

Gerken, Egbert

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The determinants of European agricultural trade interference

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The Determinants of European Agricultural
Trade Interference

by
Egbert Gerken

Institut für Weltwirtschaft an der Universität Kiel

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Kiel Institute of World Economics
Department IV
Düsternbrooker Weg 120, 2300 Kiel 1

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I. A CAP with less trade interference?

First World politicians ascribe an exceptionally high social value to the well-being of domestic farmers, apparently without being penalized by political setbacks. In the European Community (EC), they fix domestic prices on most agricultural commodities above world market prices, sustain these prices through variable import levies and export restitutions, subsidize production and factor use and dampen price fluctuations, all with the purpose of raising the levels and improving the stability of farmers' incomes. While agricultural policymakers in the United States (US) and in most other OECD countries do not always intervene in the same commodity markets, they generally rely on the same set of instruments¹. Given the fairly inelastic demand and supply responses among Second World planners and the limited flexibility among Third World producers and consumers, the effect of agricultural policies adopted in the First World is to lower the levels of world agricultural prices and to amplify their oscillations². World welfare is reduced as a result. Although net food importers in the Third World gain on account of the Terms of Trade effect, the increased uncertainty arising from these policies, which also becomes transmitted to non-food commodity supplies, turns the net welfare effect negative in most cases³.

¹ On the use of agricultural policy instruments in the EC, the US and other OECD countries see, respectively, Harris, Swinbank and Wilkinson (1983), Gorter (1983) and OECD (various issues).

² See Sarris and Freebairn (1983) and Schmitz and Koester (1983).

³ See Koester and Bale (1984) for a review of the issues. For a country study see Dick, Gerken and Vincent (1982), for a world study see Burniaux and Waelbroeck (1985).

The authorities in the First World could avoid domestic and foreign welfare losses by pursuing the income level and the income stability targets with a different set of policies that include direct income transfers and an insurance solution to income instability¹. Agricultural policymakers have shown little willingness to seriously debate alternatives proposed by the agricultural economics profession on welfare grounds, rather they have accomplished to win public support for the continuation of their price and subsidy policies. What has been called the "dialogue of the deaf" (Hagedorn 1984a) suggests that the two sides perceive targets and constraints of agricultural policymaking differently.

Budget considerations, among others, seem to shape agricultural policy decisions more than welfare considerations. For the EC's Common Agricultural Policy (CAP) budgetary problems became pressing when, commodity by commodity, the European farmers' supply response to the CAP propelled the Community into a net export position, thus drying out tariff revenues and escalating the expenditure on export subsidies. In March 1984, the Council of Agricultural Ministers (Council) which is the EC's sector policymaking body, responded by extending production quotas² from sugar to milk, and by strengthening so-called guarantee thresholds to some other commodities, particularly cereals and vine³. These

¹ See Koester and Tangermann (1977).

² Above-quota supplies on the producer level, or on the first-buyer level, are charged a levy sufficient to cover the full cost of disposal.

³ In 1982, sugar accounted for 2.4% of final agricultural production evaluated in intra-EC prices, milk accounted for 19.2%, cereals (excluding rice) for 12.9% and vine for 5.8%. Commission of the European Community 1985.

thresholds might signal future output restrictions as they did in the case of milk prior to March 1984¹. The production quota instrument seems to open the option of pursuing the income level target by raising guarantee prices on stagnant or falling quotas. In that case, the trend to an ever-increasing misallocation of world production locations would be reversed.

Since the EC is a dominant participant on most temperate-zone commodity markets the 1984 decision could conceivably have far-reaching implications for Third World welfare. Lower production, however, is by no means a certain outcome of adding production quotas to the armory of sector politicians. The experience with the EC's sugar quota and with milk quotas in Switzerland, Norway and Austria is not encouraging in this respect. The Council could finance both higher quotas and higher prices through a producer levy - as it did in the case of sugar. It could continue in its efforts to press the European Council, that is the policymaking body of Prime Ministers and Heads of State, for higher contributions to the common budget. In this the quota instrument would facilitate a more skillful exploitation of the ratchet effect made possible by fluctuating world market prices (in Dollar) and variations in the ECU/Dollar rate. That would entail an expansion of quotas whenever high world market prices (in ECU) allow for additional surplus disposal on the world market, then legitimiz-

¹ A guarantee threshold defines an EC-wide level of supplies for which the intervention price is supposed to be guaranteed. Excess supply triggers corrective action of the Council for the next year. The Council introduced production quotas on the farm level or on the first-buyer level when a price cut of 12% was estimated necessary to reduce milk production to the EC-wide guarantee threshold.

ing the new reference quantity and presenting the subsequent downswing in ECU world market prices as an external shock, which in all fairness should be borne by all, to be absorbed through an extended and again legitimized budget. World agriculture could therefore be thrown into even greater "disarray" (Johnson 1973).

This paper investigates the EC's policy choices after the 1984 Council decisions with the aim to predict the trend in agricultural trade interference. First, the objectives and the institutional constraints of agricultural policymaking in the Community must be brought to light. In section II this is attempted with a positive (as opposed to normative) analysis. What choices will be made obviously depends on the impact of various options on targets and constraints as perceived by the members of the Council, that is the national ministers of agriculture. Section III describes the analytical approach taken in the evaluation of options. A brief description of the EC simulation model is provided in the Appendix. In section IV the reference case is established: a freeze in all 1982 intervention levels and a continuation of exogenous trends. The alternative policies which can be used to reverse the relative income trend predicted in the reference case are simulated in section V. This leads to the selection of two polar cases of a range of combined quota and price interventions which are feasible in the sense of being acceptable to European agricultural policymakers. The implications of these cases for inflation, intra-European transfers and, particularly for European interference in world agricultural commodity markets are discussed in section VI. Tentative conclusions on the future course of the Common Agricultural Policy are drawn in section VII.

II. Objectives and constraints of European agricultural policy-making

II.1 Organized discontent

When private plans are coordinated through markets, changes in foreign and domestic factor endowments, in technology and in tastes affect the sectoral and the regional structure of economic activity. While the suppliers of labour and capital services, though with some hesitation, respond to higher rewards elsewhere, the owners of factors that are specific to a particular sector or location see their earnings shrink relative to those of fellow citizens when the sector or location declines. They then have an incentive to ask for political instead of market coordination.

In the mid- and late 19th century industrialization gained momentum on the European continent, scale effects of urban agglomeration were exploited, new frontiers were opened overseas and advances in transport technology eroded the natural protection of the agricultural sector. Farmers found themselves on the losing end of both sectoral and regional structural changes. By 1870, their discontent led them to form the first modern political associations outside the system of political parties in France and in Germany¹. More than a century later, farmers' associations

¹ See Puhle 1975, Neville-Rolfe 1984. Instrumental for overcoming the free rider problem of large groups with many small members were fundamentalist ideologies which transformed collective feelings of status-loss into strong feelings of solidarity. Olson 1965, Hagedorn and Schmitt 1985.

stand out as the most successful among the many groups in Western Europe competing for political favours¹. Farmers' discontent with market coordination seems easy to understand. It is less obvious why the political demands of this particular minority should prevail and why they should be specified and met in the way they are.

II.2 Constraints of sector policy

Farmers cannot hope to advance their case by switching votes between political parties. Besides being a small minority, they are also known for their party loyalty. With a given redistribution budget, therefore, political entrepreneurs could mobilize more votes among groups that are both larger and show a more flexible voting behaviour². Also, from the farmers' point of view, party programmes would not be sufficiently differentiated to make voting the main channel of influence. Farmers had to entrust specialists with furthering their detailed demands through parliament and administration - and had to accept their leadership in return. The formulation and representation of farm interests has consequently become the task of a political sector elite consisting of specialized parliamentarians and politicians, high level administrators and the executives of farmers' associations.

¹ See Tracy (1982) on the history of farmers' political response in the United Kingdom, France, Germany, Denmark and in the European Community.

² See Beusmann and Hagedorn 1984.

The evolution of professional leadership has two important implications for the range of admissible policy options. (1) The professionals will not lose sight of their own interests and will, therefore, hardly approve of policy proposals which are likely to lower the demand for their services. (2) Leaders are permanently involved in explaining policy demands to their clientele and are therefore more trusted than members of the general public including the agricultural economics profession. To some extent, then, leaders can control the intra-sector conflicts (for example between small and large landowners, between cattleholders and wheat growers, and between young and old farmers) which are brought about by the unavoidable distributional implications of sector policy. The control over intra-sector conflicts is in fact a prerequisite for the production of political influence.

Any sector policy is constrained by macroeconomic policy as well as by other sector policies which are influenced by consumers, taxpayers and numerous rival pressure groups through voting and other channels. Farmers are at a comparative disadvantage with respect to voting. The political sector elite has, therefore, seized the opportunity provided by the Treaty of Rome's call for common policies. Unlike their cabinet colleagues for Industry, Transport, Labour, or Health, ministers of agriculture, with the support of farmers' associations, have readily agreed to transfer policy decisions from the national to the community level on which there is little electoral control. But also with respect to the remaining national agricultural policies have they succeeded in what the Dutch call "verkokering", that is, self-contained

insulation¹.

To obtain public consent for the insulation, the professionals engage in ideological work. The electorate is assured that a complex sector policy, the details of which are best left to the experts, is only fair. Sector demands are presented as being in accordance with prevailing conceptions of social justice. Von Weizsäcker (1983) lists four of them: the legitimacy of near (modest) objectives, the justice of the status quo ante, the protection of the poor and the weak and a just reward for the suppliers of public goods. Three are extensively used in public relations work: (1) Farmers are said to only demand income parity - which appears modest enough as long as the implications of a particular policy for the real value of assets held by farmers are not spelled out. (2) A level of support once achieved is always the normative base for future parity demands. This appeals to a public which is not accustomed to fluctuations around the income trend. Whoever merely wants to keep his piece of the pie, does not take anything away from others. (3) The presentation of needy farm families would be unsuitable for eliciting more support for the whole sector. It would more likely awaken the public to the intra-sector distribution issue. Rather, the affluence of large farmers must be justified. Farmers are said to produce public goods like food supply security, food quality reliability,

¹ Louwes (1984) uses the term to capture "... the tendency to create insulated political circuits between pressure groups, clientele ministers and civil servants as well as specialists in parliament... Such circuits for the formulation and implementation of agricultural policies, which are more or less independent from the rest of the political system, have been created in all member states and on the community level."

environmental protection and political stability, and to represent the vanguard in the process of European political integration. These claims relate to very basic fears in the electorate. For the individual citizen who is not trained in the economics of welfare and trade it appears reasonable to accept the sector policy as part of an implicit social contract: farmers are supported as a precaution against possible emergencies. His opposed preferences as a consumer or taxpayer are then neutralized or even reversed. Once public consent to insulation has been achieved, a farm-interest policy is almost costless to the political party farmers traditionally vote for. This allows farmers' representatives to pressure party politicians by threatening abstention in general elections.

