The Political Economy of United States and European Community Agricultural Trade

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Political economy models of trade combine a number of features. To reflect the differing political power of groups in society, it is usually assumed that government policy decisions are made by maximizing a weighted function of the each of the group's welfare. Economic power considerations are often modeled in order to capture the impact that large countries or firms are able to exert on the market. The introduction of economic power also entails the use of game theory, since with economic power, countries or firms will be able to act strategically. Finally, political economy models usually involve a consideration of the institutional framework that is in place, whether this be in the form of specifying property rights or whether it is to limit the set of policy instruments that can be used in the analysis. It should be pointed out that it is this combination, rather than any one specific feature, that sets political economy models apart from more standard economic models.

The features listed above are important when it comes to understanding agricultural trade between the United States (US) and the European Community (EC). Rausser and Freebairn, Rausser and de Gorter, and Gardner (among others) have incorporated a weighting of the welfare of interest groups in their models of US agricultural policy. The weighting of interest group welfare in both the US and the EC has been carried out by Vanzetti and Kennedy, Paarlberg and Abbott, and Sarris and Freebairn in the context of international wheat trade models incorporating numerous importers and exporters. In addition to incorporating welfare weights, these studies have also introduced market power considerations. The consideration of market power in models of the international grain market has also be argued for by McCalla, Alaouze et. al., Carter and Schmitz, Karp and McCalla, and Kolstad and Burris (among many others).

In terms of institutional structure, agricultural policy in both the US and the EC has evolved over a long period of time. As a consequence, while minor changes in the level of policy instruments may be possible, changes in the type of policy instruments that can be considered can often be ruled out. Runge and von Witzke argue, for instance, that while institutional change in the EC is possible, it will be long and arduous. Tracy makes essentially the same point in his analysis of the changes that have occurred in the Common Agriculture Policy (CAP) over the past 20 years. While he notes that support prices in the EC have fallen and surpluses have diminished, he also points out that no fundamental reform of the CAP is likely.

For the US, Rausser points out that to obtain major changes in agricultural policy, the relative political power of different interest groups will have to change dramatically. Although he does not rule out such changes, the point remains that this will be much more difficult than achieving incremental changes in the existing policy instruments. This point is further underlined by noting that the broad elements of recent (and not-so-recent) US Farm

Bills had their origins in the agricultural reforms of the 1930s which contained provisions for price supports, export subsidies and production controls (Hadwiger).

The purpose of this paper is to develop a political economy model of agricultural trade between the US and the EC that incorporates the elements outlined above. The US and the EC are chosen for the analysis because they are the main players in the agricultural trade talks at GATT. In addition, the focus of the analysis will be on the wheat trade. Wheat is chosen because of its importance in both the GATT negotiations and in trade relationships between the US and the EC.

More specifically, this paper develops a political economy model that is used to explain in general terms the wheat policies introduced in the US and the EC over the past 30 years. In order to provide this explanation, it is necessary to incorporate political factors into the model. This is done by assuming that agricultural producers in both the US and the EC have considerable political power. Consumers are assumed to generally lack political power, particularly in the EC where agricultural policy is structured so that consumers pay the internally set price. US consumers, in contrast, are assumed to pay the world price.

Modeling this difference in consumer prices not only reflects the historical record, but is an indication of a different institutional structure in place in the two regions. The paper shows that this institutional structure limits the types of policies that can be adopted in the two regions. A major conclusion is that without major institutional change, the range of potential policy solutions agreeable to both the US and the EC is restricted.

Given the importance of the US and the EC in the world wheat market, it is assumed that both regions are aware of their market power and take account of it when making domestic policy decisions. It is assumed that the two regions adopt a non-cooperative strategy. The institutional changes that would be required to have the US and the EC behave cooperatively are also examined.

