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Abolishing Green Rates

The Effects on Cereals, Sugar, and Oilseeds in West Germany

Donald F. Larson
Simon Glance
Brent Borrell
Merlinda Ingco
and
Jonathan Coleman

Eliminating the price differentials that result from country- and commodity-specific exchange rates ("green rates") would reduce farm income and devalue fixed agricultural assets. This complicates the difficult task of reform that is essential if there is to be a unified European market.

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In 1987 the European Community began the ambitious task of forging a single market for goods and services across the national borders of its member states by 1992. Substantive reform of the Community's Common Agricultural Policy — necessary for the full integration of existing markets — has not yet been accomplished and has proven difficult to achieve.

Creating a truly "common" agricultural policy in the European Community requires, at a minimum, eliminating price differences resulting from country- and commodity-specific exchange rates, known as "green rates."

Larson and his associates discuss the various policy instruments that complicate the effects of these policy-determined price differences on crop production and the demand for inputs. They present a model that estimates the cross-commodity biases created by multiple policy instruments and that quantifies the effects of removing green-rate differentials in what was West Germany.

The effects of price changes on domestic production are statistically significant in the model, although quantitatively small. This result suggests that eliminating green rates would lead primarily to a decline in farm income and a devaluation of fixed agricultural assets — which complicates the difficult task of attaining reform.

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Summary

In 1987 the European Community began the ambitious task of forging a single market for goods and services across the national borders of member states by 1992. Substantive reforms to the Community's Common Agricultural Policy, necessary for a full integration of existing markets remain to be accomplished and have proven difficult to achieve. The creation of a truly "common" agricultural policy in the EC requires, at a minimum, the elimination of price differences resulting from country-and-commodity-specific exchange rates, known as "green rates". This paper discusses the variety of policy instruments which complicate the effects of these policy-determined prices differences on crop production and the demand for inputs. A model is presented and estimated which measures both the significant cross-commodity biases created by the multiple policy instruments and quantifies the effects of removing green-rate differentials in (formerly) West Germany. While the effects of prices changes on domestic production are statistically significant in the model, they are shown to be quantitatively small. Such a result suggests that eliminating green rates would lead primarily to a fall in farm income and a devaluation of agricultural fixed-assets, exacerbating the difficult task of attaining reform.

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Introduction

The creation of a borderless market in the Economic Community requires, at a minimum, that homogeneous goods be priced the same regardless of where they are produced. For agricultural goods, this requires, among other things, the elimination of "green rates" and derivative policy interventions such as MCAs and MDAs. Because of the multiple ways in which the EC intervenes in agriculture, eliminating green rates would not have a uniform impact on all crops. It is argued that if green rates were eliminated, relative prices would change only across broad classes of agricultural goods, such as cereals and oilseeds, but not within those categories. Since consumer substitution among the major annual crops covered by this paper--cereals, oilseeds, and sugar-- is minimal across these aggregate groups, the primary responses to eliminating green rates will come from producers. To the extent that production is joint, government policies which affect one crop directly create secondary effects in other markets; eliminating green rates will generate corresponding direct and indirect effects as well.

In this paper, a general restricted-profit model is presented and estimated. Results support the notion that production is joint and measures of bias resulting from fixed factors and from sugar quotas are quantified. Estimation results indicate that prices are statistically important in the short-run, but simulation results demonstrate that the supply and input-demand effects of eliminating green rates are, in the short-run, quantitatively small in West Germany.

Intervention instruments and EC 1992

In June, 1985, the European Commission issued a White Paper entitled "Completing the Internal Market." The paper outlined 279 directives, which, if implemented would create a European market without borders. One hundred of the directives dealt with agriculture. One month later, the Commission released a Green Paper entitled "Perspectives for the Common Agricultural Policy," which provided a major review of the CAP and the escalating costs of the policy programs. In 1987, the Single European Act which amended the Treaty of Rome to enable the adoption of the reform package was ratified by all members; and in February, 1988 an agreement was reached at the Brussels Summit to finance the reforms to completion by the end of 1992.

Article 8A of the Single European Act states that:

> **The Community shall adopt measures with the aim of progressively establishing the internal market over a period expiring on 31 December 1992....The internal market shall comprise an area without internal frontiers in which the free movement of goods, persons, services and capital is ensured in accordance with the provisions of this Treaty.**

Kelch (1989) points out that an EC without borders has four fundamental implications for EC food and agriculture: 1) the harmonization of plant and animal health standards, and food labeling, ingredients, and packaging laws; 2) the harmonization of taxes on food and agricultural products and inputs; 3) the elimination of agricultural border taxes and subsidies; 4) removal of quotas, variable premiums, and national aids which are incompatible with the 1992 program. Implementation of these reforms would bring about a single price for agricultural goods for consumers and producers throughout the Community and constitute a revision of relative and absolute prices among commodities and countries. It is argued below that, in general, the proposed changes are likely to affect the decision-making processes of producers more drastically than those of consumers, leading to a greater reallocation of resources in production than in demand. The result stems from the multiple instruments by which agricultural prices are supported under the Common Agricultural Policy.

For the major annual crops, three major programs exist. Cereal producers and consumers face a legislated price substantially above world levels which is defended by a variable levy system. Sugar producers receive quotas which enable them to sell a fixed amount of their production at legislated prices higher than world prices, with the remainder to be exported at world prices. Oilseed producers receive aid in the form of an indirect payment to oilseed crushers, due to a binding trade agreement entered during the Dillon-Round of GATT in 1962.

Cereals and variable levies: The variable levy program is conceptually straight-forward but, in practice, it is complicated by exceptions and modifications. For example, in order to remove supplies which would otherwise dictate lower consumer and producer prices, cereals are exported with a subsidy roughly equal to the difference between world prices and domestic EC prices. As world prices change, the subsidy, rather than domestic prices, changes. In the case of crops for which the EC is not self-sufficient, importers face a variable import-tax equal to the difference between the internal legislated EC price and world prices, preventing consumers from substituting relatively inexpensive imports for expensive domestic products. The result of this intervention was to create a single, higher and more stable farm-gate price (and consumer price) within the borders of the EC. This simple mechanism was greatly complicated in 1969. Obtaining a common level of farm support was a stated objective of the CAP at the inception of the EC and much progress had been made prior to that date in removing border-taxes, but a devaluation of the French franc and the revaluation of the German mark in 1969 brought about a major revision in the way in which cereal support levels were calculated. Unwilling to let CAP support prices rise by the 12.5% implied by the devaluation, French authorities continued to use the exchange rate established prior to the devaluation when calculating commodity support levels. The Germans, unwilling to accept an 8.5% cut in support prices, used older exchange rates as well--and the practice of using "green" exchange rates (i.e., specifically to prevent common agricultural prices) was established.

