



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

# MARY A. MARCHANT, STEVEN A. NEFF AND MEI XIAO\*

## *Political Economy of United States and European Union Dairy Policy Choice*

**Abstract:** Policy interventions in dairy markets are pervasive in industrialized countries. Resistance to domestic agricultural policy reform in the USA and the EU is partially responsible for delays in reaching a GATT Uruguay Round agreement. We explain US and EU dairy policy choices by analyzing the influence of key domestic variables. Empirical results for the US price support and the EU intervention price show a dominant influence of the support (intervention) price in the previous year. US farm income, stocks, and government costs also influenced US policy-makers' choice of the price support level. In the EU, where multiple policy instruments are used, government costs influence both production and surplus disposal policies. The EU chooses dairy policies sequentially — first the farm support policies and then surplus disposal policies. The results imply that trade policy reforms will be most acceptable if farm incomes can be maintained without increasing government support expenditures.

## INTRODUCTION

Through 7 years of negotiation in the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), the USA and the EU<sup>1</sup> locked horns over agricultural policy differences, including methods of domestic support and export competition. Resistance to reform in such countries as the USA and the EU was partially responsible for delaying a GATT Uruguay Round agreement. By understanding why regions choose the policies they do, the relative importance of key variables affecting policy choice are identified and can be used to anticipate policy responses to major developments, such as the GATT.

US and EU dairy policies make an excellent case study for agricultural policy choice. The USA is second only to the EU in world milk production. Dairy policy is important in the agricultural support budgets of both the USA and the EU. As an example of the large and variable government expenditures, US dairy program costs ranged from \$700 million to \$2.6 billion in the 1980s. Dairy averaged 7 percent of US farm support costs in the late 1980s, with an average annual expenditure of \$1.6 billion. The budget problem is even more severe in the EU, where dairy has historically received the greatest amount of government support, averaging 18 percent of EU agricultural spending at \$6 billion annually, with the largest portion used for export subsidies.

Government domestic and trade policies play a significant role in US and EU dairy markets, unlike other important commodities (for example, pork) with much less policy direction. Also, significant dairy policy changes took place in both the USA and EU during the 1980s, fueling dramatic price changes on international markets and realized in both domestic markets (Marchant, Neff, and McCalla, 1992). By contrast, the sugar markets in the USA and the EU also have heavy policy involvement, but there have been no significant policy changes in sugar since 1982.

Dairy product markets are among the most distorted agricultural markets in the world, as evidenced by high ratios of domestic prices to international prices in many countries. In

\* University of Kentucky, Economic Research Service, US Department of Agriculture and University of Kentucky, respectively.

the decade 1982–1991, US support prices averaged 1.85 times the international milk price equivalent, as composed from international prices for butter and skim milk powder (which we refer to as powder). For the EU during the same time, the intervention milk price equivalent was more than twice the international milk price equivalent.

The support price is the primary US dairy policy instrument. The authorizing legislation specified that the manufacturing milk price would be supported through purchases of manufactured dairy products (MDP) by the Commodity Credit Corporation (CCC). The CCC offers to purchase MDP from handlers at the support purchase price, equalling the price support level plus a make allowance (processing margin).

European Union dairy policy was created in 1962, upon adoption of the Common Agricultural Policy (CAP). EU domestic dairy policies are targeted at two different levels, production and surplus disposal. The EU supports minimum producer prices through support purchases (called intervention in the EU) of butter and powder, similar to the support purchase prices used in the USA. The other key production policy variable is the marketing quota, a supply control measure instituted in 1984 by the EU Council of Ministers in an effort to decrease costly surpluses generated by the intervention price policy. The EU disposes of surpluses through subsidized domestic consumption and export subsidies. We estimate the policy choice function for subsidized EU domestic consumption of powder as the subsidy rate for use in calf feed, the largest use of EU powder. Similarly for butter, we estimate the policy choice function for the subsidy rate for butter use by food manufacturers, the largest category of subsidized domestic consumption.