II.3 Objectives

The public consent to the insulation of agricultural policy has been brought about at the expense of an ideology constraint: sector policy targets must always be shown to be in line with the prevailing conceptions of social justice. The proclaimed targets, therefore, need not fully reflect the underlying objectives of farmers' political activity.

Farmers' dissatisfaction with market coordination is brought about by the unfavourable development of sector-specific factor earnings. Policy demands, therefore, envisage a trend shift in these earnings¹. Specificity, however, is a time-related concept.

¹ It will be assumed here that the trend level of earnings is independent from the variance.

Labour is fixed to the sector only in the short-run, human capital and non-durable physical capital are sector-specific in the medium-run, and land and durable physical capital in the long-run. While payments to land and durable physical capital may fall towards zero, payments to the services of other factors, because of inter-sector movements, remain under the influence of factor returns outside the sector. The income parity target of agricultural policy, though nowhere precisely defined, basically relates to the gap between the household incomes of farmers and of non-agricultural workers. Asset returns contribute but a small share to the household income of non-agricultural workers. Achievement of the parity target, therefore, would not redress the dissatisfaction of farmers which hold more than a trivial amount of land and durable physical capital as real assets. Yet these farmers belong to that section of the present farming population that predictably remains in the sector while others outmigrate. It matters here that professionals formulate policy. Their interest in keeping up the demand for their services suggests that raising the relative income position of those likely to remain in the sector is the relevant objective. The criterion for selecting between policy options then is their impact on rents accruing to factors which are specific to the sector in the long-run. Policy choices so far have been consistent:

- With respect to income parity, the first-best policy would be a direct income transfer to persons presently engaged in the sector. As less resources would be used up in misdirected production, farmers would receive a higher share of the funds provided by taxpayers and consumers. Provided new entries are

not entitled to the transfer and recipients are allowed to capitalize it when leaving the sector, the policy would speed up the process of labour outmigration, thus solving the so-called parity problem¹. Substituting direct income transfers to persons presently engaged in the sector for price and subsidy policies would cause capital losses for the holders of real agricultural assets. Direct transfers, could meet the dissatisfaction of those remaining in the sector only when provided on the basis of ownership of land and durable physical capital. Direct income transfers have time and again been proposed by members of the agricultural economics profession but have never found support in the political process. The political sector elite anticipates difficulties in explaining to the public, year by year, that more direct transfers to compensate large farmers, or absentee landowners, for unsatisfactory real asset returns would be a just reward for the suppliers of public goods, and would not violate the social justice notion of near or modest objectives.

- Sector politicians have assigned common price and production subsidy policies to the income target. Immediately after a price or subsidy increment, all returns as well as real asset values improve. Over time, however, the rewards to mobile factors revert to the level of opportunity costs². The income of persons not well-endowed with land and durable physical capital again falls below the parity line, whereas the relative income position of households with substantial real assets is main-

¹ See Koester and Tangermann (1977) for details.

² See Schmitt and Tangermann (1984).

tained. Trying, and never quite succeeding, to combat the misery of land-poor farmers, the Community continues to step up the level of prices and subsidies. Seemingly as a side effect, rents to factors fixed in the long-run increase. The same mechanism is at work in the case of national subsidies on labour and capital use, respectively called "social" and "structural" policies. Aside from a higher factor input and production volume, their only lasting effect is, again, to increase rents.

- Hagedorn (1984), among others, explains the professional leaders' dislike of direct income transfers with the expected strain on group solidarity within the sector. Their choice of policies would then not disclose a discrepancy between the parity target and the underlying objectives of sector policy. Hagedorn contends that direct transfers would have to be allocated according to general social policy rules, that is, with a strong redistributive element. This would contradict the intra-sector notion of justice and would, therefore, lead to conflicts that could impair the ability of professional leaders to exert influence. The argument implies that that sector politicians would feel constrained by the prospect of intra-sector conflicts. Recent events in West Germany suggest otherwise. Though production quotas strain intra-sector relations no less than direct income transfers, the West German farmers' representatives actively campaigned for the extension of quotas to the milk sector prior to the decisions of the Council of Agricultural Ministers in March 1984. This suggests that the professionals relied on their proven ability to control intra-sector conflicts.

II.4 The choice in 1984

European agricultural policymakers have used their leeway for an active price and subsidy policy. Eventually, however, CAP intervention prices and subsidies approached a level where the constraints of general economic policy became binding again. Though politicians are rarely inspired by aggregate welfare considerations, they do worry about budget deficits, inflation, conflicts within the Community and policy retaliations of third countries.

- Once the domestic supply reaction had carried the Community to and above self-sufficiency in most temperate zone commodities, further price advances proliferated the CAP deficit, and the proportional gross national contribution to the common budget¹. CAP expenditures in any one particular country relieve the political pressure for national assistance which is why the so called net transfer receives attention. Yet the growing national contribution must eventually trigger political protest in all countries which do not hold a strong net agricultural export position.

¹ The CAP deficit - the net of expenditure on export restitutions, intra-EC intervention buying and monetary compensatory amounts (MCAs) and of revenue from import levies, producer levies and MCAs - must be financed along with other common expenditures by the common industrial tariff revenue and by national contributions which are basically a flat percentage of national value added (see Tables 4 and 5). There is an understanding that the CAP's share in total expenditure should not increase. Since industrial tariff rates are fixed at levels agreed upon in GATT negotiations, the maximum CAP deficit depends on the willingness of each member state to join in a flat increase in the value added tax (VAT) contribution.

- Relative world market prices for food have tended to decline over the last two decades¹. The inflationary effect of raising European above world market prices, therefore, went largely unnoticed by the public. Recognizing the substantial weight of food in the consumer basket, macro politicians in inflation-prone countries nevertheless do mind the lost opportunity for retarding the climb of the consumer price index. They further observe that the CAP adds to the Central Bank financed domestic budget deficit.

- CAP effects on farmers' income differ from country to country. Though the effects can be modified or compensated by national decisions on sector-specific social and structural policy, the Ministers of Agriculture have, in the interest of insulating their fief against national control, tended to reconcile divergent national interests within the Council's annual decision package. Intra-community trade taxes and subsidies, so-called monetary compensatory amounts (MCAs), were reintroduced as a means for reconciliation². Yet the protest of farmers rightly feeling discriminated by negative MCAs (import subsidies and

¹ Hoffmeyer and Schrader (1985).

² See Ritson and Tangermann 1979. Throughout, Germany and the Netherlands have kept positive MCAs (import taxes and export subsidies), France and Italy negative ones. This pattern is consistent with the view that in low inflation/high income countries governments tend to be less concerned with the CPI effect of agricultural price policies, and more with their income effect than in countries with relatively high inflation rates and a somewhat lower level of per capita income.

export taxes) curbed the use of the instrument. Divisive conflicts within the Council about the intra-EC transfer effects of price and subsidy decisions have subsequently strained the spirit of European integration.

- The trade effects of European agricultural policies have drawn the rage of suppliers elsewhere in the world. The US government has taken up the cause of domestic producers and has confronted the EC with the prospect of a serious disruption in trade relations which would not be confined to agricultural commodities.

There is no way to predict at which point any of the adverse effects of the CAP will convince general politicians that they should intervene. During a recession, for example, such a step might be postponed as the release of farm labour, the slow-down in agricultural investment and the worsening of the agricultural trade balance would be unwelcome in that phase. The crisis in Europe came in 1983, when the common budget was exhausted and the French Minister of Agriculture insisted on the unconditional dismantling of MCAs. Since the common price level could not be raised within the existing budget, this would have resulted in a major income shock to Dutch and German farmers which were at the time enjoying high positive MCAs. The European Council would not agree on a higher value added tax (VAT) contribution without a CAP reform. For that case, the Prime Ministers and Heads of State indicated, they would readily expand the budget by more than was required for financing the accession of Spain and Portugal to the Common Market.

The Council of Agricultural Ministers then had the option to

- introduce direct income transfers,
- extend production quotas to all commodities in which the Community was self-sufficient or about to become so in the foreseeable future,
- finance higher intervention prices and subsidies through CAP operations - by raising producer levies and introducing tariffs and taxes on substitutes for EC-produced agricultural commodities,
- stage a half-hearted "reform", elicit the higher VAT contribution and continue with the old strategy afterwards.

In the event the Council agreed on a package containing production quotas for milk, guarantee thresholds for cereals, vine and a few minor commodities, a more rapid phase out of MCAs than had been envisaged before, a freeze in ECU intervention prices and in various production subsidies, and a further "strengthening of the Community preference", particularly a mandate for the EC-Commission to negotiate higher tariffs for substitutes within the GATT. No element of direct transfers was included in the package. The European Council subsequently agreed to contribute up to 1.6% of the value added tax base from 1986 onwards without exactly specifying the contribution after the accession of Spain and Portugal.

The decisions are consistent with the proposition that direct income transfers would not further the objectives of agricultural policymakers in Europe. Besides that, all options for the future have been left open. The Council can adopt a restrictive quota and active price policy. It can, however, also expand quotas and raise prices in a way that would leave little distinction to a continuation of the previous price-cum-subsidy strategy. Even without the prospect of a generous budget expansion it could finance such a strategy through CAP operations. Whether it will do so depends on which policy serves the national income targets best while meeting the constraints of general economic policy in member countries.

III. The approach to an analysis of options

III.1 The steps of the quantitative investigation

The next step in the investigation is to work out the implications of policy options for relevant indicators of sector policy and general economic policy. The analytical instrument best suited for that purpose is a quantitative general equilibrium model. An EC-model was constructed which recognizes four regions and six commodities. A brief presentation is given in the Appendix. In this section, the disaggregation is described along with other salient features necessary for understanding the policy simulations.