Since support prices in France were lower than those in other Community countries and considerably lower than those in Germany in particular, free trade across member borders would have driven up prices in France and lowered those in Germany--exactly what France and Germany intended to avoid. To prevent this, an amount equal to the difference (either positive or negative) was levied against trade crossing French or German borders, thus neutralizing the legal gains to trade created by the use of artificial exchange rates. These levies became known as monetary compensatory amounts or MCAs. Since that time, green rates have proliferated; there are currently 40 green rates among the 12 members of the EC (Kelch:1989). Italy, for example, has one green rate for grains and oilseeds, another for sugar, peas, and beans, a third for pork, and a fourth for beef and milk.

Sugar quotas: The EC support mechanism for sugar is based on a complicated system of quotas, rules, legislated prices, and import levies. There are three categories of sugar: A, B, and C. Production of both A and B sugar is limited by quota. Both receive a support price well above world market levels which has helped transform the EC from a net importer to a substantial net exporter of sugar. The price support for A sugar is above that of B sugar and A sugar constitutes the bulk of production. C sugar is considered excess production, cannot be sold in the EC, and must be exported at international prices. Producer support prices are for A and B sugar are set in ECU terms and then transformed to local currencies using green rates. The green rate used for most countries is the same rate that is used for cereals and oilseeds; however, as stated above, Italy uses a separate rate for sugar, peas and beans. The green rate used for sugar support conversion in Spain is the same as that used for cereals, but differs from the oilseed green rate. A series of import taxes prevents sugar imports from all countries except those that enter under the Lomé Agreement.

Oilseeds and the crushing subsidy: The support mechanism for oilseeds is perhaps the most convoluted. It has its antecedents in a concession made by the EC during the 1962 Dillon round negotiations on the General Agreement on Tariffs and Trade (GATT) to allow unrestricted imports of soybeans and to limit the tariff on vegetable oils and meals. At that time, the EC maintained a large oilseed crushing industry but oilseed production was negligible.

During the 1970s, as the EC moved toward a policy of obtaining self-sufficiency in oilseeds, the 1962 concession prevented the establishment of a variable-levy system similar to that used in cereals. In response, the EC established a system of production aids, or crushing subsidies which are paid to crushers of domestic oilseeds. Rules guarantee that a large portion of the payment is remitted to farmers. In addition, the EC stands ready to buy the oilseeds at a minimum intervention price. The program ensures EC oilseed producers of a price substantially above world levels, and has been quite effective in expanding oilseed production.[1] The indirect nature of the program, however, has created an additional set of distortions whereby relative prices of cereals and oilseeds can differ from country to country even when cereal and oilseed prices are both converted by a single green rate. This obscure distortion occurs because the support comes indirectly via a crushing subsidy. Oilseed crushers are free to import and face world market prices. In order to encourage crushers to buy the more expensive EC produced oilseeds, the EC calculates the difference between the world price in ECUs and the support price in ECUs. Since the world price changes daily the subsidy fluctuates as well. The difference is converted using "green" exchange rates and paid to the crusher, who passes the bulk of the subsidy back to producers. The farmer, in effect, receives the world price --which is converted at the official exchange rate-- plus an ECU-denominated bonus via the crusher --which is converted at the green rate. While the cereal support price is fully converted using the green exchange rates, the farm-price for oilseeds is a strange combination of world prices, official exchange rates, subsidies, and green rates. Hence, the price of oilseeds relative to cereals will differ from country to country. Annex A gives a numeric example.

The use of multiple exchange rates introduces artificial incentives for trade in oilseeds as well as cereals. However, since the support price is a weighted sum of international prices converted by one set of exchange rates, and a production aid converted by another, the corresponding mechanism used to calculate taxes or subsidies at the border of each member nation is more complicated than the MCAs. The Monetary Differential Amounts (or MDAs) are calculated so that the cost of the oilseeds are identical to crushers located throughout the EC despite differing levels of producer support. Since the market exchange rate may fluctuate as well as the market rate for oilseeds, the MDAs are also in a constant state of revision and adjustment. Annex B gives a numeric example.

Profit, supply, and demand effects of common agricultural prices

The creation of a borderless EC requires, at a minimum, the elimination of separate green rates and their derivative instruments, MCAs and MDAs. Since the current system of multiple exchange rates and production aids creates country differences in both absolute price levels and relative prices, moving to a single set of agricultural prices will have real effects on consumption and production.

Consider first the effects on profits in agriculture, and therefore on resource allocation between agriculture and the rest of the economy. Let λ = a row vector of exchange rate ratios on output prices, and γ = a row vector of exchange rate ratios on input prices, where member $\lambda_i = e_i^g/e$ and e_i^g is the ECU/country exchange rate used for good i, and e is the market exchange rate.

Noting that some of the λ_i and most of the γ_j may equal one, the aggregate profit function can be written as:

$$\pi(\lambda p, \gamma w, q, z) = \lambda p y(\cdot) - \gamma w(\cdot) \tag{1}$$

where q is a vector of the production quantities for supply-managed crops such as sugar and olive oil, where output prices (p) and input prices (w) are intervention prices stated in ECUs, and z is the vector of fixed inputs.

Under a borderless EC, $\lambda_i = \gamma_j = 1$, for all outputs and inputs so that the relative, as well as absolute prices will change. For example, in W. Germany, where the green rates over-value support prices (see Figure 1), setting

[1] While the creation of a single-market Europe in 1992 promises potentially large changes in all support programs, the future of the oilseed regime in the EC remains even more clouded. In 1989 the EC accepted a GATT ruling in response to charges brought by the United States that the crushing subsidies violated the 1962 agreement and had hampered soybean exports from the US into the EC. In response to the ruling, the EC must either alter the support program, pay damages to the US, or negotiate an alternative settlement.

