common currencies. Generally, since EC prices are kept relatively stable, the coefficients of protection tend to be high in periods of low world market prices and/or a weak U.S. dollar.

It is interesting to note that coefficients of protection have also varied across EC member countries (as indicated by the standard deviations of the coefficients of protection under each year in Table 3). These differences stem from variation in local prices among the EC countries and could be attributed to the existence of Monetary Compensatory Amounts (see Chapter II), quality differences and the transportation cost component of prices paid for farm products in importing countries.

A recent OECD study confirms the impression of a significant degree of protection in European agriculture. <sup>2/</sup> Table 4 reproduces OECD estimates of "producer subsidy equivalents," defined as the payments, as a percent of value added, needed to compensate producers for the removal of agricultural producer support policies for the period 1979-81. <sup>3/</sup> Dairy production and beef tend to be the most heavily protected activities, followed by lamb, cereals, sugar and rice production. The international comparison suggests that agricultural production is less

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<sup>1/</sup> Coefficients were calculated for each product and EC member country using producer prices in ECUs (excluding value added tax) as published by Eurostat and international commodity prices, as published in International Financial Statistics converted into ECUs. The following prices were taken to represent the "world market" (i.e., the low-cost suppliers') prices: for beef, prices quoted in the London market; for sugar, the average of the New York spot price and London daily price, f.o.b. Caribbean ports; for butter, London prices; for maize, the Thailand price; and for wheat, the Australian price. Prices were not adjusted for transportation costs nor for quality differences that may exist between products of different origin. The resulting coefficients of protection give therefore only a broad picture of the actual protection afforded EC producers. Coefficients for the EC as a whole are arithmetic averages of country coefficients.

<sup>2/</sup> OECD (1987a).

<sup>3/</sup> The OECD treats the EC as a single entity for purposes of its computations, while the estimates on nominal protection presented in Table 3 are based on individual country and commodity data.

protected in the EC than that in Japan and other OECD countries, but more protected than that in the United States and Canada. 1/

Despite the price support given under the CAP, agricultural producer prices have declined relative to industrial prices or all prices in the EC economies over the 1975-86 period (Table 5). The relative decline was most pronounced in the United Kingdom while in Belgium relative agricultural prices were in fact slightly higher in 1986 than in 1975. Also, farmers have been under substantial cost pressures in all EC countries as input prices have increased much more strongly than producer prices (Table 6); but this has been alleviated by productivity increases (see below).

#### b. Production and consumption balances

Rapid increases in self-sufficiency rates 2/ in the Community for most products covered by the CAP (Tables 7-18) are, of course, consistent with the results of the model in the previous section. In the case of cereals, the EC changed from being a net importer before the inception of the CAP to being a net exporter in more recent years (Table 7). With the exception of the Netherlands, degrees of self-sufficiency increased in all countries during the 1965-85 period. A few of the member countries with a relatively more efficient agricultural sector experienced quite substantial increases in production. Prior to joining the EC and adopting the Common Agricultural Policy in 1973, the United Kingdom was a net importer of cereals; only ten years later it became a net exporter. 3/ A similar change occurred in Denmark and Ireland which joined at the same time, and in Greece which joined in 1981. The degree of self-sufficiency also almost doubled in France after the adoption of the CAP. Self-sufficiency increased to a similar extent in the case of white sugar in Belgium, France, and Denmark (Table 12) and to an even larger extent in the case of butter in the Netherlands (Table 16). Reflecting the rise in production in Italy and France, the EC also increased its self-sufficiency in wine (Table 18). The degree of self-sufficiency of the EC in rice (Table 9) and vegetables (Table 10) declined in the 1960-84 period. For rice, this reflects the decline in production in France and Greece after these countries became members of the CAP. This decline exceeded the substantial increase of production relative to consumption in Italy. In the case of fruit and vegetables, the association of certain Mediterranean countries with the EC (e.g., Israel) and their improved

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1/ Estimates by the U.S. Department of Agriculture for more recent years, however, suggest a relatively higher degree of protection of U.S. agriculture (see U.S. Department of Agriculture (1987)).

2/ Self-sufficiency rates are calculated as the ratios of domestic production to consumption.

3/ It is not clear that this was entirely due to the CAP; the timing of the U.K.'s entry into the CAP coincided with the adoption of higher yielding seed varieties in cereals.

access to the Common Market contributed to a decline in self-sufficiency in all EC member countries but Greece. For meat in general and pork in particular, there was only a small increase in overall EC self-sufficiency (Tables 13 and 15) although Belgium and the Netherlands experienced substantial increases during the CAP period. <sup>1/</sup>

c. Trade

As a result of the rapid increase of production relative to consumption for most products covered under the CAP, the EC's agricultural exports have risen. Since the mid-1970s, the EC has become a net exporter of most temperate zone food products. This has been facilitated to a significant extent by export subsidies. As mentioned earlier, these exports have probably reduced prices in world markets. Currently, the EC is the world's second largest exporter of agricultural products, after the United States. The products exported by the Community include butter, milk powder, condensed milk, cheese, wheat flour, egg products, poultry meat and wine (Table 19). The EC's exports of beef exceed those of Argentina or Australia and its sugar sales in world markets almost match those of Cuba. Nevertheless, the Community continues to be the world's largest net importer of foodstuffs: as a proportion of world trade in agricultural products, imports by the EC 12 (excluding intra-Community trade) amounted to 21.6 percent in 1983-85, while exports totaled 11.7 percent.

The influence of the CAP on trade flows in agricultural commodities is reflected too in the changing composition of trade within the OECD. Over time, the EC's share in total agricultural exports of OECD countries (including intra-EC trade) has increased. In the 1964-70 period, the EC's share of OECD agricultural exports was 45 percent and that of OECD agricultural imports, 60 percent (Tables 20 and 21). In the 1981-85 period, the EC's export share rose to 53 percent, while its import share declined to 56 percent. The gain in export market shares was most pronounced for Germany and the decline in relative imports the largest for the United Kingdom.

Also, the share of agricultural imports in total imports declined between the 1964-70 and 1981-85 periods in each EC country (Table 22). In the United Kingdom, this share fell from 27 percent in 1964-70 to 12 percent in 1981-85 and in Germany from 19 percent to 11 percent. The share of agricultural imports in total imports declined also for most other countries under consideration (quite sharply for the U.S. but only slightly for other countries). The share of agricultural exports in total exports, on the other hand, remained virtually unchanged on average for the EC over the same period while that in the other OECD

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<sup>1/</sup> It is, however, worth noting that the data on developments in EC self-sufficiency between 1960 and 1985 tend to underestimate the increase, since from 1973 onwards the figures include the U.K. which is a major net importer of food.

countries fell appreciably (Table 23). There were, however, significant changes of this share in individual member countries with a substantial increase in Germany and Belgium, and a decline in most other EC countries.

As a consequence of the common market for agricultural products, one might have expected to see a higher degree of specialization in the production of agricultural products among EC countries and a rapid increase in intra-EC trade. Although some adjustment has taken place, the degree of specialization in agriculture is much less than that achieved in manufacturing. <sup>1/</sup> Greater specialization in agriculture appears to have been inhibited by pricing policies aimed at keeping the marginal farmer in business; at the same time, of course, these policies produced large windfall gains for more efficient farmers.

#### d. Stocks

Expanded agricultural output has given rise to growing public stocks. While the model of the previous section suggests that the share of agriculture in exports should have risen, not merely remained stable, it abstracts from stockbuilding behavior and therefore over-emphasizes the role of exports as an outlet for surplus production of some products. Increases in the ratio of stocks to production have been particularly significant for butter, beef and veal, and skimmed milk powder (Table 24). By the end of August 1986, the value of the EC stocks had risen to ECU 12 billion. <sup>2/</sup> In addition, there are privately held but publicly subsidized stocks of certain commodities, notably wine.

#### e. Income and employment

Despite the support given to the agricultural sector in EC member countries under the CAP, the share of value added in this sector in GDP declined in the 1960-85 period (Table 25). The decline was pronounced in Belgium, France, Germany, Italy, Ireland, and Luxembourg, but much smaller in the United Kingdom where the agricultural sector had already undergone substantial structural adjustment in the past. Similar structural change also took place in non-EC countries. In Spain and Portugal, which joined the EC only in 1986, the structural change away from agricultural activities was much more pronounced in the 1960-85 period than in EC member countries. The same is true for Japan, but not for the U.S. or Canada. It would, however, appear to be misleading to attribute differences in structural change away from agriculture largely

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<sup>1/</sup> Also, as pointed out by Jacquemin and Sapir (1987), while the Common Market led to "trade creation" in manufactures, the CAP led to "trade-diversion" and "seems to have effectively discriminated against non-partner suppliers" (p. 12).

<sup>2/</sup> This reflects the book value and not the market value of stocks at resale prices which is considerably lower.

to the agricultural policies followed by a country; the level of development of a particular country also plays an important role.

In all EC countries and most other countries under consideration, agricultural employment fell and the share of agricultural employment in total employment decreased significantly in the 1960-85 period (Tables 26-27). The simulations of the previous section suggest that in the absence of the CAP the structural adjustment in agriculture would have proceeded even more rapidly.

With the exodus from the land, there was not only an increase in the average size of holdings but also in the relative importance of large farms. This is probably attributable to the price mechanism in the CAP, generating attractive returns for the relatively large farms and creating incentives for them to expand further. As a result, between 1960 and 1984, the area taken up in the EC-10 by holdings larger than 50 hectares rose from 28 percent to 45 percent of the total (Table 28). Over the same period, the average size of holdings grew from 11 hectares in 1960 to 17 hectares in 1984 (Table 29). The pace of change differed significantly among countries, and the average size of holdings continues to vary considerably (Table 30). Holdings remain largest in the United Kingdom, where the average size rose to 70 hectares, followed by Denmark, France, and Luxembourg with around 30 hectares. They are smallest in Italy and Greece, where they average 8 hectares and 5 hectares, respectively.

Reflecting the restructuring of the agricultural sector toward larger farm sizes and the rapid pace of mechanization, labor productivity in this sector (measured as real value added per employed person) increased relative to total productivity in all EC countries, even though it remained well below the economy-wide level of productivity (Table 31). Agricultural productivity relative to total productivity also increased in the United States, Canada, Australia, and New Zealand, but not in Japan.

In its early years, the CAP rapidly boosted farm incomes, as it continues to do in new member states during the period of adjustment to the common price level. But since 1974, real per capita incomes, measured as net value added at factor cost per annual work unit deflated by the implicit GNP deflator, appear to have stagnated (Table 32). This contrasts with per capita final output which grew at an average rate of about 1 1/2 percent over the same period and reflects the decline in the agricultural terms of trade. Thus, for the average farmer, the developments of recent years mean that the major gains in income in the early period of the CAP are now being reversed.

#### f. Financial and economic costs

In the 1980s, the bulk (i.e., around 70 percent) of expenditures in the EC budget has been allocated to the agricultural sector. In fact, between 1973 and 1985, expenditure by the European Agricultural Guidance



and Guarantee Fund (EAGGF) increased from ECU 4.1 billion to ECU 20.7 billion (0.7 percent of aggregate GDP in the EC), an increase of over 400 percent (Table 33). <sup>1/</sup> In 1985, expenditures incurred on agricultural price support (included under the Guarantee Section) represented over 95 percent of the total. The remaining 5 percent (classified under the Guidance Section) was used to provide structural assistance to agriculture. In 1985, the major recipient of transfers from the EAGGF was France, followed by Germany and Italy. While the share in total receipts of France, Germany and other members declined between 1973 and 1985 with the arrival of new members, Italy's share increased, reflecting in part similarities in the agricultural sectors of Italy and the new members. Nearly one-half of the expenditures under the Guarantee Section are spent on milk products, meat, eggs and poultry--the commodities that receive high levels of protection (Table 34). In 1985, support to milk products constituted 30 percent of the total expenditure, whereas meat, eggs and poultry producers received about 18 percent of the total. The other commodities whose producers received significant transfers under the pricing policy were cereals and rice, and fats and proteins. Between 1981 and 1985, support for sugar, fats, fruits and vegetables, and tobacco rose, reflecting in part Greece's accession to the EC, while that for cereals declined.

National expenditures on agricultural support by member countries have been rising along with the increases in EC spending. Because of the considerable uncertainty regarding the expenditure on agriculture made directly by the member states through their own budgets, the Commission set up a team of consultants to shed light on this question. <sup>2/</sup> Their report covers the period 1975-80.

Despite the caveats by the authors of the report, the factual findings are quite striking. In the period under review, national payments far exceeded EAGGF payments, in particular on account of social security benefits. In 1980, payments from national sources were more than twice as high as those from the EAGGF, with almost two-thirds taking the form of social security benefits (Table 35). <sup>3/</sup> In 1975, national payments had been four times as high as those from the EAGGF, with just over half in the form of social security benefits. The

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<sup>1/</sup> The EAGGF accounts for most of the appropriations for agriculture in the EC's common budget. Although most receipts in the EC budget stem from contributions by the members, some revenue is collected by way of import and certain agricultural levies. In addition, co-responsibility levies on milk and cereals generate revenues to finance specific expenditures. These levies are treated as measures to regulate agricultural markets; they are not recorded as revenue receipts, but subtracted from expenditures.

<sup>2/</sup> See Commission des Communautés Européennes (1984).

<sup>3/</sup> However, net social security benefits represent subsidies to agriculture only to the extent that they exceed net benefits granted persons employed in other sectors of the economy.

decline in the ratio was due primarily to the EAGGF gradually assuming a larger role. It is similarly revealing that France and Italy each accounted for around one-third of total national payments, while the United Kingdom's share shrunk from 10 percent in 1975 to 5 percent in 1980 (Table 36).

The financial costs of price support are only part of the total costs. To get at the net economic costs to the member countries, one has to sum the various gains and losses in economic efficiency in product and factor markets that arise from the pricing policy. Given the extent of likely direct and indirect effects on resource allocation, such a task is rather complex. Nevertheless, numerous studies have been carried out to estimate the costs and benefits of the CAP by making simplifying assumptions.

The cost estimates are derived by following, broadly speaking, two approaches. 1/ The first approach starts with the simple single-sector partial equilibrium analysis and extends to rather complicated multi-country and multi-commodity models. Some models in the latter category incorporate seven agricultural commodities and thirty countries or country groups with possibilities of inter-sectoral links and accumulation of stocks. The second approach uses so-called general equilibrium models (of the sort outlined in the previous section), which explicitly model sectoral linkages within and between countries. A summary of the results of recent studies is given in Table 37. 2/ The estimates on domestic costs derived from these studies would suggest a loss of around 1 percent of the Community's GDP on average with a range between 0.32 percent and 2.7 percent of GDP, depending on the sophistication of the model used, the country and commodity coverage and the years examined. The results of those studies using the general equilibrium approach to assess the effects of the CAP on EC economies are similar to those reported in the previous section for the case of Germany.

The greater the degree of sophistication of the model in terms of inter-sectoral links and the further into the future projections are made, the larger are the cost estimates. Given the complexity of the subject, these figures are little more than broad indications of the net effects of CAP. Nonetheless, two unequivocal conclusions emerge from the empirical work. First, the CAP redistributes large amounts of income to farmers, principally from consumers and secondarily from taxpayers. The former transfer has been estimated by one recent study

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1/ For a detailed survey on these studies, see Appendix III.

2/ The results from the OECD study (1987a) can be construed to be based on a simple "partial" equilibrium approach, which implicitly assumes inelastic demand for agricultural products in the EC for estimating costs to the consumers. The expenditures incurred by both the national and the EC authorities on agriculture, on the other hand, are taken in the study to represent the costs to the taxpayers.

(Tyers and Anderson, 1986) to be as high as US\$49 billion in 1980 dollars. The OECD study (1987a) cited has estimated the annual average cost of these transfers to the consumers and taxpayers in the EC to be ECU 11,437 per holding and ECU 7,465 per agricultural worker during the period 1979-81. That these transfers are inefficient is clear from the implied transfer ratios, defined as the cost to the economy of increasing farmers' income by one unit. All the studies point to the fact that the ratio is more than one--the exact magnitude varying between 1.17 and 3.23. Second, the distribution of costs is not uniform across countries. For instance, according to Buckwell et al. (1982), in 1980 the transfer ratio was the highest for the United Kingdom (2.07), followed by Italy (1.87) and the Federal Republic of Germany (1.80). In contrast, the Netherlands, Ireland and Denmark are assessed to be the beneficiaries, with estimated transfer ratios of less than one (Table 38). Some recent studies indicate that Greece also gains slightly from being a member of the EC.

#### 4. Concluding remarks

The simulations and historical analysis presented in this chapter (like the numerous other studies in the literature) have broadly confirmed the hypotheses about the negative effects of the CAP on EC member countries stated at the beginning. Some caution is warranted, however, in interpreting the size of these effects. Given the absence of properly-specified, "free-market" standards against which actual developments can be judged, the conclusions drawn from the historical analysis can only be indicative. The simulation results are, of course, dependent on the numerous simplifying assumptions implicit in the specification and parameterization of the model. Further research, aimed in particular at testing the sensitivity of models of this sort to small changes in specification and in parameter values, is needed before firmer conclusions about the exact magnitudes of the effects of the CAP can be drawn.

#### IV. The Effects of the CAP on the Rest of the World

##### 1. Background

The EC as a group is the leading importer and the second largest exporter of agricultural commodities in the world (excluding intra-EC trade) (Table 39). Naturally, therefore, decisions taken in Brussels on agricultural prices and levies to control output growth end up influencing world prices and, over a period of time, the growth of the farm sector in the rest of the world. The Community's share of world exports is not only large but it has grown since the inception of the CAP (Table 40). In the mid-1970s, the EC became a net exporter of most temperate zone food products. This development had a significant effect on the two-way trade in agricultural commodities between the developing countries (LDCs) and the EC, with the latter becoming a net food exporter and the former a net importer. Broadly speaking, in trade with the EC, temperate zone commodities are now imported by the LDCs and tropical commodities exported by them.

A little less than half of EC exports of agricultural products are absorbed by the industrialized countries (Table 41); of this a third goes to the U.S. and another third to non-EC Western Europe. A little more than 40 percent of EC exports are taken by the developing countries, of which one third is absorbed by 12 countries in the Mediterranean basin. The rest of EC exports go to state trading countries. The picture with regard to the imports is somewhat different (Table 42). The developing countries provide more than half of the total agricultural imports to the Community. The share of industrialized market economies is around 40 percent, of which a third comes from the United States and the rest from non-EC Europe and the so-called "industrialized Commonwealth" (Canada, Australia, New Zealand and South Africa). State-trading countries account for the remaining 7-8 percent of EC imports.

##### 2. The international effects of the CAP

There are three major identifiable effects of the CAP on the international economy. The first originates in the protection afforded agriculture through pricing policies that elicit excessive production in the EC and, it is asserted, reduce EC imports from the rest of the world and expand EC exports. This, accompanied by growing output in other parts of the world without corresponding shifts in demand, has depressed world prices. The effect on world market prices has been further exacerbated, it is argued, by subsidized EC exports of excess production. The resulting trade flows at "distorted" prices influence the real incomes of the Community's trading partners.

Second, price support in the EC insulates domestic markets from external commodity price fluctuations, thereby destabilizing world commodity prices. Because variable import levies insulate domestic prices in the face of world price changes, the effect of output changes in the rest of the world are neither reflected in the ECs' domestic prices nor do they elicit any supply or demand response within the EC. This means that the rest of the world must adjust more to any quantity shifts, amplifying price instability there. 1/

The third effect is related to the second. The greater the fluctuations in world prices, the greater is likely to be the instability of incomes of agricultural producers and exporters. When combined with risk averse behavior in production, this instability could cause farmers to contract output, thereby lowering their incomes. This effect is expected to be stronger in poorer countries, since farmers there have a reduced access to insurance markets.

Attempts at estimating the magnitude of such international effects of the CAP have followed approaches similar to those used in estimating the domestic economic costs (discussed in chapter III). The two methodologies--partial equilibrium and general equilibrium--contain models ranging from simple one-good models to multi-sector, multi-region stochastic models. 2/ The quantification of effects has been limited to the first two effects, with the third one discussed only in theoretical terms. The results from these models are discussed below.

a. Effect on prices, trade and welfare

The debate on the CAP depressing world prices has centered on its impact on the terms of trade of importing and exporting countries. Countries exporting CAP commodities (mostly developed countries, such as the U.S. and the "industrialized Commonwealth") lose from the excess production of the EC. On the other hand, LDCs whose agricultural exports do not compete with EC exports could benefit because of lower prices for imported food and increased demand within Europe for substitutes for high-priced domestic agricultural products.

It has to be borne in mind, however, that the existing trade pattern in which LDCs emerge as net importers of food, has been greatly influenced by the operation of the CAP itself. A liberalization of the CAP might induce LDCs to produce temperate zone commodities domestically and ultimately even provoke a switch from their being net importers to their becoming net exporters. It is difficult to assess the potential

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1/ This argument would be weakened if the management of stocks by the EC contributed toward stabilizing world prices. There is, however, no evidence in favor of countercyclical stock management by the EC.

2/ For details, see Appendix III.

for such a switch in the food importing developing countries, but the success of some LDCs (particularly in Asia) in expanding food output suggests that it may be considerable. Higher domestic prices for CAP goods in the Community may also have stimulated the demand within the EC for substitutes produced by LDCs. The benefit to LDCs from higher prices for these substitutes is offset, however, by lower world prices for the goods protected by the EC which, in turn, discourage demand for these LDC-produced substitutes in the rest of the world.

A number of studies have attempted to estimate the impact of an abolition of the CAP on world prices. All of them conclude that the CAP does indeed exert downward pressure on the actual price level (Table 43). The effect is stronger for commodities that face relatively high rates of protection like dairy products, grains, and ruminant meat. Consequently, according to the studies referred to in Table 43, a liberalization of EC markets would raise world prices for different commodities ranging from 0.1 percent (for rice) to over 28 percent (for dairy products). The recent OECD study (1987a) has estimated the effect on world prices of a 10 percent across-the-board unilateral cut in the level of protection afforded by the CAP. This partial liberalization is estimated to increase prices of most commodities in world markets, from 0.55 percent for sugar to 2.91 percent for milk. In the case of grains, however, the study concludes that prices would actually fall in response to diminished demand by livestock producers. This result stands in contrast to the other estimates referred to.

The various studies indicate that an abolition of the CAP would lead to an expansion in world commodity trade, which in case of barley and maize could increase in volume terms by as much as 68 percent. For most commodities, a lowering of both consumer and producer prices in the EC would turn the Community into a net importer and the LDCs into net exporters (Table 44). As expected, the effect is stronger in the most heavily protected commodities, such as dairy products, coarse grains and wheat.

The changes in prices and quantities traded make it possible to calculate the effects the CAP has on the real income of the Community's partners. A hypothetical liberalization of the CAP should, a priori, affect both the non-EC industrial countries and the developing countries. Calculations of the effects (Table 45) result in two general conclusions. First, the size of the total effect on each of the two country groups is not large in proportion to GDP or total export earnings. Second, LDCs as a group stand to lose from the abolition of the CAP, while the effect on industrial countries is ambiguous.

These conclusions, however, need to be treated with caution as the computation of net effects conceals the distribution of gains or losses among individual countries. First, net effects in the industrial countries mask the significant cost to Japan of a liberalization of the

CAP which is offset by gains in some of the other countries in the group. The distribution of the effects within the LDC group is also uneven, depending on whether the country is a net exporter or importer of temperate zone products. The gains and losses from a liberalization have been estimated to be substantial for some countries--for example, in 1980 dollars, Argentina would gain US\$200 million per year and Korea and Pakistan would each lose US\$300 million per year. Second, results showing losses for the LDCs from unilateral liberalization in the EC assume that higher world prices would not elicit greater production of temperate zone commodities in the LDCs. Moreover, these results are derived from models covering only the CAP commodities; a policy reform in the EC could be expected to liberalize the markets for all agricultural commodities. Furthermore, the models employed capture only the direct price effects in a partial equilibrium setting. A liberalization of agricultural markets in the Community would impinge also on the nonagricultural sectors, factor markets and, ultimately, aggregate incomes in the EC's trading partners.

That effects on other sectors are significant is supported by a study which uses a general equilibrium approach. <sup>1/</sup> The results of this study indicate that if trade in agricultural commodities were liberalized in the EC today, total LDC income as a group would be higher by 2.9 percent in 1995. While the assumptions underlying the model certainly influence the results, it is plausible that partial equilibrium models underestimate the potential benefits to the LDCs. In any case, most models overlook the effect on LDCs of higher real incomes in the EC as a result of the efficiency gains from a liberalization of the CAP. Higher income in the EC would in turn, increase the demand for LDC exports.

b. Effect on price stability

The studies surveyed in Table 46 conclude that a significant part of the variability in world prices is attributable to the CAP. The effect of the CAP on variability would seem to be largest for dairy products and wheat. Despite differences in the methodologies used, the various estimates are quantitatively fairly similar, with the exception of those for wheat, nonruminant meat, and coarse grains. Even when compared with price support schemes in other countries, the CAP has been found to be a significant destabilizing factor in world markets. The study by Sarris and Freebairn (1983) concludes that the CAP accounted for more than half of the excess variability in the price of wheat over its global free trade level. Blandford (1983) concludes that the EC has transmitted a larger absolute amount of price variability to the world grain market than any other producer.

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<sup>1/</sup> Burniaux and Waelbroeck (1985).

