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Feed Grains Imports and Pricing in the European Economic Community

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ABSTRACT

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This study focuses on the nature of feed grains price policy in the European Economic Community (EEC). It presents an econometric model to identify factors affecting EEC feed grains target prices and to explain the effects of these prices on EEC feed grains imports, world prices, and EEC livestock inventory.

FEED GRAINS IMPORTS AND PRICING IN THE EUROPEAN ECONOMIC COMMUNITY

Introduction

There has been a continuing interest in the European Economic Community (EEC) feed grains price policy because of the importance of EEC in world feed grains trade. This study focuses on the nature of EEC feed grains price policies, presents an econometric model, and draws conclusions on the effects of these policy variables on EEC feed grains imports, world prices, and EEC livestock inventory.

Background

The EEC has played an important role in world feed grains trade over the past decade and a half. From 1965/66 to 1981/82, EEC[1] total imports, including intra-community trade, accounted for 31.8 percent of total world feed grains trade.

The primary purpose of EEC has been to create a customs union by removing restrictions among member countries' trade and imposing a common system of restrictions for trade with nonmember countries. Considering the importance of the agricultural sector in their economies, member countries stressed the need for a Common Agricultural Policy (CAP) when forming EEC. The basic objectives of CAP set out in the Treaty of Rome, signed by the six original member

states in 1957, are (1) to increase agricultural productivity, (2) to assure a fair standard of living for the farm population, (3) to stabilize markets, (4) to guarantee regular supplies, and (5) to maintain reasonable consumer prices (Balassa, p. 276).

Grains, considered the cornerstone of the policy, were the first product to come under CAP. Under the Community system, three types of prices are set for each type of grain, before the crop year begins. The other two are linked to the first--the target price--that price toward which the common market price should aim. Its level is set to provide a fair return to the efficient family farm producer and to serve as a guide for farmers in planning their production.

The intervention price is set from 12 to 20 percent below the target price as a guaranteed minimum price for producers. Intervention agencies and marketing centers throughout EEC stand ready to purchase grain offered at this price, if it meets specified quality standards.

The threshold price is the minimum price by which grain imports from non-EEC countries enter EEC ports, thus insulating domestic EEC prices from world price fluctuations. The threshold price insures that imported grain will not sell below the target price in domestic markets. If higher than world price, the threshold price necessitates the imposition of import levies (variable levies), calculated as the difference between the prevailing threshold price and the lowest quoted c.i.f. price at Rotterdam, and adjusted for quality differences. For exports from EEC, subsidies are granted to make up this same difference.

A Model for the EEC Feed Grains Imports and Pricing

In this study the policy variable, EEC feed grains target price,[2] is treated as endogenous and also its effect on EEC feed grains imports, livestock inventory, and feed grains world price is explored.

The EEC Net Import Demand Function

The quantity of imports at any given time is the quantity supplied subtracted from the quantity demanded domestically.

The EEC feed grains supply function. The EEC supply function for feed grains (SF), based on the assumption of profit maximization by producers is specified as a linear function of present and lagged feed grains target prices (TP), the lagged index of input (factor) prices for feed grains production (FP), the current target price of soft wheat (SP), and a time trend (T).

$$SF_t = a_0 + a_1TP_t + a_2TP_{t-1} + a_3FP_{t-1} + a_4SP_t + a_5T + e_1$$

Because target prices are set each year prior to the coming crop year, prices at harvest time may be rather accurately anticipated by farmers when making planting decisions so that a positive relationship would be expected between the current target price and supply. But current supplies may also be affected by the preceding year's market prices which are closely related to that year's target price so a positive relation is also expected for the lagged target price. The lag on the

index of input prices reflects the fact that planting decisions are made six to twelve months before the crop is harvested; an inverse relationship with supply is anticipated. The target price of soft wheat is included as a substitute for feed grains when farmers are making their planting decisions, with a negative relation expected. Finally, the time trend is supposed to capture the effect of technical developments on yield with a positive effect anticipated.

The EEC feed grains demand function. The EEC demand function for feed grains is based on the assumption of profit maximization by producers who use feed grains as an input, and utility maximization by consumers who are direct users of feed grains as food. EEC demand for feed grains (DF) is specified as a linear function of the current market price of feed grains which is in turn a function of current feed grains target prices, EEC's GDP at constant prices converted into European common currency at constant exchange rates (YEC), the EEC livestock inventory (L), the price of oilseed meal in the Community (PO), and the quantity of manioc (casava roots) utilized in the Community (MA).

$$DF_t = b_0 + b_1 TP_t + b_2 YEC + b_3 L_t + b_4 PO_t + b_5 MA_t + e_2$$

The target price for feed grains would be expected to have a negative effect on demand, but the expected sign on the coefficient associated with income is ambiguous. As income rises in countries with relatively low levels of per capita income, the quantity of feed grains demanded for food purposes is expected to increase. However,

in countries with higher levels of per capita income, there may be a substitution of higher priced commodities for feed grains in the diet. Additionally, in all countries, as the income level increases, the quantity of livestock products demanded will increase, which will lead to an increase in feed grains demanded for feed. Both manioc and oilseed meal can enter EEC without restriction and when mixed serve as a substitute for feed grains. A negative relationship with demand for feed grains would be expected for both except that oilseed meal is also mixed with feed grains, serving as a complement, making the sign of its associated coefficient ambiguous.