The analysis of policy effects is organized in the following way. First, a reference case is established. The general economic policy constraint had become binding to the CAP in 1983, when the budget was exhausted and the divergent interests of member countries could no longer be reconciliated through the agrimonetary system. In the preceding year, the level of interventions had stayed within the general policy constraint. The effects of freezing that level, and abstaining from any additional policy, therefore, provide a baseline for the evaluation of the effects of policy alternatives. By how much would farmers' relative income and agricultural employment decline when exogenous trends in population, world income and total factor productivity continue and the CAP is frozen at the 1982 level? In section IV the model is used to simulate the medium-term development. In section V the various options recognized by the Council are simulated in a series of model experiments along with the exogenous trends. The implications laid open for relative income differences between member countries, for agricultural employment, for the budget and for the intervention levels provide a basis on which to form a judgement on whether an option is feasible in the sense of being acceptable to sector politicians in member countries. Those options identified as acceptable within the sector are then investigated in section VI for their general policy implications, particularly with respect to the implied net exports of agricultural commodities to the rest of the world. This serves to further narrow a down in the range of feasible options, and to

describe the areas of future conflict between the Community and other countries.

III.2 Salient features of the EC model

The EC model consists of two-sector general equilibrium models for four regions of the EC-10. The agricultural sector produces five commodities, the industrial sector one. Both sectors compete for factor services. The regions are linked to each other and the rest of the world through trade flows. The regional authorities take common decisions on the prices or quantities of the agricultural commodities, and they maintain a common agricultural policy budget which leads to financial transfers between them. The CAP fixes agricultural commodity prices in terms of the given world price of the industrial commodity. For the industrial commodity, the model determines regional production, price, absorption and international trade. For the agricultural commodities, the system determines domestic production or production quota rents, tariff and export subsidy rates, domestic absorption, international trade and intra-EC transfers. Regional factor allocation and factor returns are also determined. The theory of the model has firm roots in microeconomic theory: producers and consumers take prices as given, producers minimize costs subject to production functions, consumers maximize utility subject to budget constraints, and markets clear. The solution then represents an equilibrium, that is, an allocation of commodities and production factors which is supported by prices.

Models have been constructed for West Germany, France, Italy and the Rest of EC-10. The model for the Rest has only been included to facilitate the modeling of a common budget. The three country-specific models, among themselves, capture major intra-EC differences with respect to the agricultural trade balance and to the commodity composition of agricultural production which determines the distribution of CAP effects.

Agricultural commodities produced within the EC are treated as perfect substitutes. Regional prices, therefore, differ only by the ad valorem rates of intra-EC trade taxes and subsidies, the so-called monetary compensatory amounts (MCAs). Regional industrial goods and imports, however, are treated as imperfect substitutes conforming to the Armington formulation. The same applies to agricultural goods produced within the EC and to agricultural imports from the rest of the world.

The agricultural produce is disaggregated into five groups of commodities defined by SITC categories. The model groups and their SITC numbers are

Group No.	Name	SITC No.
1	Meat	00,01
2	Dairy products	02
3	Sugar	06
4	Cereals	04
5	Other food	05,08,09,1,22,29,4

The production of these commodities is, in each region, constrained by one separable multi-output, production function. The output shares in equilibrium are assumed to reflect the given and fixed natural endowment of each region as well as relative commodity prices. Changes in the output mix are brought about by changes in relative prices or production subsidies, not by changes in relative input prices. The SITC code identifies food commodities after processing. Sector policy, however, is directed towards the earnings of factors engaged in the primary stage of production only. The model recognizes this distinction through a nested input function, - where the nests' contain, respectively, intermediates, primary factors for agricultural production and primary factors for processing.

The model ignores international factor movements. Regional supplies of primary factors are exogenously determined. Agriculture and industry in each region compete for labour and non-durable fixed capital (henceforth called capital). Land and durable physical capital are aggregated to a sector-specific factor (henceforth called land) that is in constant supply. Since the model is only used for medium-term projections, no allowance has been made for rigid factor service prices and for changes in the rates of factor utilization. Region-wide, wages and returns to capital equalize.

Household income of farmers differs from those of the rest of the population with respect to the shares contributed by rents accruing to land and to production quotas. Ownership rights of production quotas and land are linked in the model. Changes in farmers' relative income are then due to the disproportionate development of rental income and of aggregate factor income, that is, of relative rental income. Relative rental income is used as the target indicator of sector policy.

IV. The development of farmers' relative income under a constant level of CAP interventions

In the first model experiment a five-year continuation of recent low growth trends in world income, industrial total factor productivity and population is assumed along with a further high growth trend in agricultural total factor productivity. A change in world demand patterns is not envisaged nor is the growth of the capital stock in EC countries assumed to regain momentum. All ad valorem rates of tariffs and subsidies are kept constant. Sufficient time is assumed to elapse for all adjustments to take place, in particular for labour and non-durable capital movements to equalize rates of return across sectors.

Table 1 reports the percentage changes of agricultural employment, real rental income, real aggregate factor income and relative rental income which, according to the simulation, result over a period of five years from the given percentage changes in

world income, in the total factor productivity of agriculture and industry of each country, and in the country population. Since the model has a linear structure the total change in any particular endogenous variable is simply the sum of the separate changes of that variable which are brought about by changes in each of the exogenous variables.

The separate simulation results for each of the exogenous trends seem plausible - (a) world income growth raises demand for European industrial and agricultural goods and thus real returns to land and all other primary factors; in the more industrialized countries relatively more labour is attracted by the industrial sector which reduces agricultural employment; (b) the monopolistic position of the EC in temperate-zone commodity markets implies that agricultural productivity growth leads to sharp reductions in world prices; at constant levels of protection agricultural factor demand is subsequently reduced whereas the real gain of productivity growth is captured by all suppliers of mobile factor services; (c) productivity advances in the industrial sector likewise create real gains for all; with industrial export demand inelastic, industrial factor demand declines thereby raising supply to the agricultural sector; (d) EC wide population growth raises agricultural product and factor demand and region-specific population growth makes more labour available thereby raising the land rent. Population decline in West Germany markedly reduces agricultural employment and land rent since other farmers in the Common Market are quick to capture any market share at the going price level.

Table 1 - Model projections of the medium-run impact of exogenous trends on selected sector variables in West Germany, France, Italy and Rest-EC¹

Exogenous Trends ²					Agricultural employment				Unit real rental income			
	G	F	I	R	G	F	I	R	G	F	I	R
World income	3.00	3.00	3.00	3.00	-1.62	-0.92	0.10	-2.43	0.88	0.93	2.22	0.59
Total factor productivity												
in agriculture	3.00	3.00	3.00	3.00	-19.76	-17.78	-16.81	-18.12	-19.95	-17.91	-17.03	-18.43
in industry	1.25	1.05	0.75	1.00	6.23	4.51	1.59	2.09	5.34	3.82	0.99	1.06
Population	-0.30	0.20	0.40	0.10	-3.64	1.37	2.60	0.34	-3.12	0.95	1.62	0.26
Total					-18.79	-12.82	-12.52	-18.12	-16.85	-12.21	-12.20	-16.52
Exogenous Trends ²					Unit real aggregate factor income				Relative rental income			
	G	F	I	R	G	F	I	R	G	F	I	R
World income	0.95	0.15	0.23	1.67	-0.07	0.78	1.99	-1.08				
Total factor productivity												
in agriculture	1.01	1.50	2.07	0.95	-20.96	-19.41	-19.10	-19.38				
in industry	5.70	4.43	3.00	4.25	-0.36	-0.61	-2.01	-3.46				
Population	0.01	-0.06	-0.25	0.00	-3.13	1.01	1.87	0.26				
Total	7.67	6.02	5.05	7.14	-24.52	-18.23	-17.25	-23.66				

¹ In percentage changes. - ² Five-year continuation of the annual growth rates indicated.

The relative size of the effects of ongoing exogenous trends is the important information given in Table 1. In all countries rapid agricultural productivity growth dominates all other sources of change. At a constant level of protection farmers can expect to stay on the losing end of structural change. Relative rental income declines by 25 % in West Germany and the Rest-EC and by 17-18 % in Italy and France, agricultural employment shrinks between 13 % in France and Italy and 18-19 % in the Rest-EC and West Germany. This suggests that farmers in all, and particularly in the more industrialized¹, countries of the EC will in the future demand more political intervention, regardless of the high level of support already achieved.

¹ Within the Rest-EC the Benelux countries, the United Kingdom and Denmark dominate the two less industrialized countries Greece and Ireland.

V. Alternative agricultural income policies

V.1 Introduction

European farmers' relative income would fall dramatically were the CAP frozen at the intervention level reached in 1982. The options for a policy set on reversing this trend are simulated in a series of experiments, and results are reported in Table 2. The exogenous trends specified earlier are always maintained which facilitates a comparison of each option's implications with those of the reference case. The simulation results thus indicate whether a policy can at all prevent the decline in relative income, or what intervention level would be required. A policy enhancing relative income may, or may not, step up the pressure on labour to leave the sector. The results on agricultural employment thus provide an indication of potential intra-sector conflict between small and large farmers which is connected with the particular option. But for the budget limit, no general policy constraints are recognized in the various experiments. The policies simulated may, therefore, be infeasible because of their implications for inflation, for transfers between member countries, and for their interference with world agricultural trade. Such implications are worked out in section VI for a limited range of policies for which the simulations in section V suggest that they would meet constraints lying within the domain of European agricultural policy.