The structure of the paper is as follows. The next section of the paper outlines the behaviour of the US and the EC in the world wheat trade since the early 1960s. This is done by separating the period into four sub-periods, each of which can be characterized by the relationship between the world price and the domestic price in the EC and the US, by the status of each region as an importer or an exporter, and by each region's world market share. A mathematical model of the wheat trade between the US and the EC is then developed. This model incorporates the political economy aspects outlined above. This model is then shown to be capable of explaining the major elements of trade between the two regions as outlined in the earlier section. The paper concludes with a discussion of the implications this model has for the likelihood of major policy changes in the two regions.

Domestic Wheat Policies and the World Wheat Trade: 1960–1990

The world wheat trade has changed dramatically over the last 30 years. To examine these changes and to relate them to the domestic policies of the US and the EC, it is useful to

divide the period from 1960 to 1990 into four sub-periods: the 1960s; the mid-1970s; the late 1970s/early 1980s; and the late 1980s. Tables 1 and 2 present data on prices, production, exports and imports, and market share for the EC and the US during these sub-periods.

It is generally argued that during most of the 1960s, the world price was raised above the free trade price as a result of the actions of the US and Canada (see McCalla). In the US, a combination of acreage set-asides and target price payments were used to reduce output. This reduction in output resulted in a relatively low US market share. The EC was a large net importer of wheat, accounting for between 10 and 20 percent of world wheat imports. The EC domestic price established under the CAP was above the world price.

By the late 1960s, world wheat prices began to fall – partly as a result of increased production in the EC and elsewhere in the world (e.g,. Australia), and partly as a result of a breakdown in cooperation between the US and Canada (see Alaouze et al.). This drop in prices was short-lived, however, as production shortfalls and increased purchases in the early 1970s resulted in a sharp price jump.

Along with the price increase that occurred in 1973 went other changes. In the US, acreage set-asides were removed and the US share of the world market rose substantially. Target prices were reduced so that they were no longer effective and farmers were advised to "plant fench-row to fench-row." For the first time in decades, farmers in the US were responding to the world market price. For EC farmers, domestic policies also had less of an effect as the world price rose to roughly the same level as the internal price. As a result of substantial increases in production over the previous ten to fifteen years, the EC was now virtually self-sufficient in wheat production.

The late 1970s and early 1980s saw a return to the type of behavior exhibited by the EC and the US during the 1960s. The US again introduced acreage set-asides and began to hold stocks, while both the loan rate and the target price were increased. The US market share also began to slip, particularly after 1981. This behavior suggests that the US was once again attempting to increase the world market price above the free trade level through its domestic policy. In the EC, the maintenance of a relatively high internal price meant that this price was now substantially above the world price. As a result, EC production continued to expand, with the result that the EC had become a net exporter by the end of the 1970s, had captured approximately 10 percent of the export trade by the early 1980s, and had a fifteen percent market share by 1985. Although the EC maintained its internal price above the world price over this period, the level of this price did begin to decline by about 1983.

Passage of the 1985 US Farm Bill signalled the beginning of the late 1980s sub-period. In an effort to obtain a greater market share, the US reduced the loan rate by 25 percent. The result was a substantial drop in the world price. Farmers in the US were protected from this fall, however, because the target price was maintained at the level of the early 1980s. Because the US maintained its acreage set-aside program, US production

remained relatively level. This, combined with a relatively constant market share, meant that the US continued to hold stocks.

In spite of the reduction in the EC domestic price, EC output and world market share remained essentially constant. In response to these events, the US began to subsidize exports using the Export Enhancement Program (EEP), particularly to countries that were EC customers. The effect of the EEP was to drive down the world price to the point where it was below the free-trade level (Tyers and Anderson, Roningen and Dixit).

The events and behavior sketched above represent the major elements that have to be explained with a political economy trade model. The next section develops this model.

A Political Economy Model of US/EC Trade

A common theme and finding in the political economy of agriculture literature is that farm groups have managed to pressure government to put in place a set of policies that are favourable to them. In this paper it is assumed that the objective in both the EC and the US is to maximize the welfare of producers, less any government costs associated with the agricultural policy. As will be seen, it is necessary to give more weight to producers than to consumers in order to obtain results that are consistent with the events of the last 30 years. In an effort to keep the analysis simple, the weight attached to consumer welfare is assumed to be zero.