### 3. Concluding remarks

The partial equilibrium analyses reviewed in this chapter failed to establish a clear interest of LDCs and other non-EC industrial countries in a dismantling of the CAP. However, as the discussion in this and the preceding chapter showed, partial equilibrium analysis is unlikely to capture the full effects of agricultural trade liberalization. Indeed, the study by Burniaux and Waelbroeck (1985) suggests that a removal of CAP would result in a gain for the developing countries as a group when all general equilibrium effects are taken into account. Moreover, if barriers to trade in agricultural commodities were removed in all OECD countries, the trade gains for developing countries would probably be more significant. 1/

The second benefit of liberalization would arise from greater price stability in world markets; there is convincing evidence that world agricultural prices are indeed destabilized by the EC trade barriers.

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1/ See, e.g. Valdes (1987).



## V. Current Proposals and Prospects for Reform

Since the inception of the CAP, the issues facing policy-makers and the arguments put forward in the discussions on policy have remained largely unchanged. At the risk of oversimplification, it may be said that there has been a difference between the Commission and the national agricultural authorities. The Commission, reflecting the very nature of its functions and responsibilities, has taken a broader view of the problems at hand. While determined to strengthen agriculture and mindful of the interests of farmers, it has paid more attention to the Community's high level of self-sufficiency and has been concerned about the budgetary and international implications of surplus production. For equally understandable reasons, the national agricultural authorities have tended to focus more on the needs of their respective agricultural sectors. In particular, they have been concerned to protect the relative income of their farmers. And they have tended to be wary of Community-wide measures to combat excess production, most notably when their respective countries were not self-sufficient in particular products or when they felt that their agricultural sector would have the ability to gain market shares within and, perhaps, also outside the Community.

### 1. The historical background

The problem of excess production and its budgetary and international implications was discussed at the Stresa conference even before the formation of the CAP. At that stage, however, the immediate objective was to forge a common policy on prices and markets, and prospective difficulties were relegated to subsequent discussions. Once a common policy had been agreed upon, the discussion on the shape of policy was given a clear focus and a forceful impetus in December 1968 by the Commission's "Memorandum on the Reform of Agriculture in the European Economic Community." <sup>1/</sup> Because of the leading role played in its conception by the then Vice-President of the Commission responsible for agriculture, this Memorandum is usually referred to as the Mansholt Plan.

The central idea of the Mansholt Plan was that the CAP was relying too much on pricing policy. Because institutional prices were set at an unduly high level, it was argued, they were giving rise to surpluses that had to be taken off the market at rapidly rising costs. At the same time, the high prices were failing to achieve the social goals of the CAP because they were too low to ensure an adequate income to the majority of farmers who, on their uneconomically small and inadequately equipped holdings, were producing a relatively small proportion of total output. The Memorandum inferred from this that the problems of

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<sup>1/</sup> Communauté Economique Européenne, Commission, Mémoire sur la Réforme de l'Agriculture dans la Communauté Economique Européenne (December 18, 1968).

agriculture were of a structural nature in the sense that pricing policy could not achieve its twin objectives--stabilizing production at the level of demand and ensuring farmers an adequate income--unless the vast majority of farms became economically viable. There were no indications that this change was taking place spontaneously. Despite the exodus from the land, most farms remained too small, in particular in the sense of not offering sufficient scope for achieving an adequate return on the investment needed to put production on an up-to-date footing. 1/ These considerations led to two closely related recommendations. First, prices should be lowered so as to eliminate surplus production, but with due regard for the market situation of individual products. Second, structural policy should facilitate the achievement of holdings of an economical size, with adequate investment.

The Mansholt Plan proved to be most controversial. The farmers' professional organizations generally saw it as an attack on the family farm as the mainstay of European agriculture. There was particularly firm opposition to measures designed to take land out of production. This forced the Commission to modify the proposals which it had made in the light of the Memorandum. After several years of often difficult negotiations, a number of Directives were approved by the Council of Ministers with a view to facilitating the modernization of agriculture. Help would be extended to farmers who were either ready to modernize their holdings in a comprehensive manner or wanted to give up farming. The land sold by the latter would then be made available to the former. It is not possible to gauge the impact of these Directives on the basis of available data, as both modernization and an exodus from the land were already taking place before their adoption. However, from the perspective of the formulation of policy they were important inasmuch as their negotiation helped focus attention on some of the main issues.

## 2. The current debate on reform in the EC

The discussion started by the Mansholt Plan has continued to this day, along broadly unchanged lines. This is explained by the fact that the problems identified in the Memorandum have persisted, despite significant social and economic progress. At present, the Community is engaged in an extended round of negotiations for agricultural reform which started in 1982-83 and has progressively gained momentum. Actual measures are negotiated mainly in the framework of the annual policy reviews that are scheduled to be completed in February-April each year but are often not concluded before the summer. In addition, there has

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1/ There was no attempt at precise quantification in the Memorandum, but it was argued that 80 percent of all holdings were too small to keep one man fully employed because modern technology would enable him to cultivate 30-40 hectares or raise at least 40 milk cows.

been a broad discussion of systemic issues on the basis of a "green paper" issued by the Commission in July 1985. 1/

The Green Paper's main theme was that the CAP had reached a turning point because constraints in the areas of foreign trade and budgetary finance made it imperative to curb excess production. Surplus production was not a passing phenomenon, it was argued, but was bound to worsen. The long-term trend of demand growth for agricultural products in the Community was 1/2 percent a year, while the growth of production was proceeding at a rate of 1 1/2-2 percent and showing no signs of slackening. At the same time, there was a large increase in output in the rest of the world, and the countries that might still need to import from the Community were generally short of foreign exchange. According to the Green Paper, the change in policy that was needed and had recently been initiated required reducing the "emphasis" on price support. Quantitative controls were not an alternative solution. Their adoption admittedly offered considerable short-term advantages, notably an immediate impact and a lesser need for price restraint, but in the longer term they were bound to have an adverse effect by freezing production structures. In addition, they were cumbersome to administer. It was therefore imperative to fix institutional prices at levels such as to give clear and appropriate signals to producers. This, however, called for structural measures to ensure that agriculture continued to play its proper social role (regional development, protection of the environment, etc.) and to avoid unduly penalizing farmers in "less favored areas." Such structural measures could include an increase in the relative importance of direct income aid as a step toward dissociating support from output.

On the basis of the Green Paper, the Commission held consultations with national authorities and professional organizations about the policies that could best be pursued to solve the problems at hand. It then presented its conclusions as a comprehensive set of tentative guidelines in December 1985. 2/ This was accompanied by a note of caution regarding the speed at which change could be expected to take place. The guidelines covered a broad range of policy areas, of which two are of immediate interest: price and market policies (the various mechanisms that are used to maintain prices, such as institutional prices and intervention) and policies on structures (including the rationalization of production, the increase of the size of holdings, and the limitation of the production potential). What the Commission advocated was in effect a two-pronged strategy to reduce surplus production and lower the budget costs of the CAP. This involved making support less generous and increasing the role of market forces, on the one hand, and making agriculture as a whole more competitive and, thus, less dependent on support, on the other.

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1/ Commission of the European Communities, Perspectives for the Common Agricultural Policy, COM(85)333 Final, July 15, 1985.

2/ Commission of the European Communities, COM(85)750 Final, A Future for Community Agriculture, Brussels (December 1985).

The Commission believed that the scope for a policy of restraint in the area of institutional prices was limited because its impact on output was a gradual one. It therefore recommended that it be combined with measures to limit the availability of price support. Two types of measures should be used to that end. The one type was "producer co-responsibility", which has been applied to some extent in the Community since 1977 and amounts to letting farmers bear part or all of the costs of disposing of surplus production. The other type of measure was essentially a reduction in the availability of intervention: farmers should no longer have a secure outlet for unlimited quantities at a fixed price. Instead, intervention should become a safety net in the event of unstable market conditions, as it was originally intended to be. The Commission argued that, as the CAP became less generous, measures should be taken to counter the possible adverse social consequences by extending income support to small farmers. Furthermore, it advocated structural measures to increase the capacity of agriculture to face international competition. The latter would include measures to reduce production by less efficient producers, including the granting of early retirement pensions to farmers aged 55-65.

### 3. Recent measures of reform

The reform, which started somewhat hesitantly in 1982 and gained in strength from 1984 has broadly followed the guidelines set by the Commission. But, so far, progress has been slow and difficult. The member states are agreed that conditions in the Community and the world at large make it imperative to curb excess production but they are divided as to what contribution, if any, each of them should make. The negotiations are now conducted with a sense of urgency. This is so in large measure because a number of member states refuse to negotiate a much-needed increase in the resources of the Community's common budget unless this is accompanied by the adoption of arrangements that make it possible to set a ceiling on agricultural expenditure. 1/ In other words, these countries want to end the present situation in which the budget appropriations for agriculture may be overrun because of the open-ended nature of many of the support schemes adopted under the CAP. Broad agreement has been reached to the effect that such a change is indeed called for, but views differ on how this should be done.

Two clear-cut proposals have been tabled. One proposal is to fix annually a ceiling for agricultural expenditure and to ensure that it is not exceeded by moderating the level of support. This would put support prices under downward pressure and in all likelihood lead to gains of market shares by the more efficient producers who are generally also the larger ones. The other proposal is to continue to fix the level of support prices per unit of product and to reconcile this with a ceiling

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1/ The inability to reach agreement over these arrangements was the principal reason for the failure of the European Council Meeting on December 11-12, 1987.

on aggregate expenditure by means of production quotas. This would ensure the survival of a large number of small farms.

The rest of this section is devoted to the changes in policy adopted in recent years and to proposals by the Commission, notably the comprehensive set of expenditure "stabilizers" put forward in summer 1987. Changes in policy have taken essentially two forms: price restraint and the adoption of arrangements that limit in one way or another the entitlement to support. The efforts made to solve the problems posed by the monetary compensatory amounts and stocks built up through intervention should be seen in the same context.

a. Price restraint

Since 1983, the Community has endeavored to pursue a restrictive pricing policy as part of the effort to reduce surplus production. In reports by the Commission, the stance of the pricing policy is often assessed by comparing the index of support prices in national currencies with the rate of inflation as measured by the GDP deflator. On the basis of this comparison, pricing policy has indeed been restrictive in recent years (Table 47). However, this comparison yields no information regarding the relationship between support prices and marginal costs, that is, it gives no indication of the extent to which price developments may have been disincentives to production. As described in chapter III, output continued to grow in the 1980s and it was on average 8 percent higher in 1984-86 than in 1980-81. Largely because of further deterioration in the ratio of producer prices to the prices of intermediate goods, the increase in production merely kept real income per employed person roughly stable, so that the significant loss incurred in the 1970s was not made good. 1/

Political and technical obstacles appear to have prevented pricing policy from making a major and rapid contribution to the elimination of surplus production. The political obstacle has been the determined opposition to reducing nominal support prices in terms of national currencies. The strength of this opposition is indicated by the resistance to the dismantling of positive monetary compensatory amounts (MCAs) in Germany, the only country--disregarding the Netherlands' much smaller positive MCAs--where nominal price reductions have been an issue. Technological progress and the open-endedness of intervention have constituted further obstacles because of the scope they give to offsetting the impact of price restraint on incomes by, respectively, increasing productivity and expanding production. As is explained below, important measures have recently been taken and others have been proposed to curtail intervention. It would cease to be open-ended if the "stabilizers" proposed by the Commission were adopted.

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1/ Real income is defined here as value added at factor cost minus rents and interest payments.

b. Restraint on entitlements to support

Over the years, increasing efforts have been made to reduce the budgetary costs of the CAP through arrangements that restrict the degree of support. These measures may be classified in three categories, although individual measures may be hybrids or be effective only in conjunction with a measure of a different category. The three categories are: co-responsibility levies, guarantee thresholds, and limitations on the scope for intervention. 1/ Co-responsibility levies are meant to let producers share in, or bear, the cost of price support. Guarantee thresholds serve the same purpose by penalizing surplus production through reduction in the intervention price in the period following the one in which the threshold has been exceeded. Both co-responsibility and guarantee thresholds reduce the level of support but not its availability. 2/ In contrast, recent decisions to limit the scope of intervention reduce the availability of support (in volume or in time) without altering the support price. They strengthen the role of market forces by compelling farmers to choose between either carrying stocks themselves until such time as sales to intervention agencies again become possible, or selling on the market at a price that would almost certainly be lower than the support price. Originally, intervention was to serve only as a safety net in exceptional circumstances, but it rapidly became permanent and unlimited. Restricting its availability therefore represents a major change in the functioning of the CAP.

Co-responsibility has been applied from the start to sugar. The availability of benefits--intervention and export subsidies--is limited to production quotas that are set annually on the basis of a five-year moving reference period. The benefits are financed from a levy on output which is paid by the sugar manufacturers who shift it back to the beet growers. Other co-responsibility schemes are less comprehensive. There has been one for milk since September 1977 and another for cereals since the beginning of the 1986/87 marketing year, with levies that currently stand at, respectively, 2 percent and 3 percent of the target price. The yield from these levies is only a fraction of the support granted through the EACGF--an average of about 10 percent for milk and cereals combined 3/--and the restraining impact on output is not believed to be significant.

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1/ The nature and the use made of these measures through 1984 is surveyed in Directorate-General for Information of the European Community Commission, The guarantee thresholds and the CAP, Brussels, 1985. As indicated by the title, the term "guarantee threshold" is used in a very broad sense.

2/ The close relationship between the two concepts is underscored by the fact that guarantee thresholds are mentioned in some reports by the Commission as instruments to implement co-responsibility.

3/ See Commission of the European Communities, Review of Action Taken to Control the Agricultural Markets and Outlook for the Common Agricultural Policy, COM(87)410 Final (August 3, 1987) Brussels, p. 12.

When guarantee thresholds were introduced in the early 1980s, the typical arrangement was that when output exceeded a given volume, the intervention price for the following marketing year was to be a certain number of percentage points lower than it would otherwise be, subject to a maximum adjustment. Such thresholds were adopted for milk, cereals, and rape and sunflower seeds. They turned out to be rather ineffective, mainly because of the absence of provisions to prevent price support from being raised to such an extent as to nullify the reduction in support triggered by the crossing of the threshold. They were therefore abandoned or replaced by more constraining arrangements.

The first step taken to end the open-endedness of intervention was the introduction in 1984 of production quotas for milk. 1/ These quotas not only left an excess production of around 10 percent but, as it turned out, could be exceeded by misusing provisions that were intended to provide some flexibility. 2/ This prompted the Council of Ministers, in December 1986, to adopt measures designed to eliminate surplus production in the course of 1987-89. 3/ Quotas will be reduced in two steps by a total of 8.5 percent, with 3 percent through buying-in on a voluntary basis and 5.5 percent through a uniform reduction (with financial compensation). The tightening of some of the provisions related to overruns of quotas is expected to have an effect equivalent to a 1 percent reduction in production, essentially by raising the penalty for surplus production paid by some farmers. At the same time, it was decided to increase the role of market forces by suspending intervention for skimmed milk powder in the months September-February, and to make suspension possible for butter as well as skimmed milk in March-August, if intervention exceeded specified quantities.

In April 1986, it was decided to limit the intervention for cereals to a number of months a year. In addition, the full support price would be paid by intervention agencies only for wheat of bread-making quality. Lesser quality wheat and other cereals used in animal feed would rate a price that could be lower by as much as 5 percent, depending on the quality. In December 1986, the Council of Ministers also decided to end unconditional permanent intervention for beef and

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1/ This decision was taken for a five-year period, but there appears to be good reason to assume that quotas will continue to be used after the end of the marketing year 1988/89. In a recent document, the Commission expressed the view that "the production cuts resulting from the suspension of the quotas must be consolidated" under the arrangements that will be applicable as of the marketing year 1989/90. See COM(87)40 Final, p. 14.

2/ For a summary of the problems facing the milk sector see Commission of the European Communities, COM(86) 510 final, Emergency Action in the Milk Sector, Brussels (September 11, 1986), pp. 1-10.

3/ See Commission of the European Communities, Bulletin, No. 12 (1986), pp. 14-15 and 85-89, and the relevant sections of COM(87)1 Final, Commission Proposals on the Prices for Agricultural Products and on Related Measures (1987/88), Volume I, Brussels, (March 4, 1987).

veal. Under arrangements introduced in April 1987 for a transitional period that is to end at the close of 1988, intervention will be available in a member state only when the average market price for the quality or group of qualities concerned falls (i) below 91 percent of the intervention price in the Community as a whole, and (ii) below 87 percent of the intervention price at the national level. However, the Council temporarily increased the deficiency payments granted to breeders in the forms of various premiums (available in some or all member states) in order to cushion the impact on incomes of the reduced availability of intervention.

These measures, although important in themselves, are proving insufficient to bring agricultural expenditure under control. As already noted, the current negotiations, aimed at a lasting solution to this problem in the context of budget discipline and finance, are proving laborious. In preparation for the negotiations, the Commission has put forward a comprehensive set of "stabilizers", i.e., *administrative mechanisms which would make it possible to enforce a ceiling on spending per product or, as the case may be, category of products.* 1/ The Commission has stressed that such mechanisms should be adopted simultaneously for all products in order not to elicit shifts of production into less tightly regulated products, thereby defeating the purpose of the reforms. Also, the Commission sees a need for some flexibility in the management of these mechanisms, and believes that it should therefore be given some latitude in dealing with unforeseen developments, that is, without having to ask the Council of Ministers to negotiate appropriate adjustments to the rules and regulations. The substance of the changes in the administrative mechanisms proposed by the Commission is to impose a guarantee threshold for each product, with a dissuasive reduction in the support price for production in excess of the threshold, and to limit intervention in time and volume in order to give market forces greater sway. Guarantee thresholds are very different from production quotas, such as currently exist for sugar and milk, in that they apply to the Community as a whole, instead of to individual producers, and therefore leave room for competition.

c. Vegetable and marine oils and fats

One of the most controversial issues currently being debated is the Commission's proposal for a tax on vegetable and marine oils and fats, a large proportion of which are imported. 2/ From a financial point of view, this tax would have the purpose of simultaneously raising revenue and, by causing demand to shift toward dairy products, of reducing expenditure on intervention. The proposal is still under consideration,

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1/ See Commission of the European Communities, Review of Action Taken to Control the Agricultural Markets and Outlook for the Common Agricultural Policy, COM(87) 410 Final (August 3, 1987) Brussels and Implementation of Agricultural Stabilizers, COM(87) 452 Final, Volume I (October 1, 1987) Brussels.

2/ See COM(87)1 final, Annex II.



but opposition is so strong as to make it doubtful that it will be adopted in the near future. Several member states object to the resulting increase in the cost of living. The Community's foreign suppliers consider that it is contrary to the provisions of the GATT.

As the Commission argued in 1983, when it first proposed such a tax, <sup>1/</sup> the support schemes for vegetable oils have become costly in particular because the same products, or the raw materials from which they are made, enter the Community at low or zero tariffs, and without quantitative restrictions. This regime cannot be altered unilaterally, as it is bound in the GATT; it was introduced to satisfy those countries that wanted to be compensated for the expected trade-diverting effect of the Community's creation. As production in the Community rose, expenditure on intervention increased rapidly. At the same time, vegetable oils depressed the demand for dairy products, thereby further increasing the cost of intervention. In the view of the Commission, the reduction in the support granted for the production of vegetable oils should be accompanied by the imposition of a tax on all vegetable oils as a further, and equitable, measure to reduce the cost of the support schemes, as border protection cannot be imposed. The levy would be a variable one and be calculated every year as the difference between the ex-refinery price for soya oil in the preceding year and the average of a five-year reference period. The Commission argues that the mechanism would be nondiscriminatory, as it would be imposed on all vegetable and marine oils, and would be completely neutral with respect to imports. <sup>2/</sup>

d. The agri-monetary arrangements <sup>3/</sup>

In a recent policy paper prepared under the obligation of member states to review the decision of March 1984, the Commission calls the MCA system a "necessary evil." <sup>4/</sup> However, the Commission believes that the system should be discontinued by 1992, when the "completion" of the internal market will have been achieved. It is precisely to facilitate this development that the Council of Ministers, acting on a proposal by

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<sup>1/</sup> See Commission of the European Communities, COM(83)500 final, Common Agricultural Policy: Commission Report and Proposals, Brussels (July 28, 1983), paragraphs 4.50-4.52. This paper was reprinted as Supplement 4/83 to the Bulletin of the European Communities.

<sup>2/</sup> It is perhaps worth making a few observations on olive oil, of which the Community has been in surplus since the accession of Spain and Portugal. Unlike other vegetable oils, it is gradually losing ground, in all likelihood because it is relatively expensive. Its main competitors are the other vegetable oils. It would nonetheless be subject to the proposed tax, because of the risk that the latter would otherwise be seen as constituting a discriminatory measure directed against imports.

<sup>3/</sup> A description of the arithmetic of Monetary Compensatory Amounts (MCAs) is provided in Appendix II.

<sup>4/</sup> Commission of the European Communities, Report on the Agri-monetary System, COM(87)64 final (February 27, 1987), p. 3.



the Commission, adopted at the end of June 1987 a scheme for the phasing out of new MCAs created as a result of EMS realignments. The practice of creating only negative MCAs has been retained, but a distinction is made between "natural" MCAs, which would have been created also under the old system using the ECU as numeraire, and "artificial MCAs", which owe their existence to the switch over from the ECU to the strongest currency in the EMS exchange rate mechanism. The point of this distinction is that 25 percent of the artificial MCAs created on the occasion of a realignment are to be eliminated at the start of the following agricultural marketing year through a reduction in the Community-wide price level expressed in ECUs. In member states with sufficient negative MCAs, their phasing out will prevent this provision from causing a reduction in support prices expressed in national currency. Member states whose prices would have to decline will be entitled to grant farmers aid financed from their own budgets, provided it is not linked to the volume of output. The remainder of the MCAs, be they artificial or natural, are to be phased out in specified installments to be completed by the beginning of the third marketing year following the realignment, with a ceiling of 30 percent on the amount of natural MCAs that may be eliminated at the time of the realignment. Thus, the new system aims at both making sure that MCAs will be phased out and preventing devaluing countries from rapidly improving the relative income position of their respective agricultural sectors.

It deserves to be noted that, as part of the drive to curb the growth of budget expenditure, MCAs have been made less comprehensive, that is, there has been a reduction in the extent to which they offset the gap between exchange rates and green rates. Further steps in this direction were taken in June 1987, as part of the annual review of agricultural prices and policies. Specifically, it was decided to use lower prices than before to calculate the MCAs of some commodities, and there were selective increases in the so-called neutral margins that are deducted from the calculated monetary gap to obtain the applied monetary gap.

It stands to reason that the price differences among the member states which are reflected in the MCAs should have an impact on supply and demand, and on trade within the Community and with third countries. Nonetheless, the Commission was unable to detect clear trends bearing this out in the two studies it carried out based upon a wealth of statistical information. The first study covered roughly the period 1959-76, while the second extended the analysis to 1982. <sup>1/</sup> The broad conclusion drawn by the Commission was that the performance of the member states could not be ranked in the light of changes in MCAs, be it for their total production or individual products, because of the much

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<sup>1/</sup> Commission of the European Communities, Economic Effects of the Agri-monetary System, COM(78)20 Final (February 10, 1978), and Communication to the Council on the Economic Effects of the Agri-monetary System, COM(84)95 Final (April 26, 1984).



more powerful combined impact of the other factors determining farmers' decisions.

4. Concluding remarks

The member states appear determined to bring agricultural expenditure under control, both because it is recognized to be inefficient and in order to free additional resources for structural policies at the Community level in the areas of regional development, social policy and, last but not least, agriculture itself. Also, it is hoped that reform will help attenuate the frictions with other industrial countries on agricultural trade, and there is keen awareness of the importance of agricultural reform in the EC for many developing countries. But, in the view of EC member states, bringing agricultural expenditure under control does not imply dismantling the CAP. What is being negotiated is mainly the open-endedness of many of the arrangements currently in force for particular commodities or groups of commodities. At the same time, however, the Community remains determined to continue exercising restraint in the annual reviews of administered prices as a means to bring supply better in line with demand. But this will not remedy the basic problems of agricultural pricing policies and, moreover, will leave the external protection of agriculture at a high level. It is therefore to be hoped that further progress will be stimulated by the negotiations on agricultural protectionism in the context of the Uruguay Round.



### The Instruments of the CAP

The objectives of the CAP are served by many different instruments. While a summary presentation--Appendix Table I.1--cannot do justice to their complexity and variety, which is essentially due to differences among the products concerned, the instruments can basically be grouped into two categories: price support and nonprice support.

For most of the products covered by the CAP, an elaborate system of price support is in place (Chart 1). In most cases, it rests on three prices which are, in descending order: the target price, 1/ which is the upper end of the range within which producer prices are left to fluctuate; the threshold price, 2/ which is the lowest price at which imports may be made; and the intervention price, at which public bodies buy in to support the market. Although the scope of intervention purchases has been reduced somewhat in recent years, the intervention price remains by and large a minimum price guaranteed to producers. For some products, however, there are co-responsibility levies, designed to finance part or all of the disposal of excess supplies and also to serve as disincentives to production. Moreover, the entitlement to CAP benefits may be limited to a specified volume of output (production quotas) or be reduced somewhat, with a time lag, when a specified volume of output has been exceeded (guarantee thresholds).

Imports are subject to levies that are broadly calculated as the difference between the relevant threshold prices and the corresponding prices abroad, quoted in the world markets or in selected supplier countries. Because prices within the Community are usually below their targets, import levies tend to make imports more expensive than domestic products. There are, however, preferential import quotas for a few products and voluntary export restraints for mutton. The system of import levies and export subsidies is referred to as "Community preference."