The net import demand function. Now that the EEC supply and demand functions have been specified, the EEC import demand function can be specified as the EEC domestic feed grains supply equation subtracted from the demand equation. The variables that have a positive effect on domestic demand and/or a negative effect on domestic supply, will have a positive effect on net import demand. Likewise those which effect domestic demand negatively and/or domestic supply positively will have a negative effect on net import demand.

The EEC Livestock Inventory Equation

The EEC livestock inventory equation is based not only on current but also on expected profits by livestock and poultry producers because of the time lag involved in the animals' maturation. To attempt to model this, both current and lagged values of three price variables are specified; target prices of feed grains, nonfeed input

prices, and livestock product prices. The current and lagged values of feed and nonfeed inputs are expected to move in an inverse direction with respect to the inventory while current and lagged output prices would move directly.

The World Price Equation

The derivation of the appropriate world price equation for feed grains is somewhat more complex. First, world supply of feed grains outside of EEC depends importantly on weather and various technological and political factors and will be considered exogenous to the model. The quantity of feed grains demanded by the rest of the world (ROW) is seen as depending on the world price and real income in ROW. The export supply offered by ROW, then, is the difference between the quantity supplied and demanded by ROW. This export supply when equated with a (simplified) EEC import demand function, including only the target price as an argument, yields world price as a function of the target price, ROW feed grains production, and income in ROW. The anticipated effect of ROW production on world price is a negative one, but the sign of the coefficient associated with income is ambiguous for some of the same reasons mentioned above. The target price is expected to have a negative coefficient in the world price equation. As target prices increase, the quantity demanded will decrease both for domestically produced and imported feed grains, and since EEC is a large feed grains importer, this is assumed to have a depressing effect on world price.

The Target Price Equation

In order to identify the factors affecting target price of feed grains, it is assumed that EEC policy makers have a utility function with CAP objectives as arguments. Other relevant arguments stem from the welfare impacts of tariffs on feed grains users, producers, and the government. (The welfare impacts of tariffs are explained in Kindleberger and Lindert, Chapter 9.) Although some of the member countries are net producers and some are net consumers of feed grains, because target prices are common throughout the EEC, one utility function is assumed for the whole. From the assumption of the existence of this EEC utility function that is maximized with respect to feed grains target prices, it is possible to derive a feed grains target price function. This equation is obtained by setting the partial derivative of the utility function with respect to target price equal to zero and solving the resulting equation for target price.

In setting target prices, it is assumed policy makers consider feed grains users' surplus (CS), feed grains producers' revenue (PR), quantity of feed grains imported (QI), the value of imported feed grains (VI), and government revenue from the variable levy (GR). (For a similar development see Reed and Ladd.) CS and PR would be expected to have a positive effect on the policy makers' utility function, while QI and VI would have negative impacts, from their adverse effects on the EEC level of self sufficiency and its balance of payments. Finally, a positive effect on utility is expected from GR.

All the arguments in the EEC policy makers' utility function can be specified as a function of the EEC feed grains supply, demand, net import demand, livestock inventory, and world price--each of which is a function of the target price (and other variables). Feed grains users' surplus is the area under the EEC feed grains demand curve above the domestic price, (which is closely related to target price). Feed grains producers' revenue is simply the target price times the EEC feed grains supply, the quantity imported is represented by the net import demand function, the value of these imports is the world price times the quantity imported and, finally, government revenue from the variable levy is the threshold price minus the world price, times the quantity imported. Assuming that the policy makers set the target price (TP) to maximize this utility function, from the first-order conditions

$$\frac{\partial U(CS, PR, QI, VI, GR)}{\partial TP} = 0$$

an equation for the target price may be derived. The result (see Rastegari, for details of the derivation) yields the target price as a function of the lagged target price (TP_{t-1}), lagged input (factor) price in the EEC (FP_{t-1}), the target price of soft wheat (SP), time trend (T), world price of feed grains (WP), EEC quantity imported from ROW (QI), EEC real incomes (YEC), livestock inventory (L), the price of oilseed meal (PO), and the quantity of manioc utilized in the EEC (MA).