## US AND EU DAIRY POLICY CHOICE MODELING

There is a growing literature that incorporates political decisions into commodity models, making the models more realistic, particularly for highly regulated markets. In order to endogenize government behaviour, one must be familiar with a wide body of literature on political economy. Publications which survey this literature include Young, Marchant, and McCalla (1991); Carter, McCalla and Sharples (1990); Rausser, Lichtenberg, and Lattimore (1982); and Buchanan *et al.* (1978). In general, Buchanan *et al.* surveyed political economic theory, while the other publications surveyed empirical modeling of this theory as it relates to agricultural policy.

Economists differ on the approach used to endogenize government behaviour. Rausser, Lichtenberg and Lattimore categorized empirical analyses of government behaviour into 2 groups: (1) analytical derivation followed by estimation of policy instruments from policy preference or criterion functions (criterion function models) and (2) direct estimation of policy instrument behavioural equations (behavioural models). Proponents of criterion function models, which analytically derive and then estimate policy instruments, include Rausser and Freebairn (1974), Zusman (1976), Zusman and Amiad (1977), Sarris and Freebairn (1983), Paarlberg (1983), Paarlberg and Abbott (1986), Riethmuller and Roe (1986) and Lopez (1989). Behavioural models, which directly specify and then estimate policy equations, include Abbott (1979a and 1979b), Lattimore and Schuh (1979), and Dixit and Martin (1986). Models which use both criterion function and behavioural approaches include De Gorter (1983), Gardner (1987), and Marchant

(1993). Beghin and Foster (1992), Rausser and Foster (1990), Beghin (1990), and Love, Rausser and Burton (1990) have recently added to the political economy literature.

Unfortunately for researchers of policy choice, many policies do not continue for extended periods of time. The result is a limited time series with few observations for estimation purposes, as in the case of the EU marketing quota. In the case of dairy policies, only a few of the main policy instruments have existed over a long time period compared to other short-lived policies, e.g., the US Dairy Termination Program. Not only are the policies changeable and sometimes brief, but social priorities change. An example is budget expenditure for dairy programs, which is far more important in the USA in 1993 than it was in the 1970s and the early 1980s. Econometrically, these changes in social priorities mean that variables used to explain policy choices can have changing coefficients.

### **General Theoretical Model of Dairy Policy Choice and US Model Specification**

Since this paper is limited to an analysis of factors that influence dairy policy choice, only dairy policy choice equations are estimated, as opposed to a structural model of the dairy industry. A general form for policy-makers' choice of the US support price for MDP follows. (Note, the functional form for this model also describes the EU intervention prices, as shown below.)

$$(1) \hat{p}_t^{Spt} = f[p_{t-1}^{Spt}; Stocks; GC; Y^{Farm}; Z]$$

where:

$p^{Spt}$	=	US support price
$Stocks$	=	government stockpiles
$GC$	=	government costs
$Y^{Farm}$	=	domestic farm income
$Z$	=	a vector of other exogenous variables

Equation (1) describes the support price as function of five general groups of variables based on economic and political economic theory. (1) Institutional inertia — following the hypothesis that, once a policy is in place, it does not change dramatically, we expect a positive relationship between the support price in the current year and the support price in the previous year (Allison, 1971; Lavergne, 1983; Von Witzke, 1990; and Young, 1987). (2) Stocks — we expect stocks to be negatively related to the price support level; that is, as stocks rise, policy-makers should lower the guaranteed minimum support price level in an effort to reduce over production and the build up of costly stockpiles of MDP. (3) Government costs — as the budgetary costs rise, the price support level should fall (Infanger, Bailey, and Dyer, 1983; De Gorter, 1983; and Von Witzke, 1990). (4) Domestic farm income — as farm income level falls, policy-makers may attempt to improve farm incomes by raising the price support level, so a negative relationship is expected (Dixit and Martin, 1986; and Gardner, 1987). (5) A vector of other applicable exogenous variables; for example, international variables following the hypothesis that policy-makers consider the international market when choosing domestic policy instruments (Lattimore and Schuh, 1979; Sarris and Freebairn, 1983; Paarlberg, 1983; Paarlberg and Abbott, 1986; and Von Witzke, 1990); or a variable representing special interest groups, following the hypothesis that political influence, as measured by campaign

contributions or economic rent can influence policy-makers' decisions (Sarris and Freebairn, 1983; Caves, 1976; and Krueger, 1974).