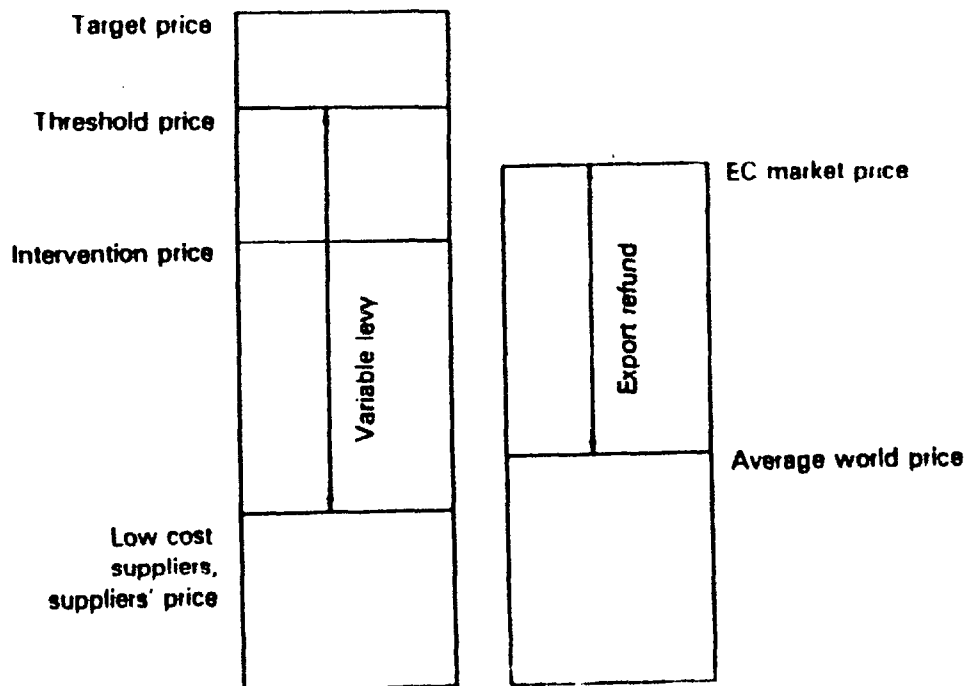
Institutional prices are expressed in ECUs. To maintain price unity within the Community, changes in both the central rates of currencies participating in the EMS exchange rate mechanism and in the market rates of independently floating currencies should be accompanied by proportional adjustments in the institutional prices expressed in

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1/ The term "target price" is used for cereals, sugar, milk, olive oil, grape and sunflower seeds. To reflect technical differences, "guide price" is used for bovine meat and wine, "norm price" for tobacco, and "basic price" for pork.

2/ The term "threshold price" is used for cereals, sugar, dairy products, and live oil. Essentially the same concept is referred to as "sluice-gate price" in the case of pork, eggs, poultry meat, and "reference price" in the case of fruit, vegetables, wine, and certain fishery products.

CHART 1  
BASIC MECHANISM OF CAP PRICE SUPPORT





domestic currencies, but with the opposite sign. For various reasons, member states sometimes wish to delay such a price adjustment in part or in its entirety. To prevent the resulting price differences from giving rise to trade distortions among member states, they are offset through so-called Monetary Compensatory Amounts: export levies and import subsidies for countries where prices have been raised by a percentage that is smaller than the devaluation; export subsidies and import levies for countries where prices have been lowered by a percentage that is smaller than the revaluation.

The most commonly used nonprice support instruments are: storage subsidies, which are chiefly meant to soften the impact on the market of seasonal fluctuations in production; consumer subsidies; input subsidies; and deficiency payments and production premiums of various kinds. These instruments are used in a highly selective fashion. Finally, nonprice support includes structural measures financed by the Community, such as irrigation schemes, reafforestation projects, and research and development. However important these structural measures may be for the future development of the Community's agricultural sector, they account for only a small fraction of total expenditure on the CAP.

Table I-1. The Main Instruments Used for the Implementation of  
the CAP -- Selected Products

	Cereals <u>1/</u>	Sugar	Dairy <u>2/</u>	Beef/ veal	Sheep- meat	Fresh fruit & vegetab. <u>2/</u>	Processed fruit	Wine <u>3/</u>
Intervention	x	x	x	x	x	x <u>4/</u>	x <u>5/</u>	x
Storage aid			x	x	x			x
Direct aid	x <u>6/</u>		x	x	x	x <u>7/</u>	x <u>8/</u>	
Import levies and export refunds	x	x	x	x	x <u>9/</u>	x	x <u>10/</u>	x <u>11/</u>
Co-responsibility levies	x	x	x					
Guarantee threshold	x						x <u>12/</u>	
Production quotas		x	x					

Source: The information presented in this table was taken mainly from Commission of the European Communities, Green Europe, "General Description of the Mechanisms of the Community Agricultural Market", Part 1: Crop Products (March 1985) and Part 2: Livestock products (April 1985) Brussels.

1/ Except rice.

2/ Arrangements generally applicable only in periods of large-scale marketing.

3/ Only table wines are subject to the prices and intervention system.

4/ Intervention only in "crisis situation". Otherwise, "withdrawal" of surpluses at a low price.

5/ No levies on imports.

6/ For durum wheat produced in certain regions of Italy, Greece, and France.

7/ For citrus fruit.

8/ Aid for processing of selected products, in some cases with a quantitative ceiling. The products concerned are: various tomato derivatives, dried figs, raisin, a particular type of prune, and preserves in syrup (cherries, peaches, and Williams pears).

9/ In case of VFRs, levies may not exceed amounts laid down in the agreements.

10/ For a limited number of products.

11/ Provided the import price is not lower than the relevant reference price, there are no levies on imports.

12/ For aid for the processing of tomatoes.

### The Arithmetic of the Monetary Compensatory Amounts (MCAs)

The CAP has always made use of a unit of account to express decisions involving prices. Initially, when the Bretton Woods system was still in force and the member states had par values expressed in dollars, it was the dollar which served as a unit of account. In August-December 1971, when the dollar floated for the first time, the member states decided not to let their currencies float against each other and to keep them within the bilateral fluctuation margins originally derived from their respective fluctuation margins around the dollar. The unit of account thus began to lead a life of its own: its value was no longer equal to the dollar but had to be derived from the par values of the member states. In the spring of 1973, the link between the dollar and the currencies of the member states was again severed. The problem this posed for the unit of account was solved in the same way as the first time round. The arrangement was given a permanent character by the fact that the conversion rates of the unit of account were based on the central rates of the countries participating in the European narrow margins agreement (the "snake"). In April 1979, in the month following the creation of the EMS, the ECU was substituted for the unit of account without affecting the common price level expressed in national currencies. <sup>1/</sup>

The unit of account has always been converted into the member states' currencies at fixed rates. For a country that participates in the EMS exchange rate mechanism, this means that the conversion rate of the unit of account--commonly known as the green rate--is in principle equal to the central rate and that exchange rate fluctuations within the allowable margins are disregarded. When the currency of a member state floats independently, or when its agricultural prices are not adjusted fully in terms of its national currency at the time of an exchange rate realignment, the green rate no longer corresponds to the central rate. MCAs are then created to prevent this "monetary gap" from giving rise to trade distortions. MCAs are called positive when the currency has appreciated against the green rate, and they serve as import levies and export subsidies; they are negative when the currency has depreciated, and they serve as import subsidies and export levies. There have been significant adjustments over time in the way MCAs are calculated, but finding the monetary gap remains the first step.

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<sup>1/</sup> Commission of the European Communities, Information Memo by the Spokesman's Group, "A History of the Monetary Compensatory Amounts", p. 44, (July 1982).

For a country with a central rate, the monetary gap is the difference between this rate and the green rate, expressed as a percentage. 1/ Fluctuations of the exchange rate within the agreed margins around the central rate are disregarded, because their incidence on prices is believed to be insignificant. This is not the case with currencies that float independently--the drachma, the escudo, the peseta, and sterling--and with the lira, which has a fluctuation margin that is considered too wide for the purposes of the common price policy (6 percent, against 2.25 percent for the other currencies in the EMS exchange rate mechanism). For these currencies, the monetary gap is calculated as the difference between the market rate of exchange and the green rate. The exchange rate is measured as the unweighted average of the rates recorded on the markets of the other member states, expressed as the amount of ECU that can be bought on those markets for one unit of the currency concerned. The MCAs of these currencies are calculated anew every week and are changed whenever the calculation yields a rate that differs by 1 percentage point or more from the preceding week's MCA. 2/ Thus, while it takes a realignment to modify MCAs of countries participating in the EMS exchange rate mechanism, the MCAs of other countries are liable to change frequently.

There is a significant departure from the principle that a country's MCAs correspond to its monetary gap. Since 1973, a "neutral margin" is deducted in the calculation of negative MCAs as a means to save money for the common budget. It was extended to positive MCAs in 1979 in order to satisfy the demand that all countries be treated alike. The upshot is, of course, a reduction in the extent to which MCAs can be used to maintain price differences among the member states. At present, the neutral margin stands at one point for the Netherlands and 1.5 points for the other member countries, except that it amounts to 5 points for wine and for poultry and eggs, and to 10 points for olive oil. How MCAs are computed when a neutral margin needs to be deducted, is illustrated in example I in the table at the end of this Appendix.

In mid-1984, it was decided to phase out positive MCAs by basing the system on the strongest currency participating in the EMS exchange rate mechanism, i.e., the currency that has been revalued most on the occasion of the latest realignment. There were actually two measures. First, there was the conversion of part of the stock of positive MCAs in countries with an undervalued green rate (i.e., with support prices in domestic currency higher than the Community-wide level) into negative MCAs in other countries. This decision, referred to as the "switch

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1/ The equation is:  $\text{monetary gap} = (1 - \frac{\text{central rate}}{\text{green rate}}) 100.$

2/ The calculations are based on data for the week ending on Tuesday. If a change is warranted, it becomes effective on the following Monday. More frequent changes have been ruled out in order not to hamper trade.

over," amounted to an increase in the common price level, as shown by the narrowing of the margin by which prices in Germany and the Netherlands exceeded the common level. Second, the common price level was tied to the strongest currency in the event of new realignments. Thus, realignments would no longer create a need to lower prices expressed in domestic currency in the country with the strongest currency and, correspondingly, there would be more scope than under the old system for raising prices in the other countries.

These decisions could have been implemented by adopting the deutsche mark as the new numeraire. Instead, it was decided to compute the monetary gap as the difference between the green rate and an adjusted central rate, called the "green central rate." The latter is obtained by multiplying the central rate by a "correcting factor" so as to devalue notionally all currencies against the ECU (by increasing the number of currency units per ECU). In the case of the switch over, the correcting factor is derived by calculating the rate of devaluation of the deutsche mark central rate needed to obtain the desired reduction in positive MCAs. (The logic behind this is that, when the green rate is kept unchanged, positive MCAs can decline only on account of a lowering of the central rate.) Example II shows how this is done and what the impact is on France's negative MCAs. As may be seen from example III, the inverse route is followed in the computations made on the occasion of a realignment. Here, the increase in the correcting factor is given by the rate of revaluation of the deutsche mark and is used to shift downward the entire grid of MCAs.

Table II.1. The Computation of Monetary Compensatory Amounts -  
Illustrative Examples for the French Franc

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Example I: Calculation of MCAs with ECU as numeraire

FF central rate: 6.87

FF green rate: 6.55

Monetary gap:  $(1 - \frac{\text{central rate}}{\text{green rate}}) 100 = -4.89$

Deducting the neutral margin of 1.5 points and rounding yields an applied monetary gap of -3.4.

Example II: Level to which MCAs for FF have to be raised if the positive MCAs for the DM are lowered by 3 points, with no change in Germany's central green rate.

A. Calculation of correcting factor:

DM central rate: 2.24

DM green rate: 2.54

Monetary gap: 11.8

With an unchanged green rate, a reduction in the monetary gap to 8.8 would require a central rate of DM 2.32. This rate is called the "green central rate."

Correcting factor:  $\frac{2.32}{2.24} = 1.0357$

B. New MCA level for French franc (FF)

FF green central rate = central rate x correcting factor

In this instance:  $6.87 \times 1.0357 = 7.115$

New monetary gap, calculated with green central rate: -8.625.

After deducting neutral margin and rounding: -7.1

Example III:

New level of MCAs for France resulting from a realignment in which the DM was revalued by 3 percent against the ECU and the FF devalued by 0.5 percent.

- a. As the FF was devalued by 0.5 percent against the ECU, its central rate becomes:  $6.87 \times 1.005 = 6.904$ .
- b. Correcting factor will rise from 1.0357 before realignment to:  
 $1.0357 \times 1.03 = 1.0668$ .
- c. It should be remembered that the monetary gap is calculated with the help of the green central rate = central rate x correcting factor.

Germany's green central rate does not change, as the change in the correcting factor offsets the change in the central rate. All other green central rates change by the difference between the revaluation against the ECU of its own central rate and that of the DM. Relevant figures are obtained by multiplying central rates by the correcting factor.

FF green central rate:  $6.904 \times 1.0668 = 7.365$ .

- d. MCAs for FF: 12.44.

After deducting neutral margin and rounding: -10.9.

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Source: Derived from historical data presented in the Commission of the European Communities, COM(87)64 final, Report on the Agrimonetary System, February 27, 1987.

### The Effects of the Common Agricultural Policy of the European Community: A Survey of the Literature

This survey deals with the costs and benefits of the common agricultural policy for EC member countries and the effects of the CAP on world markets and the well-being of the Community's trading partners. It presents and discusses recent empirical literature that attempts to estimate quantitatively the domestic and international effects of the CAP. The "domestic effects" are the welfare gains and losses of producers, consumers and taxpayers, the effects on other sectors and the deadweight costs to the economy as a whole. The "international effects" are the effects on world commodity prices, the volume and pattern of international agricultural trade and the welfare of the rest of the world. The impact the CAP has on the stability of world commodity prices is also included in this category.

In order to compare and evaluate the empirical evidence, section 1 discusses the development of the conceptual framework for the welfare analysis of price support and its limitations. Section 2 presents the evidence categorized in five groups: domestic welfare level of world prices, international trade, welfare of non-EC countries, and stability of world prices. Section 3 is a discussion of the conclusions and their relevance to the current debate about agricultural policy reform.

#### 1. The theory

Although the structure of the CAP is complicated, for the large majority of products the basic method of implementation is through price support. This is achieved by a variety of instruments, such as intervention purchases, market withdrawals, export restitutions, minimum import prices and import levies. <sup>1/</sup> Other price support devices (e.g. deficiency payments) and nonprice support instruments (storage aids, input subsidies, voluntary export restraint (VER) agreements with non-member countries, etc.) are also used, but on a more limited scale.

The simplest way to examine the effects of price support on domestic welfare is the single-good partial equilibrium analysis. Chart 2, panel (a) illustrates the case of a small importing country. If the world price is  $P_w$  but the domestic price is maintained at  $P_c$  by a tariff, production is at  $S_c$ , consumption at  $D_c$  and the difference is imports. Reducing consumption below and increasing production above what they would be if the world price prevailed entails a consumer loss

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<sup>1/</sup> Some of the secondary objectives of the CAP, such as improving the quality of food consumed, improving the distribution of income within the agricultural sector, protecting small family farms and preserving rural life styles and the natural environment, create the need for a different family of instruments that generally go under the name of guidance expenditure.

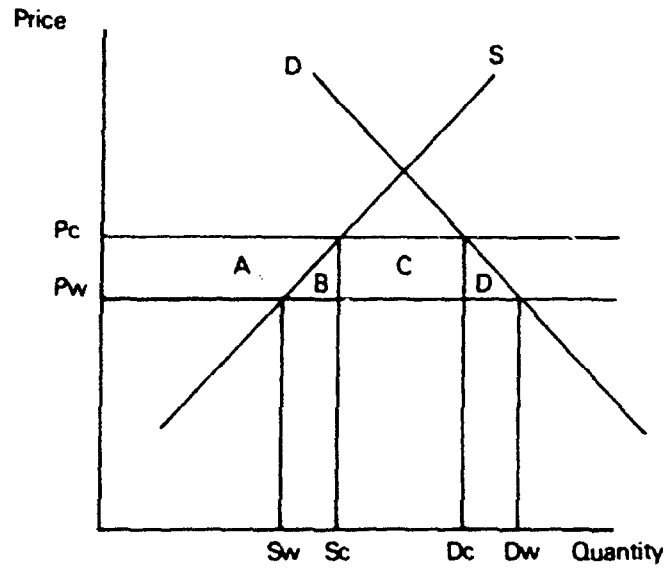


CHART 2

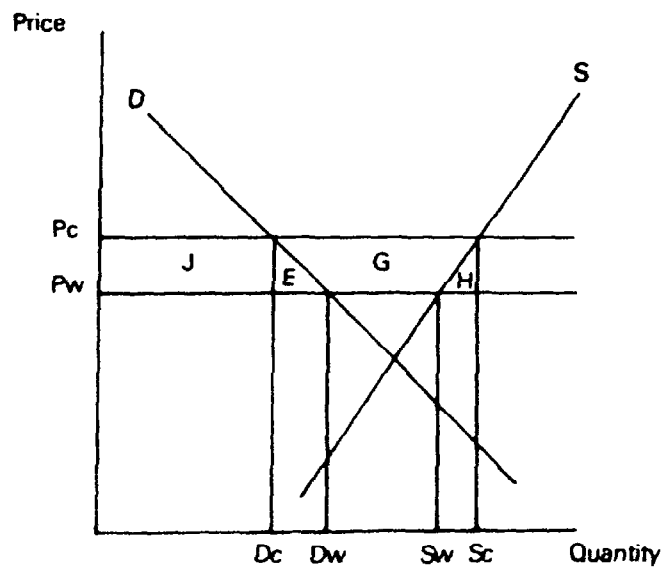
APPENDIX III

THE ECONOMICS OF PRICE SUPPORT:  
THE SINGLE COUNTRY CASE

1a Importing country



1b Exporting country



of  $A+B+C+D$ , a producer gain of  $A$  and an increase in government revenue of  $C$ . The net welfare loss (or, alternatively, the net welfare gain of liberalizing) is  $B+D$ . Price support in an exporting country by means of an export subsidy is illustrated in panel (b). Here the consumer loss is  $J+E$ , the government expenditure  $E+C+H$ , and the producer gain  $J+E+G$ ; by subtraction the net welfare loss is  $E+H$ .

This simple domestic welfare analysis treats the EC as a single entity. In order to examine the country-specific effects of the CAP the previous analysis has to be modified in three ways. First, it has to allow for intra-EC commodity trade (Buckwell et al., 1982, pp. 30-39). Some of the imports of an importing country will now originate in other Community members and, therefore, be priced at the CAP support level. Consequently, part of the tariff revenue  $C$  will now be foregone. Similarly, part of the government expenditure for subsidies in an exporting country will now be avoided, since the gain to producers is generated directly by sales to other Community members at the high protected prices.

Second, the analysis has to capture the function of the so-called agri-monetary system of the EC. The MCAs that came into effect in the early 1970s to protect farmers from national currency fluctuations, essentially allow member-countries to maintain domestic prices different from the common CAP support levels. Importers in a country with a domestic price lower than  $P_c$  can be thought of as paying  $P_c$  at the border for imports from other members and then getting a subsidy to allow these imports to compete in the domestic market. Exporters in that country must pay a tax on their exports in order not to undermine the higher prices in the rest of the Community. The situation in a member country which maintains a domestic price higher than  $P_c$  is the opposite.

Third, the principle of common financing, which means that the Community is collectively responsible for paying the subsidies for (and receiving the tariff revenue generated by) all products covered by the CAP, requires that additional transfers between the EC and members' budgets be taken into account.

Even after introducing these additional considerations to make the model capture the supranational character of the CAP, the partial equilibrium analysis still retains its simplicity. Its usefulness is limited, however, by the strong assumptions that underlie it. <sup>1/</sup> In what follows, the main difficulties of assessing the effects of price

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<sup>1/</sup> For a discussion of the partial equilibrium welfare analysis and its advantages see: Corden (1957); Corden (1971); Harberger (1959); Johnson (1960); Currie et al. (1971). For a discussion of its limitations, in particular with respect to analyzing agricultural price support in the EC, see: Buckwell et al. (1982); Valdes & Zietz (1980); Matthews (1985a); Winters (1987).

support by means of the partial equilibrium model are outlined, and ways of dealing with these difficulties are discussed.

1. The analysis of price support, even when amended to take into account the aforementioned intra-EC transfers, is designed to capture the effects of one specific policy. There are, however, many different CAP price support instruments, not all of which have the same effect. Deficiency payments, for example, differ from export subsidies in that, as consumers pay the world price, there are no consumer losses. Nontariff barriers or variable import levies do not generate the same revenues as ad valorem tariffs. These differences are very hard to capture empirically.
2. The analysis in Chart 2 implicitly assumes that the country is a price taker in the world market. This "small country" assumption means that, no matter what the level of domestic protection is, the world price remains unaffected. The welfare effects of price support can then be accurately measured with reference to that world price. It also means that these effects are limited to the home country; there is no room for international repercussions. This is clearly unsatisfactory in the case of the CAP; the EC is large enough to influence world markets.
3. Partial equilibrium analysis assumes that the prices of all other goods remain constant. This means that substitutability and complementarity in consumption and production between the good studied and other commodities is ignored. In order to correct this shortcoming one has to model the interactions between markets for different goods explicitly. The choice of the relevant group of goods is, however, a difficult task, since the chain of substitution can extend from commodities very close to the one studied (e.g. different varieties of wheat) to nonagricultural goods.
4. The preceding discussion also assumes that all demand is final. This is obviously not true for many agricultural products. The demand for those products has to be derived from the cost function of the food industry. Moreover, many commodities use other agricultural products as inputs: beef, for example, requires animal feed. The true degree of protection for beef, therefore, is captured by the effective, rather than the nominal rate.
5. Price support policies in agriculture, especially in cases like the CAP where a wide range of commodities is covered, can have a considerable effect on total employment and the allocation of capital and labor. This, in turn, affects other sectors of the economy. The size and direction of the effects depend mainly on relative factor intensities and the policies implemented in the other sectors. Such interactions can exert a significant influence on the actual welfare gains or losses from agricultural policies.
6. Because of the range of coverage of policies like the CAP, macroeconomic considerations also enter the picture. Changes in the

price support policies for many commodities can have sizeable effects on the external balance of the economy and, consequently, the exchange rate, and/or the relative price of tradables and nontradables. Either could then shift the supply and demand curves in Figure 1 endogenously.

7. Externalities and market distortions, if present, represent the greatest challenge to the welfare analysis of price support policies. Even if they are absent from the agricultural sector proper but exist elsewhere, externalities and distortions can affect the calculation of welfare costs and benefits in a variety of ways. Empirical work has shied away from these problems by routinely postulating perfectly competitive structures, full information and complete markets.

These shortcomings of the simple partial equilibrium model have prompted analytical efforts in several directions. First, in order to simplify the empirical question at hand and take care of the problem raised in point (1) above, most researchers convert all sorts of price-support instruments into tariff equivalents (nominal or effective, as the case may be). Alternative policy options are then described in terms of changing this notional rate of protection, without specifying how exactly this is to be done. Harling (1983) and Valdes & Zietz (1980) discuss at length the methods of calculating tariff equivalents and the ensuing problems.

Second, "large country" effects, substitution of agricultural commodities in production and consumption and backward and forward linkages with other sectors are incorporated in the analysis by applying partial equilibrium techniques in a multi-country multi-sector framework. This approach is used extensively in evaluating policies such as the CAP, which affect many agricultural commodities simultaneously. Trouble spots (2) through (4) from the previous list are dealt with in this way.

Multi-country multi-commodity models differ fundamentally from the simple analysis in Chart 2 in one respect: the world price loses its meaning as a reference point for the measurement of the welfare costs of protection. Since the home country is "large," a change in domestic policies will affect the world price. The effects of the policy must be estimated with respect to what the world price would be, had the policy been absent. The calculation of that hypothetical price requires formulating demand and supply functions for the country(ies) and commodity(ies) involved and solving the system at a notional, unobserved equilibrium. This is called counterfactual analysis.

Counterfactual analysis is necessary for the effects of domestic policies on international trade and other countries to be addressed. Once counterfactual world equilibria have been computed, the resulting prices and trade flows can be compared with the actual ones and the distortions implied by the existing policies can be demonstrated. Moreover, the effects of the policies on the real income of other countries can also be calculated. Multi-country multi-sector partial

equilibrium models that use counterfactual analysis to estimate both domestic and international effects of price support can get quite complicated.

Probably the most advanced model in this category is that of Tyers, used by the World Bank in the 1986 World Development Report. <sup>1/</sup> It incorporates seven agricultural commodities and thirty countries or country groups. The intersectoral links are captured by cross-elasticities in both supply and demand. Supply is represented by a mechanism of "partial adjustment" of production to prices (Nerlove, 1958). It models government action explicitly by using "transmission elasticities" which determine what proportion of a world price shock is passed through to domestic producers and consumers, it includes stock-holding behavior endogenously, and it estimates welfare effects on consumers and producers, and changes in government budgets and stockholders' profits. Finally, it is dynamic in nature, in the sense that it allows for differences in the short- and long-run effects of a shock or policy change.

Even a model of such sophistication, however, is essentially limited by the constraints of partial equilibrium methodology. Computable General Equilibrium (CGE) models make one further step and bring nonagricultural sectors, factor markets and the macroeconomy into the picture. Thus, the problems raised above in points (5) and (6) are, addressed directly in CGE models.

CGE world models are essentially higher-dimensional analogs of the traditional two-sector Heckscher-Ohlin international trade model. Each region has a production function with primary and intermediate inputs and demand functions derived from utility maximization. The Armington heterogeneity assumption, which postulates that similar goods from different countries are imperfect substitutes, is usually made to account for the cross-hauling of goods observed in international trade. The countries are constrained by their total factor endowments. The balance of payments, or parts thereof, is modeled explicitly and constrained by an external condition. A global general equilibrium is characterized by a set of international prices for all goods and factors such that: (i) all markets clear, (ii) the zero-profit conditions are met in all industries, and (iii) the external accounts of each country satisfy the constraints. <sup>2/</sup>

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<sup>1/</sup> See Tyers & Anderson, 1986 and also Tyers and Anderson, 1987a, 1987b; earlier versions of the same model are used in Anderson & Tyers, 1984, Chisholm & Tyers, 1985, and Tyers, 1985.