Table 2 - Medium-run model projections of sectoral target indicators in West Germany, France, Italy and Rest-EC under alternative Common Agricultural Policies¹⁾

Experiment No.	Description ²⁾	Policy		VAT ⁴⁾ contribution	Agricultural employment				Relative rental income			
			Instrument level		G	F	I	R	G	F	I	R
(1)	Reference case	all tariffs and subsidies (a.v.r.)	O(EX) ³⁾	-0.03	-18.79	-12.82	-12.52	-18.12	-24.52	-18.23	-17.25	-25.26
(2)	Old policies with higher VAT contributions	all subsidies (expenditure) ⁴⁾	40.73	0.16	3.43	7.09	-11.25	-0.57	O(EX) ³⁾	8.08	-14.44	-5.85
(3)	Complete protection	group 5 tariffs and export subsidies (a.v.r.)	20(EX) ³⁾	O(EX) ³⁾	-4.81	4.93	2.53	-1.31	-9.85	3.44	2.11	-7.10
		all subsidies (expenditure) ⁴⁾	15.59									
(4)	Producer levies	group 1,2,4 producer subsidies (a.v.r.)	-3.34	O(EX) ³⁾	-0.82	-1.07	-13.79	-1.48	O(EX) ³⁾	0.59	-30.85	-6.22
		group 1,2,4 export subsidies (a.v.r.)	64.32									
(5)	Production quotas	group 1,2,4 quotas	-31.57	O(EX) ³⁾	-41.27	-42.91	-33.05	-45.20	O(EX) ³⁾	0.40	10.69	-2.41
		group 1,2,4 prices	78.97									
(6a)	Active price policy	group 1,2,4 quotas	O(EX) ³⁾	0.23	-20.24	-19.37	-17.78	-18.52	8.23	5.19	O(EX) ³⁾	10.13
		group 1,2,4 prices	42.24									
(6b)	Active quota policy	group 1,2,4 quotas	26-79	0.46	-2.98	5.10	25.53	3.65	O(EX) ³⁾	O(EX) ³⁾	O(EX) ³⁾	O(EX) ³⁾
		group 1,2,4 prices	O(EX) ³⁾									

¹⁾ In percentage changes unless indicated otherwise. - ²⁾ Policy simulations are described in the Appendix, section A3. - ³⁾ Denotes variable exogenously set to zero. - ⁴⁾ Absolute change in the percentage of the value added contributed to the Common Budget.

The target indicator is formulated on the national level. Since an indicator for a group of countries is of little interest, the simulation results for the Rest-EC, though reported in Table 2, are not discussed any further.

V.2 Continuing old policies with higher VAT contributions

European agricultural policymakers might be tempted to return to their old ways once the European Council has granted higher VAT contributions. Whether pursuing the income target with higher intervention levels is a feasible option, obviously, depends on whether the consequent raise in the CAP deficit stays within the new limits on the VAT contribution.

In experiment 2 the CAP deficit is allowed to increase so as to finance a higher level of interventions. The expenditure on EC interventions is structured by the five commodity groups and by three types of intervention (export restitutions, import levies and producers subsidies net of producer levies), which makes for fifteen expenditure classes. Whereas the intervention level increases, the expenditure structure is held constant, that is, expenditures of all classes increase in the same proportion. National intervention levels and MCAs are left unchanged. The policy target of maintaining the relative income position is imposed by exogenously setting the change in relative rental income to zero. The model then solves for the change in the EC intervention level, and it spells out the implication for the CAP deficit. Since there is a target variable for each of the model's

four regions, a decision has to be made which country's target is imposed. Since German relative rental income falls most in the reference case, the change in that variable is set to zero in experiment 2.

The figures in Table 2 indicate that the VAT contribution would have to be stepped up to about 1.2 % which is well within the new limit set by the European Council. The relative income trend in France would then be turned around and agricultural employment would increase. The figures for Italy suggest that a continuation of previous policies would completely miss the national target. This reflects the dominant share of group 5 commodities in Italian agricultural production. The aggregate protection level for this group is low because several important commodities within the group are bound by GATT agreements on import tariffs. Since export subsidies would be of little help to farmers when import protection is not increased accordingly, EC assistance concentrates on producer subsidies (see Table 4 and Table 5 on the Common Budget in the base year). The income impact coefficient of one ECU in the budget, however, is higher when it is spent on exports - by raising the domestic price it forces the domestic consumer to support the producer by a multiple of what is allocated to it in the budget. A proportional increase in expenditure on all interventions and commodities, therefore, puts the recipients of producer subsidies at a disadvantage. Raising the intervention level without changing the expenditure structure on interventions, thus, would aggravate regional imbalances within the EC, which suggests that the option is not a feasible one.

Table 3 - The European Community Budget 1982

(Mill. ECU)

Revenues		Payments	
Agricultural import levies	1 522	Agricultural policy	
Sugar producer levies	706	- Guarantee section	13 124
Industrial tariffs	6 815	- Guidance section	749
VAT contributions	12 000	- Fisheries	79
Other revenues	304	Other policies	3 860
		Refund to United Kingdom	1 654
Balance	647	Other payments	2 528
Total	21 994	Total	21 994

Source: Commission of the European Communities (1983).

Table 4 - Expenditures of the Guarantee Section 1982

(Mill. ECU)

Commodities	Export resti- tutions	Intervention buying	Sum
Meat	844	782	1 626
Dairy products	1 521	1 806 ¹	3 327
Sugar	744	498	1 242
Cereals	1 106	769	1 875
Other	536	3 453	3 989
Fishery products	14	20	34
Total advances	4 765	7 328	12 093
Final balance			1 031
Total expenditure			13 124

¹ net of milk producer coresponsibility levy (537 Mill. ECU).

Sources: Commission of the European Communities (1983, 1985).

In a further experiment, the Italian income target was imposed along with the West German one and expenditure on group 5 producer subsidies was allowed to rise overproportionally. The results are not reported in Table 2. Although the other expenditure items grew less than in experiment 2, the CAP deficit resulting from producer subsidies could not be financed within the 1.6 % VAT contribution limit. Hence, a return to pre-1984 policies does not seem to be a feasible option.

V.3 Completing the system of protection

The level of protection for European farmers varies from commodity to commodity. The simulation results for the option continuation of old policies suggest that the regional imbalance of the CAP would be redressed by an extension of high tariffs and export subsidies to commodities of group 5. Since the EC is a net importer with respect to this group, the extension would also enhance CAP revenues, thus allowing for higher intervention levels overall.

In experiment 3 a 20 % ad valorem import tariff and export subsidy is imposed on extra-EC trade of group 5 commodities. The additional revenue thereby obtained is spent on a proportional increase in all interventions in the same way as in experiment 2. The VAT contribution is fixed at 1.0 %. The simulation results in Table 2 suggest that relative income trends would turn around in both Italy and France. West German farmers would also gain considerably against the reference case, although they would require

additional assistance were relative income to be maintained at the base-year level. As was observed earlier, the EC cannot raise import tariffs on important products within the aggregate without violating a commitment within the GATT. The simulation results illustrate why these tariffs remain attractive to agricultural policymakers and why the EC-Commission continues to attempt to annul its commitment through negotiations.

V.4 Relying on producer levies

As observed earlier, one ECU spent on export subsidies raises farmers' relative income by more than one ECU spent on producer subsidies. Sector politicians can exploit the difference by shifting funds from producer to export subsidies, thus forcing domestic consumers to support farmers' income. Instead of asking the European taxpayers for a higher VAT contribution, the Council of Agricultural Ministers might consider to enlarge funds for export subsidies through negative producer subsidies, that is, producer levies. The instrument is already used to finance the disposal of sugar on the world market. Under the name of "corresponsibility levy" it has also been introduced in the milk market, though on a much smaller scale¹. The Council might contemplate to extend the instrument to all commodities the Community exports.

¹ As a percentage of final production, in 1982 the sugar producer levy amounted to 19.9% and the milk producer corresponsibility levy to 1.9%. Commission of the European Communities 1983.

In experiment 4 income policy is financed through a producer levy on meat, dairy products and cereals. The sugar levy is held constant along with all other interventions with respect to sugar and other food (group 5 commodities). Technically, the model provides for a proportional reduction in the ad valorem rates of group 1, 2 and 4 producer subsidies net of producer levies and channels funds thereby released into a proportional increase of ad valorem export subsidy rates. Import tariff rates are raised proportionally. The West German relative income target is then imposed and the model solves for the producer levy. The solution indicates that a 3.8 % producer levy or the corresponding cut in subsidies would be sufficient¹. The results further suggest that French farmers would likewise be saved any loss in relative income. In Italy, on the contrary, the relative income would slip further compared to the reference case.

Experiment 4 thus indicates that the Council can indeed substitute producer levies for higher VAT contributions, thus switching the burden of income policy from the taxpayer to the consumer. Comparing results with experiment 2 (higher intervention levels financed through additional VAT contributions), however, reveals that a reliance on producer levies would even further aggravate the regional imbalance of the CAP. Thus, unless the EC-Commission can undo the GATT commitment, a renewal of the pre-1984 strategy seems unlikely, both with additional VAT contributions and with producer levies.

¹ The levy is calculated on the final output of both primary and processing activity. If raised on primary output only, it would have to be accordingly higher.

V.5 Extending production quotas

With the 1984 decision on production quotas and guarantee thresholds the Council has opened the option of an active price policy within a given budget limit. Were the Council to rely on that option in years to come, the ministers would have to impose quotas on all commodities in which the Community has reached, or is about to reach, self-sufficiency. Sector-specific resources would otherwise be switched from, say, milk production to cereals production. Since domestic consumers respond to higher prices the quotas would have to be fixed below actual production levels.

A pure quota solution to the relative income problem of sector policy has certain adverse implications. Substantial price increases are required which noticeably boost the consumer price index. With smaller output and continued growth of total factor productivity more labour is squeezed out of the sector. Rental incomes accrue to quota owners. Only by linking the ownership rights of quotas and land, however, can the new instrument be made to serve the relative income target. Small farmers giving up production then receive little compensation in the form of quota rents which means that intra-sector conflicts of interest are intensified. Whether or not these implications elicit protest which renders the quota solution infeasible depends, i.a., on the magnitude of price and employment effects. The model is used to simulate the implications of a policy which attempts, within the given budget limits, to maintain relative income by raising prices and restricting production.

In experiment 5 quotas are extended from sugar to meat, dairy products and cereals. Prices are allowed to increase, though the price ratios and the quantity ratios between commodities produced under the quota system are held constant. The budget stays within the limit set by the 1% VAT contribution. Once a relative income target is imposed for any particular region, the model solves for the price increase and the quota reduction necessary to achieve that target. Three computations were made fixing, respectively, the relative rental income in West Germany, France and Italy. The results indicate that all quotas would have to be reduced by, respectively, 32%, 30% and 15%, which would allow for price increases of, respectively, 79%, 76% and 41%. The results for the case of constant relative income in West Germany are reported in Table 2. They indicate that agricultural employment would decline sharply in all countries (33% in Italy and more than 40% in West Germany and France). The magnitude of both the price and the employment effect suggests that a pure quota solution to the relative income problem of farmers are well-endowed with land would meet with strong resistance outside and inside the sector.