### Empirical Estimation of the US Policy Choice Model

Data were obtained from the US Department of Agriculture, the Bureau of Labor Statistics (BLS), and the Federal Election Commission (FEC). A dummy variable was included for years in which Congress enacted farm legislation. Ordinary least squares (OLS) estimations used annual time series data, beginning in 1951, depending on data availability for specific variables. Presented below are empirical estimation results for US dairy policy choice of the price support level for MDP ('t' statistics are listed below estimated coefficients).

$$(2) \hat{P}_t^{Spt} = 0.391 + 1.13 P_{t-1}^{Spt} - 0.043 Exp(Stk)_t - 0.022 Y_{t-1}^{Farm} + 0.008 (GR - GC)_{t-1}^{US}$$

(2.3) (42.8) (-5.3) (-2.2) (3.7)

$R^2 = 0.99$   $F = 1152$   $h = 0.45$   $n = 31$

$$(3) \hat{P}_t^{Spt} = 0.005 + 1.31 P_{t-1}^{Spt} + 0.005 (GR - GC)_{t-1}^{US} - 0.053 \left[ \frac{GC^{MDP}}{GC^{Ag}} \right]_{t-1}$$

(0.03) (32.6) (2.87) (-6.0)

$$- 0.62 (P^{Spt} - P^{Wld})_{t-1}$$

(-5.8)

$R^2 = 0.99$   $F = 815$   $h = -0.3$   $n = 15$

where previous definitions hold and

$Exp(Stk)$	=	expected additions to government stockpiles
$(GR - GC)^{US}$	=	US Federal Government deficit, i.e., government revenues minus government costs
$GC^{MDP} / GC^{Ag}$	=	government costs for the dairy program as a share of government costs for all agricultural programs
$P^{Wld}$	=	world price for manufactured dairy products

Equation (2) was estimated at an aggregate level using nominal prices, where expected stocks were measured as actual additions to government stocks, assuming perfect foresight, and farm income was measured as the change in net farm income. The difference between Equations (2) and (3) was that Equation (3) has fewer observations but includes two more independent variables, both of which were significant: (1) the costs to government of the dairy program relative total agricultural program costs, and (2) the difference between the support price and the world price for MDP.

Empirical results indicated a common set of explanatory variables which appeared to affect policy-makers' choice of the support price: (1) the support price in the previous year, supporting the hypothesis that institutional inertia is important; (2) the dairy program's share of total agricultural program costs to government, where, as the cost share increased in the previous period, the support price fell; (3) the difference between the support price

and the world price, where a positive price distortion resulted in a lowering of the support price; (4) expected additions to CCC stocks, that is, as stocks increased, the support price fell; (5) change in net farm income, that is, as farm income fell, support prices rose, and (6) US Federal Government deficit, where as the deficit increased, the support price fell. (Estimations using real prices indicated that the first three variables were significant.) Empirical results were good in terms of statistical significance and properties, and reinforced empirical results of prior research, described above.

### Theoretical Model and Empirical Results for EU Dairy Policy Choice

The theoretical policy equations and empirical estimation results are described below for four key EU dairy policies: (1) intervention price, (2) marketing quota, (3) EU domestic subsidized consumption rate, and (4) subsidized export rate. Annual time series data ranging from 1978 through 1992 (depending on the variable) were used for estimation.

#### *Intervention price*

$$(4) \quad P_t^{Intv} = f(P_{t-1}^{Intv}; Y_{t-1}^{Farm}; Stock_{t-1}; GC_t^{CAP}; Z)$$

where previous definitions hold and

$$P_t^{Intv} = \text{EU intervention price}$$

$$GC_t^{CAP} = \text{EU government costs spent on the Common Agricultural Policy}$$

The 'Z' vector for the EU represents, in addition to the considerations mentioned for the USA, the presence of the milk marketing quota and the particular interests of member states, where individual members may have more or less than equal influence on EU policy choice based on their political power (comparable to political influence by special interest groups). The only 'Z' variable that proved quantifiable was the marketing quota, which is included as a dummy independent variable set equal to 1 for the years since it was implemented in 1984 and equal to 0 before 1984. Empirical results are presented in Equations (5) and (6) for powder and (7) and (8) for butter.