<sup>2/</sup> The basic structure of CGE models is discussed in detail in Whalley (1984), Whalley (1985a) Ch. 3 and Winters (1987). Whalley (1985b) outlines some of the methodological problems that applied general equilibrium analysis still faces.

The issues raised earlier in point (7) are not dealt with successfully in either advanced partial equilibrium or general equilibrium analysis. Externalities, in particular, are hard to handle because market prices do not reflect the true social valuations of different activities.

The discussion so far has focused on different ways of measuring the effects that price support policies have on domestic welfare, international trade and the welfare of other countries. Such policies in large countries or regions, however, have other effects as well. One that has attracted a considerable amount of attention is the effect on the stability of international commodity prices.

Price instability, especially in agricultural markets, has long been an issue of concern. The conventional view is that policies that insulate domestic markets from international price movements tend to increase world price instability. This happens because if a country does not let its domestic consumption accommodate, for example, a world production shortfall, the consumption of everybody else must fall disproportionately. To ration the reduced world output, world prices must rise by more. This, in turn, causes farmers' incomes to fluctuate. Farmers with utility functions with the usual convexity properties react with aversion to risk in their supply decisions and, in this way, affect the economy as a whole. Moreover, the poorer the country whose commodities are affected the more undesirable these fluctuations are, for two reasons: one, because farmers there tend to be relatively more numerous and impoverished; two, because owing to the reduced access to insurance markets, they are more vulnerable to income fluctuations.

This view is not completely accurate for two reasons. First, it is unclear whether all price support measures increase instability or whether they increase it to the same extent. Bale & Lutz (1978 and 1979b) show that some policy instruments have no impact on world price stability while others transfer different degrees of instability from one country to another. <sup>1/</sup> Second, world prices in theory can be stabilized even if most countries insulate their markets, as long as countries or private individuals operating on the free market hold big enough stocks. The issue is, ultimately, an empirical one.

In order to measure empirically how much the insulation of particular domestic markets adds to price instability in the world, the partial or general equilibrium models used need to be modified to take into account price fluctuations. This is done by introducing stochastic supply and demand shocks in the models (see, for example, Tyers &

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<sup>1/</sup> The effect of domestic policies on international price stability is also analyzed in Bale & Lutz (1979b), Blandford (1983) and Berck & Schmitz (1984). Koester (1982) compares alternative price support policy packages vis-à-vis their (de)stabilizing properties.

Anderson, 1986) and observing how the specific policies change the variance of prices.

A final methodological point that ought to be mentioned has to do with the scope of counterfactual equilibrium analysis. There is no hard and fast rule for the choice of the appropriate counterfactual "base case;" it depends on what the specific question addressed is. If the focus is on a cost benefit analysis of the CAP, then the free trade competitive equilibrium is the obvious choice. If, on the other hand, the objective is an evaluation of an alternative policy package (such as maintaining unchanged nominal support prices for a certain period of time, reducing protection of some communities or across the board, etc.), then this is the appropriate counterfactual. The first option has the additional advantage of being conceptually simple and familiar. The second is obviously more interesting from a policymaker's point of view, but requires a detailed spelling out of the components of the alternative policy package. <sup>1/</sup>

## 2. The evidence

### a. Effects of the CAP on EC Members

This section presents a survey of recent empirical literature on the domestic effects of the CAP. Most studies treat the Community as one entity, although some provide estimates of the effects on a country-by-country basis. Most also provide a breakdown of the total welfare cost into consumer and taxpayer (or government) loss and producer benefit. Table 37 summarizes the evidence from all the existing studies that report results in a comparable form. Also presented and discussed are studies that focus on different aspects of the domestic effects of the CAP or that formulate their questions in a different way. The cost estimates in columns (a) through (d) are all converted into 1980 U.S. dollars.

All but one of the studies presented are multi-sector models, covering all or most of the CAP commodities. Koester & Schmitz (1982) is the only exception. They examine the effects of the EC Sugar Protocol (a mixed system of price support and quotas) on LDCs, intra-EC transfers and Community welfare. The welfare costs are calculated with a free trade counterfactual world price as the reference point, which was taken to be equal to 38 percent of the EC support price. This counterfactual world price was arrived at by a series of computations of free trade counterfactual equilibria under different assumptions about demand and supply elasticities in the Community and the rest of the world. However, no exact information about the elasticities was available and, in addition, the computed counterfactual equilibria were

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<sup>1/</sup> Buckwell et al. (1982) ch. 3, Bureau of Agricultural Economics (1985) Ch. 6 and Whalley (1985a) ch 3. offer a brief discussion of the problems of counterfactual equilibrium analysis.

very sensitive to the elasticity values (op. cit., p. 189). The welfare calculations, therefore, do not seem very reliable.

Morris (1980) estimates the effects of price support for the main CAP commodities (the exceptions are wine, tobacco, fruit and vegetables). A serious drawback of this study is that the counterfactual free trade prices do not come out of a demand and supply system, but are instead postulated ad hoc. Since these counterfactual prices are not listed in the study, it is impossible to tell a priori whether the paper tends to over- or underestimate the welfare costs.

Thompson & Harvey's (1981) paper models the markets for sixteen groups of agricultural commodities. Their interaction is captured by a set of cross-elasticities. The study evaluates the CAP with respect to its stated objectives and does not address the wider social costs. The closest one could come to a measure of overall efficiency is the transfer ratio of 1.77. The transfer ratio is the cost to the economy of an increase in farmers' income by one unit.

A very comprehensive study of agricultural protection in the EC is the one by the Australian Bureau of Agricultural Economics (Bureau of Agricultural Economics, 1985). They treat the Community as one country, but distinguish between different commodities, as do Thompson & Harvey, and make adjustments to account for their interaction. They consider the CAP together with national price support policies and provide yearly estimates of the costs for the 1971-83 period. In Table 37 estimates are reported for 1978, when, according to the study, the costs of agricultural support peaked, and 1983. Their results imply significant costs from the operation of price support mechanisms: around 0.3 percent of total EC-10 GDP, equivalent to roughly one-third of Greece's GDP, was wasted in 1983. In per capita terms, this means approximately US\$25.

Probably the most often quoted study of the effects of the CAP is the monograph by Buckwell et al. (1982). As with the previous two studies, they model explicitly many countries and markets, with the interaction between commodities captured by cross-elasticities. An important advantage of this paper is that it takes into account intra-EC transfers resulting from Community preference schemes, the common financing of the CAP and MCAs. Their estimate of the consumers' loss is comparable to that of the Bureau of Agricultural Economics, but that of the taxpayers' is smaller, possibly because of the inclusion of the aforementioned intra-EC transfers. The total cost estimate, however, is larger than that of the Bureau. The reason for this is probably the fact that Buckwell et al. model the structure of the agricultural sector in greater detail and, therefore, are more accurate in their estimation of the producers' benefit.

Tyers (1985) and Tyers & Anderson (1986, 1987a, 1987b) use different versions of the same model to estimate the costs of the CAP alone and of the CAP plus domestic policies respectively. The basic



model is discussed in section I of this appendix. In comparison to the previous studies, there seem to be several advantages in the analytical framework used by Tyers and Anderson. First, the international policy interactions are better captured, because the degree of disaggregation is higher (24 countries and country groups in the Tyers and 30 in the 1985 Tyers & Anderson paper). Second, government behavior is incorporated in the model and assumed to be different in the short and the long run. Third, stockholding behavior is modeled explicitly.

The estimates presented in the studies are for different years (1980 for the Tyers, 1980-82 and 1985 for the Tyers & Anderson studies) <sup>1/</sup> and country groups (EC-9 to EC-12) and for varying degrees of disaggregation of the rest of the world. In the two earlier studies, the total cost estimate is significantly higher than in any other partial equilibrium study: it is 1.1 percent of EC-9 GDP in 1980 in the Tyers study and 1.3 percent of EC-10 GDP in 1985 in the Tyers & Anderson paper. The implied transfer ratio in the latter study is 1.98. In their 1987 study, however, the authors estimate total costs at only 0.3 percent of EC-12 GNP and the transfer ratio at 1.2. The discrepancy with the earlier studies seems to reflect in part a change in the measurement of the welfare effects. While the model used in this and earlier studies by the same authors is non-linear, in the earlier studies linear approximations to supply and compensated demand curves were used to measure the welfare effects. The areas which emerge from such approximations are accurate only for small changes in domestic prices--in the case of the EC, however, the price changes were in fact very large. In the 1987 studies, the areas under non-linear curves were measured which resulted in some cases in substantially smaller welfare effects. In addition, the 1987 study assumes a much lower degree of transmission of world market price changes to domestic price changes. The long-run transmission elasticities for the EC, for example, range between 0 and 0.76 depending on the particular commodity. <sup>2/</sup> As a consequence of the higher degree of insulation of prices in the EC and other countries and geographical regions, trade liberalization in the EC has a larger impact on world market prices. This is reflected in the significantly larger increases in agricultural world market prices as a result of trade liberalization in industrial countries in the 1987 study as compared with the earlier studies (see below). Consequently, the gains from liberalization, which depend on the counterfactual world market prices, are much smaller.

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<sup>1/</sup> Note, however, that both in the 1986 and 1987 studies the base period for the estimates was 1980-82. The results reported for 1985 are merely "scaled up" results for 1980-82 and do not take into account the major macroeconomic and supply shocks which occurred between 1980 and 1985.

<sup>2/</sup> A value of 0 implies no pass through of changes in the world prices to the domestic prices; a value of 1 implies complete pass through.

The studies by Spencer (1985) and Burniaux and Waelbroeck (1985) are general equilibrium models. Spencer (1985) has a very simple CGE model with nine countries (eight in the EC, with Belgium and Luxembourg lumped together, and the rest of the world) and two goods (agriculture and non agriculture) produced with two factors of production. He calculates that 0.9 percent of EC-9 GDP is lost as a result of the CAP.

Burniaux & Waelbroeck (1985) use a more sophisticated CGE framework, which includes nine regions and models separately production and consumption in the urban and rural areas of each (see Burniaux & Waelbroeck, 1985, Appendix). As in the Tyers & Anderson (1986) model, different degrees of insulation of the domestic market are captured by price transmission equations. The paper distinguishes between more and less "flexible" regions; the U.S. and Latin America, for example, are assumed to insulate their domestic markets less than oil-exporting countries and Europe.

The Burniaux & Waelbroeck model calculates the long-run effects of a policy change today, subject to growth rate forecasts for the regions under consideration. Dismantling the CAP today (1985), according to the model, generates a gain in real income equal to 2.7 percent of EC GDP in 1995. This result is somewhat surprising, compared with the other studies presented here, but can be explained by the assumptions fed into the model. Burniaux & Waelbroeck, unlike other studies, assume that international commodity prices, even if nothing else changes, will be decreasing continuously until 1995. Agricultural protection in the EC with variable import levies, which maintain domestic commodity prices unchanged, is obviously bound to look increasingly expensive against this background. Nevertheless, this scenario is not unreasonable, especially if the commodity price trends of the last 30 years continue in the future.

Finally, the results from a recently released OECD study (1987a) can be construed to be based on a simple "partial" equilibrium approach, which implicitly assumes inelastic demand for agricultural products in the EC for estimating costs to the consumers. The expenditures incurred by both the national and the EC authorities on agriculture, on the other hand, are taken in the study to represent the costs to the taxpayer. The OECD study estimates the cost of agricultural policy in the EC to the consumers at about US\$28 billion in 1980 prices (or about 1.8 percent of EC-9 GDP). The total cost (to the consumers and taxpayers) of this policy is estimated at 2.8 percent of GDP; the annual average costs are estimated at ECU 11,437 per holding and ECU 7,465 per agricultural worker during the period 1979-81. <sup>1/</sup>

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<sup>1/</sup> These are the "gross" costs of the CAP and not comparable with the "net" costs, or deadweight losses, reported in Table 37.

The diversity of the methodologies used makes it difficult to summarize the evidence presented in Table 37. In general, though, the estimates of the welfare costs of the CAP seem to fall into two zones: a "low" one, with net losses ranging from 0.32 percent to 0.55 percent of EC GDP (Morris, 1980; Bureau of Agricultural Economics, 1985; Buckwell et al., 1982, Tyers & Anderson, 1987), and a "high" one, with net losses at around 1 percent or more of EC GDP (Tyers, 1985; Tyers & Anderson, 1986; Spencer, 1985, Burniaux & Waelbroeck, 1985). The Thompson & Harvey study also belongs to the latter group by virtue of their estimate of the transfer ratio, which is comparable to that of Tyers & Anderson (1986).

Although it is impossible to judge the validity of these figures without some idea of the "true" costs, it is worth noting that the studies that produce estimates in the "high" zone use generally superior methodology and a higher level of disaggregation. To the extent that this is a valid criterion for evaluating empirical work, it can be concluded that these studies are probably more accurate in estimating the welfare costs of the CAP.

The remaining part of this section discusses briefly a few studies that focus on different, distributional or country-specific, effects of the CAP and are not included in Table 37. Harling & Thompson (1985) use a partial equilibrium model to estimate the costs of intervention in the poultry industry for, among other countries, Germany and the United Kingdom. They find that in 1975-77 the resulting deadweight losses were of the order of US\$10.5 million for these two countries together.

Bale & Lutz (1979a and 1981) calculate the costs of price support for wheat, maize, sugar and beef in selected countries. They use a very simple partial equilibrium model and report a net welfare loss of US\$737.3 million for France, US\$1,112.4 million for Germany and US\$112.4 million for the United Kingdom.

The Buckwell et al. paper provides estimates of the welfare costs by country. They are summarized in Table 38. The transfer ratio, which can be thought of as a broad measure of policy efficiency, is 1.50 for the Community as a whole. It is the highest in the U.K. (2.07), Italy (1.87) and Germany (1.8). It is less than unity in the Netherlands, Ireland and Denmark, indicating that these countries benefit from the inter-country redistribution of income caused by the CAP (see Buckwell et al., 1982, pp. 90-134; also, Koester & Tangermann, 1986, p. 63).

This ranking of the gainers from the CAP is similar to the one in Spencer (1986). He uses a general equilibrium model to evaluate which countries would do better outside the CAP, and by how much. It turns out that Ireland would be the only clear loser, with Denmark gaining the least. The only notable difference between Buckwell et al. and Spencer is the Netherlands: in the former study the less than unity transfer ratio indicates that the country is benefiting, whereas in the latter the Netherlands appears to be losing from the operation of the CAP.

Greece also appears to gain a very small amount, around 5-10 million ECU per year, from participating in the CAP (see Georgakopoulos, 1986; Georgakopoulos & Paschos, 1985). This result, however, should be interpreted with care, since it is not derived from a full counterfactual analysis.

Breckling et al. (1987) use a simple general equilibrium model to appraise the economy-wide effects of the CAP for four EC members: Germany, France, Italy and the United Kingdom. They conclude that the costs of agricultural price support extent beyond the traditional welfare losses. Specifically, for all countries taken together manufacturing industries (excluding food processing) lose between 1.1 and 2.5 percent of potential gross output and between 4.4 and 6.2 percent of exports and total employment is reduced by around 1 percent. Unemployment increases universally in these countries as nonagricultural sectors are relatively intensive employers of labor. The job loss is more in the United Kingdom and Germany followed by Italy and France. This is the result of slower growth of labor intensive nonagricultural sectors in the former countries. However, the results suggest that despite the emerging unemployment, France is a net beneficiary of the CAP in view of its large rural sector and EC transfers under the applicable common policy.

Despite the budgetary and welfare burden of the CAP, the agricultural lobby has resisted attempts to liberalize and is, instead, stepping up pressure to reinforce the CAP (Koester, 1985; Gerken, 1986; von Witzke, 1986). This movement away from liberalization is apparently accelerated by demands for more equal distribution of the CAP benefits between member states. Josling (1979) discusses the CAP in the light of the expansion of the EC in Southern Europe and concludes that the wider range of commodities and the shifting political balance within the Community will increase the domestic costs, exacerbate the budgetary problems and amplify the international effects of agricultural protection. In the same vein, Koester (1977) argues that as long as it is possible for member countries to supra-nationalize costs of national agricultural support, the prospects for a CAP reform are poor. This argument may be questionable at a time of acute budgetary crisis.

#### b. Effects of the CAP on international trade

This section discusses the evidence on the effects the CAP has on the level of prices and the volume and pattern of world trade in agricultural commodities. Since the policies that apply to different products vary widely, the estimated effects for each of the most important commodities covered by the CAP are presented separately. These commodities are: wheat, coarse grains (barley, maize, rye, oats, millet and sorghum), rice, ruminant meat (beef and veal), nonruminant meat (pork, poultry, etc.), sugar and dairy products. Table 43 presents the estimated effects of a hypothetical abolition of the CAP on the international prices of the above commodities. Each of the studies reviewed calculates a counterfactual world trade equilibrium with a

completely liberalized EC market for the commodities in question and then compares the resulting counterfactual prices with the actual world prices.

The estimates show that abolition of the CAP would significantly increase the world prices of all the commodities examined. In other words, the CAP exerts a powerful downward pressure on the actual price level. Roughly speaking, the effect is stronger on dairy products, grains and ruminant meat and weaker on sugar and rice. This result is to be expected, since the former category of products is afforded greater effective protection than the latter (see Sampson & Yeats, 1977; Koester & Tangermann, 1986, p. 71).

All the estimates reported in Table 43 come from partial equilibrium models. There are considerable differences between the estimated price effects for each commodity, which can be, to a large extent, traced back to the differences in the methodology and the data used in each study. First of all, models that cover only a few commodities and/or do not take into account market interaction tend to predict higher counterfactual prices and, therefore, overestimate the effects on world markets of price support in the CAP. If only a few isolated markets are liberalized, then the pressure from the other, still protected, markets will spill over via commodity substitution and the observed effects will be amplified. The first four studies listed in Table 43 share this characteristic. The Koester & Valdes paper in particular, although it examines many products, it does not take into account cross-effects and uses, essentially, a single-commodity approach. <sup>1/</sup>

A second element that accounts for differences between estimated effects, even if the methodology is similar, is the data used. This explains partially why the results of the four other papers (Anderson & Tyers, 1984; Tyers & Anderson, 1986, 1987b, and Matthews, 1985a), which are all multi-commodity models and examine the effects of a generalized liberalization on individual commodity prices, are so diverse. Anderson & Tyers (1984) probably overestimate the degree of protection in the Community by using the official intervention prices as the appropriate domestic market prices (Koester & Tangermann, 1986, p. 74). Due to the existing surplus stocks, however, EC market prices are generally lower than the intervention prices (see the information provided in: Commission of the European Communities, 1986, Statistical Appendix). Matthews, on the other hand, underestimates the degree of protection in

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1/ Tyers (1985) and Matthews (1985a) estimate the effects of liberalization in a multi-commodity model with and without cross-effects. In both studies the models without cross-effects produce estimates 20 to 100 percent higher than the models with cross-effects. This difference is most noticeable in coarse grains, wheat and non-ruminant meat, where the removal of channels for market interaction roughly doubles the calculated effects of liberalization.

the Community, because he uses the EC cif price as the appropriate world price. As the Community is a net exporter of many of these commodities, however, the fob price or the price in major foreign ports should be used.

A third factor that affects crucially the outcome of counterfactual experiments is the values of the parameters used. For example, the higher the domestic demand elasticity is, the stronger the domestic reaction to liberalization and the larger the final effect on the world price will be. Tyers (1985) and Anderson & Tyers (1984) use EC demand elasticities between -0.5 and -0.7 (Tyers, 1985, Appendix), whereas Matthews postulates a value of -0.4 for all commodities (Matthews, 1985a, p. 115). The former range of values is based on a more detailed survey of the relevant empirical literature. Also, as mentioned above, the difference in "transmission elasticities" between the more recent Tyers & Anderson studies influences the results.

Finally, the last significant cause of deviations between the estimates of different models is the varying degree of country and commodity coverage and differences in the base period. The Tyers & Anderson papers (1986, 1987b) are by far the most detailed in that respect, modeling seven commodity and thirty country groups. Unfortunately it is impossible to tell a priori whether a greater degree of disaggregation tends to generate larger or smaller effects.

The OECD has produced a comprehensive partial equilibrium study on the effects of agricultural protection in the world (OECD 1987a). Although the emphasis is on multilateral liberalization, they report some estimates of the effect on world prices of a unilateral liberalization in the Community. Their counterfactual, however, is not the free trade equilibrium, but a 10 percent across-the-board reduction in nominal protection of all commodities. They calculate that this partial liberalization in the EC increases the world prices of most commodities from 0.55 percent, in the case of sugar, to 2.81 percent in the case of milk. In the case of grains, however, prices actually fall a little following the hypothetical CAP reform, owing to decreased demand for grains by livestock producers.

The calculated counterfactual prices are important, first, because they give some idea of the degree of distortion in world agricultural markets that is due to the CAP and, second, because they provide the basis for the estimation of the effects of liberalization on the pattern and volume of world trade. Changes in the pattern and volume of trade, of course, have little importance in and of themselves. Calculating them, however, is a necessary step in assessing the effects the CAP has on the real income of Europe's trading partners. For that reason we present and discuss some of the empirical work on this issue very briefly.

Table 44 highlights the main results. Abolition of the CAP increases total commodity trade by a considerable amount. This is

caused basically by a large increase in EC net imports, prompted by lower consumer and higher producer prices. The effect is stronger in the most heavily protected sectors, such as wheat, grains and dairy products. The reported effects would be much larger if they were expressed in value, rather than volume, terms.

The results of studies cited in Table 44 are influenced by the estimated post-liberalization counterfactual prices and the coverage and grouping of countries. Koester (1982), for example, includes in the Developed Countries group all the centrally planned economies, which form a separate group in Tyers & Anderson (1986). The only surprising result, which cannot be explained by these factors, is the negative change in EC net imports of wheat that Tyers & Anderson (1986) report. Given that the Community is a net exporter of wheat, this means that abolishing the CAP will lead to an increase in net wheat exports. Unfortunately the authors do not comment on this counterintuitive conclusion.

The net trade effects of the CAP on other trading partners are also discussed in other studies, which are not comparable to the ones reported in Table 44 because in those, authors conduct a different counterfactual experiment, or use a different taxonomy for reporting their quantitative results, or do not provide quantitative results at all. Sarris (1983) calculates the effects of EC enlargement in Southern Europe on international trade in fruit and vegetables. He estimates that including Greece, Spain and Portugal under the CAP umbrella increases the value of net imports (or reduces the value of net exports) of the other major producing countries by approximately US\$116.6 million (in 1980 prices). Tangermann (1978 and 1981) discusses the possible effects of reforming the CAP on the trade flows between developed and less developed countries. He concludes that, since the CAP protects mostly temperate products, EC imports from other temperate/developed countries will increase as a result of reducing price support. The effect on trade with LDCs, however, is ambiguous. The producers of such commodities there will have an incentive to increase their production but, on the other hand, they will also have to compete with other exporters. The final outcome depends crucially on the supply elasticities. Finally, Mackel et al. (1984) focus on, among other things, the effect of the CAP on trade in commodities that are not protected in the EC. They argue that the CAP has increased imports of substitute products to the EC, like manioc and soya and that, therefore, a liberalization will harm producers of such commodities.

Empirical research on the impact of the CAP on international commodity trade, far from being in unequivocal agreement, has reached some common conclusions regarding at least the direction of the effects. First, the CAP has a significant depressing effect on world prices. Second, as a result of this, trade flows are severely distorted: EC exports are artificially boosted at the expense of net exports of other countries. Third, this distortion keeps the volume of world trade at a lower level than it would otherwise be. Fourth, these

effects are generally more significant for the products that are heavily protected in the Community, such as wheat, coarse grains, ruminant meat and dairy products.

c. Effects of the CAP on the welfare of non-EC countries

The influence the CAP exerts on international trade means that the real incomes of all trading partners are eventually affected. The conventional view, popular with Community officials, is that a unilateral liberalization in the EC will benefit the exporters and harm the importers of temperate zone products by increasing their prices. Consequently, given that most LDCs import temperate zone commodities, the CAP actually constitutes a transfer of income from EC consumers and taxpayers to poor countries via cheaper international food prices. Furthermore, the concessionary character of the Lome Convention means that a liberalization, which would imply an abolition of those agreements as well, would be even more detrimental to the LDC group. The data in Table 45 seem to support this view. The Table presents the effects that a hypothetical liberalization has on the welfare of two broad groups: the non-EC developed countries and the less developed countries.

The models reviewed in Table 45 are all partial equilibrium and the degree of commodity and country coverage varies, but two facts stand out. First, the size of the total effect on each of the two country groups is not large compared to GDP or total export earnings. Second, less developed countries as a group stand to lose from an abolition of the CAP, while the effect on developed countries is ambiguous.

Differences in the estimated size of the effects can be generally traced back to commodity coverage or the data used. The figures reported by Koester (1982) and Koester & Schmitz (1982) are expectedly lower than the rest, since these studies cover only cereals and sugar respectively. Therefore, although the estimated effect on the world price of the individual commodities may be higher, as discussed in the previous section, the total welfare effect is small. Matthews (1985a) also reports a small estimate of LDC loss for two reasons. One, that was mentioned earlier, because he underestimates the degree of protection in the Community. Two, because he uses smaller domestic supply elasticities than other studies. The higher the LDC supply elasticity assumed, the stronger is the supply response to increasing world prices and the more likely is the realization of gains from increased exports. Matthews uses a supply elasticity of 0.4 for all countries (Matthews, 1985a, p. 115), whereas Koester (1982), Anderson & Tyers (1984) and Tyers (1985) use elasticities in the neighborhood of unity (Koester, 1982, p. 27; Tyers, 1985, Appendix). Extensive empirical research has shown that long-run supply elasticities in LDCs vary widely according to the specific product but are generally rather low, fluctuating between 0.1 and 0.3 for grains and 0.2 and 0.5 for rice (see Bale & Lutz, 1979; Scandizzo & Bruce, 1980; and the references therein).