V.6 Raising prices and quotas within an expanded budget

The simulation results so far have suggested that neither a pure production quota strategy nor a continuation of the pre-1984 price and subsidy policy, whether financed by higher VAT contributions or by producer levies, would be feasible. As these in-

struments have adverse implications for agricultural employment and for the regional distribution of CAP benefits, their use would, respectively, elicit the protest of small farmers and of national sector politicians. The 1984 decisions, however, leave room for a less restrictive quota policy - prices can be raised on constant or even increasing quotas, and the budget can be balanced by higher VAT contributions or by producer levies. The policy choice is then one between different combinations of price increases and quota expansions within an expanded budget. An active quota policy allows for smaller price increases and a less ruthless squeeze of agricultural employment. Quota expansions which differ by country, furthermore, provide room for the reconciliation of divergent national sector interests. An active price policy, on the other hand, by requiring smaller quota expansions has less adverse consequences with respect to foreign policy conflicts about agricultural trade.

There is, of course, a wide range of perceivable combinations between an active price policy and an active quota policy. The range can be narrowed down by admitting only non-negative quota changes and non-negative price changes. The two polar cases are simulated next.

In experiment 6a, quotas are held constant at the 1982 production levels of meat, dairy products, sugar and cereals. Prices are allowed to increase, yet price ratios between commodities produced under quota regulations are fixed. The relative income target is imposed for a particular country, and the model then

solves for the price increase on all quota products that is necessary to achieve the target. French and West German farmers enjoy a rising relative income when prices are increased so as to maintain the income position of Italian farmers. The simulation results for this case are reported in Table 2. The other polar case is simulated in experiment 6b where prices of commodities produced under quotas are held constant. Quotas are allowed to increase, with rates that vary from region to region. The relative income target is now imposed for each region, and the model solves for the region-specific quota adjustments necessary to achieve these targets. In both experiments the higher CAP deficit is financed through VAT contributions. MCAs, producer subsidies net of producer levies, and all intervention levels for group 5 commodities are held constant.

The results reported in Table 2 indicate that both an active price and an active quota policy would raise the CAP deficit by amounts which are within the limit set by the European Council's decision on a 1.6 % VAT contribution. In the case of fixed quantities prices would have to be raised by about 42 %, whereas, when prices are held constant, quotas need to be increased by 27 % in West Germany, 34 % in France, 79 % in Italy and 26 % in the Rest-EC. Agricultural employment would then fall 18-20 %, more than in the reference case, yet decidedly less than in the case of a pure quota solution. An active quota policy structured to meet national relative income target levels, in contrast, would attract labour into the agricultural sector, in the extreme Italian case sector employment would grow by more than 25 %.

From a sector politician's point of view both polar cases may have disadvantages. Solidarity between small and large farmers could be overextended when labour demand falls by the amount indicated in experiment 6a and ownership rights to quotas and land are linked. German and French agricultural ministers, on the other hand, may find it difficult to explain to their clientele the size of the difference in quota expansions suggested in experiment 6b, albeit a disproportional quota expansion will more easily find approval than a disproportional quota reduction. While the polar cases may not appeal to sector politicians, a wide range of combinations between them does. Note that the implications of any combination of price and quota increases, due to the linear structure of the model, can be obtained as weighted averages of the results for the two polar cases.

VI. Wider implications of European agricultural policy choice

Combining price and quota policies, European agricultural policy-makers can maintain national relative incomes within the extended budget limit indicated by the Prime Ministers and Heads of State. General policy constraints other than the budget limit, however, have been neglected in the process of searching for options acceptable to the political sector elite. It was observed in section II that adverse implications for domestic consumer prices, for the net transfers between a country and its partners in the Community, and for the EC's external trade relations, particularly with the United States of America, can motivate national poli-

Table 5 - Medium-run model projection of the consumer price index and the net budget and trade transfer in West Germany, France, Italy and the Rest-EC

Policy	Consumer price index (percentage changes)				Net budget and trade transfer (changes in Bill.ECU of 1982)			
	G	F	I	R	G	F	I	R
Active price policy	7.15	10.54	10.77	6.98	-0.90	0.55	-3.92	4.27
Active quota policy	5.59	3.98	10.65	4.68	-2.85	0.15	-2.31	4.71

Table 6 - Implications of price and quota policies for extra-EC agricultural trade

Bill. ECU of 1982

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Trade variable	Meat (00,01)	Dairy products (02)	Cereals (04)	Other food (05,08,09,1,22,29,4)	Sum
EC net exports (extra-EC) 1982	-1.26	3.28	1.60	-11.07	-7.11
Five-year model projection					
- active price policy	7.99	8.02	1.46	-14.32	3.15
- active quota policy	15.93	14.16	12.66	-2.11	40.64
World exports (extra-EC) 1982	15.33	7.45	32.55	28.00	83.33
Five-year extrapolation (5% growth p.a.)	19.57	9.51	41.54	35.74	106.36

Sources: Eurostat, Analytical Tables of Foreign Trade, 1982. - FAO, FAO Trade Yearbook, 1982.
Model calculations.

ticians to bear upon the agricultural policy choice. The respective model results for the two polar cases are interpreted next.

VI.1 Domestic consumer prices

The share of food in the consumption expenditure of private households varies between 15% in West Germany and 26% in Italy. An active price policy which raises the prices of meat, dairy products and cereals by more than 40% (see Table 2, experiment 6a) thus has a substantial direct effect on the consumer price index. The simulation results in Table 5 indicate that also an active quota policy with constant prices has inflationary implications. These are due to general equilibrium effects: the active quota policy attracts resources into the agricultural sector thereby pushing up primary factor costs in industry; additional agricultural production activates the agricultural trade balance and, through balance of payments equilibrium, allows for fewer industrial exports; domestic industrial suppliers can, therefore, raise product prices so as to accommodate the factor cost push. The figures in Table 5 show that the push would be particularly strong in Italy, which reflects the exceptional agricultural employment effects of an active quota policy in that country (see Table 2, experiment 6b).

The inflationary effects of an active price and an active quota policy are hardly to be distinguished in Italy. The difference amounts to less than 2% in West Germany, yet to nearly 7% in France. The striking difference between France and her partners

reflects the higher share of food in the French (compared to the German) consumer price index, and the smaller increase in production quotas required to maintain the French (compared to the Italian) relative income of farmers. Economic planners in France may, therefore, be inclined to influence the agricultural policy choice towards the raising of quotas rather than prices.

VI.2 Transfer between member countries

All governments have agreed to a higher VAT contribution from 1986 onwards. Since both options stay within the new budget limit, differences with respect to the aggregate budget implication are not likely to be of much relevance in the choice between combinations of price and quota expansions. Common financing and preferential trade within the Community, however, cause transfers¹ the country-specific net position of which is a prominent topic in the public debate about the CAP. As such it conceivably colours the view of general politicians.

¹ A narrow concept of transfers relates to the financial flows between each country and the Community exchequer - export refunds on extra-EC exports, intervention payments and net MCAs on the one side; sugar producer levies, levies on extra-EC agricultural imports, tariffs on extra-EC industrial imports, and the direct VAT contribution and other contributions on the other side -. The wider concept used here also includes the transfers between intra-EC exporting and importing regions caused by common prices above world market level. Since the model treats agricultural commodities produced in member states as perfect substitutes, it cannot separate the financial transfers from the net budget and trade effect.

The figures in Table 5 indicate that previous trends continue in both cases - losses concentrate in West Germany and Italy, large net gains accrue to the Rest-EC whereas the budget and trade effects nearly balance in France¹. The choice between the two polar cases determines, however, the burden sharing between West Germany and Italy. West German politicians clearly have a motive to opt for higher prices on constant quotas, Italian politicians for larger quotas at constant prices, whereas French politicians could be indifferent in this respect.

VI.3 Agricultural trade conflict

European governments have been faced with the prospect of a trade war should the Community's agricultural exports to the rest of the world capture more than an unspecified "fair share". A common agricultural income policy, if set on a parity target for those presently employed in the sector need not risk a foreign policy conflict as it can allow the gap between domestic and world market prices to narrow. For a policy attempting to maintain the relative income position of landowners, however, direct income transfers are not a feasible option. A pure price and subsidy policy without a budget limit, by fostering production and retarding consumption within the Community, inevitably heads for a

¹ Buckwell et al. (1982) have estimated the net budget and transfer effects of the existence of the CAP in the EC-9 1980 compared to a free trade situation. Their figures are: West Germany -1.74, France -0.04, Italy -0.93 and Rest-EC 2.71 (all in Bill. ECU of 1980). Within the Rest-EC, the losses falling on the United Kingdom (-1.92) are swamped by the sizable gains accruing to the Netherlands, Denmark and Ireland.

conflict with external trade partners. A pure quota solution would tend to eliminate net exports of meat, dairy products, sugar and cereals. The model calculations in section V.5, however, strongly suggest that such a policy is unlikely to be adopted for reasons within the agricultural sector. What seems acceptable to European agricultural policy makers are combinations of price and quota policies which do not enforce production or price cuts below the 1982 level.

Table 6 reports the net exports of meat, dairy products, cereals and other food from the EC to the rest of the world 1982 and gives the model projections for the two polar cases after five years. Although production volumes for meat, dairy products and cereals are fixed under the active price policy, domestic consumers' response to higher prices can activate net exports. The figures in Table 6 suggest substantial expansions of meat and dairy exports which are due to high (absolute) own-price elasticities of domestic household consumption. The stagnant net export position of cereals reflects stagnant domestic demand for both consumption and intermediate use in current production which is related, respectively, to own-price elasticities of consumption near zero and to constant animal production. Consumption of other food commodities picks up as households respond to lower relative prices, and net imports in group 5 consequently increase. Yet, in total, the EC turns from a net importer to a net exporter already in the case of constant quotas. With respect to an active quota policy, of course, the model projects a much more dramatic net export growth.

The figures for the active quota policy are neither consistent with the world export figures of 1982, nor with a simple extrapolation based on the assumption of an annual growth of 5% over the five-year period. The same may be said about the net exports of dairy products simulated for the active price policy case. These inconsistencies result from two independent projections that need to be interpreted with respect to their underlying assumptions. One implication of agricultural protection in OECD countries is the small size of the world market compared to total EC production. Small changes in the EC's commodity balance, therefore, have a strong impact on the EC's world market share, whereas a large improvement in the net export position is only possible when aggressive EC export policies by themselves enlarge the world market, for example through concessional arrangements negotiated with countries outside the OECD. This assumption was made when the EC model was specified with world export demand elasticities that reflect past experience with small changes. It might be argued, however, that governments in the rest of the world are more likely to step up import protection for domestic farmers than to allow domestic consumers to accept the gift of European agricultural policy. Even a 5% annual growth of world exports would then look too optimistic.