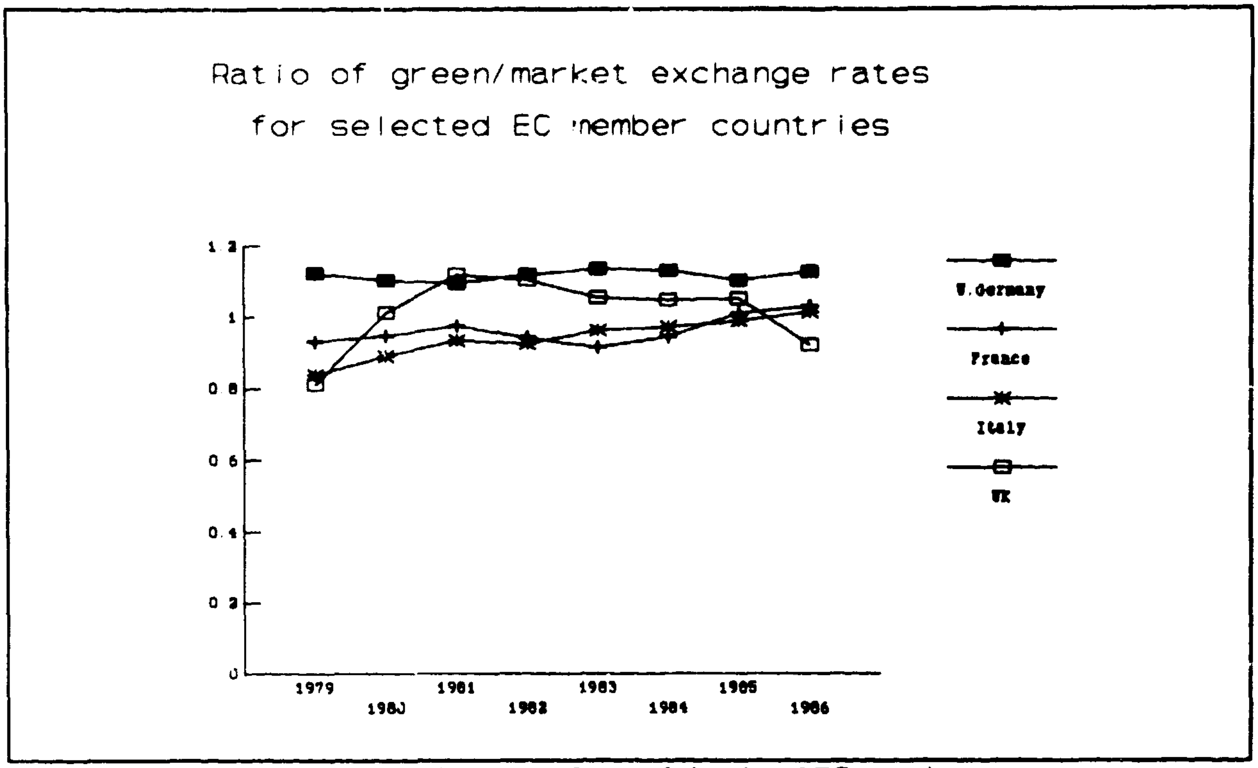

Figure 1: Ratio of green-to-market exchange rates for cereals in selected EC countries.

the ratio of green-to-market exchange rates to 1 would significantly lower all producer output prices. Generally speaking, green rates do not affect input prices directly. A notable exception is in the livestock sector where production from the annual crop sector is used as inputs to both dairy and meat production. A notable indirect effect is the influence that support programs have on land values.[2]

To the extent that the inputs are tradeable, a borderless EC may lead to a realignment of tax rates on inputs as well, as farmers will seek the lowest cost inputs. Augmenting γ to include differences in effective tax rates, the effects on supply and input demand can be derived using the regular envelope theorem properties, so that:

$$\partial\pi/\partial\lambda p = y(\lambda p,\gamma w,q,z) \tag{2}$$

and

$$\partial\pi/\partial w = -x(\lambda p,\gamma w,q,z), \tag{3}$$

where $y(\cdot)$ is a vector of short-run supply curves, and $x(\cdot)$ is a vector of short-run input demand curves.

From (2) and (3), it is clear that a borderless EC with a single real price structure, where $\lambda_i=\gamma_i=1$ will lead

[2]The model developed in this paper is limited to the major annual crops only and cannot address these issues. However, the effects of prices changes on the livestock sector and land prices are discussed in an forthcoming extension of the model by Ingco and Larson.

to a change in both supply and input demand even in the short run when fixed resources cannot be reallocated. To the extent that most of the γ_i are equal to one, supplies should decline (increase) in countries where the ratio of green-to-market exchange rates are greater (less) than one, since the supply curves are monotonically increasing in p. Input demand should decline (increase) as well. Equation 4 provides the shadow price on the fixed inputs and provides the direction of the long-run adjustment:

$$\frac{\partial \pi}{\partial \lambda z} = r(\lambda p, \gamma w, q, \cdot) \qquad (4)$$

To the extent that the value of the shadow price is reduced below (increased above) the marginal cost of the fixed input when $\lambda_i = \gamma_j = 1$, the utilization of the inputs which are fixed in the short-run, will be reduced (increased) in the long-run as these inputs become variable.

The change in absolute and relative prices will affect final consumer demand as well; however, the magnitude of the changes is expected to be more limited than the supply effects due to the more limited opportunities for substitution.

Consider the utility maximization problem:

$$Max\ U = U(d)\ s.t. \sum_i \lambda_i p_i d_i = B \qquad (5)$$

where d is a vector of consumption levels and B is the budget constraint.

It is clear from (5) that a change in λ will bring about a change in consumption levels through the budget constraint, and, because of relative price changes, lead to a price effect on demand. However, to the extent that groups of commodities are separable--that is, to the extent that consumption of cereals is independent of the price of sugar, or vegetable oils and meals--these effects should be quite limited.

For the purposes of this paper, total budget expenditures is divided into expenditures on sugar, vegetable oils, cereals, and other goods. While the demand-elasticities of substitution among vegetable oils are quite high, under current policies consumers face international price levels that are independent of support prices. Changes in taxes are likely to affect all vegetable oils equally, so relative prices among vegetable oils are not likely to change. The substitution among cereals may be significant and support prices do effectively determine consumer prices. However, since all cereals face the same green rates within each country, green rate changes will again not affect relative prices. Sugar is a single product and sometimes faces a green rate different from that applied to cereals.

To the extent that relative prices within the three groups do not change, the only price effects of a price change on final demand will come through the substitution among the groups and the income effects. The demand cross-elasticities for sugar, vegetable oils, and cereals are likely to be small if not zero. In wealthy nations where a small portion of income is spent on cereals, vegetable oils, and sugar, the income effects are likely to be small as well.

Qualitatively, the move to a unified market and the abolition of artificial country-specific prices for homogeneous goods should have the following effects:

1) small changes in final demand with little substitution effects.
2) changes in resource allocations devoted to agriculture among countries, as well as a reallocation of resources within countries among crops.
3) changes in the value of non-traded inputs, especially land.

The remainder of the paper deals with quantifying result 2 for the major annual crops, cereals, oilseeds, and sugar in (formerly) West Germany. The effects of the proposed policy changes have potentially large and interesting effects on non-traded assets such as land and older farmers; however, the effects on resource allocation and the resulting supplies of these goods will potentially have the greatest effects on international markets and other, particularly developing, countries.

Empirical Model

Applications based on duality results and flexible-form estimates of jointly produced agricultural products have flourished in recent years and include Ray (1982), Shumway (1983), Lopez (1984) and Lee and Chambers (1986). The implications of supply-managed outputs, in addition to fixed inputs, was first considered by Moschini (1988) who showed that the restricted profit function given in (1) is nondecreasing in p and in z, nonincreasing in w and in q, positively linearly homogenous in (p,w), convex in (p,w), continuous, and twice-differentiable. Because of the constrained output vector q, profits need not be positive.

Using the SPEL database, provided by the University of Bonn, flexible output and input-demand groups were created for cereals (barley, oats, maize, rye, and wheat), oilseeds (rapeseed), non-quota C sugar, fertilizers (nitrogenous, phosphatic, and potassic), energy, and pesticides; the following groups were designated as fixed outputs or inputs: quota-sugar (A-quota plus B-quota), net subsidies (subsidies minus taxes), depreciation (on machinery and buildings), other inputs (based on total input constant-price costs minus explicitly modeled expenditures, and comprised primarily of maintanence expenditures). The data covered the period 1967 to 1987. Aggregate quantity and price measures were created using divisia indices.