Anderson & Tyers (1984) conduct a different counterfactual experiment. They calculate the impact of a 2 percent annual reduction in EC support prices from 1981 to 1990. Their results are difficult to interpret because, although the final effect of the phased reduction of the support prices will be significant, it is unclear how close it will be to that of a complete liberalization.

Tyers & Anderson (1986, 1987a) have the highest degree of disaggregation, and the most detailed model among the ones in the Table, and report in both studies the highest welfare loss for less developed countries from abolishing the CAP. <sup>1/</sup> In their 1986 study, Tyers and Anderson found that even non-EC developed countries lose because the increase in grain prices as a result of liberalization diminishes the welfare of producers of livestock as they have to pay higher input prices.

Table 45 may lead one to believe that, no matter what the sign is for each group, the effect of the CAP is essentially small. Reporting only net effects for two large country groups, however, conceals the distribution of gains or losses among individual countries. The information that can be pieced together about this is quite interesting. First of all, the small net gain (or the net loss) in the developed countries group is entirely due to the heavy losses of Japan. The rest of the countries in the group all register gains or very small losses (see Tyers, 1985; Tyers & Anderson, 1986). Second, the distribution of the effect within the LDC group is also very varied, depending basically on whether the country is a net exporter or importer of temperate zone commodities. For some of the countries the gains or losses are significant. Argentina, for example, appears to gain around US\$200 million per year, while Korea and Pakistan each lose US\$300 million (Tyers & Anderson, 1986, p. 59) from a liberalization of the EC agriculture. Moreover, if liberalization implies abolition of the Lome Conventions, it is possible that the LDC signatories will lose even more than the rest of the group. Given, however, that agricultural commodities and, in particular, temperate zone products are a very small portion of the goods that get preferential treatment under the Conventions, the effects of abolishing the Lome agreements is likely to be small compared to the effect of a CAP liberalization.

The evidence supporting the conventional view that most LDCs actually benefit from the operation of the CAP tends to be discounted by some researchers. They argue that the fact that LDCs are net importers of temperate zone commodities is due to protectionist policies such as the CAP in developed countries, which depress international prices and make agricultural exports unprofitable. Abolishing such policies, therefore, may imply costs for LDCs in the short-run, but in the long-run increased prices will stimulate agricultural production and exports,

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<sup>1/</sup> In line with the estimated larger price effects of liberalization, the authors report a higher loss to LDCs in their more recent study.

the pattern of trade will change and LDCs will realize important gains. Counterfactual analysis, which uses econometrically estimated supply elasticities, fails to capture this potential "switching" effect and, consequently, measures only the short-run losses. This argument is very appealing to the proponents of unilateral liberalization, who also point out that it is only under the CAP regime that the Community has turned into a net exporter of many temperate commodities (Bureau of Agricultural Economics, 1985, p. 129). It has, however, two important drawbacks. First, the lack of reliable long-run supply elasticity estimates makes it impossible to measure the potential "switching" effect accurately. Second, it is not supported by the existing evidence on agricultural policies in developing countries. If they actually believed in the harmful effects of the present low level of international prices and in their dynamic comparative advantage as commodity producers, they would subsidize agriculture to stimulate domestic production. Many LDCs, however, especially in Africa, actually tax agriculture (Koester & Tangermann, 1986, p. 78).

Another argument that has been voiced against the estimates in Table 45 has to do with the limitations of the partial equilibrium methodology. A unilateral liberalization in the Community will affect nonagricultural sectors and factor markets and have repercussions on commodity trade. In order to capture these secondary effects, a general equilibrium model must be used.

Burniaux & Waelbroeck (1985) use a CGE to calculate how a liberalization of trade in agricultural commodities in the Community in 1985 would affect the welfare of LDCs in 1995; the results are quite striking. They estimate that total LDC real income would be higher by 2.9 percent if the CAP were abolished. This is explained by the strong assumption that, even with no change in the CAP, foreign exchange shortages in LDCs will oblige them to rely more and more on agricultural exports. Thus the "switching" occurs even with no policy change in the Community. It is obvious then that an abolition of the CAP, which raises world prices, benefits the LDCs.

Unfortunately, there are not enough CGE models applied to the international aspect of the CAP to form a convincing body of evidence. Despite this, the survey by Matthews (1985b) argues that partial equilibrium models tend to systematically underestimate the benefits to LDCs of a unilateral liberalization in the EC. If, for example, EC real income rose as a result of a more efficient allocation of resources after a liberalization, the LDCs would gain indirectly from the increased demand for their exports by the Community and by other developed countries whose agricultural export earnings would also have risen. This argument is convincing in qualitative terms in that the partial equilibrium does not take account of these secondary effects on global welfare and therefore probably leads to an underestimation of the gains from liberalization. It is far from clear, however, that these secondary effects would be quantitatively significant.

To summarize, the empirical literature surveyed in this section seems to point to a few unambiguous conclusions. First, agricultural price support in the Community is not necessarily harmful to all, or even most, non-EC countries. A unilateral liberalization would benefit some of Europe's trading partners and harm others. In particular, current net importers of temperate zone commodities would lose, whereas current or potential net exporters would gain. Since most LDCs are current net importers, they stand to lose as a group from an abolition of the CAP, at least in the short-run. The important issue is who will be able to adjust domestic production and consumption patterns so as to take advantage of the higher world prices in the longer run.

Second, although the size of the effect on broad groups of countries is small, the distribution of gains and losses is far from uniform. Countries that are heavily dependent on temperate commodity imports because of climate and geography (e.g. Japan) or because they are poor appear to benefit significantly from the operation of the CAP.

Finally, the above results should be interpreted with some caution. It is important to keep in mind that the gains from unilateral liberalization predicted with partial equilibrium models probably have some degree of downward bias built in, because they do not take into account secondary repercussions in nonagricultural sectors.

d. Effects of the CAP on international price stability

Conventional wisdom holds that countries or regions that insulate their domestic markets increase world price instability. As was discussed in section 1 of this Appendix, this is not necessarily true. The question is essentially an empirical one. Empirical research on the effects of the CAP on price stability has given an affirmative answer: all the studies reviewed here agree that the CAP exerts a significant destabilizing influence on world commodity prices. Table 46 summarizes some of the evidence.

The impact of policies on price stability is estimated with the help of counterfactual analysis. A measure of variability is defined first and then the price variability at the counterfactual non-CAP equilibrium is calculated and compared to actual price variability. Most studies introduce random supply and demand shocks, calculate the corresponding counterfactual equilibria and then use either the standard deviation or the coefficient of variation of the resulting distribution

of prices to measure variability. <sup>1/</sup> Table 46 presents the calculated share of world price variability due to the CAP; in other words, the decrease in variability that would obtain if CAP were abolished. The destabilizing effect is strongest in the wheat, coarse grains and dairy products sectors.

Comparing the EC agricultural policies with price support schemes in other countries reveals that the CAP is the most important destabilizing factor in the world markets. Sarris & Freebairn (1983) estimate that the CAP alone accounts for more than half of the excess variability of the price of wheat over its global free trade level. Blandford (1983) calculates "transmission coefficients" that show the extent to which changes in trade rather than in domestic consumption are used to stabilize the domestic market, and concludes that the Community transmits a larger absolute amount of domestic variability in grain to the world market than any other group of countries. Of all the ways in which price support can affect world price stability mentioned earlier, two are most important for the destabilizing effect of the CAP. First, the CAP relies heavily on variable tariffs, which not only protect the domestic agricultural sector, but also insulate domestic consumers from world price variations (Matthews, 1985a, p. 211). Second, protection reduces the incentive for private stock-building, which implies wider price fluctuations. The latter effect could be avoided by government-sponsored stockpiling. Koester, however, finds evidence that in some years EC stocks increased when world market prices were extremely high, thereby actually amplifying world price variability (Koester, 1982, pp. 53-65).

Section 2 discussed briefly why price stability is considered important from a welfare point of view, especially for developing countries. Unfortunately, there are no empirical estimates of the welfare losses caused by the destabilizing effects of the CAP. Given the size of the effects, though, it may well be the case that a liberalization would benefit Europe's trading partners significantly by reducing world price variability.

### 3. Concluding remarks

This appendix has been concerned with two different but related aspects of the Common Agricultural Policy of the EC: the domestic

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<sup>1/</sup> The choice of the measure is important: the standard deviation, for example, depends on the level of the mean (in this case the price level) and, therefore, even if prices remain equally stable after liberalization, the standard deviation will be different. Koester (1982), pp. 53-54, discusses at length the different measures of variability. It turns out that even the coefficient of variation is not unbiased. Koester suggests correcting the coefficient of variation by the explanatory power of the trend regression to obtain a better measure of variability.

effects on the welfare of EC members, and the effects on international commodity trade and, consequently, on the welfare of the rest of the world.

Recent empirical literature that has been surveyed addresses these two issues by means of various tools, ranging from single-sector partial equilibrium models to general equilibrium models of the global economy. The differences in methodology, data used, country and commodity coverage and degree of disaggregation are considerable, and so are the differences in the quantitative estimates. A good understanding of the theoretical premises and the modeling details of each study is, therefore, necessary in order to put the reported results in perspective and compare them.

Each approach has its relative merits. The attraction of partial equilibrium models is their simplicity, which means that greater effort can be devoted to collecting data and capturing the peculiarities of the sector(s) represented. On the other hand, inter-sectoral links are ignored, which in turn means that not all of the effects of agricultural policies are covered. General equilibrium models are more comprehensive in that sense, but they are more demanding both analytically and in terms of data requirements. Overall, however, general equilibrium models are preferable in that they reveal the effects of agricultural price support on other sectors and on the macroeconomy. These effects are both important for policy purposes and, in the case of the CAP, significant in size. Without a general equilibrium model it is difficult to capture the secondary repercussions that liberalization has on the world economy via factor and other product markets. Ignoring these effects may cause systematic underestimation of the gains from liberalization.

Empirical research on the domestic effects of the CAP has reached some unequivocal conclusions. First, the CAP redistributes large amounts of income to farmers, primarily from consumers and secondarily from taxpayers. This transfer is economically inefficient, in that it incurs a deadweight loss. The mean estimate of this loss is around 1 percent of the Community's GDP.

Second, the distribution of this loss between countries is not uniform. Most countries, however, stand to lose. The heaviest loser appears to be the United Kingdom, followed by Italy and Germany. France probably also registers small losses. The clear gainer is Ireland. The evidence on Denmark and the Netherlands is ambiguous.

Third, other than the deadweight loss that the whole economy suffers, other sectors incur costs because of the CAP as well. In particular, subsidizing agricultural production means discriminating against industry and services, diverting resources away from them and reducing their exports. This kind of cost has not attracted enough attention, mainly because it requires general equilibrium modeling. Quantification of inter-sectoral effects is, therefore, an important area for future research.

The economy-wide and sectoral losses are by no means the only costs of the CAP. Agricultural price support, especially of such magnitude, generates wasteful rent-seeking and lobbying and distorts investment. These costs are difficult to estimate, but they mean that the traditional welfare calculations, even if they include inter-sectoral repercussions, underestimate the true social costs of operating the CAP.

With regard to the international effects of the CAP, empirical research has come to some interesting conclusions. By encouraging domestic production and raising consumer prices, especially in products with low income elasticity, the CAP has artificially reduced EC consumption and boosted production, turning Europe into a net exporter of most temperate zone commodities. This increase in the EC commodity surplus depresses and destabilizes world prices and makes production in other countries less profitable. The pattern of world trade is, in this way, severely distorted. This effect is more evident in the sectors that are relatively more heavily protected, like wheat, coarse grains, ruminant meat and dairy products.

The distortionary effects of the CAP affect the welfare of the Community's trading partners. Generally speaking, net exporters of temperate zone commodities lose, while net importers gain. Since most LDCs are net importers, less developed countries as a group appear to benefit from the operation of the CAP.

This result, although it is confirmed by most existing studies, should be treated with caution. First of all, it conceals the distribution of losses and gains across countries, which is far from uniform. Second, it is derived mostly from partial equilibrium models, which ignore secondary repercussions on welfare via the nonagricultural markets; it is possible that ignoring those repercussions leads to systematic underestimation of the costs of the distortion. Third, it may be relevant only in the short-run; if many developing countries were able to take advantage of higher commodity prices and switch from being net importers to net exporters, the result would prove incorrect over the longer run. Fourth, it ignores the cost of increased price instability, which is probably more detrimental to poor than to rich countries.

It is hard to express these qualifications quantitatively. However, even if the majority of LDCs actually gains from the CAP this gain is very small compared with the welfare losses in the EC. It would be easy for the Community to compensate the losers from a unilateral liberalization and still realize substantial benefits. 1/ From a world welfare point of view, of course, there is an even better alternative than a unilateral liberalization-cum-compensation scheme: that of a multilateral reduction of protection in agricultural markets. All existing evidence strongly suggests that moves toward freer trade that involve more, rather than fewer, trading partners would spread the benefits more uniformly. In other words, the optimal response of the losers from a unilateral liberalization is to liberalize their markets as well. 2/

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1/ It is worth noting that, even by the most pessimistic estimate, the LDC losses from a unilateral liberalization in the EC are only around 70 percent of the official development assistance actually disbursed in 1985 by the seven largest EC members, excluding Greece, Ireland and Luxembourg (in 1980 US\$; see World Bank, 1986, Statistical Appendix).

2/ OECD (1982) discusses the issue of multilateral liberalization in detail. There is also a large body of empirical evidence on this: Chisholm & Tyers (1985); Tyers & Anderson (1986); Whalley (1984); Whalley (1985a); World Bank (1986) and the references therein.

## Modeling Agricultural Pricing Policy with a Computable General Equilibrium Model

### 1. Introduction

There is by now a sizeable empirical literature on the effects of the CAP on the domestic economies of member-countries. <sup>1/</sup> Most of this literature is based on models of the "partial equilibrium" type--that is, models that focus on the markets for agricultural products and assume that prices and quantities of other goods and services are unaffected by changes in agricultural policy. Only a few attempts have been made at estimating the effects of the CAP by means of so-called "computable general equilibrium" (CGE) models, which take account of intersectoral linkages. Those CGE experiments that have been carried out, however, indicate that intersectoral dependencies are important, and that without taking explicit account of them it is not possible to calculate the full effect of agricultural policies on macroeconomic variables, such as growth, employment, and prices.

This appendix presents an analysis based on a simple CGE model for Germany. A change in EC-protection of agricultural production is simulated and domestic effects on the German economy are explored. Section 2 below describes the underlying model assumptions. Thereafter a detailed exposition of numerical results is provided in section 3.

### 2. The model

The model which serves as the basis for the simulation is a "small" CGE-model which closely follows Dixon et. al. (1982). It is small in the sense that "only" four productive sectors are represented: agriculture (which includes food processing), industry, craded services and nontraded services. Each sector is assumed to produce one good. Final demands and demands for intermediate inputs are satisfied by a combination of imports and domestic production. The model distinguishes three types of imports (agricultural goods, industrial goods and traded services), each constituting an imperfect substitute for the corresponding type of domestic production. There are four kinds of final demand (investment, government consumption, private consumption and exports) and three types of primary inputs (labor, capital and land). All tariff and subsidy changes in agriculture are assumed to apply at the EC-border and all EC countries are assumed to act in an identical way. The simulation results represent short-run (1-2 year) effects of policy changes. Thus the model assumes that each sector's capital stock as well as real wages, total domestic absorption and the nominal exchange rate, are unaffected by the simulated change in policies.

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<sup>1/</sup> See Appendix III for a survey of existing studies.



The aggregation level of the model is reflected in the following input-output table. The table describes which sources satisfy each type of demand in the base period:

Input-Output Table for the Base Year 1/

Delivery from	Delivery to	Sector 1: Agri- culture	Sector 2: Industry	Sector 3: Traded services	Sector 4: Non- traded services	Invest- ment	House- holds	Govern- ment	Ex- ports
Sector 1: Agriculture									
Sector 2: Industry									
Sector 3: Traded services									
Sector 4: Nontraded services									
Import type 1: Imports of agricultural goods									
Import type 2: Imports of industrial goods									
Import type 3: Imports of traded services									
Labor									
Capital									
Land									
Total									

1/ The capitalized names in the table represent variables of the CGE-model. The notation is fully documented in appendix-table 1.

In the model, changes of input-output structures are represented by equations for input demand, final demand, supplier behavior and market equilibrium. These equations are discussed in the following paragraphs.

a. Input demand

Producers are assumed to minimize the cost of production, and to be confronted with a two-level production function. The first level imposes constant returns to scale and Leontieff complementarity between different types of intermediate inputs and between intermediate and primary inputs. The second level allows for CES substitution between imported and domestically produced intermediate inputs and between different types of primary factors. The model describes the solution to the optimization problem in a set of equations for producers' factor demand. Thus, in a given sector (sector  $j$ ) demand for both domestically produced and imported intermediate inputs depends on the activity level ( $Z[j]$ ) and the relative prices of imports and domestic production:

- (1)  $INTERINPUT[DOM,i,j] = F1(Z[j], P[DOM,i], P[IMP,i]);$   
 $i = 1, 2, 3; j = 1, 2, 3.$
- (2)  $INTERINPUT[IMP,i,j] = F2(Z[j], P[DOM,i], P[IMP,i]);$   
 $i = 1, 2, 3; j = 1, 2, 3.$
- (3)  $INTERINPUT[4,j] = F3(Z[j])$

Here equation (3) states that input-demand for non-traded services (which are produced by sector 4) only depends on activity levels in the demanding industries, as there are no imports to substitute for domestic deliveries.

The equations for primary input-demand state that each sector's demand is determined by its activity level and the relative prices of labor, capital and land:

- (4)  $LAB[j] = F4(Z[j], P[LAB], P[CAP], P[LAND]); j = 1, \dots, 4$
- (5)  $CAP[j] = F5(Z[j], P[LAB], P[CAP], P[LAND]); j = 1, \dots, 4$
- (6)  $LAND[j] = F6(Z[j], P[LAB], P[CAP], P[LAND]); j = 1, \dots, 4$

b. Final demand

(1) Investment

By assumption, the simulated policy shock leaves the total level of investment unchanged, but the model allows for substitution between imports and domestically produced investment goods, when relative prices change:

- (7)  $INV[DOM,i] = F7(INV[TOTAL], P[DOM,i], P[IMP,i]); i = 1, \dots, 4$
- (8)  $INV[IMP,i] = F8(INV[TOTAL], P[DOM,i], P[IMP,i]); i = 1, \dots, 3$
- (9)  $INV[TOTAL] = \overline{INV[TOTAL]}$

(2) Household consumption

Consumers are assumed to maximize their utility by substituting between different goods in response to relative price changes (in a linear expenditure system). However, the model fixes total consumption at its initial level:

$$(10) \text{ CONS[DOM,i] = F10(CONS[TOTAL], P[DOM,1], P[DOM,2], P[DOM,3], P[DOM,4], P[IMP,1], P[IMP,2], P[IMP,3]); } i = 1, \dots, 4$$

$$(11) \text{ CONS[IMP,i] = F11(CONS[TOTAL], P[DOM,1], P[DOM,2], P[DOM,3], P[DOM,4], P[IMP,1], P[IMP,2], P[IMP,3]); } i = 1, 2, 3$$

$$(12) \text{ CONS[TOTAL] = } \overline{\text{CONS[TOTAL]}}$$

(3) Government consumption

Like private consumption, government consumption is fixed at the base period level. Since government services are solely provided by the "nontraded services sector" (sector 4), <sup>1/</sup> this rigidity can be expressed as follows:

$$(13) \text{ GOV[DOM,4] = } \overline{\text{GOV[DOM,4]}}$$

(4) Exports

The model describes total export-demand as a function of world prices for the exported good, measured in foreign currency:

$$(14) \text{ EX[i] = F14(FCP[EX,i]); } i = 1, \dots, 3 \quad \underline{2/3/}$$

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<sup>1/</sup> The German input-output table has a "government sector" which creates the goods used by government. This sector is contained in the nontraded services sector of the model.

<sup>2/</sup> Import-supply and export demand are assumed to respond to the EC-policy change in accordance with equations 14 and 15 in all member countries. Thus, as the EC is a major player in international markets, changes in EC export and import patterns are modelled to affect the world market prices.

<sup>3/</sup> For agriculture in particular, it is assumed that intra-EC-trade remains unaffected by the increase in EC-border protection, while extra-EC trade varies with the world market prices, measured in foreign currency. The nature of the experiment (a proportional rise in domestic prices of all agricultural goods) ensures that no substitution between imported and domestically produced agricultural products takes place. Upward pressure on intra-EC-trade as a consequence of higher agricultural production and input-demand is assumed to be neutralized by a reduction in trade for consumption purposes (higher prices of agricultural goods provoke a switch in consumption toward products from other sectors).

c. Supply

(1) Imports

By assumption, total import supply of each good rises in response to an increase in the world price measured in foreign currency:

$$(15) \text{ IMP}[i] = \text{F15}(\text{FCP}[\text{IMP}, i]); i = 1, \dots, 3$$

(2) Domestic supply

A constant-returns-to-scale technology is assumed for all productive sectors. However, marginal costs of production increase with output since the supply of two of the primary factors (capital and land) is fixed. The individual producer chooses the output level which equates marginal cost with output price:

$$(16) \text{ P}[\text{DOM}, i] = \text{F16}(\text{P}[\text{DOM}, j], \text{P}[\text{IMP}, w], \text{P}[\text{LAB}], \text{P}[\text{CAP}], \text{P}[\text{LAND}]); j = 1, \dots, 4 \text{ but } j \neq i, w = 1, \dots, 3; i = 1, \dots, 4.$$

Here, F16 is the marginal cost of production.

d. Domestic prices and world market prices

The mark-ups in foreign trade (for transport, wholesale, retail-services, etc.) are assumed to remain constant in the wake of the simulated policy change. Similarly the nominal exchange rate is assumed to be unaffected. Thus, the relationship between world market prices (in foreign currency) and domestic prices of traded goods only changes if the duty ratio (defined as 1 plus the ad valorem rate of import protection) or the subsidy ratio (defined as 1 plus the ad valorem rate of export protection) moves:

$$(17) \text{ P}[\text{DOM}, i] = \text{FCP}[\text{EX}, i] * \text{XRATE} * \text{SUBSIDYRATIO} * \text{MARKUP}; i = 1, \dots, 3$$

$$(18) \text{ P}[\text{IMP}, i] = \text{FCP}[\text{IMP}, i] * \text{XRATE} * \text{DUTYRATIO} * \text{MARKUP}; i = 1, \dots, 3$$

$$(19) \text{ MARKUP} = \overline{\text{MARKUP}}$$

$$(20) \text{ XRATE} = \overline{\text{XRATE}}$$

The domestic prices of agricultural products ( $\text{P}[\text{DOM}, 1]$  and  $\text{P}[\text{IMP}, 1]$ ) are the policy variables which are used to simulate a rise in agricultural protection. A 5 percent exogenous increase in these variables provokes the effects which are described in section 3.

e. Market closure

The model is closed by a set of equations which link demand and supply by imposing market clearing on all markets except the labor market.

(1) Markets for primary factors

By assumption there is a slack in the labor market as wage-earners keep real wages fixed at a rate above the market-clearing level. Capital and land are assumed not to move between sectors in the short run and equilibrium in the markets for these factors is attained by adaption of demand:

$$(21) \quad P[LAB] = \text{CONSUMERPRICEINDEX}(P[DOM,1], P[DOM,2], P[DOM,3], P[DOM,4], P[IMP,1], P[IMP,2], P[IMP,3])$$

$$(22) \quad CAP[j] = \overline{CAP[j]} ; j = 1, \dots, 4$$

$$(23) \quad LAND[j] = \overline{LAND[j]} ; j = 1, \dots, 4$$

(2) Domestic production

Equilibrium in the markets for output from the four sectors requires that total domestic production satisfy aggregate demand:

$$(24) \quad Z[i] = \sum_j \text{INTERINPUT}[DOM,i,j] + \text{INV}[DOM,i] + \text{CONS}[DOM,i] + \text{GOV}[DOM,i] + \text{EX}[i]; i = 1, \dots, 4$$

f. Mathematical structure

In practice all equations described above are formulated in a log-linear form and the model constitutes a linear equation system which can be solved for percentage changes in all endogenous variables. <sup>1/</sup>

g. Parameter settings

The model is numerically specified for Germany, and the initial demand and supply structure is represented by a German input-output table for 1980. <sup>2/</sup> The key parameter settings are shown in the

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<sup>1/</sup> The specification of the model ensures that the solution is unique.

<sup>2/</sup> For agriculture it was assumed that 50 percent of gross value added in the base-year covered labor costs, while the remainder was evenly distributed on capital and land. For all other sectors, labor costs in the base year were represented by total wage costs, while the rest of gross value added was assumed to constitute the cost of capital utilization.

following table:

Germany: Key Parameter Settings

	Agriculture	Industry	Traded Services	Nontraded Services
Expenditure elasticity 1/	0.63	0.63	1.16	1.43
Elasticity of substitution between domestic production and imports 2/	2	1	2	
Elasticity of substitution between primary factors 3/	0.3	1	1	1
Import-price response parameters 4/	0.12	0.12	0.12	
Export-price response parameters 5/	0.12	0.12	0.12	

1/ Based on Lluch et al (1977), p. 54.