The comparison of simulated net exports of the EC with extrapolated world exports suggests that the European sector politicians will meet with stiff foreign policy resistance for any policy which is not in the neighbourhood of the active price and constant quota policy polar case. This might signal a conflict of

interests between the governments of member countries interested in an active quota policy (France, Italy) and of member countries concerned about foreign retaliations against their non-agricultural exports, for example West Germany. Even the polar case of an active price policy, however, is shown to entail an increasing interference in the world markets for meat and dairy products. This suggests that a conflict with US agricultural trade policy might be unavoidable, unless European agricultural policymakers are persuaded to compromise on their income target. Increasing net imports of other food, on the other hand, that are simulated for the same case, provide a hint that Community negotiators might continue in their efforts to seek the consent of the US government for a higher protection for commodities in group 5, and might offer some restraint with respect to production quotas for other commodities. As was observed in section V.3, such a policy would be consistent with the relative income target and would serve to redress the regional imbalance of the CAP.

VII. Conclusions

Writing on farm policies in the U.S., the EC and in other OECD countries a dozen years ago, Johnson (1973) remarked that the cost of export subsidies is the only measure of the absorptive capacity of world market that seems significant to policymakers in the industrial countries. These costs have indeed persuaded the European Council of Agricultural Ministers to introduce production quotas for a major group of commodities. The aim of this

paper was to investigate whether their move signals a reversal in the trend of European trade interference. It was felt necessary, firstly, to analyse positively which policies can or cannot find approval in the European political process and, secondly, to narrow down the range of instruments and instrument levels by working out quantitatively the implications for the sector policy targets and the general policy constraints.

The main point made in the positive analysis is that in the view of agricultural policymakers in West Germany, France and other member states the income parity of those presently engaged in the sector would not redress farmers' dissatisfaction with market coordination. Dissatisfaction relates to the prospect of a deteriorating relative income position brought about by a decline in returns to factors that are specific to the sector in the long-run. Direct income transfers that serve the parity target are, therefore, not acceptable. Since the political sector elite consisting of specialized parliamentarians, high-level administrators and functionaries of farmers' associations has managed to insulate their policy domain, no sector policy proposal can find approval in the political process without their consent.

A comparative-static EC model with four regions reflecting West Germany, France, Italy and the Rest-EC 10 was used to work out quantitatively the implications of the remaining policy options. Model simulations then indicated that within, the budget constraint, the regional income targets cannot be achieved jointly without introducing either quotas or extending the high level of common import protection to all commodities. The latter would

violate commitments within the GATT. Yet also a pure quota solution within the existing budget turned out to be infeasible since a contracting domestic demand would have to be reflected in implausible quota reductions which, furthermore, would have to discriminate between regions. Yet the budget was shown not to be a limiting factor. This allows sector politicians to combine price increases and quota expansions. Further simulations then suggested that the Council of Agricultural Ministers can maintain relative income of farmers in all regions with a combined policy.

The polar cases of an active price policy with constant quotas and an active quota policy with fixed prices were subsequently explored for their effects on the regional consumer price indices, the net budget and trade transfers, and on net extra-EC commodity exports. The results indicate that French and Italian politicians would be motivated to object to the polar case of an active price policy with constant quotas. The world market implications of quota extensions, however, are such that serious foreign policy retaliations would be unavoidable. Member governments concerned about their country's non-agricultural exports can be expected to narrow the choice of policies to the neighbourhood of an active price policy. Even that, however, entails a further rapid expansion of net exports from the EC to the rest of the world. The commodity-specific simulation results, furthermore, indicate an interest on the side of European sector politicians to negotiate about the level of production for various commodities which are bound by GATT regulations, and to offer some restraint with respect to commodities in which the Community holds

a positive net export position. A combination of expanded quotas and higher prices in the neighbourhood of an active price policy is then the most likely prediction about the future Common Agricultural Policy. This entails a further rapid expansion of meat and dairy product net exports from the EC to the rest of the world.

Finally, two observations can be made. (1) Within the institutional setting of agricultural policymaking in Europe, the expansion of quota regulations from sugar and milk to cereals and, possibly, to meat production seems to be unavoidable, unless direct income transfers find approval. Prevailing notions of social justice, however, seem to allow only for modest transfers allowing farmers' households an income comparable to that of dependent workers' households. Such transfers cannot compensate for declining returns to land and durable physical capital, and thus are not acceptable to those shaping sector policy. In future, though, the sector policy elite might attempt to expand the concept of social justice to include direct compensations for proclaimed merits of landowners in the provision of environmental protection and other public goods. (2) The adoption of production quotas does not signal a reversal of the increasing trend of European trade interference. The budget problem which was pressing at the time of the introduction of milk production quotas is not a lasting constraint on export growth, whereas the prospect of a conflict with other OECD governments, determined to protect domestic farmers regardless of welfare costs, seems to emerge as an important issue shaping European agricultural policy.

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Appendix: A short description of the EC model

A quantitative general equilibrium model of the EC was used to simulate the implications of CAP options for various indicators. The model consists of four general equilibrium models of three member countries and the Rest of the EC-10 which are linked through the CAP and through international trade. The disaggregation of regional models with respect to commodities, sectors and production factors has been described in section III along with other salient features. The Appendix provides a brief description of the equation system, of the numerical specification and of the use of the model for various policy simulations.

A1 The equation system

The EC model consists of four regional models and a CAP component. The regional models follow closely the ORANI model system developed by Dixon et al. (1982). To allow for a brief presentation, the functional forms have been omitted in Table A1. The role played by various substitution parameters, however, is subsequently discussed.

ORANI models are barter models in which exchange rates are nothing but conversion factors between the domestic and the foreign expression of the world prices of goods. In the EC model, units have been chosen so that exchange rates are always unity. This facilitates their omission from the equations and the list of variables in, respectively, Tables A1 and A2.

Table A1 - Schematic representation of the core equation system

Identifier	Description	Equation	Number
<u>Common Agricultural Policy</u>			
(A1)	Supplies of EC commodities	$X_{a1}^S = \sum_n X_{a1n}^S$	h
(A2)	EC demands for EC commodities	$X_{a1}^D = \sum_n X_{a1n}^D$	h
(A3)	EC demands for extra-EC commodities	$X_{a2}^D = \sum_n X_{a2n}^D$	h
(A4)	Supplies of extra-EC commodities	$X_{a2}^S = X_{a2}^S (P_{a2}^W)$	h
(A5)	EC market clearing for extra-EC commodities	$X_{a2}^S = X_{a2}^D$	h
(A6)	Export demands for EC commodities	$X_{a1}^E = X_{a1}^E (P_{a1}^W, Y^W)$	h
(A7)	Market clearing for EC commodities	$X_{a1}^S = X_{a1}^D + X_{a1}^D$	h
Zero pure profits			
(A8)	- in extra-EC exporting	$P_{a1} = \hat{P}_{a1}^W V_a$	h
(A9)	- in extra-EC importing	$P_{a2} = \hat{P}_{a2}^W T_a$	h
(A10)	- in intra-EC trade with Ec commodities	$P_{a1n} = \hat{P}_{a1} V_{an}$	h
(A11)	- in intra-EC trade with extra-EC commodities	$P_{a2n} = P_{a2}$	nh
(A12)	- in intervention activities	$P_{a1n}^S = \hat{P}_{a1n} W_a$	nh
(A13)	CAP budget deficit	$CAP = (X_{a1}^E)' (\hat{V}_a - I) P_{a1}^W - (X_{a2}^D)' (\hat{T}_a - I) P_{a2}^W$ $+ \sum_n (X_{a1n}^S)' (\hat{W}_a - I) P_{a1n} + \sum_n (X_n^S - X_n^D)' (\hat{V}_{an} - I) P_{a1}$ $+ \sum_n P_{g2}^W (T_{gn} - 1) X_{g1n}^E$	1
<u>Regional Models</u> ¹			
<u>Commodity and Factor Demands</u>			
(B1)	EC agricultural and domestic industrial commodities for domestic use	$X_1^D = X_1^D (Z, C, P_1, P_2)$	nh+n
(B2)	Extra-EC agricultural and imported industrial commodities for domestic use	$X_2^D = X_2^D (Z, C, P_1, P_2)$	nh+n
(B3)	Labour, capital and land	$L = L (Z, P^P, S^P, F)$	nm
(B4)	Industrial exports	$X_{g1}^E = X_{g1}^E (P_{g1}^W, Y^W)$	n
(B5)	Agricultural Commodity Supplies	$X_{a1}^S = X_{a1}^S (Z_a, P_{a1}^S, R_{a1})$	nh

¹ Country subscript n deleted.

Note: $\hat{\cdot}$ denotes a diagonal matrix
 \cdot' denotes a vector transposition

Table A1 (continued)

Identifier	Description	Equation	Number
<u>Market Clearing</u>			
(B6)	for domestic industrial commodities	$Z_g = X_{g1}^D + X_{g1}^E$	n
(B7)	for primary factors	$L = \bar{L}$	nm
<u>Zero Pure Profits</u>			
(B8)	in agricultural production	$v(P_{a1}^S) = w_a(P_1, P_2, P^P, S^P)$	n
(B9)	in industrial production	$P_{g1} = w_g(P_1, P_2, P^P)$	n
(B10)	in industrial exporting	$P_{g1} = \hat{P}_{g2}^W V_g$	n
(B11)	in industrial importing	$P_{g2} = \hat{P}_{g2}^W T_g$	n
<u>Balance of Payments Equilibrium</u>			
(B12)	Balance on trade and CAP contributions	$B = (X_{a1}^S - X_{a1}^D)' P_{a1} - (X_{a2}^D)' P_{a2}$ $+ P_{g1}^W X_{g1}^E - P_{g2}^W X_{g2}^D - CAP\lambda$	n
<u>Other Equations</u>			
(B13)	CAP induced budget and trade transfers	$F_a = (X_{a1}^S - X_{a1}^D)' (P_{a1}^S - P_{a1}^W) - (X_{a2}^D)'$ $(\hat{T}_a - I) - CAP\lambda$	n
Total: 9h + 1 + n(6h + 2m + 10)			