$$(5) \quad \hat{P}_t^{Intv} = 168 + 0.6 P_{t-1}^{Intv} + 0.02 Y_{t-1}^{Farm} + 0.08 Stock_{t-1} - 0.006 GC_t^{CAP}$$

(1.8)	(4.6)	(2.8)	(2.1)	(-1.8)
$R^2 = 0.98$	Adj $R^2 = 0.97$	$F = 104$	$n = 15$	

$$(6) \quad \hat{P}_t^{Intv} = 223 + 0.6 P_{t-1}^{Intv} + 0.02 Y_{t-1}^{Farm} + 0.07 Stock_{t-1} - 0.006 GC_t^{CAP} + 27 M_t^Q$$

(1.6)	(4.0)	(2.2)	(1.5)	(-1.7)	(0.4)
$R^2 = 0.98$	Adj $R^2 = 0.96$	$F = 76$	$n = 15$		

$$(7) \hat{P}_t^{Inv} = 1456 + 0.6 P_{t-1}^{Inv} + 0.002 Y_{t-1}^{Farm} - 0.03 Stock_{t-1} - 0.01 GC_t^{CAP}$$

(3.0) (3.0) (0.1) (-0.8) (-0.07)

$R^2 = 0.65$  Adj.  $R^2 = 0.51$   $F = 5$   $n = 15$

$$(8) \hat{P}_t^{Inv} = 1089 + 0.4 P_{t-1}^{Inv} + 0.04 Y_{t-1}^{Farm} + 0.1 Stock_{t-1} - 0.01 GC_t^{CAP} - 495 M_t^Q$$

(2.6) (2.6) (1.7) (1.2) (-0.81) (-2.5)

$R^2 = 0.79$  Adj.  $R^2 = 0.68$   $F = 7$   $n = 15$

where previous definitions hold and

$M_t^Q =$  marketing quota dummy variable

The overall model is significant at the 1 percent level for both powder models and for the butter model that included the marketing quota dummy variable, while Equation (7) was significant at the 2 percent level. The previous intervention price is significant at the 1 percent level in all cases except in Equation (8), where it was significant at the 3 percent level. For the stock variable, we expected a negative sign. Although most of the estimated results had a positive sign, the stock variable was insignificant in most cases. The government cost variable had the correct sign and is most significant in Equation (5). The marketing quota appeared to affect the butter intervention price but not the nonfat powder intervention price. The farm income variable had a positive sign in all of the estimated equations and its level of significance varied, but was most significant for the powder models. Our original hypothesis was that if farm incomes fell in the previous year, the EU would raise the intervention price in an effort to achieve the domestic goal of raising farm incomes. EU farm incomes rose in 11 of 15 observations, while in the USA the changes in farm incomes were equally split between rising and falling observations.

One possible explanation is asymmetric decision making where policy-makers strive to improve farm incomes by increasing the support price if the change in farm incomes is negative (a negative relationship), but may wish to continue this trend by further increasing the intervention price if the change in farm income is positive (a positive relationship). Support price increases are always politically popular with farmers, especially so in the EU because there was an explicit policy to bring farm incomes up to nonfarm incomes. The political counterweights to farmers are consumers and the budget. Unless consumers are mobilized (not the case) or there is a binding budget constraint (only occasionally the case), higher support prices are popular.

#### *Milk marketing quota*

$$(9) M_t^Q = f(Stock_t; GC_t^{CAP}; SX_{t-1})$$

where previous definitions hold and

$SX =$  subsidized export rates

The goal of the marketing quota is to decrease both government stocks acquisition and government expenditures by restricting milk production without having to reduce

intervention prices. We expect that the marketing quota will be negatively related to EU government expenditures, stock levels, and subsidized export rates. If CAP costs or stocks are high, quotas are reduced as a correction. Similarly, high export subsidy rates indicate both an oversupplied international market and surplus disposal problems, that may be avoided by reducing the quota. Although the marketing quota is for milk, rather than for butter and skim milk powder, variables for stocks and export subsidies are in terms of products. We accordingly specified the marketing equation twice, using the milk marketing quota as the dependent variable in both and the cost of the CAP as an independent variable in both, but with butter stocks and the butter export subsidy in Equation (10) and powder stocks and the powder export subsidy in Equation (11). This was practical and also served as a test to determine if one product dominated the choice of the marketing quota level.