2/ Based on Lächler (1985), p. 85 and staff calculations. These elasticities are assumed to be the same for all uses.

3/ A simple Cobb-Douglas production function was assumed to characterize industry and the service sectors, while the substitution elasticity for primary factors in agriculture was set at a level, which brought the output supply price elasticity in line with estimates from the literature.

4/ Based on Stern et al (1976) p. 20, Winters (1981), p. 165 and staff calculations. The parameters show the percentage change in world prices for the imported basket in response to a 1 percent change in EC imports. These parameters enter equation (15).

5/ Based on Stern et al (1976), p. 20, Winters (1981), p. 165 and staff calculations. The parameters show the percentage change in world prices of the exported basket in response to a 1 percent change in German exports. These parameters enter equation (14).

The underlying household utility function is assumed to be additive; thus the uncompensated own price elasticities ( $n_{ii}$ ) and cross price

elasticities ( $n_{ij}$  for  $i \neq j$ ) can be derived as follows: 1/

$$n_{ii} = (\epsilon_i/w) - \epsilon_i \alpha_i [1 + (\epsilon_i/w)]$$

$$n_{ij} = - \epsilon_i \alpha_j [1 + (\epsilon_j/w)] \text{ for } i \neq j$$

Here  $\epsilon_i$  represents the expenditure elasticity for product  $i$ , while  $w$  is

1/ See Lluch et. al. (1977).

the Frisch parameter. The Frisch parameter was set to -1.83. <sup>1/</sup>

### 3. Numerical results

The effects of agricultural policies under the CAP were simulated by exogenously increasing nominal agricultural support prices by 5 percent--the annual average increase in the EC in national currency terms during 1980-87--and endogenously determining the tariffs and export subsidies which would accommodate the desired price rise (i.e. the variables  $P[DOM,1]$  and  $P[IMP,1]$  in equations 17 and 18 above were exogenously raised by 5 percent). <sup>2/</sup> The estimated macroeconomic net effects proved to be significantly negative (Table IV.2). Aggregate GDP fell by 3/4 percent and employment declined by 1 1/4 percent as the detrimental effects on industry and the traded services sector exceeded the boost to agricultural production. The trade balance deteriorated by about 3/4 percent of GDP chiefly because of a sharp fall in exports of industrial products and traded services, and the consumer price level increased by 1 1/2 percent, owing principally to higher agricultural prices. These results are, of course, dependent upon the model assumptions. Wage earners are assumed to be fully compensated for the rise in agricultural prices and since the nominal exchange rate is kept constant and exporters cannot cut profit margins, the rise in unit labor costs results in significant losses of exports of services and industrial products. Moreover, monetary and fiscal policies are assumed to accommodate the effects of the agricultural pricing policy. A relaxation of these assumptions could dampen the estimated effects. Thus, the cited model results can be interpreted as an estimate of the isolated effects of a "CAP-like" policy in the absence of corrective measures. The following paragraphs give a detailed description of the sectoral factors which elicit these results.

#### a. Sectoral effects on output

The (administered) price increase for agricultural products induces farmers to expand output and employment until marginal costs meet the output price. Nominal wages rise as consumer prices of agricultural products increase, reflecting the assumption of fixed real wages. This forces the other sectors to reduce production in order to reestablish the balance between output prices and input costs. The set-back is most

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<sup>1/</sup> Using the relationship between per capita GDP and  $w$  estimated by Lluch et al (1977), p. 248.

<sup>2/</sup> Prices of domestically produced and imported agricultural products are adjusted by the same amounts. This implies the assumptions that (1) agricultural prices in domestic currencies rise in all EC member countries by the same amount (in other words, Monetary Compensatory Amounts are not changed), and (2) variable import levies and export subsidies are adjusted at the EC border such that users will not substitute imported for domestic products. As a result of these assumptions, intra-EC trade will remain unaffected by the agricultural price changes and the pricing policy will have a maximum effect.

pronounced in industry and in the traded services sector, both of which compete with foreign production and have limited scope for raising their output prices, while the nontraded services sector passes part of the increased costs on to consumers and therefore changes production only slightly. The net results of the sectoral output changes are significant reductions in GDP and aggregate employment.

**b. Prices and trade flows**

Since real domestic absorption is assumed to be unaffected by the simulated policy change, the main outlets for increased agricultural production are extra-EC markets. <sup>1/</sup> Thus, German (and other EC-) farmers expand their supply to the world market significantly, whereby a downward pressure is exerted on the world price for the exported basket. Consequently, export subsidies have to increase by about 8 percent. Agricultural imports (and the foreign currency price of the import basket) change only little as the increase in input-demand from farmers is largely offset by lower demand from consumers. Variable import levies, therefore, increase by only 5 percent.

The rise in prices of agricultural products has a strong impact on the consumer price index and, by assumption, on nominal wages. In agriculture, the additional costs are easily covered by the price increase, but other sectors lose international competitiveness and export shares. In spite of a slight fall in imports (primarily owing to reduced industrial input-demand) and an improvement in the terms of trade, the trade balance deteriorates significantly.

**4. Concluding remarks**

The model simulation shows that intersectoral dependencies are important in the debate on consequences of the CAP. Strong effects on non-agricultural production, prices and trade are likely to go through factor markets. Thus, an assessment of the CAP cannot be made by solely judging the CAP's ability to live up to its own stated objectives, but has to take account of its influence on other policy variables. The simulation indicates that the CAP's influence on EC-countries' GDP, employment, inflation and balance of payments is significantly negative.

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<sup>1/</sup> Note that by assumption other EC countries follow the same policy and their economies react in a similar way to this policy so that there are no changes of the relative competitive position of countries within the EC.



Table IV.1. Germany: Notation of Variables

Variable name	Interpretation
INTERINPUT[DOM,i,j]	Sector j's use of intermediate inputs, delivered by sector i.
INTERINPUT[IMP,i,j]	Sector j's use of imported intermediate inputs of type i.
LAB[j]	Use of labor by sector j.
CAP[j]	Use of fixed capital by sector j.
LAND[j]	Use of land by sector j.
Z[j]	Total production in sector j.
INV[DOM,i]	Investment in domestically produced goods of type i.
INV[IMP,i]	Investment in imported goods of type i.
INV[TOTAL]	Total investment.
CONS[DOM,i]	Consumption of domestically produced goods of type i.
CONS[IMP,i]	Consumption of imported goods of type i.
CONS[TOTAL]	Total consumption
GOV[DOM,i]	Government consumption of domestically produced goods of type i.
EX[i]	Exports of domestically produced goods of type i.
IMP[i]	Imports of type i.
P[DOM,i]	Price of domestically produced goods of type i.
P[IMP,i]	Price of imports of type i.
P[LAB]	Price of labor.
P[CAP]	Price of capital.

P[LAND]	Price of land.
FCP[EX,i]	Foreign currency price of exports of type i in the world market
FCP[IMP,i]	Foreign currency price of imports of type i in the world market.
XRATE	Exchange rate (measured in local currency per unit of foreign currency)
MARKUP	Mark-up factor in foreign trade (covering transport, wholesale, etc.).
SUBSIDYRATIO	1 plus the ad valorem rate of export protection.
DUTYRATIO	1 plus the ad valorem rate of import protection.

Table IV.2. Germany: Changes Elicited by a 5 percent Increase in Administered EC Agricultural Prices

	Agricultural Goods	Industrial Goods	Traded Services	Nontraded Services	Total
Domestic output <u>1/</u>	2.1	-1.9	-0.9	-0.0	-0.8
Exports	25.9 <u>2/</u>	-4.9	-5.2		-3.6
Imports	-0.1	-0.6	0.2		-0.4
Consumption	-1.3	0.3	0.4	0.1	0.0
Home market price of domestic production	5.0	0.6	0.6	1.1	
Home market price of imports	5.0	-0.1	0.0		
Consumer prices	5.0	0.5	0.6	1.1	1.4
World price of German exports	-3.1 <u>2/</u>	0.6	0.6		0.4
World price of German imports	0.0	-0.1	0.0		-0.1
Terms of trade					0.5
Employment	4.2	-2.6	-1.8	-0.1	-1.3
Trade balance					-0.7 <u>3/</u>

1/ Because of the "constant-returns-to-scale assumption" (see section 2 above) the percentage changes in output are equal to percentage changes in GDP.

2/ The recorded expansion of agricultural exports may in practice be blocked politically through stockbuilding in order to avoid a huge drop in world market prices and marginal export revenue. (Stockbuilding is not explicitly accounted for in the model.) The rise in agricultural exports may seem large, but it constitutes only 1 percent of total initial agricultural production.

3/ In percent of GDP.

Table 1. EC: Self-Sufficiency in the Community of Six before the CAP  
(In percent of demand)

	Period before Second World War <u>1/</u>	Average 1954/55-1958/59
Cereals <u>1/</u>	81	85
Potatoes	98	102
Sugar	75	101
Fresh vegetables	102	103
Fresh fruit	89	87
Beef and veal	96	94
Pork	96	102
Eggs	101	91
Cheese	105	100
Butter	104	100
Oils and fats	41	40
Total	85	87 <u>2/</u>

Source: Communauté Economique Européenne, Commission, Propositions Concernant l'Elaboration et la Mise en Oeuvre de la Politique Agricole Commune, Partie I, (June 30, 1960), p. 9.

1/ Time period not specified in source.

2/ Average 1953/54-1957/58.

Table 2. Monetary Gaps 1/

(In percent of common price)

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987 <u>2/</u>
Belgium/Luxembourg <u>3/</u>	4.0	2.7	2.7	2.0	1.4	1.4	3.3	1.9	1.7	) —	—	—	—	—	—	—
Netherlands										) 4.3	5.4	6.2	3.1	2.4	2.4	1.0
Denmark <u>4/</u>	--	--	--	--	--	--	--	--	--	--	--	1.0	--	--	--	--
France	--	--	-7.2	--	-17.5	-19.4	-10.6	--	--	--	-5.3	-4.4	-2.0	--	-4.8	1.0
Germany	5.7	12.0	12.0	10.0	9.3	9.7	10.8	10.8	8.8	8.3	8.4	10.3	7.4	2.4	2.4	1.0
Greece <u>5/</u>									--	--	--	-3.0	-3.6	-32.6	-17.6	-32.8
Italy	--	-11.6	-4.1	--	-19.2	-22.5	-16.4	-7.8	-1.0	-4.4	-2.3	--	--	-4.5	-1.7	-4.2
Ireland <u>4/ 6/</u>		-13.8	-10.5	-7.2	-23.5	-4.1	-2.0	--	--	--	--	--	--	--	-5.8	-3.6
United Kingdom <u>4/</u>		-13.8	-13.8	-13.1	-38.5	-31.6	-27.0	-9.0	12.1	8.0	3.1	7.6	-1.9	-1.8	-25.4	-17.5
Portugal <u>7/</u>															--	--
Spain <u>7/</u>															-4.9	--

Sources: Commission des Communautés Européennes, Agri-Monétaire: Evolution des Ecarte, various issues, mimeographed and Official Journal.

1/ Applied monetary gaps at end of year. Minus sign denotes a negative monetary gap, i.e., a price in national currency that is below the common price. Data afford no indications regarding changes in monetary gaps that may have occurred in the course of a year on account of adjustments in green rates, EMS realignment and, for countries that do not participate in the EMS exchange rate mechanism and Italy, fluctuations in the exchange rate. Applied monetary gaps (i.e., monetary gaps minus neutral margin) may vary among products because of ad hoc decisions or because of phasing of the entry into force of changes in green rates is linked to dates in the marketing year or the products concerned. For the sake of comparability, data shown here always apply to cereals, if not to other products.

2/ November 2, 1987.

3/ Following the EMS realignment of October 5, 1981, MCAs merged between the Netherlands, on the one hand, and Belgium and Luxembourg, on the other.

4/ Joined the Community in 1973.

5/ Joined the Community in 1980.

6/ As of October 7, 1974, Ireland ceased to peg its green rate to the green rate of the United Kingdom, without ending the pegging of the Irish pound to sterling. The Irish authorities wanted to have more leeway to "devalue" the green rate, i.e., to raise prices expressed in domestic currency.

7/ Joined the Community in 1986.

Table 3. EC: Coefficients of Nominal Protection for  
Selected Agricultural Products <sup>1/</sup>

	1970	1975	1980	1985	Average
Beef	123 (27)	121 (26)	95 (8)	100 (7)	111 <sup>2/</sup> (16) <sup>3/</sup>
Sugar	204 (19)	81 (12)	82 (7)	391 (126)	180 <sup>2/</sup> (84) <sup>3/</sup>
Butter	225 (44)	169 (26)	130 (7)	124 (13)	172 <sup>4/</sup> (36) <sup>3/</sup>
Maize	151 (14)	124 (14)	144 (16)	149 (19)	155 <sup>5/</sup> (22) <sup>3/</sup>
Wheat	151 (20)	80 (7)	115 (11)	137 (20)	126 <sup>4/</sup> (28) <sup>3/</sup>

Sources: Statistical Office of the European Communities, Eurostat,  
Agricultural Prices; and IMF, International Financial Statistics.

<sup>1/</sup> Coefficients of nominal protection are defined as the ratio of  
domestic to world-market prices expressed in percent. Coefficients were  
calculated for individual EC member countries and averaged for the EC.  
Standard deviation of the coefficients of protection across countries  
and over time are given in parentheses.

<sup>2/</sup> 1969-85.

<sup>3/</sup> Standard deviation of the average coefficients of protection  
during the observation period.

<sup>4/</sup> 1961-85.

<sup>5/</sup> 1963-85.

Table 4. OECD: Producer Subsidy Equivalents (PSEs)  
by Commodity and Country 1/  
(Averages 1979-81, in percent)

	United States	Canada	European Community	Japan	Other Coun- tries <u>2/</u>	Total OECD <u>3/</u>
Dairy	48	67	69	83	71	64
Wheat	17	18	28	96	57	22
Coarse grains	13	13	28	107	55	19
Beef and veal	10	13	53	55	62	30
Pigmeat	6	15	22	14	24	17
Poultry	6	26	16	21	43	14
Sugar	17	13	25	48	33	27
Rice	5	...	14	69	...	61
Sheepmeat	...	...	45	...	64	29
Wool	...	...	...	...	--	9
Soybeans	7	...	36	108	...	9
Average, all above commodities	16	24	43	59	56	32

Source: OECD, National Policies and Agricultural Trade (Paris, OECD, 1987).

1/ A PSE attempts to measure the payment or subsidy needed to compensate producers for the removal of agricultural producer support policies (expressed here in percent of the value of output) plus direct payments minus any producer levies or taxes.

2/ Finland, Norway, Sweden, and Switzerland.

3/ Includes all OECD countries.

Table 5. EC: Development of Agricultural  
Producer Prices (in real terms) 1/

(1980 = 100)

	1975	1978	1979	1981	1982	1983	1984	1985	1986
Belgium	101.7	107.5	103.2	101.8	106.3	108.1	102.8	101.4	104.1
Denmark	112.3	114.7	106.1	96.6	97.7	97.8	93.8	89.0	91.4
France	100.4	109.4	102.3	100.8	102.9	99.7	90.8	88.7	...
Germany	113.1	109.0	105.4	98.5	96.0	93.8	89.9	84.6	83.3
Greece	98.4	108.1	105.0	98.7	104.1	102.2	101.3	99.3	97.5
Ireland	108.7	119.8	112.8	100.3	97.9	97.8	93.4	88.1	88.7
Italy	109.3	112.2	106.2	97.2	98.7	98.0	95.1	94.1	97.9
Luxembourg	...	...	...	97.4	95.2	98.8	91.8	92.1	94.1
Netherlands	115.7	105.8	104.5	99.5	96.6	96.8	94.6	91.5	...
United Kingdom	123.1	115.3	111.9	101.2	101.4	101.2	95.4	88.9	86.5
Average	109.2	111.3	106.4	99.2	99.7	99.4	94.9	91.7	92.9

Sources: EC Commission, The Agricultural Situation in the Community-1986 Report, Brussels, Luxembourg 1987; and IMF, International Financial Statistics.

1/ Agricultural producer prices deflated by wholesale prices or prices for industrial products.

Table 6. EC: Ratio of Real Producer Prices to Input Prices 1/  
(1980 = 100)

	1973	1981	1982	1983	1984	1985
Belgium	109.3	98.2	96.7	99.1	94.1	94.5
Denmark	112.0	96.0	95.8	94.1	90.9	91.8
France	127.6	99.0	99.5	99.0	94.0	93.8
Germany	112.6	97.1	97.1	92.7	91.7	91.6
Greece	112.3	99.4	106.9	101.8	105.8	107.3
Ireland	131.3	101.7	99.4	99.5	94.1	90.4
Italy	106.7	92.4	94.9	92.0	90.4	92.9
Luxembourg	119.2	97.0	101.1	98.4	94.4	101.6
Netherlands	114.0	100.5	99.4	97.2	96.8	98.9
United Kingdom	119.8	101.4	100.3	97.5	95.5	92.4
EC-10	116.7	97.9	98.6	96.6	94.4	94.6

Source: EC Commission, the Agricultural Situation in the Community-1986 Report, Brussels, Luxembourg 1987.

1/ The "cost-price squeeze" is calculated by dividing changes in the index of prices of the value of final agricultural production by changes in the index of prices of the value of inputs.



Table 7. EC: Degrees of Self-Sufficiency in Cereal Production  
(In percent)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985
Belgium	53.8	48.8	41.6	41.2	52.0	60.6
Denmark	...	...	97.7	108.2	106.9	133.5
France	117.0	135.2	158.8	157.0	175.4	215.3
Germany	76.6	76.0	78.0	82.9	90.3	99.5
Greece	...	...	...	92.0	105.0	110.3
Ireland	...	...	70.8	76.6	83.8	101.8
Italy	76.1	69.6	67.8	69.0	77.1	81.6
Netherlands	34.1	37.3	31.3	26.1	28.0	31.0
United Kingdom	...	...	65.3	70.1	100.1	138.7
EC Total	84.0	88.0	89.7	91.2	106.3	127.1

Source: Statistical Office of the European Communities, Yearbook of Agricultural Statistics.

Table 8. EC: Degrees of Self-Sufficiency in Wheat Production  
(In percent)

	1960-64	1965-69	1970-74	1975-79	1980-84
Belgium	71.8	71.7	52.7	64.0	69.5
Denmark	...	...	121.0	139.2	126.0
France	118.1	142.6	163.2	188.6	206.0
Germany	75.9	83.5	83.7	97.6	104.3
Greece	...	...	...	139.4	144.1
Ireland	...	...	66.2	53.0	50.1
Italy	90.5	96.6	89.8	83.6	84.6
Netherlands	39.7	61.9	46.5	58.0	58.1
United Kingdom	...	...	53.4	62.9	95.9
EC Total	93.6	107.2	97.1	106.4	121.6

Source: Statistical Office of the European Communities, Yearbook of Agricultural Statistics.

Table 9. EC: Degrees of Self-Sufficiency in Rice Production  
(In percent)

	1960-64	1965-69	1970-74	1975-79	1980-84
Belgium	--	--	--	--	--
Denmark	...	...	--	--	--
France	57.2	49.6	30.7	12.2	7.3
Germany	--	--	--	--	--
Greece	...	...	...	183.0	115.7
Ireland	...	...	--	--	--
Italy	141.8	144.9	255.2	200.5	230.6
Netherlands	--	--	--	--	--
United Kingdom	...	...	--	--	--
EC Total	80.6	82.0	98.4	75.3	71.6

Source: Statistical Office of the European Communities, Yearbook of Agricultural Statistics.

Table 10. EC: Degrees of Self-Sufficiency in Vegetables  
and Fruit Production  
(In percent)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985
Belgium	94.5	95.8	96.9	93.8	93.0	93.8
Denmark	...	...	60.9	65.8	59.6	59.3
France	98.8	96.8	97.0	92.0	93.8	92.4
Germany	60.9	55.7	47.9	40.9	44.9	47.3
Greece	...	...	...	122.1	136.3	143.0
Ireland	...	...	85.5	84.2	68.7	65.7
Italy	120.1	115.4	114.6	119.6	124.8	124.3
Netherlands	149.8	144.0	139.2	129.3	135.2	143.5
United Kingdom	...	...	62.6	61.5	55.8	49.7
EC Total	99.6	96.6	91.6	88.7	93.9	94.1

Source: Statistical Office of the European Communities, Yearbook of Agricultural Statistics.

Table 11. EC: Degrees of Self-Sufficiency in Sugar Beet Production  
(In percent)

	1960-64	1965-69	1970-74	1975-79	1980-84
Belgium	100.0	100.0	100.0	96.7	99.2
Denmark	...	...	101.5	100.0	100.1
France	100.0	100.0	100.0	100.2	100.2
Germany	99.4	99.6	100.0	100.0	100.0
Greece	...	...	...	100.0	100.0
Ireland	...	...	100.0	100.0	100.0
Italy	100.0	100.0	100.0	100.0	100.0
Netherlands	100.3	100.0	100.0	101.7	99.6
United Kingdom	...	...	100.0	100.0	100.0
EC Total	99.8	99.9	100.0	100.0	100.0

Source: Statistical Office of the European Communities, Yearbook of Agricultural Statistics.

Table 12. . EC: Degrees of Self-Sufficiency in White Sugar Production  
(In percent)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985
Belgium	117.0	133.4	184.2	194.1	257.5	231.0
Denmark	...	...	121.1	180.4	200.8	238.9
France	118.1	118.7	153.9	182.1	224.6	211.4
Germany	89.9	86.8	95.5	116.0	133.4	131.9
Greece	...	...	...	94.0	100.7	84.8
Ireland	...	...	107.7	114.3	123.5	141.4
Italy	88.7	90.2	72.5	83.0	98.0	77.3
Netherlands	97.7	100.5	112.2	144.0	164.8	164.3
United Kingdom	...	...	34.8	32.2	51.9	63.7
EC Total	99.3	99.9	91.5	108.5	134.4	131.7

Source: Statistical Office of the European Communities, Yearbook of Agricultural Statistics.

Table 13. EC: Degrees of Self-Sufficiency in Meat Production

(In percent)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985
Belgium	97.6	101.3	119.5	116.7	127.0	130.3
Denmark	...	...	322.6	298.6	332.1	322.5
France	101.7	97.0	95.4	96.0	100.7	98.5
Germany	91.1	88.5	86.2	87.7	90.7	90.7
Greece	...	...	...	78.6	77.1	71.3
Ireland	...	...	172.2	195.7	183.7	198.9
Italy	88.0	80.6	78.9	82.7	83.5	80.6
Netherlands	135.2	146.8	167.1	162.8	174.7	183.9
United Kingdom	...	...	69.7	73.4	78.3	81.6
EC Total	97.5	94.3	94.8	97.2	101.6	102.1

Source: Statistical Office of the European Communities, Yearbook of Agricultural Statistics.

Table 14. EC: Degrees of Self-Sufficiency in Beef Production

(In percent)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985
Belgium	95.0	91.5	96.5	97.2	113.1	120.2
Denmark	...	...	231.8	291.8	368.1	327.8
France	106.3	105.3	105.0	106.5	106.0	109.2
Germany	95.6	88.0	89.3	96.7	109.7	111.6
Greece	...	...	...	50.7	44.9	36.8
Ireland	...	...	216.3	296.6	253.8	323.0
Italy	77.8	64.1	67.1	71.7	73.6	71.5
Netherlands	111.9	111.7	118.3	124.9	159.3	185.8
United Kingdom	...	...	73.3	76.8	87.0	91.6
EC Total	97.2	90.2	92.5	98.5	104.7	108.0

Source: Statistical Office of the European Communities, Yearbook of Agricultural Statistics.

Table 15. EC: Degrees of Self-Sufficiency in Pork Production  
(In percent)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985
Belgium	103.1	114.5	144.8	150.0	161.5	161.7
Denmark	...	...	416.0	346.4	392.8	367.9
France	99.3	91.5	88.9	89.2	87.0	84.5
Germany	96.9	96.0	91.5	90.0	88.7	88.2
Greece	...	...	...	87.9	79.7	69.7
Ireland	...	...	158.9	135.0	139.6	118.3
Italy	93.4	91.7	81.4	78.2	77.8	74.1
Netherlands	146.0	159.1	179.7	174.8	177.1	188.1
United Kingdom	...	...	64.3	63.4	67.2	70.1
EC Total	101.0	99.7	100.9	100.2	101.9	102.5

Source: Statistical Office of the European Communities, Yearbook of Agricultural Statistics.

Table 16. EC: Degrees of Self-Sufficiency in Butter Production  
(In percent)

	1963-64	1965-69	1970-74	1975-79	1980-84	1985
Belgium	96.8	103.7	104.9	106.1	116.0	...
Denmark	...	...	327.8	297.8	217.2	198.0
France	108.8	115.6	113.2	111.2	122.5	127.9
Germany	94.3	101.8	105.6	132.3	134.8	111.9
Greece	...	...	...	65.5	58.1	...
Ireland	...	...	202.2	285.4	319.3	...
Italy	63.2	68.4	65.3	62.3	64.5	...
Netherlands	140.1	238.7	361.7	443.8	419.2	...
United Kingdom	...	...	18.3	29.2	62.8	73.1
EC Total	99.6	109.2	101.5	110.5	128.4	112.6

Source: Statistical Office of the European Communities, Yearbook of Agricultural Statistics.