$$TP_t = \beta_0 + \beta_1 TP_{t-1} + \beta_3 FP_{t-1} + \beta_3 SP_t + \beta_4 T + \beta_5 WP_t + \beta_6 OI,$$

$$+ \beta_7 YEC, + \beta_8 L_t + \beta_8 PO_t + \beta_9 MA_t.$$

The coefficient of TP_{t-1} is expected to be negative--if TP_{t-1} was set high, it would depress quantity demanded and increase quantity supplied; policy makers would move to counteract these effects in t. Positive signs are expected for FP_{t-1} and SP_t. Higher input costs encourage policy makers to set higher target prices, and grain target prices tend to move together. Positive signs are also expected for OI_t and L_t--higher imports and livestock inventory will encourage higher target prices to prevent shortages in feed grains market. Negative signs are expected for manioc utilization, a feed grains substitute, and for time trend--as yield increases because of technological developments over time, the target prices will be set lower to prevent surpluses. The signs of coefficients associated with income, the price of oilseed meal, and the world price are ambiguous.

Because feed grains net import demand, livestock inventory, and world prices not only affect the target price but are in turn affected by it, the target price equation must be estimated together with the other three equations as a simultaneous system.

While each of the variables specified in the target price equation "belongs" there, having been derived from the utility maximization problem, the model as it stands is intractible. Not only were the degrees of freedom very limited (with only 17 years of data--16 observations because of the lag) but also there were severe

multicollinearity problems. The explanatory power of some of the variables are almost entirely captured by the others. As a result, a smaller model[3] was estimated using two-stage least squares; results are reported in Table 1.

Results and Conclusion

In all four equations, the signs of the coefficients of included variables are consistent with what is expected from economic theory. The target price equation, in particular, with all but one coefficient being large releative to their standard errors, met one objective of this study: To explain factors affecting EEC feed grains target price setting. Looking at the other equations in Table 1, however, none of the coefficients associated with the EEC target price is significantly different from zero, though they carry the "right" sign. Little support, therefore, can be found in this study for the commonly held belief that EEC target prices have important "large country" impacts on world feed grains prices. Similarly, the commonly held hypotheses that target prices are important in the levels of livestock inventory and of feed grains imports to the Community are not supported empirically.

TABLE 1. Two Stage Least Squares Estimates of the EEC Feed Grains Imports and Pricing Model, 1962/63—1978/79.

Import Demand	$QI_t = -122821.00 - 529.62TP_t + 2.08\ L_t - 5.38MA_t^{*} - 72.34\ YEC_t + 912.99SP_t$	$R^2 = 0.523$
	(73692.03) (630.76) (1.41) (2.20) (50.64) (582.47)	
Livestock Inventory	$L_t = 2809.68 - 91.13TP_t + 0.98L_{t-1}^{**} + 73.93LP_{t-1}$	$R^2 = 0.957$
	(6004.90) (86.37) (0.14) (57.57)	
World Price	$WP_t = 54.07 - 0.07TP_t + 2.76YROW_t^{*} - 0.000380P_t$	$R^2 = 0.545$
	(37.61) (0.52) (1.27) (0.00024)	
Target Price	$TP_t = -57.76^{**} + 0.0016L_t^{**} - 0.0061MA_t^{*} + 0.74FP_{t-1}^{**} + 0.00028QI_t - 0.186WP_t^{**}$	$R^2 = 0.996$
	(13.73) (0.0002) (0.0025) (0.12) (0.00024) (0.049)	

Standard errors are in parenthesis. Single asterisk indicates significance at the 5% level; double asterisk, at the 1% level.

QI—Quantity of feed grains imported by EEC; corn, barley, sorghum, oats, and rye were converted to feed units (the feed value of 1 kg. of barley) before aggregating; million units.

TP—Target price in UA/MT; units of account per metric ton; UA is a fictitious but legal currency introduced in 1962. Actually, since target price data were not complete before 1967, threshold prices were used instead.

L—Livestock inventory; all livestock and poultry were converted to livestock units (= 2600 kg feed units) before aggregating; thousand units.

MA—Manioc utilization, 1000 metric tons.

YEC—EEC Gross Domestic Product, 1000 million EURs a European currency unit.

SP—Target price for soft wheat, UA/MT.

LP—Index of livestock product prices, 1970/71=100.

WP—World feed grains price, UA/MT.

YROW—Index of GDP in the rest of the world (non-EEC), 1974/75=100.

QP—World feed grain production, million feed units.

FP—Index of feed grains factor prices, 1970/71=100.

Footnotes

[1]EC-9, excluding Greece which joined January 1, 1981.

[2]A weighted average of the target prices for corn, barley, sorghum, oats, and rye is used to represent feed grains target price. The weights are based on the coefficients used in converting each type of feed grain from product weight into feed units.

[3]In the livestock inventory equation, lagged livestock inventory was substituted for lagged values of nonfeed input prices and target price. Current nonfeed input prices and livestock product price were dropped because of the high correlation they had with the remaining variables.

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