Table A2 - Variables of the core-model

Variable	Description	Number
X_{a1}^S	EC-wide supplies of EC agricultural commodities	h
X_{a1n}^S	Domestic supplies of EC agricultural commodities	nh
X_{a1}^E	Extra-EC exports of agricultural commodities	h
X_{a1}^D	EC-wide demands for EC agricultural commodities	h
X_{1n}^D	Domestic demands for EC agricultural and domestic industrial commodities	nh+n
X_{a1n}^D, X_{g1n}^D	Vector parts	
X_{g1n}^E	Exports of industrial commodities	n
X_{a2}^D	EC-wide demands for extra-EC agricultural commodities	h
X_{a2}^S	EC-wide supplies of extra-EC agricultural commodities	h
X_{2n}^D	Domestic demands for extra-EC agricultural and foreign industrial commodities	nh+n
X_{a2n}^D, X_{g2n}^D	Vector parts	
Z_n	Sector output levels	n2
Z_{an}, Z_{gn}	Vector parts	
L_n	Demands for primary factors	nm
\bar{L}_n	Factor employment levels	nm
P_{a1}^W	Foreign currency prices for extra-EC agricultural exports	h
P_{a2}^W	Foreign currency prices for extra-EC agricultural imports	h
P_{a1}	ECU prices for extra-EC agricultural exports	h
P_{a2}	ECU prices for extra-EC agricultural imports	h
P_{a1n}^S	Local producer prices for agricultural commodities	nh
P_{1n}	Local prices of EC agricultural and domestic industrial commodities	nh+n
P_{a1n}, P_{g1n}	Vector parts	
P_{2n}	Local prices of extra-EC agricultural and foreign industrial commodities	nh+n
P_{a2n}, P_{g2n}	Vector parts	
P_{g1n}^W	Foreign currency prices for industrial exports	n
P_{g2n}^W	Foreign currency prices for industrial imports	n
P_n^P	Prices for primary factor services	nm
R_{a1n}	One plus ad valorem rate of quota rent	nh

Table A2 (continued)

Variable	Description	Number
V _a	One plus ad valorem rate of extra-EC agricultural export subsidy	h
V _{an}	One plus ad valorem rate of intra-EC agricultural export subsidy or import tariff	n
V _{gn}	One plus ad valorem rate of industrial export subsidy	n
T _a	One plus ad valorem rate of extra-EC import levy	h
T _{gn}	One plus ad valorem rate of industrial import tariff	n
S _n ^P	One plus ad valorem rate of subsidies for primary factor use in agricultural production	n
W _a	One plus ad valorem rate of EC agricultural producer subsidy net of producer levy	h
F _n	Sector total factor productivity levels	n2
C _n	Aggregate real domestic absorptions	n
CAP	CAP budget deficit	1
F _{an}	CAP induced budget and trade transfers	n
B _n	Balances on trade and CAP contributions	n
Y ^w	World income	1

Total: 12h + 2 + n(7h + 3m + 18)

The CAP component

The CAP component is represented by equations (A1)-(A13). The first three equations add up regional quantities to their respective EC totals: supplies (A1) and EC demands (A2) for agricultural commodities of EC origin, and EC demands for agricultural commodities from the rest of the world (A3). Extra-EC supplies of these commodities to the EC (A4) contain as argument the respective world price. The specification of the supply equations recognizes that the EC holds a monopsony position on world agricultural commodity markets. Equation (A5) equates EC demand and EC supply for extra-EC commodities.

Export demands for EC commodities, (A6), contain as arguments the respective world price and world income. The EC is considered a large country also on the supply side of world commodity markets. Furthermore, provision is made for world income to influence the export demand for EC commodities. Supplies and demands for EC commodities are equated in equation (A7).

Equations (A8)-(A12) depict the CAP system of price support. The model assumes that no pure profits are made, and no real resources are used, in trade activities. The revenue obtained from a trade activity (the selling price) is then equated to the cost of doing so (the domestic price for exporters and the domestic equivalent of the world price including the tariff for importers). Fixing common prices for EC and for extra-EC commodities, the

authorities must adjust export subsidies (A8) and import tariffs (A9) to compensate for any difference with world prices. MCAs drive a wedge between regional and common prices of EC commodities (A10), yet not of extra-EC commodities (A11). Zero pure profits and no use of real resources are also assumed with respect to intervention buying (A12). Subsidies on the level of intervention buying are, therefore, reflected in the difference between regional producer and consumer prices.

Equation (A13) completes the CAP component by defining the CAP budget deficit: expenditures on extra-EC export subsidies, intra-EC trade subsidies and subsidies for intervention buying, revenues from extra-EC import levies and intra-EC trade taxes, as well as revenues from the common external tariff on industrial imports from the rest of the world. Since the model does not distinguish between intra-EC and extra-EC industrial trade, differences in the intra-EC/extra-EC composition of each region's industrial imports are captured by different tariff rates.

Regional models

The regional model equations can be divided into six groups; Demands. The models use the Armington approach to the treatment of external sector transactions. All sources of domestic demands (households, government, current production, capital creation) are demands for composite goods defined as CES aggregates of domestically produced and imported goods. The optimal composition

of each composite good follows from minimizing the cost of acquiring the good subject to the condition that a given level of demand is satisfied. In the ORANI model system this is captured through nested production and utility functions. Sector demand equations for domestic and imported commodities and for primary factors are derived from the assumption that producers choose their commodity and factor inputs to minimize their output costs subject to constant returns to scale production functions of an hierarchical or nested form. At the first level is the Leontief assumption of no substitution between categories of intermediate inputs or between them and aggregates of primary factors. At the second level are CES functions describing substitution between imported and domestic sources of each intermediate input category. At the third level of the agricultural production function is the Leontief assumption of no substitution between the aggregates of primary factors used in primary production and in food processing. At the fourth level of the agricultural production function, and at the third level of the industrial production function are CES functions describing substitution possibilities between the primary factors (labour, fixed capital and land). Household demand equations for domestic and imported commodities are derived assuming that consumers maximize an additive nested utility function subject to an aggregate budget constraint. Only one household class is recognized. The nests of commodity categories contain CES functions describing substitution prospects in consumption between domestic and imported sources of each consumer good.

The resultant demand equations are represented by equations (B1)-(B3). Equation (B1) and (B2) depict an aggregation over the four sources of domestic demands recognized (current production, capital creation, household and government demands). They contain, as arguments, vectors of local commodity prices (domestic and imported industrial commodities and, respectively, EC and extra-EC agricultural commodities) and of activity variables (represented by Z and C). Z , the vector of sector output levels, appears in the model equations explaining demands for intermediate inputs. C is the level of real domestic absorption, i.e., public and private consumption and investment. The inclusion of a single scalar variable to reflect the levels of final demands by domestic users considerably simplifies the model treatment. The model equations allow demands to respond to the distribution of aggregate absorption across households, the government and capital formation. Equations (B1) and (B2) contain a set of elasticities describing the extent of substitution between domestic and imported sources of supply in each of the end uses. Equations referring to household demands, additionally, contain household expenditure and price elasticity parameters.

Sector production functions allow for substitution between types of primary factors, but not between them and other input categories. The resulting factor demands, depicted in (B3), are thus not determined by intermediate input prices, but by levels of output, by factor prices and subsidies, and by levels of total factor productivity. Because regional agricultural commodities are perfect substitutes, export demands are described in the CAP

component. Industrial export demands, (B4), contain as arguments foreign export prices and world income (as explained before, the conversion factor between the domestic currency and the foreign currency expression of world prices is always unity). The industrial sector faces a downward sloping export demand curve. World income growth results in an upward shift of the industrial export demand curve. On the import side, "small country" assumptions prevail, that is, the world price of industrial imports is exogenously given.

Commodity supplies. Unlike the industrial sector, the agricultural sector produces more than one commodity. Underlying the model specification of agricultural commodity supplies in equation (B5) is a "multi-output, multi-input" production function which is separable between inputs and outputs. At a given activity level agricultural producers are assumed to choose their commodity output composition to maximize their revenue subject to CES output functions describing transformation prospects between competing commodities in production¹. Hence (B5) contains parameters determining the strength of transformation between commodities in the output bundle for a given change in relative prices. Alternatively, when production quotas apply, they determine changes in the quota rent.

Market Clearing. The markets for agricultural commodities clear on the EC level (A7), those for industrial goods on the regional

¹ The choice of restrictive CES functions was made necessary by the paucity of data. See section A2 on the numerical specification of the model.

level (B6). Equation (B7) indicates that factor employment demands are satisfied. Full employment assumptions are not imposed.

Zero Pure Profits. Equations (B8)-(B11) describe the zero pure profit conditions for each of the activities recognized on the regional level - agricultural and industrial production and industrial exporting and importing. In (B8) and (B9) production revenue per unit of activity in each country (a function of domestic prices of the commodities produced by that sector) equals costs per unit of activity (prices of domestic and imported inputs, factor service prices, subsidies and taxes). Equation (B10) equates the revenue from exporting (right hand side) to the cost of doing so (the domestic price), (B11) equates the selling prices of imported commodities to the cost of importing which represents the domestic currency expression of the foreign price including the tariff.

A general equilibrium model must satisfy Walras' law. Most authors explicitly include equations in which household consumption is constrained by household income. They show that balance of payments equilibrium is then implied¹. The ORANI model system explicitly includes the balance of payments equilibrium condition, and recognizes only one household. The income-expenditure link for households is then implicit. Equation (B12) imposes the condition that the consolidated balance of trade and of CAP contributions must be in equilibrium. Any change in a region's agricultural trade balance and in CAP contributions, therefore, re-

¹ See, for example, Gunning, Carrin and Waelbroeck (1982).

quires an adjustment on the side of that region's industrial imports or exports. Since the world prices of industrial imports are given and the exchange rate is held constant, the adjustment is brought about by a change in the price of domestically produced industrial goods.

Included in the model are equations defining useful summary variables. In Table A1, only one example is provided by equation (B13), which defines the CAP-induced budget and trade transfers. Further equations are added to the core model to facilitate the simulation of policy options. These are specified along with the description of experiments in section A3.

A2 The numerical specification

The simulation mode of the model is obtained by logarithmically differentiating the non-linear equation system represented in Appendix A1 and evaluating the derivatives at an equilibrium point. This is a trademark of ORANI models, and the reader is best referred to Dixon et al. (1982) for a discussion of the derivatives and of the solution procedure. The equilibrium point is defined by the set of shares (such as cost shares, sales shares and revenue shares) found in a base year in which the economy is assumed to be in equilibrium, along with a number of behavioural parameters (such as elasticities of substitution between imported and exported commodities and between primary factors, and elasticities of export and of household demand).