$$(10) \quad M_t^Q = 121\,093 - 0.8 \, GC_t^{CAP} + 0.8 \, Stock_t^{Butter} - 4.6 \, SX_{t-1}^{Butter}$$

$$(24) \quad (-4.4) \quad (0.2) \quad (-1.1)$$

$$R^2 = 0.86 \quad Adj \, R^2 = 0.75 \quad F = 8 \quad n = 8$$

$$(11) \quad M_t^Q = 117\,799 - 0.65 \, GC_t^{CAP} - 2.9 \, Stock_t^{Powder} - 2.0 \, SX_{t-1}^{Powder}$$

$$26 \quad (-4) \quad (-1.4) \quad (-0.8)$$

$$R^2 = 0.91 \quad Adj \, R^2 = 0.85 \quad F = 14 \quad n = 8$$

Both marketing quota equations were significant at the 5 percent level and virtually all variables exhibited the correct sign, although limited to a short series by the fact that quotas were only instituted in 1984. The government cost variable was significant at the 1 percent level for powder and at the 5 percent level for butter. Although the result was slightly stronger for the equation using butter variables, neither formulation showed stocks or export subsidies to be significant.

#### *Subsidized EU consumption rates*

$$(12) \quad SEC_t = f(Stock_{t-1}; GC_t^{CAP}; P_{t-1}^{Inv})$$

where previous definitions hold and

$SEC =$  subsidized domestic consumption

Subsidized domestic consumption is a surplus disposal strategy (as is subsidized exports), in contrast to the above production policy instruments. We expect that the rate of subsidized consumption is negatively related to government expenditures. If government costs are high, then policy-makers may seek to reduce government costs by decreasing the subsidy rate. Domestic consumption subsidy rates should be positively related to stocks as policy-makers strive to reduce stockpiles and avoid further intervention buying by more intensive use of subsidies. Internal EU subsidies are primarily in the form of animal feed for powder and discount prices to bakeries for butter. Insufficient butter data were available for proper estimation. Empirical results for subsidized powder are presented in Equation (13).



$$(13) \quad SEC_t = -19.7 \quad -0.01 \quad GC_t^{CAP} + 0.1 \quad Stock_{t-1} + 0.5 \quad P_{t-1}^{Inv}$$

$$(-0.3) \quad (-3.6) \quad (3.9) \quad (7)$$

$$R^2 = 0.88 \quad Adj. R^2 = 0.85 \quad F = 27 \quad n = 15$$

For EU domestic subsidies of powder, of which a large proportion is used for animal feed, the estimated equation is significant at the 1 percent level. The government cost variable, the lagged stock variable and the lagged intervention price were all significant at the 1 percent level and had the correct signs. If CAP costs are relatively high, the Commission may opt for a low subsidy to defer some expense until budgetary slack returns. If stocks are already high, a higher subsidy will help to reduce the stocks. If the intervention price in the previous year was high, a high export refund may be desirable to prevent additional surpluses from depressing the EU market.

#### Subsidized EU export rates

$$(14) \quad SX_{t-1} = f(Stock_{t-1}; GC_{t-1}^{CAP}; ER_t; P_{t-1}^{Inv})$$

where previous definitions hold and

$ER =$  exchange rates

Export subsidies are another surplus disposal strategy which dispose of large EU surpluses on the world market at the world price using export restitution payments. The estimated equation includes independent variables similar to the EU domestic subsidy equation and we expect the same sign for explanatory variables. In addition, exchange rates (US\$/ECU) are now included, where we expect a positive relationship between the exchange rate and the export subsidy rate because a weakening US dollar results in lower international prices as reflected in European currencies, thus requiring higher EU export subsidies. Empirical results are presented in Equations (15) for powder and (16) for butter.