Following Moschini (1988), the normalized quadratic, first proposed by Lau (1974) and subsequently applied in profit function estimation by Shumway (1983), was chosen as the postulated functional form. The form allows for negative profits, and has a Hessian of constants so that global convexity can be imposed and tested.

Choosing one of the inputs as a numeraire (we chose energy), let

$$\hat{y} = (y, -x_1, \ldots, -x_{J-1}) \tag{6}$$

represent the netput vector corresponding to the normalized prices

$$\hat{p} = (p, w_1, \ldots, w_{J-1}), \tag{7}$$

obtained by deflating each price by w_J. Defining

$$\hat{z} = (q, z, t), \tag{8}$$

where t is a trend variable representing the state of technology, the normalized quadratic restricted profit function is written as:

$$\begin{aligned}\hat{\pi}(\hat{p},\hat{z}) = \alpha_0 &+ \sum_i \alpha_i \hat{p}_i + \sum_j \beta_j \hat{z}_j + \tfrac{1}{2}\sum_i \sum_m \alpha_{im} \hat{p}_i \hat{p}_m \\ &+ \tfrac{1}{2}\sum_j \sum_n \beta_{jn} \hat{z}_j \hat{z}_n + \sum_i \sum_j \zeta_{ij} \hat{p}_i \hat{z}_j\end{aligned} \tag{9}$$

where i,m = 1,...,M and j,n = 1,...,N; where α_0, α_i, β_j, α_{im}, β_{jn}, are fixed parameters. Note that profits are normalized, that is:

$$\hat{\pi}(\hat{p},\hat{z}) = \frac{\pi(p,w,q,z)}{w_J} \tag{10}$$

so that $\Pi(p,w,q,z)$ is linearly homogenous. Symmetry is imposed by setting $\alpha_{im} = \alpha_{mi}$ and $\beta_{jn} = \beta_{nj}$.

The netput functions can be recovered via the envelope theorem:

$$\frac{\partial \hat{\pi}}{\partial \hat{p}_i} = \hat{y}_i = \alpha_i + \sum_m \alpha_{im} \hat{p}_m + \sum_j \zeta_{ij} \hat{z}_j \tag{11}$$

for each of the M variable netputs.

Ideally the M flexible netput equations given in (11) are estimated together with the profit function given in (10). However, including the profit function adds an additional set of parameters corresponding to β_j and β_{jk} leaving the empirical problem unmanageable. Because of this difficulty, only the M netput equations were estimated This procedure still allows price and cross-price elasticities to be estimated for all variable outputs and inputs as well as parameters measuring the marginal effects on constrained outputs and inputs on variable netputs.

Lau (1978b) first proposed a nonlinear transformation of the equations in (11), also used by Moschini, which allows the property of convexity to be directly tested. Letting A represent the M x M matrix of the α_{im} coefficients, the restricted profit function will be convex if A is positive semi-definite. Since A is symmetric and square, it can be decomposed so that A = LDL', where L is a unit lower triangular matrix and D is a diagonal matrix. The elements of D are called the Cholesky values which must be nonnegative for A to be positive semi-definite.

Cholesky factorization renders the equations in 11) nonlinear in their parameters and stochastic versions of the netput equations as well as their corresponding "Cholesky" versions were estimated using a Maximum Likelihood procedure Justification for this technique is given in Amemiya (1983), Chalfant and Gallant (1985), Moschini (1988), and Weaver (1983).

Estimation Results

The first two columns of Table 1 provide the summary statistics for the model estimated in its base-form. The underlying profit-function is linearly homogenous in prices by construction and symmetry has been imposed. Production is assumed to be joint. Convexity of the underlying profit function has not been imposed at this point. The summary statistics are fairly good, but not greatly revealing. The explanatory power of the equations are uniformly good, and only the equation for oilseeds appears to be affected by first-order autocorrelation.

Table 1: Summary statistics for estimated normalized quadratic restriced profit function with and without convexity constraint.

Dependent Variable	Adjusted R^2	Durbin-Watson	Adjusted R^2	Durbin-Watson
	Unconstrained Model		Constrained Model	
Grains	0.84	2.22	0.82	1.94
Oilseeds	0.99	3.23	0.99	3.04
C-Sugar	0.83	2.09	0.84	2.13
Fertilizer	0.95	2.00	0.95	1.74
Pesticides	0.98	2.20	0.97	1.68

Mean-point price and quantity elasticities and the associated asymptotic t-scores calculated from the model

Table 2: Elasticity estimates at the mean point from estimated normalized quadratic restricted profit model.

	with respect to the price of						with respect to the quantity of					
Elasticity of	Cereals	Oilseeds	C-sugar	Fertilizers	Pesticides	Energy	Quota -sugar	Capital	Time	Other Inputs	Subsidies	Land
Cereals	0.17	0.07	0.02	-0.25	-0.04	0.03	0.11	0.20	-0.06	0.39	0.06	0.09
	(1.58)	(3.23)	(1.74)	(-4.43)	(-2.59)	(0.27)	(0.70)	(0.11)	(-0.22)	(0.35)	(0.49)	(0.02)
Oilseeds	0.71	-0.79	-0.12	-0.07	-0.15	0.42	-0.42	-2.94	2.27	-0.79	-0.30	3.04
	(3.23)	(-4.90)	(-1.91)	(-0.27)	(-1.90)	(3.26)	(3.24)	(-2.67)	(14.15)	(-1.19)	(-4.42)	(0.83)
C-sugar	1.31	-0.62	0.99	-0.23	-0.31	-1.13	-4.44	15.10	-3.05	-3.59	0.54	-36.41
	(1.74)	(4.91)	(2.24)	(-0.24)	(1.38)	(-1.81)	(-6.57)	(1.98)	(-2.70)	(-0.78)	(1.13)	(-1.47)
Fertilizers	0.60	0.02	0.01	-0.83	-0.14	0.35	0.12	-1.44	0.23	0.89	0.05	4.47
	(4.43)	(0.27)	(0.24)	(-4.13)	(-3.34)	(3.72)	(1.69)	(1.86)	(2.04)	(1.92)	(1.00)	(1.79)
Pesticides	0.61	0.23	0.09	-0.93	-1.01	1.01	0.34	-2.66	0.76	1.20	0.06	10.67
	(2.59)	(1.90)	(1.38)	(3.34)	(8.47)	(6.48)	(2.89)	(2.31)	(4.57)	(1.69)	(0.86)	(2.84)
Energy	-2.93	-0.12	-0.20	3.75	1.12	-1.62						
	(-3.97)	(-0.47)	(-1.03)	(4.14)	(5.59)	(-2.84)						

Note: symmetry and homogeneity maintained, but convexity not imposed. T-scores, given in parentheses, are based on asymptotic standard errors.

are given in Table 2.[3] A large number of the elasticities are statistically significant and many conform to *a priori* expectations. Contrary to conventional theory, however, the model yields a supply curve for oilseeds which slopes downward in its own price.