Table 17. EC: Degrees of Self-Sufficiency in Egg Production  
(In percent)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985
Belgium	120.8	124.9	176.6	162.7	126.9	112.8
Denmark	...	...	122.9	106.1	102.8	97.6
France	98.7	100.2	100.2	100.1	102.5	98.4
Germany	65.4	84.3	84.1	77.5	71.9	72.5
Greece	...	...	...	100.6	98.4	97.6
Ireland	...	...	98.7	94.1	74.1	78.7
Italy	83.3	93.8	96.5	96.4	93.4	92.1
Netherlands	217.9	141.3	149.5	211.4	304.8	...
United Kingdom	...	...	97.3	99.6	97.6	95.3
EC Total	93.1	97.2	99.8	100.3	102.4	89.9

Source: Statistical Office of the European Communities, Yearbook of Agricultural Statistics.

Table 18. EC: Degrees of Self-Sufficiency in Wine Production <sup>1/</sup>  
(In percent)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985
Belgium	0.5	0.6	0.6	0.2	0.2	0.1
Denmark	--	--	--	--	--	--
France	88.8	94.4	97.3	97.1	102.6	101.8
Germany	59.5	56.8	62.7	56.8	59.5	55.5
Greece	...	...	...	129.4	109.2	115.9
Ireland	--	--	--	--	--	--
Italy	103.0	106.1	114.0	123.1	121.6	186.0
Netherlands	2.2	1.9	1.0	--	--	--
United Kingdom	...	...	--	0.1	0.1	0.2
EC Total	94.2	95.9	97.8	98.6	99.5	112.3

Source: Statistical Office of the European Communities, Yearbook of Agricultural Statistics.

<sup>1/</sup> No account is taken of the very large volume of wine distilled into alcohol for human consumption or industrial use.

Table 19. World Production and the EC's Share in Trade of Selected  
Agricultural Products (1983) 1/

	World Production 1000 t	World Trade <u>2/</u> 1000 t	Proportion of Production Traded (in percent)	Percent of World Trade		
				Imported by EC	Exported by EC	Net EC share of world trade <u>3/</u>
Total cereals (except rice) <u>4/</u>	1,268,375	195,869	15.4	9.7	9.8	0.1
Of which: total wheat	500,533	103,692	20.7	4.3	15.0	10.7
Feed grain (except rice) <u>4/</u>	767,842	92,177	12.0	15.8	4.0	-11.8
Of which: maize	415,127	63,082	15.2	19.8	0.3	-19.5
Oil seeds (by weight produced)	201,679	31,655	15.7	49.0	0.1	-48.9
Of which: soya	87,192	26,959	30.9	52.0	--	-52.0
Wine	35,066	2,448	7.0	9.4	64.7	55.3
Sugar	113,206	28,889	25.5	6.2	14.2	8.0
Total milk	443,135	255	0.1	2.0	64.7	62.7
Butter	7,532	765	10.2	14.8	45.6	30.8
Cheese	12,159	810	6.7	13.5	49.6	36.1
Milk powder (skimmed and whole)	6,489	1,639	25.3	0.9	43.0	42.1
Total meat (except offal)	140,526 <u>5/</u>	5,489 <u>6/</u>	3.9	13.6	17.9	4.3
Of which: beef and veal	45,757 <u>5/</u>	2,280 <u>6/</u>	5.0	9.0	19.8	10.8
pigmeat	53,899 <u>5/</u>	760 <u>6/</u>	1.4	10.5	13.7	3.2
poultrymeat	29,015 <u>5/</u>	1,349 <u>6/</u>	4.6	4.8	30.6	25.8
Eggs	28,456	457	1.6	3.5	37.2	33.7

Source: EC Commission, The Agricultural Situation in the Community-1986 Report, Brussels, Luxembourg 1987.

1/ Community of 12.

2/ Exports (excluding intra-EC trade) and excluding processed products.

3/ Net balance EC trade/world trade.

4/ Cereals as grain; processed products excluded.

5/ Including salted meat.

6/ Excluding salted meat for trade.

Table 20. OECD: Share of Each Country in OECD Agricultural Exports  
(Percent of agricultural exports in U.S. dollars)

	1964-70	1971-75	1976-80	1981-85	1981	1982	1983	1984	1985
Belgium <u>1/</u>	3.0	4.2	4.6	4.5	4.4	4.6	4.4	4.4	4.6
Denmark	5.8	4.5	4.4	4.1	3.9	4.1	4.1	4.1	4.3
France	10.3	13.0	12.8	12.8	12.8	12.3	12.7	12.5	13.6
Germany	3.1	5.3	7.0	7.5	7.3	7.6	7.5	7.3	7.8
Greece	1.3	1.0	1.1	1.0	0.8	1.0	1.1	1.1	1.1
Ireland	2.2	2.1	2.4	2.1	2.0	2.0	2.1	2.1	2.4
Italy	4.7	4.4	4.4	4.4	4.2	4.5	4.2	4.2	5.1
Netherlands	9.8	11.1	11.8	11.0	10.6	11.2	11.2	10.7	11.2
United Kingdom	5.0	4.8	5.6	5.7	5.5	5.8	5.6	5.4	5.9
EC-10	45.2	50.3	54.1	53.1	51.6	53.2	52.8	51.8	55.9
Portugal	0.8	0.6	0.4	0.4	0.3	0.3	0.4	0.4	0.4
Spain	2.8	2.7	2.7	2.6	2.7	2.5	2.4	2.8	2.9
United States	25.0	23.6	23.5	23.1	25.6	22.6	23.6	23.5	20.1
Japan	2.3	1.8	1.2	1.2	1.3	1.2	1.2	1.2	1.2
Canada	8.6	6.9	5.6	6.8	6.1	7.0	7.4	7.2	6.4
Australia	6.5	6.4	5.5	4.9	5.1	5.3	4.1	5.4	4.8
New Zealand	3.2	2.5	1.9	2.3	2.1	2.3	2.3	2.2	2.5
OECD	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: OECD, Foreign Trade Statistics.

1/ Including Luxembourg.



Table 21. OECD: Share of Each Country in OECD Agricultural Imports

(Percent of agricultural imports in U.S. dollars)

	1964-70	1971-75	1976-80	1981-85	1981	1982	1983	1984	1985
Belgium <u>1/</u>	3.8	4.6	5.3	4.9	5.2	5.3	4.8	4.7	4.5
Denmark	1.4	1.2	1.5	1.5	1.6	1.4	1.5	1.5	1.5
France	7.8	7.7	9.4	9.0	9.1	9.2	9.3	8.6	8.7
Germany	14.9	15.2	15.3	13.8	14.3	14.2	14.1	13.3	13.3
Greece	0.6	0.7	0.6	0.9	0.7	1.0	1.0	1.0	1.0
Ireland	0.7	0.7	0.8	1.0	1.1	1.0	1.0	0.9	0.9
Italy	7.2	9.2	8.5	8.5	8.1	8.9	8.6	7.9	9.1
Netherlands	4.7	5.8	6.9	6.6	6.8	6.8	6.8	6.3	6.4
United Kingdom	18.8	13.8	11.2	10.1	10.5	10.4	10.0	9.8	9.5
EC-10	60.0	58.7	59.6	56.3	57.4	58.2	57.0	54.1	54.9
Portugal	0.5	0.9	0.8	0.8	1.1	0.9	0.7	0.8	0.7
Spain	2.0	2.4	2.3	2.2	2.2	2.4	2.4	2.1	2.1
United States	18.9	16.4	15.4	17.5	15.9	15.9	17.1	19.2	19.5
Japan	7.1	10.3	11.3	12.5	12.7	12.0	12.5	13.1	12.4
Canada	3.2	3.5	3.2	3.4	3.4	3.2	3.4	3.7	3.4
Australia	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.9	0.9
New Zealand	0.3	0.3	0.2	0.3	0.2	0.3	0.3	0.3	0.3
OECD	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: OECD, Foreign Trade Statistics.1/ Including Luxembourg.

Table 22. OECD: Share of Agricultural Imports in Total Imports 1/  
(Percent of merchandise imports in U.S. dollars)

	1964-70	1971-75	1976-80	1981-85	1981	1982	1983	1984	1985
Belgium <u>2/</u>	12.4	11.6	11.3	10.6	10.6	11.1	10.7	10.7	10.1
Denmark	11.1	9.3	10.4	10.7	11.1	10.5	11.0	10.8	10.0
France	15.1	11.4	11.2	10.0	9.5	9.7	10.5	10.1	10.1
Germany	19.3	15.4	12.8	10.9	11.0	11.2	11.0	10.7	10.6
Greece	12.8	10.6	8.3	12.0	10.7	12.1	12.5	12.3	12.3
Ireland	16.2	12.6	12.0	12.1	12.6	12.2	12.5	11.4	11.7
Italy	19.0	18.3	14.7	12.5	11.5	12.9	13.1	11.8	13.0
Netherlands	13.3	13.1	13.3	12.8	12.9	13.3	13.1	12.4	12.2
United Kingdom	26.9	19.5	14.6	12.0	13.0	12.8	12.0	11.4	11.0
EC-10	18.5	14.9	12.8	11.3	11.3	11.6	11.6	11.1	11.1
Portugal	12.6	15.4	14.2	11.7	13.9	11.3	10.7	11.5	11.0
Spain	14.7	12.9	11.0	9.1	8.7	9.4	9.7	9.1	8.8
United States	17.5	12.3	9.1	7.3	7.4	7.7	7.5	6.9	6.8
Japan	15.8	14.8	13.4	11.7	11.3	11.2	11.9	11.9	12.2
Canada	8.2	7.7	7.3	6.4	6.6	7.3	6.6	6.1	5.6
Australia	5.0	5.0	5.1	4.6	4.1	4.1	5.1	4.9	4.8
New Zealand	6.9	6.6	5.9	5.8	5.3	6.2	5.6	5.8	5.9
OECD	16.2	13.1	11.1	9.5	9.6	9.9	9.8	9.3	9.1

Source: OECD, Foreign Trade Statistics.

1/ Agricultural imports are SITC categories 0 and 1 (food, beverages, and tobacco).

2/ Including Luxembourg.

Table 23. OECD: Share of Agricultural Exports in Total Exports 1/

(Percent of merchandise exports in U.S. dollars)

	1964-70	1971-75	1976-80	1981-85	1981	1982	1983	1984	1985
Belgium <u>2/</u>	7.3	9.0	9.0	10.0	10.3	10.5	9.6	10.1	9.5
Denmark	43.0	34.3	32.9	30.5	31.9	32.5	29.9	29.6	28.5
France	16.1	16.9	14.8	15.8	16.4	15.9	15.8	15.6	15.3
Germany	2.5	3.7	4.4	5.0	5.4	5.2	5.0	4.9	4.7
Greece	54.2	34.2	29.4	26.6	25.7	27.4	27.4	26.6	25.9
Ireland	55.4	44.3	39.0	28.3	33.1	30.0	27.8	25.5	25.1
Italy	10.0	8.2	7.1	6.9	7.2	7.2	6.5	6.5	7.1
Netherlands	23.7	21.0	20.1	19.3	20.0	20.1	19.5	18.7	18.0
United Kingdom	6.4	6.8	6.9	6.9	7.2	7.1	7.0	6.7	6.4
EC-10	11.0	10.8	10.4	10.6	11.1	10.8	10.5	10.4	10.0
Portugal	22.3	16.5	13.9	9.3	10.4	9.7	9.6	8.8	7.8
Spain	37.9	23.3	18.1	14.5	16.9	14.7	14.1	13.7	12.9
United States	14.8	15.0	14.4	13.0	14.7	13.0	13.8	12.9	10.7
Japan	3.8	2.1	1.2	0.9	1.1	1.0	0.9	0.8	0.7
Canada	15.4	12.1	10.5	10.7	11.6	12.4	11.7	9.8	8.3
Australia	36.3	34.7	31.6	27.3	30.2	29.9	24.4	27.8	24.1
New Zealand	56.4	54.8	46.7	50.4	50.2	53.2	50.9	47.0	50.5
OECD	12.4	11.3	10.3	9.9	10.7	10.3	10.0	9.6	8.8

Source: OECD, Foreign Trade Statistics.

1/ Agricultural exports are SITC categories 0 and 1 (food, beverages, and tobacco).2/ Including Luxembourg.

Table 24. EC: Ratio of Stocks to Production for  
Selected Commodities and Countries

(Percent of mid-year stocks in the volume of annual output)

	1973-75	1976-80	1981	1982	1983	1984	1985
Cereals <sup>1/</sup>							
United States	69.6	78.8	73.0	85.6	125.8	71.9	...
EC-9 <sup>2/</sup>	14.5	13.7	11.9	12.4	13.3	...	...
Australia	10.2	15.1	15.8	29.5	16.4	28.1	...
Butter							
United States	12.8	21.3	41.3	43.2	45.5	46.8	23.0
EC-9	11.4	14.9	9.9	10.7	24.7	42.3	51.9
Australia	10.7	13.9	14.5	17.0	21.6	28.1	27.6
New Zealand	10.7	10.8	8.1	10.6	7.1	27.1	...
Skimmed milk powder							
United States	22.7	55.1	53.7	78.2	90.1	118.6	75.3
EC-9	19.9	34.4	12.2	19.0	31.2	38.0	29.2
Australia	12.6	11.8	15.4	7.8	10.6	13.6	9.3
New Zealand	45.9	55.2	35.7	60.3	31.0	31.0	...
Beef and veal							
EC-9	2.4	4.3	2.6	3.1	5.4	8.2	8.7
Australia	7.2	5.5	4.7	2.9	3.0	2.9	3.4

Source: OECD,

<sup>1/</sup> Cereals excluding rice.

<sup>2/</sup> Excluding Ireland.

Note: EC intervention (EAGGF) stocks are included in all EC totals.

Table 25. OECD: Share of Agricultural Value Added in GDP 1/

(Percent of nominal value added)

	1960-70	1971-75	1976-80	1981-85 <u>1/</u>	1981	1982	1983	1984	1985
Belgium	5.2	3.5	2.5	2.5	2.4	2.5	2.6	2.5	2.4
Denmark	9.3	5.6	5.0	5.2	5.1	5.7	4.9	5.6	4.8
France	8.2	6.0	4.6	3.9	3.9	4.3	4.0	3.9	3.7
Germany	4.6	2.9	2.4	2.0	2.1	2.3	1.9	2.0	1.7
Greece	19.7	16.9	15.2	15.8	16.1	16.6	15.2	15.7	15.5
Ireland	18.3	15.0	14.4	10.4	10.1	10.4	10.7	11.0	9.6
Italy	10.8	7.5	6.9	5.6	6.0	5.8	6.0	5.4	5.0
Luxembourg	5.6	3.6	2.9	2.9	2.7	3.4	2.9	2.7	...
Netherlands	6.8	4.8	3.9	4.3	4.1	4.3	4.3	4.4	...
United Kingdom	2.9	2.5	2.1	1.8	1.9	2.0	1.8	1.9	1.6
EC-10	6.5	4.3	4.1	3.6	3.7	3.8	3.5	3.6	3.3
Portugal	19.4	14.4	11.7	8.7	8.5	8.8	8.5	9.1	...
Spain	15.7	10.1	8.1	6.2	6.1	6.3	6.2	6.5	6.2
United States	3.2	3.3	2.9	2.4	2.3	2.6	2.0	2.3	2.1
Japan	9.3	5.6	4.6	3.3	3.5	3.4	3.3	3.2	3.1
Canada	4.9	4.2	3.9	3.5	3.8	3.7	3.3	3.2	...
Australia	9.4	6.6	5.7	4.6	5.1	3.8	5.0	4.5	...
New Zealand	...	11.2	10.7	9.4	9.6	8.2	8.7	11.1	...
OECD <u>3/</u>	6.1	5.0	4.3	3.6	3.8	3.7	3.4	3.5	3.3

Source: OECD, National Accounts.1/ Agriculture includes hunting, forestry and fishing.2/ 1981-84 for Canada, Luxembourg, Netherlands, Portugal, Australia and New Zealand.3/ Excluding Iceland and Switzerland. Aggregates were calculated using purchasing power parities for GDP of the current year. OECD estimates for 1985 for Canada, Luxembourg, Netherlands, Portugal, Australia and New Zealand are included in the OECD total.

Table 26. OECD: Growth of Agricultural Employment 1/  
(Average annual percentage change)

	1960-70	1970-75	1975-80	1980-85	1981	1982	1983	1984	1985
Belgium	-5.0	-4.8	-3.8	-1.3	-2.7	-1.8	-0.9	--	-0.9
Denmark	-3.1	-3.0	-5.2	-0.7	-0.6	1.7	--	-6.8	2.4
France	-4.1	-4.8	-3.0	-3.1	-3.4	-3.3	-3.2	-3.0	-2.7
Germany	-4.6	-4.8	-4.1	-0.7	-2.0	-0.9	-0.3	-0.1	-0.1
Greece	-4.1	-2.5	-2.1	0.4	6.6	-6.9	5.2	-1.5	-0.7
Ireland	-3.2	-3.4	-2.6	-4.2	-6.2	-1.5	-2.1	-4.2	-6.6
Italy	-5.2	-3.4	-2.3	-4.6	-5.8	-7.7	0.2	-4.0	-5.4
Luxembourg	-5.0	-4.1	-4.3	-4.4	-7.1	-3.8	-2.6	-4.1	-4.2
Netherlands	-3.4	-1.9	-1.3	0.2	-0.8	-1.2	2.5	-0.8	1.2
United Kingdom	-3.4	-3.0	-0.9	-0.5	-0.3	--	-1.2	-0.8	-0.3
EC-10	-4.5	-3.8	-2.7	-2.4	-2.5	-4.3	-0.1	-2.4	-2.4
Portugal	-3.6	4.7	-3.2	-2.8	-5.3	-2.6	-1.1	1.8	-6.5
Spain	-2.8	-3.7	-5.0	-2.5	-2.7	0.6	-1.8	-3.6	-5.1
United States	-4.4	-0.3	0.1	-1.1	-0.3	1.4	-0.8	-2.0	-3.8
Japan	-4.1	-5.7	-2.7	-2.5	-3.5	-1.6	-3.1	-3.6	-0.6
Canada	-2.7	-1.3	0.6	0.2	2.4	-6.5	5.2	-0.2	0.7
Australia	-0.5	-1.3	0.1	0.2	1.7	-0.7	1.0	-3.1	2.2
New Zealand	0.3	--	1.2	1.4	3.6	2.1	-2.7	0.7	3.5
OECD <u>2/</u>	-3.4	-2.7	-1.7	-1.6	-1.7	-1.4	-0.9	-1.9	-1.9

Source: OECD, Labor Force Statistics.

1/ Agriculture includes hunting, forestry and fishing. According to ILO guidelines unpaid family workers are included in employment irrespective of the number of hours worked during the specified period. Some of the above countries may exclude such workers, however, if they worked less than a number of specified hours per week.

2/ OECD estimates for 1985 for Iceland are included in the OECD total.

Table 27. OECD: Share of Agriculture in Civilian Employment 1/

(Percentages)

	1960-70	1971-75	1976-80	1981-81	1981	1982	1983	1984	1985
Belgium	6.6	3.9	3.2	3.0	3.0	3.0	3.0	3.0	2.9
Denmark	14.8	9.9	7.7	7.1	7.3	7.5	7.4	6.7	6.7
France	18.0	11.4	9.2	8.0	8.4	8.2	7.9	7.8	7.6
Germany	11.2	7.4	6.1	5.6	5.5	5.5	5.6	5.6	5.5
Greece	49.4	37.0	32.1	29.6	30.7	28.9	29.9	29.4	28.9
Ireland	32.3	24.2	20.4	16.8	17.3	17.0	17.1	16.6	16.0
Italy	26.0	18.4	15.4	12.3	13.4	12.4	12.4	11.9	11.2
Luxembourg	12.6	7.9	6.1	4.7	5.0	4.8	4.7	4.5	4.2
Netherlands	7.8	5.8	5.3	4.9	4.9	4.8	5.0	5.0	4.9
United Kingdom	3.9	2.9	2.7	2.7	2.7	2.7	2.7	2.7	2.6
EC-10	14.8	10.1	8.5	7.5	7.8	7.6	7.6	7.4	7.2
Portugal	37.3	30.7	31.2	24.5	26.0	25.2	23.6	24.5	23.2
Spain	32.0	24.3	20.1	18.4	18.6	18.8	18.6	18.6	17.6
United States	6.3	4.2	3.7	3.4	3.5	3.6	3.5	3.3	3.1
Japan	23.7	13.9	11.5	9.3	10.0	9.7	9.3	8.9	8.8
Canada	10.3	6.7	5.7	5.3	5.4	5.2	5.5	5.3	5.2
Australia	9.6	7.3	6.5	6.4	6.5	6.4	6.6	6.2	6.2
New Zealand	13.0	11.2	10.9	11.3	11.4	11.4	11.2	11.2	11.1
OECD <u>2/</u>	17.5	12.3	10.6	9.4	9.7	9.6	9.5	9.2	8.9

Source: OECD, Labor Force Statistics.

1/ Agriculture includes hunting, forestry and fishing. According to ILO guidelines unpaid family workers are included in employment irrespective of the number of hours worked during the specified period. Some of the above countries may exclude such workers, however, if they worked less than a number of specified hours per week.

2/ OECD estimates for 1985 for Iceland are included in the OECD total.

Table 28. EC-10: Holdings: Number and Area Covered by Agriculture

Size of Holdings (in hectares)	Number of Holdings (in thousands)				Area Covered by Holdings (in thousands of hectares)			
	1960	1970	1980	1984	1960	1970	1980	1984
1- 5	4,030	3,085	2,945	2,342	10,297	7,658	6,054	5,642
5-10	1,712	1,244	924	859	12,259	8,839	6,535	6,125
10-20	1,329	1,116	848	781	18,724	15,855	12,116	11,219
20-50	820	850	853	844	24,561	25,591	26,281	26,022
More than 50	<u>265</u>	<u>291</u>	<u>339</u>	<u>359</u>	<u>25,516</u>	<u>34,034</u>	<u>37,893</u>	<u>39,457</u>
Total	8,147	6,585	5,458	5,175	91,356	91,997	88,878	88,466

Sources: Commission of the European Communities, The Agricultural Situation in the Community, various issues; and Eurostat, Agriculture-Statistical Yearbook 1986.

1/ Totals may not add up because of rounding and overlapping categories.



Table 29. EC-10: Average Size of Agricultural Holding  
Per Member State

(In hectares)

	1960	1970	1980	1984
Belgium	8.2	11.6	15.4	16.4
Denmark	15.7	20.7	25.0	30.2
France	17.0	21.0	25.4	27.9
Germany	9.3	11.7	15.3	16.3
Greece	4.0	4.3	4.6	5.3 <sup>1/</sup>
Ireland	17.1	17.7	22.6	22.8 <sup>1/</sup>
Italy	6.8	7.5	7.4 <sup>2/</sup>	8.0 <sup>3/</sup>
Luxembourg	13.4	19.4	27.6	30.7
Netherlands	9.9	13.0	15.6	16.4
United Kingdom	32.0	56.8	68.7	69.9
EC-10	11.2	14.0	16.3	17.1

Sources: Commission of the European Communities, The Agricultural Situation in the Community, 1986 Report; and Eurostat, Agriculture-Statistical Yearbook 1986.

<sup>1/</sup> 1983 Community survey.

<sup>2/</sup> 1977 national survey.

<sup>3/</sup> 1982 Community survey.

Table 30. EC: Distribution of Farm Sizes in 1983 by Country

Size <u>1/</u>	Belgium	Denmark	France	Germany	Greece	Ireland	Italy	Netherlands	Luxem- bourg	United Kingdom
Less than 2	0.8	0.1	0.9	1.3	12.1	4.0	7.4	0.1	0.6	0.3
2 less than 4	1.2	0.9	1.4	2.5	17.4	7.4	9.0	0.4	1.4	0.8
4 less than 8	3.0	3.6	4.0	6.3	29.1	14.5	13.3	1.4	3.7	1.8
8 less than 16	9.4	9.8	11.7	14.7	26.1	23.3	16.0	3.4	9.7	4.1
16 less than 40	41.8	34.9	37.4	42.6	12.3	34.5	21.5	17.4	50.4	16.1
More than 40	43.8	50.7	44.6	32.6	3.0	16.3	32.8	77.3	34.2	76.9

Source: EC Commission, The Agricultural Situation in the Community - 1986 Report. Brussels, Luxembourg 1987.

1/ Measured in European size unity.

Table 31. OECD: Relative Labor Productivity in Agriculture 1/

(Total economy = 100)

	1970-75	1976-80	1981-85 <u>2/</u>	1981	1982	1983	1984	1985
Belgium	65.6	68.4	84.6	80.5	83.4	82.1	87.9	89.0
Denmark	46.8	59.9	76.3	70.9	74.6	67.3	87.7	80.9
France	50.6	53.2	65.3	57.7	65.5	63.6	69.1	70.5
Germany	31.2	35.3	40.4	37.5	44.2	39.2	41.4	39.5
Greece	39.6	39.4	41.5	41.1	44.8	39.2	41.4	41.0
Italy	40.5	44.3	55.6	50.3	53.8	58.6	57.6	58.3
Luxembourg	39.7	45.7	61.5	54.2	68.1	59.4	64.2	...
Netherlands	54.3	62.5	88.0	81.5	89.8	87.4	90.7	90.9
United Kingdom	58.4	60.7	73.4	70.6	74.5	68.5	78.8	74.6
EC-10 <u>3/</u>	39.4	42.9	51.3	47.9	52.7	50.9	53.8	...
Portugal	12.0	35.8	43.1	44.6	47.4	48.2	48.2	52.1
Spain	41.7	48.2	51.1	48.6	46.9	49.6	53.8	56.5
United States	68.4	71.4	82.2	84.4	86.2	70.8	79.6	90.0
Japan	38.8	37.4	36.5	34.6	36.2	37.3	37.8	36.9
Canada	48.6	53.4	55.7	54.9	59.8	54.7	53.4	...
Australia	87.7	101.3	98.4	98.3	84.3	102.5	108.4	...
New Zealand	...	...	118.2	115.0	121.3	109.9	117.9	126.7
OECD <u>4/</u>	34.9	37.3	41.5	40.5	42.5	40.3	42.6	...