The political aspect of the problem is further captured by allowing for different types of policies in the US and the EC. More specifically, it is assumed that consumers in the US pay the world price for agricultural products, while consumers in the EC pay the domestic producer price that is established internally. In addition to reflecting the current policy regimes in the two regions, this difference in policy indicates a difference in the institutional environment between the US and the EC. More precisely, consumers in the EC are assumed to be willing to pay a higher price for food than their counterparts in the US. Among the reasons for this willingness are a desire for food security, a recognition that agricultural policy acts in many respects as social policy, and the recognition that even with such a policy in place, food costs represent a declining share of household expenditures.

Given these institutional constraints, the focus of agricultural policy in both the US and the EC is to choose a level of domestic producer prices that maximizes the objective functions outlined above. In choosing an internal price, it is assumed that each region recognizes that their policies affect the world price. More specifically, if the world price is affected by internal policies, and the level of the world price influences the ability of a region to achieve its domestic goals, then it is assumed that both the EC and the US will adjust their domestic policies accordingly.

The effect of US and EC production on the world price can be formulated explicitly by assuming that the US and the EC face a linear demand curve for their exports

(1) $r = a - b[(x-x_d)+(y-y_d)]$

where: r = world price
x = total production in the US
x_d = domestic consumption in the US
y = total production in the EC
y_d = domestic consumption in the EC

Equation (1) can be interpreted as the excess demand curve from the rest of the world, assuming that all the importers and exporters are price-takers.[1] Note that equation (1) also gives the world price when the EC is an importer. In this case the excess demand curve facing the US shifts out by an amount $-b(y-y_d)$, where $y < y_d$. For the EC, equation (1) can be interpreted as the excess supply curve facing that region.[2]

Domestic consumption in both regions is assumed be inelastic, i.e., x_d and y_d are presumed fixed. The implication of this is that while changes in the price paid by consumers affect consumers' welfare, it does not affect domestic consumption. Relaxing this assumption does not change the qualitative results of the model.

As outlined above, the internal policies of the US and the EC are characterized by the level of the producer price established by the respective governments. Production in both regions is a linear function of these prices, ie.,

(2) $x = \alpha + \beta q$ for $x < x_{max}$

(3) $y = \delta + \gamma p$ for $y < y_{max}$

where q is the internal price in the US and p is the internal price in the EC. The values x_{max} and y_{max} represent the maximum production attainable in the two countries in the short run. In effect, the supply curves are assumed to be vertical at x_{max} and y_{max}, reflecting the presence of a supply capacity. The prices at which the supply curves become vertical are q_{max} and p_{max}, respectively. Substituting equations (2) and (3) into equation (1) allows the the world price to be written as a function of the internal prices

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[1]This formulation can be modified to reflect other countries or regions in the world exerting market power (see, for example., Carter and Schmitz, Alaouze et al., Karp and McCalla, Vanzetti and Kennedy). As mentioned above, Canada is thought to have played an important role in the world wheat trade in the 1960s. Given the desire to focus on the US and the EC and a need to keep the model relatively simple, this aspect has not been explicitly incorporated into the paper.

[2]Karadininis provides a formulation of a price equation similar to this in his study of a model of oligopoly buyers and sellers.

(4) $$r = a - b[(\alpha+\beta q-x_d)+(\delta+\gamma p-y_d)].$$

In determining the internal price to establish, the United States is assumed to maximize the producer surplus of farmers, less the costs of any government expenditures required to obtain this surplus, i.e.,

(5) $$\max_{q} \quad V = \alpha q + \frac{\beta q^2}{2} - (q-r)x$$

where V is the value of benefits to the US.[3]

Two features of this formulation are worth highlighting. The first is that the level of government expenditures is calculated on the basis of total US production (x). This implicitly assumes that US consumers are paying the world price. The second feature is that the internal price, q, can be greater than or less than the world price, r. If the internal price is greater than the world price ($q > r$), then the government is required to make up the difference through a price support payment or an export subsidy. If the internal price is less than the world price ($q < r$), then two possibilities exist. One option is for the government to tax farmers by an amount equal to the difference between q and r, ie., impose an export tax. In this case, farmers receive the domestic price q, while the government obtains revenues equal to $(r - q)x$. The other option is for farmers to receive the world price, while the government imposes a restriction on output (e.g., acreage controls) so that production is limited to $x = \alpha + \beta q$.