$$(15) \quad SX_t = -1139 + 0.6 \quad Stock_{t-1} + 0.1 \quad GC_t^{Dairy} - 0.03 \quad GC_t^{CAP} + 1138 \quad ER_t + 0.3 \quad P_{t-1}^{Inv}$$

$$(-4.8) \quad (5.3) \quad (2) \quad (-4.2) \quad (2.9) \quad (0.9)$$

$$R^2 = 0.94 \quad Adj. R^2 = 0.88 \quad F = 15 \quad n = 11$$

$$(16) \quad SX_t = 5937 + 0.6 \quad Stock_{t-1} + 0.16 \quad GC_t^{Dairy} - 0.02 \quad GC_t^{CAP} + 190 \quad ER_t - 1.6 \quad P_{t-1}^{Inv}$$

$$(2) \quad (3.4) \quad (1.5) \quad (-1.5) \quad (0.2) \quad (-2.2)$$

$$R^2 = 0.88 \quad Adj. R^2 = 0.76 \quad F = 7 \quad n = 11$$

where previous definitions hold and

$GC^{Dairy} =$  EU Dairy Program Government Costs

Overall, the estimation results for the export subsidy rate for powder were significant at the 1 percent level, and at the 2 percent level for butter. In terms of signs, the stock variable was positively correlated with export subsidy rates, as expected; thus, as stocks

increased, export subsidies were used for surplus disposal. The stock variable was highly significant in both equations, at the 1 percent level for powder and at the 2 percent level for butter. Government costs had different signs depending on their origin — dairy program costs were positively correlated with subsidized exports, as expected, since subsidized exports are a large component of program costs. Alternatively, government costs for CAP were negatively correlated with dairy export subsidies. This makes sense from the viewpoint that if CAP costs are high and the Ministers do not want them to increase, they may choose a less expensive form of surplus disposal than subsidized exports; thus, they are negatively correlated. Government cost variables were significant in the powder equation but insignificant in the butter equation. As expected, the US\$/ECU exchange rate was positively correlated with subsidized exports. It was significant in the powder equation at the 3 percent level but insignificant for butter. The lagged intervention price was significant at the 8 percent level for butter, but insignificant for powder. The intervention price was expected to carry a positive sign because a high intervention price in the previous year would tend to produce a greater need for surplus disposal through a higher export refund rate. The mixed signs and mixed significance of the intervention price lead us to discount the importance of the prior year's intervention price.

## **ASSESSMENT AND IMPLICATIONS OF RESULTS**

Results for both the USA and EU show a dominant influence of the support (intervention) price in the previous year, which supports the institutional inertia hypothesis discussed above. US farm income, stocks, and government costs also appeared to influence US policy-makers' choice of the price support level.

In the EU, additional policy instruments are used. Government costs appear to influence both production and surplus disposal policies. Public stocks significantly influence EU surplus disposal policies. From a dairy policy perspective, which may be applicable to other commodities, the EU appears to choose policies sequentially — first choosing farm level support policies and then choosing surplus disposal policies. If the farm policies produce a large surplus, the surplus disposal policy instruments are then changed accordingly to minimize the consequent budget costs and stocks. While the limited number of observations may hinder statistical analysis, we were able to establish a connection between budget costs and the marketing quota decisions.

The statistical results, in combination with the Uruguay Round agreement, point toward likely policy approaches to current and future challenges. For the United States and the European Union in the Uruguay Round, an understanding of each other's agricultural policies was not sufficient to assure that an agreement could be reached. But such an understanding was necessary, however, for each to propose solutions acceptable to both parties, which were then offered for general consideration by all contracting parties of the GATT. This analysis may not extend to other subsectors of the agricultural economy, or to political forces that affect policy decisions. This research does contribute to gaining an understanding of the factors which influence US and EU dairy policy choice, which can be used in the broader context of trade negotiations.

## NOTE

- <sup>1</sup> As of 1 November, 1993, the European Community was renamed the European Union.