Source: OECD, National Accounts and Labor Force Statistics.

1/ Labor productivity is measured as value added in constant market prices divided by employment. For the United Kingdom, value added is in constant factor prices.

2/ 1981-84 for Canada, Luxembourg, Australia, EC and OECD.

3/ Excluding Ireland.

4/ Excluding Iceland, Ireland, New Zealand, Portugal, and Switzerland. Aggregates were calculated using 1980 purchasing power parities for GDP.

Table 32. EC-10: Revenue of the Agricultural Sector

(Average of 1979-81 = 100)

	Net Value Added at Factor Costs <u>1/</u>	Volume of Final Output <u>1/</u>	Price Index of Final Output	Agricultural Terms of Trade <u>2/</u>
1973	112.0	89.7	61.5	115.2
1974	101.6	90.4	64.6	101.3
1975	103.1	88.2	72.9	106.2
1976	105.3	88.4	82.6	108.8
1977	104.2	91.1	86.6	106.3
1978	106.5	95.7	88.3	107.6
1979	103.6	98.7	93.3	104.7
1980	97.3	100.6	98.5	98.7
1981	99.1	100.6	108.2	96.6
1982	109.3	105.7	116.2	97.3
1983	103.6	105.3	120.9	95.3
1984	109.3	109.1	123.0	93.2
1985	102.8	107.3	123.6	93.4
1986	103.7	109.7	123.0	95.9

Source: Eurostat, Agricultural Income, 1986, Luxembourg 1987.

1/ Per annual work unit, i.e., the equivalent of the work done by one full-time worker in one year, deflated by the GDP deflator.

2/ Price index of final output divided by price index of intermediate consumption.

Table 33. Expenditures by the European Agricultural  
Guidance and Guarantee Fund by Country

(In percent; or millions of ECUs)

	1973	1981	1982	1983	1984	1985
(In percent of total expenditure)						
Belgium	5.4	4.4	4.2	3.8	3.8	4.5
Denmark	8.5	4.5	4.4	4.2	4.7	4.1
France	29.9	27.7	23.3	22.7	19.2	23.1
Germany	20.3	18.2	16.4	18.9	17.9	17.9
Greece	--	1.4	5.4	6.5	5.3	6.4
Ireland	2.3	4.3	4.5	4.3	5.1	6.0
Italy	14.4	19.2	20.2	18.4	21.7	17.8
Luxembourg	0.1	0.1	--	--	--	--
Netherlands	14.8	10.2	11.2	10.4	10.4	10.1
United Kingdom	4.3	10.1	10.4	11.0	11.8	9.8
EC-10						
Total						
(millions of ECU)	4,115.9	11,866.6	13,059.4	16,863.4	19,050.8	20,725.1
Guarantee						
(in percent of total)	95.4	93.9	95.0	94.4	96.4	95.7
Guidance						
(in percent of total)	4.6	6.1	5.0	5.6	3.6	4.3

Source: EC Commission, Official Journal of the European Communities, Volume 29 (C321), December 15, 1986.

Table 34. Expenditure of the European  
Guarantee Fund by Product

(In percent)

	1981	1982	1983	1984	1985
Cereals and rice	17.8	15.2	16.1	9.3	12.0
Sugar	7.0	10.0	8.3	8.9	9.1
Fats and protein plants	10.0	10.5	11.2	10.7	11.0
Fruit and vegetables	5.8	7.4	7.6	7.9	6.2
Wine	4.2	4.6	4.2	6.7	4.7
Tobacco	3.3	5.0	4.3	4.2	4.4
Milk products	30.5	26.9	27.8	29.7	30.1
Meat, eggs and poultry	17.0	13.1	14.6	17.7	17.6
Other markets	3.7	4.7	3.5	3.0	3.7
Agri-monetary measures	2.2	2.5	3.1	2.1	1.0
Other expenditure	-1.5	0.0	-0.7	-0.1	0.2
Total (millions of ECU)	10,960.2	12,369.5	15,788.2	18,328.3	19,725.9

Source: EC Commission, Official Journal of the European Communities, Volume 29 (C321), December 15, 1986.

Table 35. EC-9: Agricultural Expenditure by the Member States in 1975 and 1980

(In percent of expenditure by the EAGGF)

	1975			1980		
	National expenditure excluding social security	Social security outlays	Total	National expenditure excluding social security	Social security outlays	Total
Germany	244.6	186.8	431.4	63.0	78.1	141.1
France	183.8	292.5	476.3	92.2	219.7	311.9
Italy	270.0	473.7	743.8	149.3	357.2	506.5
Netherlands	36.9	33.8	70.7	21.0	19.7 <u>1/</u>	40.8
Belgium	54.1	150.2	204.3	38.5	72.1	110.6
Luxembourg	240.0	250.0	490.0	146.8	254.0 <u>2/</u>	400.8
United Kingdom	236.4	63.3	299.7	108.5	30.2	138.7
Ireland	72.5	47.6	120.1	59.2	37.2	96.4
Denmark	42.1	112.2	154.4	42.8	48.7	91.5
EC-9	179.4	224.3	403.7	80.1	143.1	223.2

Source: Commission des Communautés Européennes, Dépenses publiques en faveur de l'agriculture, Etude P 229 (November 1984).

1/ Social security outlays 1977.

2/ Social security outlays 1979.

Table 36. EC-9: Agricultural Expenditure by the Member States  
and the EAGGF in 1975 and 1980

(In percent of total)

	1975				1980			
	National expenditure excluding social security	National expenditure including social security	EAGGF	Total	National expenditure excluding social security	National expenditure including social security	EAGGF	Total
Germany	18.6	14.6	13.6	14.4	17.2	13.8	21.8	16.3
France	26.2	30.2	25.6	29.3	28.6	34.8	24.9	31.7
Italy	30.4	37.2	20.2	33.8	30.2	36.8	16.2	30.4
Netherlands	2.3	2.0	11.4	3.9	3.5	2.4 <sup>1/</sup>	13.2	5.7
Belgium	1.2	2.0	3.9	2.4	2.4	2.5	5.0	3.3
Luxembourg	0.2	0.2	0.1	0.1	0.2	0.2 <sup>2/</sup>	0.1	0.2
United Kingdom	17.5	9.8	13.3	10.5	11.3	5.2	8.3	6.1
Ireland	2.1	1.5	5.2	2.2	3.8	2.2	5.1	3.1
Denmark	1.6	2.6	6.7	3.4	2.9	2.2	5.4	3.2
EC-9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Commission des Communautés Européennes, Dépenses publiques en faveur de l'agriculture, Etude P 229 (November 1984).

<sup>1/</sup> Social security outlays 1977.

<sup>2/</sup> Social security outlays 1979.



Table 3/. Welfare Effects of the CAP on the EC Members

(In billions of 1980 U.S. dollars per year)

Source	Commodity(ies)	Country(ies)	Model Structure 1/	Year	Effects on				
					Consumers (a)	Taxpayers (b)	Producers (c)	Absolute Total	Relative (d)
Koster & Schmitz (1982)	Sugar	EC-9	PE	1978-79				-4.0	
Morris (1980)	Main CAP commodities	EC-9	PE	1978	-43.5	-10.7	38.6	-15.6	-0.53% of EC-9 GDP Transfer ratio of 1.40 3/
Thompson & Harvey (1981)	All CAP commodities	EC-9	PE	1980 2/					Transfer ratio of 1.77 3/
Bureau of Agricultural Economics (1983)	All CAP commodities	EC-9	PE	1978	-35.4	-18.1	44.1	-9.4	-0.48% of EC-9 GDP Transfer ratio of 1.21 3/
		EC-10	PE	1983	-25.6	-20.8	39.7	-6.7	-0.32% of EC-10 GDP Transfer ratio of 1.17 3/
Buckwell et. al. (1982)	All CAP commodities	EC-9	PE	1980	-34.6	-11.5	30.7	-15.4	-0.55% of EC-9 GDP Transfer ratio of 1.5 3/
Tyers (1985)	Rice, wheat, coarse grains, ruminant and non-ruminant meat	EC-9	PE	1980	-44.0	-0.9	13.9	-31.0 4/	-1.1% of EC-9 GDP Transfer ratio 1.23
Tyers & Anderson (1986)	Rice, wheat, coarse grains, ruminant and non-ruminant meat, dairy, sugar	EC-10	PE	1985 4/	-49.0	-2.2	27.2	-24.1 4/	-1.3% of EC-10 GDP or Transfer ratio of 1.88 3/
Spencer (1985)	All CAP commodities	EC-9	GE	1980					Approx. -0.9% of EC-9 GDP
Burniaux and Waelbroeck (1985)	All CAP commodities	EC-10	GE	1995					-2.7% of EC-10 GDP
Tyers & Anderson (1987a,b)	Rice, wheat, coarse grains, ruminant and non-ruminant meat, dairy, sugar	EC-12	PE	1980-82	-42.3	-0.9	36.4	-6.8 5/	-0.27% of EC-12 GDP Transfer ratio of 1.19
OECD (1987c)	All CAP commodities	EC-9	PE	1979-81	-27.8				

1/ PE - Partial equilibrium (single- or multi-sector); GE: General Equilibrium.

2/ The Thompson & Harvey (1981) results are for 1980 but their model used data from 1975 for calibration.

3/ The transfer ratio is defined as the cost to the economy of increasing farmers' income by 1 unit; in other words columns (a)+(b) (c)

4/ Results are for 1985, but the model is calibrated to data from 1980-82.

5/ Includes change in net government revenue and profits from storage.

Table 38. Welfare Effects of the CAP by Country in 1980  
(In millions of U.S. dollars)

Country	Consumers	Taxpayers	Producers	Net	Transfer Ratio
EC-9	-34,580	-11,494	30,686	-15,388	1.50
Germany	-12,555	-3,769	9,045	-7,279	1.80
France	-7,482	-2,836	7,237	-3,081	1.42
Italy	-5,379	-1,253	3,539	-3,093	1.87
Netherlands	-1,597	-697	3,081	787	0.74
Belgium/Luxembourg	-1,440	-544	1,624	-320	1.22
United Kingdom	-5,174	-1,995	3,461	-3,708	2.07
Ireland	-320	-99	965	546	0.43
Denmark	-635	-302	1,736	799	0.54

Sources: Buckwell et. al. (1982), pp. 90-134; and staff calculations.

Table 39. The Community's Trading Position  
(In billions of U.S. dollars)

	1978	1984
Agricultural exports:		
EC-12 <u>1/</u>	18.4	26.1
United States	33.0	42.0
Canada	8.1	13.4
Australia	6.1	8.8
Agricultural imports:		
EC-12 <u>1/</u>	49.4	48.6
United States	22.4	29.8
Canada	4.1	5.8
Australia	1.1	1.6

Source: Commission of the European Communities (1987).

1/ Excludes intra-EC trade.

Table 40. EC: Export Share in World Agricultural Exports 1/

	1971-71	1973-74	1975-76	1977-78	1979-80	1980-81	1981-82	1982-83
Wheat	8.1	8.3	12.9	6.8	12.1	15.6	15.2	17.1
Wheat flour	47.6	60.0	54.4	54.0	61.6	66.4	67.3	61.5
Total grains	...	7.8	9.1	...	8.2	10.1	8.6	...
Beef and veal	2.6	6.3	8.9	2.9	18.4	18.2	13.9	...
Butter	31.1	47.5	18.4	43.1	57.2	59.3	52.6	46.8
Non-fat dairy products	22.9	29.9	28.5	36.8	62.9	56.9	49.5	50.3
Cheese	28.1	26.9	36.6	36.6	38.5	41.1	43.6	44.5
Broilers	36.6	26.5	39.0	38.0	37.4	35.4	34.7	39.3
Shell eggs for consumption	...	...	...	...	20.0	28.0	37.5	52.4
Sugar	6.2	4.3	3.4	9.5	13.8	16.2	18.4	18.5

Source: Koester & Bale, 1984. p.5.

1/ EC export quantities as percentage of world export quantities, excluding intra-EC trade.

Table 41. EC: Exports of Agricultural Products to Various Groups of Countries 1/

	Millions of ECU			Percent of total EC		
	1983	1984	1985	1983	1984	1985
World total <u>2/</u>	82,288	95,731	100,920	...	...	...
Total EUR 12, intra-EC	54,644	62,554	66,415	...	...	...
Total EUR 12, extra-EC	27,644	33,176	34,505	100.0	100.0	100.0
Industrialized countries	11,497	14,557	16,120	41.6	43.9	46.7
Of which: USA	4,190	5,465	6,347	15.2	16.5	18.4
Canada	671	946	992	2.4	2.9	2.9
Japan	1,049	1,497	1,547	3.8	4.5	4.5
Developing countries	12,582	15,202	14,702	45.5	45.8	42.6
Of which: Argentina	28	27	25	0.1	0.1	0.1
Brazil	104	113	139	0.4	0.3	0.4
Morocco	275	277	485	1.0	0.8	1.4
State-trading countries	3,436	3,249	3,480	12.4	9.8	10.1
Of which: Poland	380	455	410	1.4	1.4	1.2
Hungary	161	160	142	0.6	0.5	0.4
Romania	51	60	77	0.2	0.2	0.2
Western Europe <u>3/</u>	4,713	5,415	5,977	17.0	16.3	17.3
Of which: Yugoslavia	263	343	348	1.0	1.0	1.0
Industrialized commonwealth <u>4/</u>	1,229	1,672	1,702	4.4	5.0	4.9
Mediterranean basin <u>5/</u>	4,095	5,122	4,949	14.8	15.4	14.3
Latin America, Central and South	734	806	828	2.7	2.4	2.4
ACP (Lomé Convention)	2,499	2,569	2,830	9.0	7.7	8.2

Source: Commission of the European Communities (1987).

1/ Community of 12, product groups SITC 0, 1, 21, 22, 232, 24, 261-265+268, 29, 4, 592.11+12.

2/ Not including confidential, ships' stores, etc.

3/ Iceland, Norway, Sweden, Finland, Switzerland, Austria, Yugoslavia.

4/ Canada, Australia, New Zealand, South Africa.

5/ Tunisia, Morocco, Algeria, Malta, Cyprus, Israel, Egypt, Syria, Jordan, Turkey, Lebanon, Libya.

Table 42. EC: Imports of Agricultural Products from Various Groups of Countries 1/

	Millions of ECU			Percent of total EC		
	1983	1984	1985	1983	1984	1985
1. World total <u>2/</u>	107,905	123,105	128,301	...	...	...
2. Total EUR 12, intra-EC	54,628	61,570	67,673	...	...	...
3. Total EUR 12, extra-EC	53,276	61,534	60,627	100.0	100.0	100.0
4. Industrialized countries (class I)	23,702	25,442	23,343	44.5	41.3	38.5
Of which: USA	11,709	11,909	9,524	22.0	19.4	15.7
Canada	1,840	1,880	1,628	3.5	3.1	2.7
Japan	230	319	290	0.4	0.5	0.5
5. Developing countries (class II)	25,590	31,526	32,421	48.0	51.2	53.5
Of which: Argentina	2,006	2,891	2,843	3.8	4.7	4.7
Brazil	4,731	5,671	6,357	8.9	9.2	10.5
Morocco	461	471	595	0.9	0.8	1.0
6. State-trading countries (class III)	3,829	4,442	4,703	7.2	7.2	7.8
Of which: Poland	536	694	836	1.0	1.1	1.4
Hungary	574	665	728	1.1	1.1	1.2
Romania	131	166	168	0.2	0.3	0.3
7. Western Europe <u>3/</u>	5,591	6,241	6,258	10.5	10.1	10.3
Of which: Yugoslavia	628	668	675	1.2	1.1	1.1
8. Industrialized commonwealth <u>4/</u>	5,146	5,862	6,013	9.7	9.5	9.9
9. Mediterranean basin <u>5/</u>	2,771	3,192	3,400	5.2	5.2	5.6
10. Latin America, Central and South	10,416	12,699	13,503	19.6	20.6	22.3
11. ACP (Lomé Convention)	6,797	8,947	9,162	12.8	14.5	15.1

Source: Commission of the European Communities (1987).

1/ Community of 12, product groups SITC 0, 1, 21, 22, 232, 24, 261-265 + 268, 29, 4, 592.11 + 12.

2/ Not including confidential, ships' stores, etc.

3/ Iceland, Norway, Sweden, Finland, Switzerland, Austria, Yugoslavia.

4/ Canada, Australia, New Zealand, South Africa.

5/ Tunisia, Morocco, Algeria, Malta, Cyprus, Israel, Egypt, Syria, Jordan, Turkey, Lebanon, Libya.

Table 43. Effects of the CAP on International Prices

(Percent change in world market prices  
following complete liberalization)

Source <u>1/</u>	EC- Concept	Base Year	Wheat	Coarse grains	Rice	Ruminant meat	Non-ruminant meat	Sugar	Dairy
Koester & Schmitz (1982)	EC-9	1979						12.0	
Koester (1982)	EC-9	1975-77	9.6	14.3 <u>2/</u>					
Koester & Valdes (1984)	EC-9	1980	4.6			10.5 <u>3/</u>	5.9 <u>4/</u>	9.7	28.3 <u>5/</u>
Sarris & Freebairn (1983)	EC-9	1978-80	9.2						
Anderson & Tyers (1984) <u>6/</u>	EC-9	1980	13.0	16.0	5.0	17.0	1.0		
Tyers & Anderson (1986)	EC-10	1985 <u>7/</u>	0.7	2.5	0.7	9.5	1.7	2.6	11.8
Matthews (1985a)	EC-10	1978-82	0.7	2.9 <u>2/</u>	0.1	4.5 <u>8/</u>	3.6 <u>4/</u>	6.0	10.5 <u>5/</u>
Tyers & Anderson (1987b)	EC-12	1980-82	6.0	5.0	3.0	18.0	4.0	7.0	25.0

1/ All studies cited base their results on partial equilibrium analysis.

2/ Reported figure refers to barley only.

3/ Reported figure refers to beef only.

4/ Average of estimated effect on the prices of pork and poultry.

5/ Reported figure refers to butter only.

6/ Same results also reported in Tyers (1985).

7/ Results for 1985, but the model is calibrated to data from 1980-82.

8/ Average of estimated effect on the prices of beef and mutton.

Table 44. Effects of the CAP on World Trade <sup>1/</sup>

(Change in volume following complete liberalization; in millions of tons)

	EC- Concept	Base Year	Net Imports to the EC	Net Imports to Developed Countries (including EC)	Net Imports to Less Developed Countries	Total Volume Traded
<b>Wheat</b>						
Koester (1982)	EC-9	1975-77		-8.5	-3.4	18.6
Anderson & Tyers (1984)	EC-9	1980	14.7			
Tyers (1985)	EC-9	1980	14.7			12.3
Tyers & Anderson (1986)	EC-10	1985 <sup>2/</sup>	-2.4	-0.2	0.2	0.0
Tyers & Anderson, (1987b)	EC-12	1980-82		4.5	-4.9	-4.0
<b>Coarse grains</b>						
Koester (1982)	EC-9	1975-77		-10.0 <sup>3/</sup>	-5.3 <sup>3/</sup>	68.5 <sup>3/</sup>
Anderson & Tyers (1984)	EC-9	1980	26.0			
Tyers (1985)	EC-9	1980	26.0			23.2
Tyers & Anderson (1986)	EC-10	1985 <sup>2/</sup>	5.9	3.0	-3.3	4.0
Tyers & Anderson (1987b)	EC-12	1980-82		4.0	2.3	0.0
<b>Rice</b>						
Anderson & Tyers (1984)	EC-9	1980	-0.2			
Tyers (1985)	EC-9	1980	-0.2			
Tyers & Anderson (1986)	EC-10	1985 <sup>2/</sup>	0.1	0.1	-0.1	0.0
Tyers & Anderson (1987b)	EC-12	1980-82		3.8	-4.0	-1.0
<b>Ruminant meat</b>						
Anderson & Tyers (1984)	EC-9	1980	3.0			
Tyers (1985)	EC-9	1980	3.0			2.7
Tyers & Anderson (1986)	EC-10	1985 <sup>2/</sup>	5.3	3.2	-2.6	107.0
Tyers & Anderson (1987b)	EC-12	1980-82		5.6	-2.9	58.0
<b>Nonruminant meat</b>						
Anderson & Tyers (1984)	EC-9	1980	-2.0			
Tyers (1985)	EC-9	1980	-2.0			2.0
Tyers & Anderson (1986)	EC-10	1985 <sup>2/</sup>	-0.5	0.0	-0.0	3.0
Tyers & Anderson (1987b)	EC-12	1980-82		1.7	-0.7	-6.0
<b>Sugar</b>						
Tyers & Anderson (1986)	EC-10	1985 <sup>2/</sup>	3.0	2.8	-2.6	-5.0
Tyers & Anderson (1987b)	EC-12	1980-82		2.3	-2.9	0.0
<b>Dairy</b>						
Tyers & Anderson (1986)	EC-10	1985 <sup>2/</sup>	38.8	29.7	-19.6	34.0
Tyers & Anderson (1987b)	EC-12	1980-82		14.0	-22.0	17.0

<sup>1/</sup> All studies cited base their results on partial equilibrium analysis.<sup>2/</sup> Results for 1985, but the model is calibrated to data from 1980-82.<sup>3/</sup> Reported figure refers to barley and maize only.



Table 45. Effects of the CAP on the Welfare of Non-EC Countries

(Change in real income following liberalization;  
in billions of 1980 U.S. dollars)

Source	Commodity (ies)	EC concept	Model structure	Base year	Non-EC Developed Countries <u>1/</u>	Less Developed Countries
Koester (1982)	Wheat, coarse grains	EC-9	PE	1979	0.9 <u>2/</u>	-0.5
Koester & Schmitz (1982)	Sugar	EC-9	PE	1979		-2.3
Anderson & Tyers (1984)	Wheat, rice, coarse grains, ruminant and nonruminant meat	EC-9	PE	1981 <u>3/</u>	-1.5	-3.7
Tyers (1985)	Wheat, rice, coarse grains, ruminant and nonruminant meat	EC-9	PE	1980	0.4	-1.8
Matthews (1985)	Wheat, rice, coarse grains, ruminant and nonruminant meat, sugar, oilseeds, dairy	EC-10	PE	1978-82		-0.5
Tyers & Anderson (1986)	Wheat, rice, coarse grains, ruminant and nonruminant meat, sugar, dairy	EC-10	PE	1985 <u>4/</u>	-4.1	-5.9
Tyers & Anderson (1987a)	Wheat, rice, coarse grains, ruminant and nonruminant meat, sugar, dairy	EC-12	PE	1980-82	0.1	-10.5

1/ Australia, Canada, Japan, New Zealand, and the United States.

2/ Koester's developed countries group also includes Austria, Switzerland and the Nordic countries.

3/ Anderson & Tyers estimate the final effects in 1990 of a 2 percent per year reduction in CAP support prices from 1981 to 1990.

4/ Results for 1985, but the model is calibrated to data from 1980-82.

Table 46. Effects of the CAP on International Price Stability  
(Percent share of variability of the world price due to the CAP)

Source <u>1/</u>	EC- concept	Base year	Measure of Variation Used <u>2/</u>	Wheat	Coarse Grains	Rice	Ruminant Meat	Nonruminant Meat	Dairy Products	Sugar
Svedberg (1981)	EC-6	1967-72	D		7.0 <u>3/</u>					
Sarris & Freebairn (1983)	EC-9	1978-80	SD	19.8						
Schmitz & Koester (1984)	EC-10	1982	CV							8.5
Anderson & Tyers (1984)	EC-9	1980	CV	50.0	33.0	12.1	25.0	0.0		
Tyers (1985)	EC-9	1980	SD	44.0	24.0	6.0	11.0	7.0		
Tyers & Anderson (1986)	EC-10	1985	CV	24.0	5.0	9.6	16.7	22.0	60.0	5.0
Tyers & Anderson (1987a)	EC-12	1980-82	CV	32.8	15.1	15.8	37.4	0.0	50.0	22.2

1/ All the studies cited base their results on partial equilibrium analysis.

2/ D: Change in the price level following a 5 percent production shortfall; SD: standard deviation; CV: coefficient of variation.

3/ The reported figure applies to a price index for wheat and coarse grains.

Table 47. EC-10: Agricultural Support Prices, Inflation and Incomes,  
1981/82-1987/88

(Change in percent over preceding year)

Marketing year 1/	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
Support prices:							
In ECUs	9.2	10.4	4.2	-0.5	0.1	-0.3	-0.2 3/
In national currencies	10.9	12.2	6.9	3.3	1.8	2.2	0.2
Rate of inflation 2/	10.7	10.7	8.3	6.6	5.9	5.6 3/	4.1 3/4/
Calendar year	1981	1982	1983	1984	1985	1986	
Final production (in volume)	--	5.1	-0.4	3.6	-1.6	2.2	
Incomes	0.6	12.8	-6.0	5.5	-8.8	1.9	
Agricultural terms of trade 5/	-2.1	0.7	-2.1	-2.2	0.2	2.7	

Source: Commission of the European Communities, The Agricultural Situation in the Community, various issues, and, COM(87)1 Final, Commission Proposals on the Prices for Agricultural Products and Related Measures, (1987/88), March 4, 1987, Eurostat, Agricultural Income 1986, Luxembourg, 1987.

1/ The marketing year begins on April 1.

2/ As measured by the GDP deflator.

3/ Calendar year.

4/ Projection by the European Commission.

5/ Prices of final output divided by the implicit index of prices of intermediate consumption.

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