The problem facing the EC is similar to that facing the US, with the exception that consumers pay the internal price. The implication of consumers paying the internal price is that government expenditures are calculated on the difference between domestic production and consumption ($y-y_d$). The problem the EC policy makers face is

(6) $$\max_{p} \quad W = \delta p + \frac{\gamma p^2}{2} - (p-r)(y-y_d)$$

where W is the value of benefits to the EC. Note that p, like q, can be greater than or less than r. The policy mechanisms of achieving a particular internal price are similar to those outlined in the discussion of the US problem.

The first order-conditions for the two players are

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[3]If $\alpha < 0$, then the correct form of equation (5) contains a constant, $\frac{\alpha^2}{2\beta}$. This constant disappears on differentiation with respect to q and can therefore be omitted without any loss of generality.

$$(7) \qquad \frac{\partial V}{\partial q} = \alpha + \beta q - x - q\frac{\partial x}{\partial q} + x\frac{\partial r}{\partial q} + r\frac{\partial x}{\partial q} = 0$$

$$(8) \qquad \frac{\partial W}{\partial p} = \delta + \gamma p - y + y_d - p\frac{\partial y}{\partial p} + (y-y_d)\frac{\partial r}{\partial p} + r\frac{\partial y}{\partial p} = 0$$

Since it is assumed that the US and the EC are playing a non-cooperative game, the Nash equilibrium is appropriate. The Nash equilibrium for this problem is obtained by letting $\partial q/\partial p = \partial p/\partial q = 0$ when evaluating $\partial r/\partial q$ and $\partial r/\partial p$. Using this information along with equations (2), (3), and (4) allows equation (7) to be written as

$$(9) \qquad r - bx = q$$

while equation (8) can be rewritten as

$$(10) \qquad r - by + \frac{y_d(1+b\gamma)}{\gamma} = p.$$

Equation (9) implies that the internal price in the US is less than the world price and that US output is restricted, either by an export tax or as the result of production restrictions. This is a standard result of an oligopoly model – namely, that a player with market power will reduce output to increase price. It is argued below that a reduction in output has been characteristic of US agricultural policy over much of the last 30 years.

Equation (10), in contrast, allows for the internal price in the EC to be either less than or greater than the world price. For instance, if $y \leq y_d$, then p will exceed r. This, of course, represents the relationship between the world price and the internal EC price when the EC was a net importer of wheat. Even when the EC is a net exporter (ie., $y > y_d$), however, the internal price can exceed the world price if y_d represents a reasonably large proportion of domestic production and/or if γ is relatively small.

Contrary to intuition, therefore, it may be optimal for the EC (even when it has market power) to set its internal price above the world price. To see why this result occurs, consider Figure 1. Suppose that the world price is r (determined by US exports $x-x_d$) and that initially the EC has no domestic policy, ie., both producers and consumers in the EC face the world price. Assume also that at the world price, domestic production equals domestic consumption. Producers earn returns equal to the area below r and to the left of the EC supply curve, S^{ec}, while government expenditures are zero.

Suppose that the EC establishes an internal price equal to p^{ec}. This results in an increase in producer returns equal to the shaded area above r, below p^{ec}, and to the left of S^{ec}. In order to achieve this gain in producer returns, the government must make an expenditure equal to $(y-y_d)(p^{ec}-r')$ i.e., the highlighted rectangle. This expenditure reflects the amount the government must incur to make wheat produced in the EC competitive on the

world market at a price r'. Note that the world price has been lowered (r to r') as a result of the higher domestic price and the subsequent increased production in the EC.