1982 was chosen as the base year being both the most recent year with a complete data set and the last year before farmers anticipated the introduction of production quotas for milk. All shares were then taken from the published statistical sources of Eurostat, FAO, OECD, the Commission of the EC and the German Ministry of Nutrition, Agriculture and Forestry.

For estimates of the behavioural parameters, the general approach was to rely on existing studies about long-run estimates to the extent feasible and to use judgmental estimates and simplifying assumptions in other cases.

The import supply elasticities for extra-EC agricultural commodities (equation A4) were calculated by multiplying rest of the world (ROW) supply elasticities with the reciprocal of the share of imports of ROW in total world imports (excluding intra-EC imports). The export demand elasticities for EC commodities (equation A6) were calculated by multiplying ROW demand elasticities with the reciprocal of the share of exports by ROW in total world exports (excluding intra-EC exports). In this way, an attempt was made to capture, respectively, the commodity-specific monopsony and monopoly positions of the EC. The ROW supply and demand elasticities were taken from Buckwell et al. (1982): meat, cereals and other food, 1.0 and -0.5 respectively; dairy products 0.3 and -0.1; sugar 1.5 and -0.1. The choice of these values is intended to reflect the degree to which the commodities are insulated from world trading prices by extra-EC domestic policies. The elasticities of ROW demand for EC-agricultural commodities with respect

to world income (equation A6) were figured as follows: meat, dairy products and other food, 1.0; sugar 0.5; cereals 0.2. In choosing these values, the rising import demand in the middle-level income countries was taken into account.

The elasticities of substitution between agricultural commodities from the EC and the ROW and between imported and domestic industrial goods in all domestic uses (equations B1 and B2) were, respectively, set at -3.0 and -1.2. The value for industrial commodities is based on Lächler's econometric work with West German data (Lächler 1985). Similar work on agricultural commodities would be fruitless because the system of variable import levies allows for little relative price variation. Since that system is also built into the model, the value chosen is not relevant for model results. Region-specific elasticities of consumption demand for agricultural commodities were taken from Caspari et al. (1980). The expenditure elasticity of demand for the industrial commodity was then calculated through the Engel aggregation. Cross-price elasticities between the industrial and the various agricultural commodities were assumed to zero.

Substitution elasticities among primary factors (equation B3) are assumed to 1.0 in both sectors thus yielding a Cobb-Douglas specification of the CES production function. Casual experiments showed no sensitivity of the results to reasonable variations in these parameters.

The industrial export demand elasticities with respect to world income and the world price of exports from the region (equation B4) were based on Kirkpatrick's estimate for aggregate German exports and set to 1.12 and -2.0 respectively for all four regions of the EC-model (Kirkpatrick 1984).

In equation (B5) a multi-output production function is specified for the agricultural sector which requires a set of pairwise transformation elasticities between the various outputs. These elasticities are precisely related to the complete set of own- and cross-price elasticities of supply¹. The set cannot be estimated from European time-series data because the CAP has not allowed for sufficient variation in relative prices. The only feasible way out was taken by the Food and Agriculture Program team of the International Institute for Applied Systems Analysis (IIASA)². The team built a programming submodel as part of a general equilibrium policy model. The price policy experiments then yielded a set of country-specific own- and cross-price elasticities. These results were kindly made available to the author. It turned out impossible to honour the homogeneity constraint within a CRETH specification of the output function. It was then decided to adopt a CES specification which yields a common value for all pairwise elasticities. Judging on the basis of the IIASA results the long-run elasticities of transformation with respect

¹ See Vincent et al. (1980).

² See Färber et al. (1984).

to a 1 % change in relative output prices were set to 0.2 in West Germany and Rest-EC, 0.25 in France and 0.3 in Italy.

A3 The policy simulations

The reference case

The core model presented in section A1 is used to develop the reference case against which policy options are evaluated. The reference case is defined by a freeze on all intervention levels and a five-year continuation of exogenous trends. The freezing of intervention levels is achieved by exogenously setting all changes in policy variables to zero: P_{a1} , P_{a2} , W_a , V_{an} , R_{aln} , V_{gn} , T_{gn} and S_n^P . Exogenous trends are imposed as described in section IV and Table 1: Y^W , F_{an} , F_{gn} , \bar{L}_n . Balance of payments equilibrium is imposed by fixing B_n . The absolute price level is determined by fixing P_{g2n}^W . The number of exogenously determined variables - $3h + 1 + n(h + m + 8)$ - equals the difference between the number of total variables in Table A2 and the number of equations in Table A1.

Continuing old policies with higher VAT contributions

In experiment 2 the relative income target of one region (West Germany) is achieved by a proportional increase in CAP expenditures on export subsidies and producer subsidies of all five

commodity groups. The core model is expanded by equations defining additional variables and imposing additional conditions.

Relative rental income for each region (R_n) is defined by

$$(1) \quad R_n = (P_n^{(3)} L_n + \sum_{i=1}^5 R_{alin} X_{alin}^S) / \sum_{q=1}^3 P_n^{(q)} L_n^{(q)}$$

where the $P_n^{(q)}$ and the $L_n^{(q)}$ are, respectively, the factor service prices and the factor quantities of labour ($q=1$), capital ($q=2$) and land ($q=3$).

CAP expenditure on commodity export subsidies (V_i') and on commodity producer subsidies (W_i') is defined, respectively, by

$$(2) \quad V_i' = (V_{ai} - 1) P_{ali}^W X_{ali}^E \quad h$$

$$(3) \quad W_i' = (W_{ai} - 1) P_{ali} X_{ali}^S \quad h$$

where the i subscripts ($i=1, \dots, 5$) denote the commodity groups.

The conditions of proportional CAP expenditure growth are represented by

$$(4) \quad v_i' = v_1' \quad (i \neq 1) \quad h-1$$

$$(5) \quad w_i' = v_i' \quad h$$

where the lower case letters are the growth rates of the upper case letters defined above. To maintain the commodity-specific level of import protection, the domestic prices of imports from the ROW must grow proportionally to those of EC commodities, that is

$$(6) \quad P_{a1i} = P_{2ai} \quad h$$

Comparing numbers with the reference case, there are $n+2h$ additional variables and $n+5h-1$ additional equations. Thus, $3h-1$ variables must be added to the list of endogenous variables. $3h$ variables (P_{a1} , P_{a2} , W_a) are transferred from the list of exogenous variables. Adding the relative rental income of West German farmers (R_G) to the exogenous list, the total number of endogenous variables again equals the number of equations.

Completing the system of protection

In experiment 3 the import tariff and the export subsidy on group 5 commodities are raised by 20%. The additional revenue is not allowed to reduce the CAP deficit, but is spent on a proportional increase of all export and producer subsidies (excluding the export subsidies on group 5). Compared to experiment 2, the two variables CAP and T_{a5} move to the exogenous list, while R_G is again made endogenous. Note that the export subsidy on group 5 (V_{a5}) moves up through the condition of proportional price increases for EC commodities and their imported substitutes (equation 6). Since the expenditure on group 5 export subsidies is independently determined, the number of equations (5) is reduced by one, thus matching the number of endogenous variables.

Relying on producer levies

In the fourth experiment higher export subsidies on meat, dairy products and cereals are financed through producer levies, that

is, a reduction of producer subsidies on the same commodities. The changes in the ad valorem rates of subsidies are made to vary proportionally which adds equations

$$(7) \quad v_{ai} = v_{a1} \quad (i=2,4) \quad 2$$

$$(8) \quad w_{ai} = w_{a1} \quad (i=2,4) \quad 2$$

to the model. The condition of proportional expenditure growth on all subsidies is dropped which removes equations (4) and (5) from the model. The ad valorem rates of export subsidies and of producer subsidies on sugar and on other food (v_{a3} , v_{a5} , w_{a3} , w_{a5}) are kept constant in this experiment. Since the CAP's savings on producer subsidies are to be spent wholly on export subsidies, also the CAP deficit moves to the exogenous list. Compared to experiment 2, then, the model is reduced by five equations and five variables are transferred from the endogenous to the exogenous list.

Extending production quotas

A pure production quota solution is simulated with experiment 5. The Council attempts to maintain relative rental income of farmers in West Germany by raising prices on meat, dairy products and cereals proportionally, and it tries to honour the budget limit by restricting the production levels of these commodities proportionally. The conditions of proportional changes in commodity prices and in regional production quotas are added to the model

$$(9) \quad p_{ali} = p_{all} \quad (i=2,4) \quad 2$$

$$(10) \quad x_{i1n}^S = x_{11n}^S \quad (i=2,4) \quad 2n$$

$$(11) \quad x_{11n}^S = x_{11G}^S \quad (n \neq G) \quad n-1$$

The sugar price and the regional sugar production quotas are held constant in this experiment. With respect to group 5 commodities, the ad valorem rates of export subsidy and producer subsidy are fixed. The ad valorem rates of producer subsidy are also fixed for the other commodities. Along with the condition of an unchanging CAP deficit, this adds $n+h+3$ variables (x_{31n}^S , P_{a3} , W_{ai} , V_{a5} , CAP) to the exogenous list of experiment 2. Removed from that list are the $n(h-1)$ variables representing the commodity-specific quota rents in each region (R_{alin} ; $i \neq 5$). The $2h-1$ equations imposing proportional CAP expenditure changes on export and producers subsidies are removed from the model. The number of additions to the lists of equations and of exogenous variables thus balances the number of removals.

Active price policy

In experiment 6a the production quotas for meat, dairy products and cereals are fixed, and the Council, without constraints on the CAP deficit, attempts to maintain the relative rental income target for Italian farmers through proportional price increases on meat, dairy products and cereals. The experiment can easily be compared to experiment 5: 2 variables (CAP, R_G) are removed from the exogenous list, 2 variables (x_{11G}^S , R_J) are added. Note that production quotas are linked through equations (10) and (11).

Active quota policy

In experiment 6b the prices of meat, dairy products and cereals are fixed. Relative rental income is maintained in all regions by allowing for disproportional increases of regional production quotas. Compared to experiment 5, the $n-1$ equations imposing the condition of proportional regional quota changes are dropped from the model, and one variable (CAP) is removed from the exogenous list. The $n-1$ variables representing the relative rental income in regions other than West Germany are added to the exogenous list, along with one price variable (P_{all}). Note that prices are linked through equation (9).