Reparameterizing the model using the Cholesky-factorization method documented in Lau (1978) and re-estimating the reparameterized model revealed a single significantly negative Cholesky coefficient. The Cholesky

Table 3: Estimated Cholesky parameters.

	Constrained		Unconstrained	
Parameter	Estimates	t-scores	Estimates	t-scores
δ_{11}	0.43	0.80	0.88	1.68
δ_{22}	-0.16	-2.09	---	---
δ_{33}	0.11	1.57	0.09	1.31
δ_{44}	0.69	2.43	0.40	1.91
δ_{55}	-0.00	-0.39	0.17	6.38

Note: LR-statistic from the test that $\delta_{22}=0$ against the unconstrained estimated equals 13.40.

[3] Most estimated parameters throughout the paper have been expressed in terms of mean-elasticities; the underlying estimates are available by request.

coefficients and the associated t-scores are given in the first two columns of Table 3. Quasi-convexity of the underlying profit function requires that every Cholesky coefficient be non-negative. Setting the offending coefficient to zero and re-estimating the model a third time produced the second set of elasticities reported in Table 4. Once the second Cholesky coefficient has been set to zero the remaining coefficients are all positive. However, the likelihood ratio statistic resulting from testing the hypothesis that δ_{22}=0 against the maintained hypothesis of an unconstrained value for δ_{22}, is significantly different from zero.[4] Therefore, the theoretical assertion of convexity in the profit function is rejected by the data.

Table 4: Elasticity estimates at the mean point from estimated normalized quadratic restricted profit model under convexity assumption.

	with respect to the price of						with respect to the quantity of					
Elasticity of	Cereals	Oilseeds	C-sugar	Fertilizers	Pesticides	Energy	Quota -sugar	Capital	Time	Other Inputs	Subsidies	Land
Cereals	0.40	-0.04	0.01	-0.21	-0.06	-0.10	0.04	1.18	-0.13	-0.11	0.04	-0.71
	(4.09)	(-2.04)	(0.64)	(-2.88)	(-3.10)	(-1.10)	(0.23)	(1.36)	(-0.73)	(-0.18)	(0.41)	(-1.50)
Oilseeds	-0.46	0.05	-0.01	0.24	0.06	0.12	-0.04	-3.62	2.54	-0.56	-0.21	11.83
	(-2.04)	(0.98)	(-0.63)	(1.53)	(1.41)	(1.65)	(-0.33)	(-2.61)	(12.11)	(-0.66)	(-2.35)	(2.61)
C-sugar	0.58	-0.06	1.00	0.06	-0.17	-1.41	-4.25	15.64	-3.00	-3.92	0.59	-31.70
	(0.64)	(-0.63)	(2.37)	(0.06)	(-0.68)	(-2.31)	(-6.74)	(2.22)	(-2.85)	(-0.91)	(1.29)	(-1.42)
Fertilizers	-0.50	0.05	0.00	-0.60	-0.13	1.16	0.08	-1.19	0.20	0.77	0.04	3.78
	(-2.88)	(1.53)	(0.06)	(-3.05)	(-2.69)	(2.94)	(1.12)	(-1.50)	(1.71)	(1.61)	(0.78)	(1.47)
Pesticides	-0.90	0.10	-0.05	-0.83	-1.04	2.72	0.19	2.31	0.67	1.06	0.02	7.61
	(-3.10)	[illegible]	(0.68)	(-2.69)	(-8.65)	(4.21)	(1.61)	(-1.74)	(3.46)	(1.30)	(0.25)	(1.79)
Energy	0.39	-0.04	-0.09	2.76	1.08	-4.10						
	(0.76)	(-0.59)	(-1.04)	(2.98)	(4.68)	(-3.00)						

Note: symmetry and homogeneity maintained and convexity imposed. T-scores, given in parentheses, are based on asymptotic standard errors.

Setting aside for the moment the implications of rejecting convexity in the underlying profit function, the model results are otherwise quite appealing. The summary statistics of the restricted model are given in the third and fourth columns of Table 1. The statistics are comparable to the earlier results and the goodness-of-fit as measured by the R^2 remains essentially unchanged. Most of the mean-point elasticities reported in Table 4 are of the correct sign and significant. As a result of the convexity restriction, all own-price elasticities are of the correct sign and four of the six are statistically highly significant. Grains, oilseeds and fertilizer use are price-inelastic, while non-quota C-sugar exhibits a unitary price elasticity, and energy and pesticide use are price elastic. Ignoring cross-effects, the table suggests that an across-the-board cut in EC support prices in West Germany would not affect production output of the major crops (cereals and oilseeds) in the short-run, but would have a larger effect on variable inputs such as pesticides and energy.

[4]The likelihood ratio statistic is asymptotically distributed as a Chi-Square variable with degrees of freedom equal to the number of constraints (Gallant and Holly [1980] or Spanos [1986].) In this case the number of constraints equals 1. Since the LR-statistic = 13.40 while $X^1_{0.01}$ = 6.635, the constrained model is rejected.

Jointness in production

Inherent in the model is the assumption of jointness in crop production. Behaviorly, the assumption implies that various production activities are not independent operations, but rather production and input decisions concerning one output influence the production of other outputs. This can rise from joint economies (land-rotation is an example) or from shared fixed resources. The assumption is intuitively appealing since, in the aggregate, much of the farm-land in West Germany is suitable for a number of crops. From a policy analysis perspective, jointness in crop production has important implications since policies specifically targeting one crop will have direct spill-over effects for other crops. From a modeling perspective, jointness in production complicates the practice of recovering elasticities by adding a large number of cross-terms, thereby reducing the degrees of freedom for a fixed sample of data. Econometrically, the implication is for less-efficient estimators, especially in the presence of multicollinearity.

In the context of the present model, jointness in production has two implications. The first is the general notion that unrestricted supplies are independent of the output prices and supply-managed outputs of other crops. Nested in this general notion is the specific claim that the supplies of grains, oilseeds, and non-quota sugar are independent of quota sugar production. The first hypothesis can be tested against the maintained hypotheses of the base-model by restricting nine of the cross-elasticities to zero. Testing the second notion requires restricting three of the parameters to zero. The results given in Table 5 indicate that both alternative models of nonjointness can be rejected with a high degree of confidence.

Table 5: Likelihood ratio statistics for non-jointness tests.

Test	LR Statistics	Critical $X_{0.01}$
Nonjointness	35.95	21.66
Nonjointness for sugar quota	29.39	11.34

The strong indication of jointness in West German agricultural production implies that quotas on sugar production not only create the direct inefficiencies associated with sugar production, but cause distortions in the grains and oilseed markets as well. These distortions come in the form of less-than-optimal production levels, and secondarily, through misallocation of variable inputs as well. Measures indicating the extent of these secondary distortions are presented later.