The significant point is that in terms of achieving the objective of maximizing producer returns less government expenditures, it may be desirable for the EC to adopt an internal price that is above the world price. This is seen in Figure 1, where the shaded area above r, below p^{ec}, and to the left of S^{ec} (the gain in producer returns) is greater than the highlighted area $(y-y_d)(p^{ec}-r')$, the increase in government expenditures. In other words, even when its influence on the world market price is accounted for, it may still be optimal for the EC to support producer prices and subsidize exports. One of the reasons for this result is that, since consumers pay the internal price, an increase in production means that the EC does not have to make expenditures on the total production, but instead only on the amount exported. The result is that the EC is much more willing to expand production internally.

To further examine the model, equations (9) and (10) can be solved for q and p, respectively, to give the reaction functions $R^{us}(p)$ and $R^{ec}(q)$,

$$(11) \qquad R^{us}(p): q = \frac{a + b(x_d + y_d) - b(2\alpha + \delta) - b\gamma p}{2b\beta + 1}$$

$$(12) \qquad R^{ec}(q): p = \frac{a + b(x_d + y_d) - b(\alpha + 2\delta) + y_d(b\gamma + 1)/\gamma - b\beta q}{2b\gamma + 1}$$

These reaction functions are graphed in Figure 2. The intersection of $R^{us}_{60s}(p)$ and $R^{ec}_{60s}(q)$ gives the Nash equilibrium prices, p^*_{60s} and q^*_{60s}, in the game described above. The subscript 60s has been added because as will be seen, the pattern of prices in Figure 2 corresponds to those existing during the 1960s sub-period.

Also graphed in Figure 2 are the equations describing perfect competition, i.e., $q^c_{60s}(p)$ for the US, and $p^c_{60s}(q)$ for the EC. The intersection of these two lines gives the price, $p^c_{60s} = q^c_{60s} = r^c_{60s}$, that would be established if both countries refrained from intervening in their respective domestic markets. The equations for the competitive – or free trade – case are

$$(13) \qquad q^c(p) = \frac{a + b(x_d + y_d) - b(\alpha + \delta) - b\gamma p}{b\beta + 1}$$

$$(14) \qquad p^c(q) = \frac{a + b(x_d + y_d) - b(\alpha + \delta) - b\beta q}{b\gamma + 1}$$

In order to see the impact of the domestic policies of the US and the EC on the world price, iso-world price lines have been drawn. These lines are labelled r^*r^* and r^cr^c, with $r^c < r^*$. The iso-world price lines are drawn using the following equation

$$(15) \qquad q^{\bar{r}}(p) = \frac{a + b(x_d + y_d) - b(\alpha + \delta) - \bar{r} - b\gamma p}{b\beta}$$

where $\bar{r}$ is a fixed level of the world price.

The prices associated with the iso-price lines can be shown on the p-axis. This is done by drawing a line up to the line AA from the point where the iso-price line crosses the q-axis.[4] Moving across to the p-axis gives the price associated with the particular iso-price line. The 45° line can be used to show the price on the q axis. To reflect the pattern of prices in the 1960s, Figure 2 has been drawn so that p^*_{60s} exceeds q^*_{60s}, with the world price, r^*_{60s}, lying above the competitive or free-trade price. As well, p^*_{60s} exceeds r^*_{60s}.

Before the events of the last 30 years are examined in greater depth using this model, it is useful to consider the relationship between the curves in Figure 2 in more detail. The reaction curve $R^{us}(p)$ will always lie below the free-trade line $q^c(p)$ and will always have a steeper slope than the free-trade line. For the EC, the q-axis intercept of the EC reaction curve ($R^{ec}(q)$) will always exceed the q-axis intercept of the EC free-trade line. In addition, the slope of $R^{ec}(q)$ will always be less than that of the free-trade line. This means that the reaction curve will cut the free-trade line from below as q is increased.