## REFERENCES

- Abbott, P.C., 1979a, 'Modeling International Grain Trade With Government-controlled Markets', *American Journal of Agricultural Economics*, Vol. 61, No. 1, pp.22-31.
- Abbott, P.C., 1979b, 'The Role of Government Interference in International Commodity Trade Models', *American Journal of Agricultural Economics*, Vol. 61, No. 1, pp.135-140.
- Allison, G., 1971, *The Essence of Decision: Explaining the Cuban Missile Crisis*, Little, Brown and Co., Boston.
- Beghin, J.C., 1990, 'A Game-Theoretic Model of Endogenous Public Policies', *American Journal of Agricultural Economics*, Vol. 72, No. 1, pp.138-148.
- Beghin, J.C. and Foster, W.E., 1992, 'Political Criterion Functions and the Analysis of Wealth Transfers', *American Journal of Agricultural Economics*, Vol. 74, No. 3, pp.787-794.
- Buchanan, J. M. and others, 1978, 'The Economics of Politics', *The Institute of Economic Affairs*, Vol. 18, pp.1-194.
- Carter, C. A., McCalla, A. F. and Sharples, J., 1990 (eds.), *Imperfect Competition and Political Economy: The New Trade Theory in Agricultural Trade Research*, Westview Press, Boulder and London.
- Caves, R.E., 1976, 'Economic Models of Political Choice: Canada's Tariff Structure', *Canadian Journal of Economics*, Vol. 9, pp.278-300.
- De Gorter, H., 1983, 'Agricultural Policies: A Study in Political Economy', Ph.D. dissertation, University of California at Berkeley.
- Dixit, P.M. and Martin, M.A., 1986, *Policymaking for US Commodity Programs: A Case Study of the Coarse Grains Sector*, Foreign Agricultural Economic Report No. 219, Economic Research Service, US Department of Agriculture, Washington, D.C., USA.
- Gardner, B.L., 1987, 'Causes of US Farm Commodity Programs', *Journal of Political Economy*, Vol. 95, No. 2, pp.290-310.
- Infanger, C.L., Bailey, W.C. and Dyer, D.R., 1983, 'Agricultural Policy in Austerity: The Making of the 1981 Farm Bill', *American Journal of Agricultural Economics*, Vol. 65, No. 1, pp.1-9.
- Krueger, A., 1974, 'The Political Economy of the Rent Seeking Economy', *American Economic Review*, Vol. 64, No. 3, pp.291-303.
- Lattimore, R.G. and Schuh, G.E., 1979, 'Endogenous Policy Determination: The Case of the Brazilian Beef Sector', *Canadian Journal of Agricultural Economics*, Vol. 27, No. 1, pp.1-16.
- Lavergne, R.P., 1983, *The Political Economy of U.S. Tariffs: An Empirical Analysis*, Harcourt-Brace-Jovanovich Academic Press, New York.
- Lopez, R.A., 1989, 'Political Economy of US Sugar Policies', *American Journal of Agricultural Economics*, Vol. 71, No. 1, pp.20-31.
- Love, H.A., Rausser, G.C. and Burton, D.M., 1990, 'Policy Preference Functions: Grand Themes and New Direction', invited paper at the annual meeting of the Western Agricultural Economics Association, Vancouver, Canada.
- Marchant, M.A., 1993, *Political Economic Analysis of US Dairy Policies and European Community Dairy Policy Comparisons*, Garland Publishing, New York.
- Marchant, M.A., Neff, S. and McCalla, A., 1992, 'Domestic Policy Interdependence: Analysis of Dairy Policies in the US and the EC', in Bellamy, M. and Greenshields, B. (eds.), *Issues in Agricultural Development: Sustainability and Cooperation*, International Association of Agricultural Economists Occasional Paper No. 6, Brookfield, Vermont, pp.339-343.
- Paarlberg, P.L., 1983, 'Endogenous Policy Formation in the Imperfect World Wheat Market', Ph.D. dissertation, Purdue University.