Dynamic production

It is the static optimization problem which gives rise to many of the properties of the restricted profit function as well as the derived supply and input-demand schedules. For a given state of available technology and fixed inputs, the farmer is hypothesized to optimize his profits for a single period. While the mathematical translation of proposed economic activity is somewhat stylized, this standard assumption is perhaps most applicable to the West German farmer growing annual crops who knows with limited uncertainty the price he will receive for his produce and who is free to adjust his crop-mix at the beginning of every season.

The implication of static-optimization is that decisions this year are independent of last year's decisions, exclusive of net changes in fixed assets such as capital. This assumption can be tested directly from the data by adding a vector of lagged-endogenous variables to the model and testing the significance of the addition. Table 6 presents the results of such a test.

The static-independence hypothesis is rejected with a high level of confidence. Unfortunately, while the results of the single-period optimization period would suggest that lagged-endogenous variables should not be significant, the significance of the lagged variables does not, in itself, imply any specific alternative theory. Epstein (1981), Chambers (1982), and Chambers and Lopez (1984) have derived dynamic alternatives to the static model but empirical applications have been quite limited. The inclusion of dynamic elements in agricultural production currently remains an ad hoc procedure.

The significance of pricing policies

Before proceeding to the effects of pricing and quota policies, it is perhaps best to ask a more general question: Do prices matter in the short-run? The existence of short-run price effects are generally taken as an article of faith among economists, however, the fervor of belief is not always shared by policy makers. In the context of the model, the significance of short-run price effects can be tested by constraining the parameters on all variable inputs and outputs to zero. The summary statistics resulting from a model which binds the price parameters to zero are given in Table 7, along with results from a model used to test the opposing extreme hypothesis that only prices matter. The LR-statistics, for tests of the hypotheses against the maintained assumptions of the base-model are given in a note to the table.

Table 6: Test statistics on significance of lagged endogenous variables

Lagged Endogenous Variable	Parameter Estimate	t-score
Grains	-0.24	-0.92
Oilseeds	-0.52	-4.43
C-sugar	0.47	5.68
Fertilizer	0.26	1.22
Pesticides	0.47	13.08

Note: the LR-statistic testing the hypothesis that all five parameters equal zero is 110.69; since $X^{5}_{0.01}$=15.086 the hypothesis is rejected.

Surprisingly, dropping the price variables on all variable inputs and outputs from the model has a negligible effect on the summary statistics. The adjusted R^2s drop slightly and the DW statistic improves for the oilseed equation. The same is not true when the fixed supply and input variables are dropped from the equation. The explanatory power drops significantly for all equations. The DW-statistics deteriorate as well.

However, as can be seen in Table 8, the original model performs significantly better than either of the alternative models. Both the hypothesis that prices do not matter and the hypothesis that only prices matter can be

Table 7. Summary statistics for estimated normalized quadratic restricted profit function under the assumption that prices do not matter and the alternative that only prices matter.

Dependent Variable	Adjusted R^2	Durbin-Watson	Adjusted R^2	Durbin-Watson
	Prices-do-not-matter model		Only-prices-matter model	
Grains	0.83	2.22	0.57	0.87
Oilseeds	0.98	2.21	0.09	0.19
C-Sugar	0.80	1.67	0.55	1.47
Fertilizer	0.92	1.77	0.77	0.59
Pesticides	0.92	1.12	0.67	0.37

Note: Both alternative hypotheses, that the coefficients on all price variables equal zero, and alternatively, that the coefficients on all non-price variables equal zero, were rejected with a high degree of confidence. The LR-statistic based on the test that all price-coefficients equal zero was 67.52 compared to the critical value $X^{15}_{0.01}$=30.58, while the LR-statistic associated with the alternative only-price-matters hypothesis was 199.7 compared to a critical value, $X^{30}_{0.01}$=50.892.

rejected with high degrees of confidence.

Measures of bias in resource allocation

In a multiple output model of agricultural production direct indicators of resource misallocation can be recovered from the estimated parameters. Following Lau (1978a), Weaver (1983), and Moschini (1988) define the indirect Hicks' neutrality as the following condition:

$$\frac{\partial(\hat{y}_i/\hat{y}_m)}{\partial \hat{z}_n} = \frac{\hat{y}_i}{\hat{y}_m \hat{z}_n}(\eta_{in}-\eta_{mn}) = 0 \tag{12}$$

where (i,m) represent any pair of variable netputs, and η_{sn} is the sth variable quantity (s=i,m) with respect to the fixed factor. Note that when indirect Hicks' neutrality holds the ratio of unconstrained production or input-demand quantity choices is unaffected by fixed inputs or supply quotas. Also, the same condition can be applied to the technology variable to measure biasing effects in technology. Defining the bias measure:

$$B^n_{im} = (\eta_{in}-\eta_{mn}) \tag{13}$$

The constraining level of $\hat{z}$ does not bias the mix between two netputs when $B^n_{im} = 0$. When $B^n_{im} > 0$, the constraint biases the ratio in favor of netput i and against netput m; when $B^n_{im} < 0$, the constraint generates a bias against netput i and in favor of netput m.

Table 8 provides the estimated pair-wise measures of bias derived from the indirect Hicks' neutrality condition. The asymptotic t-scores are reported in the table as well. Perhaps surprisingly, a large number are highly significant. Changes in the quota levels for sugar would substantially alter the production mix away from C-sugar and in favor of oilseeds and cereals. The ratios of C-sugar production relative to pesticide and fertilizer demand would decline as well. These results seem logical as an increase in the quota would result primarily in a shift of C-production into quota-sugar production rather than a general increase in sugar production of both types. Changes in the quota allocation would have little effect on the mix between oilseeds and cereals. A decline in existing capital would cause a decline in C-sugar production relative to cereals and oilseeds, as well as a decline in cereals relative to oilseeds. Changes in technology at the mean-point generates a bias in favor of oilseeds over cereals as well as a greater use of fertilizers and pesticides relative to cereal output. A general increase in land availability would appear to favor oilseeds primarily. The biases generated by net subsidies (subsidies minus taxes) are not large but do generate a significant bias in favor of sugar production vis-a-vis cereal and oilseed production and also generate a small bias in favor of cereals over oilseeds.

The effects of abolishing green rates

In order to quantify the effects of eliminating the policy-determined difference between market and agricultural green rates, six years (crop years 1980/81-1985/86) of EC crop production was simulated under two scenarios. Under the baseline scenario, prices were kept at historic levels. Under the second, policy prices were reproportioned to reflect market exchange rates. This assumption is no doubt extreme, and it is more likely that a policy which eliminates green rates will be accompanied by either off-setting direct payments to farmers or a general upward revision of policy prices. However simulations of the extreme case re-inforce the general conclusion that short-run production-effects resulting from the policy will be quantitatively small.

Table 9 provides the policy exchange rates for rapeseed and cereals, the market exchange rates as well as the changes in policy prices implied by setting green rates equal to market rates for the period under consideration. Under the second scenario the effects of the changes in policy prices on farm prices were assumed to translate in

Table 8: Estimated pair-wise measures of bias for constraining variables at mean-point

Netput Pair	Sugar-quota estimate	Sugar-quota t-score	Capital estimate	Capital t-score	Technology estimate	Technology t-score	Other Inputs estimate	Other Inputs t-score	Land estimate	Land t-score	Net Subsidies estimate	Net Subsidies t-score
Cereals/Oilseeds	0.078	0.410	4.800	3.018	-2.671	-10.106	0.450	0.443	-12.538	-2.783	0.256	1.956
Cereals/C-Sugar	4.289	7.237	-14.457	-2.076	2.861	2.796	3.306	0.906	30.984	1.386	-0.542	-1.255
Cereals/Fertilizers	-0.041	-0.229	2.374	1.986	-0.334	-1.527	-0.880	-1.101	-4.493	-1.707	0.006	0.053
Cereals/Pesticides	-0.152	-0.779	3.491	2.206	-0.807	-3.063	-1.168	-1.141	-8.323	-1.929	0.024	0.180
Oilseeds/Cereals	-0.078	-0.410	-4.800	-3.018	2.671	10.106	-0.450	-0.443	12.538	2.783	-0.256	-1.956
Oilseeds/C-Sugar	4.211	6.575	-19.257	-2.666	5.532	5.153	3.357	0.766	43.522	1.896	-0.799	-1.721
Oilseeds/Fertilizers	-0.118	-0.829	-2.426	-1.526	2.337	9.849	-1.330	-1.372	8.044	1.566	-0.250	-2.471
Oilseeds/Pesticides	-0.230	-1.141	-1.308	-0.580	1.864	5.552	-1.617	-1.170	4.215	0.578	-0.232	-1.628
C-Sugar/Cereals	-4.289	-7.237	14.457	2.076	-2.861	-2.796	-3.806	-0.906	-30.984	-1.386	0.542	1.255
C-Sugar/Oilseeds	-4.211	-6.575	19.257	2.666	-5.532	-5.153	-3.357	-0.766	-43.522	-1.896	0.799	1.721
C-Sugar/Fertilizers	-4.330	-6.888	16.831	2.388	-3.195	-3.047	-4.686	-1.097	-35.478	-1.593	0.549	1.208
C-Sugar/Pesticides	-4.441	-7.293	17.948	2.634	-3.668	-3.614	-4.974	-1.204	-39.307	-1.827	0.566	1.290
Fertilizers/Cereals	0.041	0.229	-2.374	-1.986	0.334	1.527	0.880	1.101	4.493	1.707	-0.006	-0.053
Fertilizers/Oilseeds	0.118	0.829	2.426	1.526	-2.337	-9.849	1.330	1.372	-8.044	-1.566	0.250	2.471
Fertilizers/C-Sugar	4.330	6.888	-16.831	-2.388	3.195	3.047	4.686	1.097	35.478	1.593	-0.549	-1.208
Fertilizers/Pesticides	-0.112	-1.395	1.117	1.233	-0.472	-3.604	-0.288	-0.502	-3.829	-1.341	0.017	0.315
Pesticides/Cereals	0.152	0.779	-3.491	-2.206	0.807	3.063	1.168	1.141	8.323	1.929	-0.024	-0.180
Pesticides/Oilseeds	0.230	1.141	1.308	0.580	-1.864	-5.552	1.617	1.170	-4.215	-0.578	0.232	1.628
Pesticides/C-Sugar	4.441	7.293	-17.948	-2.634	3.668	3.614	4.974	1.204	39.307	1.827	-0.566	-1.290
Pesticides/Fertilizers	0.112	1.395	-1.117	-1.233	0.472	3.604	0.288	0.502	3.829	1.341	-0.017	-0.315

T-scores are base on asymptotic standard errors.

Table 9: Effects of abolishing green rates on West German policy prices

Crop Year	green rate rapeseed	green rate cereals	market rate	percentage change in effective policy prices rapeseed	cereals	C-sugar
	DM/ECU			% change		
1980/81	2.752	2.752	2.518	-9.3	-9.3	0.0
1981/82	2.657	2.657	2.434	-9.2	-9.2	0.0
1982/83	2.575	2.575	2.315	-11.3	-11.3	0.0
1983/84	2.515	2.528	2.252	-11.7	-12.3	0.0
1984/85	2.450	2.453	2.231	-9.8	-9.9	0.0
1985/86	2.385	2.398	2.169	-10.0	-10.5	0.0

Source: Herlihy et. al. (1989)

the following way. Since C-sugar must be exported at international prices, eliminating green rates would have no direct effect on prices received by farmers. Since green rates are applied directly to intervention prices for cereals, eliminating green rates would reduce cereal prices by the full 9-10% given in Table 10. Since green rates are applied only to the crushing-subsidy portion of the rapeseed price, roughly 50% of the change in the policy price would be passed on to farmers.

The results of the earlier sections create a dilemma when choosing the appropriate model to simulate the policy changes. The hypotheses that prices matter in the short-run and that West German agriculture exhibits jointness-in-production are supported by the data, and all estimated models reported earlier explain a large portion of the deviation in the data. At the same time, the data did not support the hypothesis of quasi-convexity in the underlying restricted profit function, nor did it support the insignificance of lagged dependent variables implicit in a static-optimization problem.

Under the working assumption that it is generally best to impose theory on the data, the results of the quasi-convex restricted profit function model are reported in Table 11. Hedging all bets, simulation results from the model without convexity restriction as well as the dynamic version of the model are reported as well.

Two general conclusions emerge across all three simulations. The first is that substantial reductions in

Table 10: Simulated annual percentage changes in selected variables under no-green-rate scenario.

	Mean Change	Stdv. of Change	Minimum Change	Maximum Change
	----------- Convexity imposed -----------			
Supplies of				
cereals	-1.70	0.25	-2.04	-1.39
oilseeds	1.80	0.58	1.01	2.59
C-sugar	-3.13	1.24	-5.51	-2.08
Input demand for				
fertilizer	-2.20	0.33	-2.69	-1.81
pesticides	-3.30	0.59	-4.25	-2.58
	--------- Convexity not imposed ---------			
Supplies of				
cereals	-0.88	0.13	-1.07	-0.71
oilseeds	-1.59	0.53	-2.38	-0.88
C-sugar	-5.60	2.31	-10.10	-3.77
Input demand for				
fertilizers	-2.89	0.44	-3.56	-2.38
pesticides	-2.81	0.53	-3.66	-2.20
	-------------- Dynamic model ------------			
Supplies of				
cereals	-0.56	0.09	-0.70	-0.46
oilseeds	-0.25	0.11	-0.44	-0.13
C-sugar	7.79	4.49	4.71	16.22
Input demand for				
Fertilizers	-3.23	0.59	-4.12	-2.46
Pesticides	-4.31	1.26	-5.92	-2.44

support prices through a reduction of green rates will have a quantitatively negligible impact on output for crops.