- Paarlberg, P.L. and Abbott, P.C., 1986, 'Oligopolistic Behavior by Public Agencies in International Trade: The World Wheat Market', *American Journal of Agricultural Economics*, Vol. 68, No. 3, pp.528–542.
- Rausser, G.C. and Freebairn, J.W., 1974, 'Estimation of Policy Preference Functions: An Application to US Beef Import Quotas', *Review of Economics and Statistics*, Vol. 56, pp.437–449.
- Rausser, G.C. and Foster, W.E., 1990, 'Political Preference Functions and Public Policy Reform', *American Journal of Agricultural Economics*, Vol. 72, No. 3, pp.641–52.
- Rausser, G.C., Lichtenberg, E. and Lattimore, R., 1982, 'Developments in Theory and Empirical Applications of Endogenous Government Behavior', in Rausser, G.C. (ed.), *New Directions in Econometric Modeling and Forecasting in US Agriculture*, Elsevier/North-Holland Publishing Co., New York, Chapter 18.
- Riethmuller, P. and Roe, T., 1986, 'Government Intervention in Commodity Markets: The Case of Japanese Rice and Wheat Policy,' *Journal of Policy Modeling*, Vol. 8, No. 3, pp.327–349.
- Sarris, A. and Freebairn, J., 1983, 'Endogenous Price Policies and Wheat Prices', *American Journal of Agricultural Economics*, Vol. 65, No.2, pp.214–24.
- Von Witzke, H., 1990, 'Determinants of the U.S. Wheat Producer Support Price: Do Presidential Elections Matter?', *Public Choice*, Vol. 64, pp.155–65.
- Young, L., 1987, 'The Formation of Wheat Policies in the U.S., Canada and Japan: Case Studies of Endogenizing Policy Behavior', Ph. D. dissertation, University of California at Davis.
- Young, L., Marchant, M. and McCalla, A., 1991, *The Political Economy of Agricultural Trade: A Review of the Literature on Domestic Policy Behavior and International Price Formation*, Agriculture and Trade Analysis Division, No. AGES 9103, Economics Research Service, US Department of Agriculture, Washington, D.C.
- Zusman, P., 1976, 'The Incorporation and Measurement of Social Power in Economic Models', *International Economic Review*, Vol. 17, No.2, pp.447–462.
- Zusman, P. and Amiad, A., 1977, 'A Quantitative Investigation of a Political Economy: The Israeli Dairy Program', *American Journal of Agricultural Economics*, Vol. 59, No. 1, pp.88–98.

## GENERAL DISCUSSION — P.J. Lund, Rapporteur (*Ministry of Agriculture, Fisheries and Food, UK*)

Both of the (only two) discussants present had been asked to discuss the same paper (that by Eldon Ball *et al.*). In presenting this paper J-C Bureau said that the objective was to make multinational comparisons, across both space and time, output and productivity, thus identifying both differential growth rates and gaps in productivity. In order to do this it was necessary to obtain price indices, for both outputs and inputs, which could be applied across both space (comparisons between countries) and time. Hence the use of Purchasing Power Parities (PPPs). The presentation (and the paper) did not elaborate on the complex details of the methodology but focussed on the results which, was claimed, would provide a basis for econometric modelling of supply responses.

David Lee (Cornell, USA) opened the discussion of this paper by asking how sensitive the results were (e.g. to choice of deflations) and whether there were common determining factors.

Similar points were made by the other opening discussant, Ellen Hanak Freud, (IRAD, France). She asked how sensitive the results were to methodological choices (such as 1985 as the base year for the PPPs) and how wide is the margin of error in the results (the non-stochastic nature of the procedure not having generated confidence intervals etc.). She went on to ask about the causal factors which might explain the obscured differences, in particular the role of policy intervention. However, one might question whether the effects of policy are not better examined at commodity rather than industry level. Ulrich (Germany) raised an important methodological point; that opportunity costs (e.g. of non labour inputs) differ considerably between countries reduces the usefulness of comparisons of productivity in which some common proxy is used. Other speakers raised the problems of measuring labour and capital inputs, the latter being dependent on estimates of asset lives. This led into a discussion of the role of the production of some commodities (notably pigs) within farmers' mix of outputs, which was lively rather than conclusive.

Jean-Marc Boussard (France) offered to open the discussion on the von Cramon-Taubadel paper. He questioned why it is necessary to know a government PPF and why it should be linear (is this a necessary assumption?). More fundamentally he questioned whether it is reasonable to assume rationality on the part of politician. He provided examples to the contrary and concluded that political decisions are a matter of chance. In similar vein, Rausser (USA) questioned whether preference functions exist. It was also suggested that there is lots of evidence to indicate that politicians are not systematically attempting to maximize something. However, although fundamental these comments did not address the more technical aspects of von Cramon-Taubadel's paper, on which there was relatively little discussion.

There was relatively little discussion of the Marchant *et al.* paper, though one person questioned whether the apparent influence of previous policy level may not simply reflect auto-correlation in the dependent variable and Revell (UK) pointed out that EU quota changes are not (in the main) reversible.