Recalling that the models fit very well, explaining 80-90% of the deviations in the underlying data, the simulated differences in supplies and input demand are still within a reasonable range of model error, ranging from 0 to 7%. The result stems from the low price elasticity for cereal and from the uneven way in which green rates affect the three crops modeled. The price changes caused by eliminating green rates are only partially passed on to oilseed prices (via the crushing subsidy), non-quota C-sugar prices are unaffected, and while cereal producer prices receive the full impact of the policy revision, cereal supplies are inelastic in the short-run.

The second result consistently reported across all three scenarios is that eliminating green rates, with the consequential reduction in cereal and oilseed producer prices, will lead to a reduction in fertilizer and pesticide applications as well as application rates. To the extent that fertilizer runoff and pesticide use generate negative externalities, eliminating West German green rates will result in positive environmental gains producing effects beyond the normal consumer and producer welfare changes.

The three simulations offer conflicting results as to the relative changes among the crops. Under the convex-static model simulation, cereal production declines, while substitution effects dominate in oilseeds, leading to a small increase in production. In the unrestricted version of the static model, production of all three crops decline. The dynamic-version of the unrestricted model, price cuts in oilseeds and cereals lead to reduction in the production of those crops and a substitution of productive resources into C-sugar.

Concluding remarks

The empirical work presented in this paper indicates that the short-run production effects of eliminating green rates on supply and input-demand for cereals, oilseeds, and sugar in West Germany would be relatively small. Despite some savings from reduced input applications, the net effect will therefore be a reduction in farm income. The price effects and the resulting income effects will be disproportately distributed among producers, conversely reflecting the disproportioned benefits of the current system. Producers of cereals have the most to lose by the change. At the same time the analysis convincingly supports the notion that crop production in the EC is joint and that policies aimed at one sector of agriculture have created secondary results in other markets. The quota for sugar perhaps best exemplifies how a policy aimed at one crop in agriculture spills over into production decisions for other crops. In addition, other policy interventions, such as tax-code provisions and direct subsidies are shown to create distortionary effects as well.

Policy interventions which have remained in place over a number of years distort the accumulation of fixed resources which have lasting effects. The empirical results indicate that distortions generated by the inappropriate accumulation of capital generate biases as well.

Generally speaking, the results show that the immediate gains in efficiency resulting from supply changes are quite limited relative to the immediate costs in terms of price and income reductions faced by West German farmers--despite quite substantive indications of resource misallocations. Therefore, the prospects of long-term efficiency gains must motivate policy decision-makers to undergo a difficult period of adjustment in the short-run.

APPENDIX A.

The Effects of a Currency Realignment on Relative Prices

Consider two crops, rapeseed and wheat, in the UK facing a currency devaluation of 20%, where:

Pre-devaluation:

Wheat target price	357.7 ECU
Rapeseed target price	464.1 ECU
Representative world price	183.5 ECU
Rapeseed production aid	280.6 ECU

Converting prices to the national currency:

Green rate:	0.61865
Market rate:	0.66899

Rapeseed world price (183.5 * 0.66899)	122.73
Rapeseed production aid (280.6 * 0.61865)	127.23
Rapeseed target price in national currency	249.96
Wheat target price in national currency: (357.7 * 0.61865)	221.29

Post-devaluation

Rapeseed world price (183.5 * 0.80279)	147.32
Rapeseed production aid (280.6 * 0.61865)	127.23
Rapeseed target price in national currency	274.55
Wheat target price in national currency: (357.7 * 0.61865)	221.29

Conversion of world prices for rapeseed at market rates of exchange allow the full impact of the devaluation to be translated into the national currency. Production of rapeseed has become more attractive (due to higher output prices, expressed in the national currency) relative to wheat.

Source: CAP Monitor

APPENDIX B.

Calculation of Monetary Differential Amounts

1. Rapeseed Target prices and published rates of aid (ECU/100kg) on 02/15/85

Target Price	Aid	World Price
50.38	11.04	39.340

2. Exchange Rates for U.K. and West Germany

The U.K. green pound is worth more than the market rate of the pound and the German green mark is worth less than the market rate against the ECU.

UK green rate:	1 ECU = £0.618655 or £1 = 1.61641 ECU
UK agricultural market rate:	£1 = 1.58691 ECU ÷ 1.033651 (CRCF-coefficient)[5]
therefore	£1 = 1.53525 ECU
West German green rate	1 ECU = DM 2.38516 or DM 1 = 0.41926 ECU
West German agricultural market rate	DM 1 = 0.446062 ECU ÷ 1.033651 (CRCF-coefficient)
therefore	DM 1 = 0.43154 ECU

3. Calculation of Rapeseed Subsidy in national currency without MDA adjustment

	UK	West Germany
i. Target price (50.38*green rate)	£31.17	DM 120.16
ii. Aid (11.04*green rate)	£ 6.83	DM 26.33
iii. Net cost in national currency	£24.34	DM 93.83
iv. Net cost in ECU	37.39 ECU	40.49 ECU
v. World price	39.34 ECU	

Without MDA adjustment, UK rapeseed is cheaper to UK crushers than is West German rapeseed to West Germany crushers. The net cost in the UK is below the world price so the subsidy is too high and vice versa for West Germany.

[5] The coefficient represents a central rate correcting factor. Starting in the marketing year 1984/85, for each product, a coefficient (central rate correcting factor), is applied in agrimonetary calculations, including MCA/MDAs. This is equivalent to revaluing the ECU for agricultural purposes and cuts positive MCAs at the expense of increasing negative MCAs. The central rate correcting factor is adjusted following EMS realignments.

4. Calculation of the basic MDA percentages

MDA percentages equal the percentage divergence of green rates from agricultural market rates:

UK MDA% = 1 - (1.61640/1.53525) * 100% = -5.286%
German MDA% = 1 - (0.41926/0.43154) * 100% = 2.846%

If the MDA differs by less than one percentage point from the existing MDA, the existing MDA continues to apply.

5. Application of MDAs to current (spot) rates of aid

The basic MDA percentage is applied to both the target price (first element) and to unadjusted rate of aid (second element). If the MDA is positive, it is positive on the target price and negative on the aid; if the MDA is negative, then the reverse.

	UK	West Germany
Target price	£31.17	DM 120.16
Aid	6.83	26.33
MDA first element	- 1.65	3.42
MDA second element	0.36	- 0.75
MDA adjusted aid	5.54	29.00
Net cost in national currency	25.63	91.16
Net cost in ECU converted at agricultural market rates	39.34 ECU	39.34 ECU

Where the seed is crushed in another member state other than the one in which it was harvested, the rate of aid is converted using the rates published in the Official Journal.

If UK rapeseed was crushed in Germany, the aid in DM would be:

UK adjusted aid is: £5.54
÷ bilateral £/ECU rate: 0.618334
* bilateral DM/ECU rate: 2.22732 = DM 19.95

Note that this is less than the aid in DM for West German produced rapeseed because the green rate support system currently means that UK rapeseed prices are lower than West German.

Source: CAP Monitor

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