Also shown in Figure 2 are iso-welfare lines for the US and the EC. The welfare measure being used is the value of the objective functions in equations (4) and (5). The lines labelled W^* and V^* indicate the welfare of the EC and the US, respectively, at the Nash equilibrium, while the lines labelled W^c and V^c indicate the welfare of the EC and US in free-trade. Since W^c lies above W^*, the EC is better off at the Nash equilibrium than it is in free trade. In fact, as long as $q^* < q^c$, the EC will always be better off at the Nash equilibrium than at the free trade equilibrium.

In the case of the US, the situation is different. As Figure 2 is drawn, the US is better off under the Nash equilibrium than it is under free trade. This follows because V^c lies above V^*. Depending upon the curvature of the iso-welfare curve and the degree to which p^* exceeds p_c, this need not be the case. For instance, if the iso-welfare curves were flatter, then V^* could lie "above" the point (q^c, p^c).

The implication of this is that the US may prefer the free trade regime to the Nash regime. If this is the case, it does not mean that the US would adopt free trade unilaterally. The nature of the Nash equilibrium means that if the EC has adopted the Nash solution, then the best response by the US is to also adopt the Nash equilibrium price. What it does mean is that the US would prefer to see the entire world trading environment governed by free trade, rather than by the set of policies that make up (q^*, p^*).

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[4]The line AA is derived as follows. When $\bar{r} = 0$, the iso-price line, $q^{\bar{r}}(p)$, and the curve $p^c(q)$ (equation 14) cross the q-axis at the same point. This gives one point on the line AA. A second point on AA is given by the point of intersection of a horizontal line at p^c_{60s} and a vertical line at the intersection of line $r^c r^c$ and the q-axis. Connecting these two points gives line AA.

This point is important because it underscores the idea that different international policy regimes are possible. In the context of the discussion above, the competitive regime is identified as free trade, while the Nash equilibrium is identified as "strategic" in nature.[5] As will be pointed out below, the selection of the policy regime that countries wish to govern international trade is at the core of understanding international trade relations. This is particularly important in the analysis of the EEP and in the context of the GATT negotiations.

Finally, it should be noted that Figure 2 is drawn on the assumption that the strategic and free trade prices in the EC and the US are less than p^{max} and q^{max}, respectively. In other words, the equilibrium production under the two regimes is less than the maximum production that is possible in the two regions. If the supply constraints are binding, then the free-trade line and the reaction function for the US both become vertical at q^{max}, while the free-trade line and the reaction function for the EC both become horizontal at p^{max}.

Analysis of US/EC Wheat Trade

The purpose of this section is to illustrate how the major events in the wheat trade between the US and the EC over the last 30 years can be explained with the aid of the political economy model developed above.

As indicated above, Figure 2 provides a sketch of the events during the 1960s sub-period. In an effort to raise the world price and increase returns, the US restricted output. In the context of the model developed above, this means that the US set an internal price (q^*_{60s}) that was less than the world price (and less than q^c_{60s}, the free trade price).[6] The reduction in output raised the world price so that it exceeded r^c_{60s}. At the same time, the EC established a domestic price (p^*_{60s}) that exceeded the world price.

It is likely that both regions found the resulting outcome to be preferable to free trade, at least during the early part of the 1960s. This has been reflected in Figure 2 by drawing W^* and V^* below W^c and V^c, respectively. However, it is possible that by the end of the 1960s, the US may have felt that a different policy regime would be more beneficial. Such an interpretation would be consistent with the US abandoning the cooperative arrangement they had with Canada throughout the 1960s. It is interesting that increases in production by the EC

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[5]See Harris for a discussion of strategic trade and the new protectionism literature.

[6]A key component of US domestic policy during the 1960s was the establishment of a target price that exceeded the world price. The model developed above does not explicitly consider a target price, primarily because this would introduce another choice variable and would complicate the analysis immensely. A partial explanation for the target price is that it represented a method of transferring income from government to farmers. In the context of the objective function in equation (4), this transfer leaves the value of the objective function unchanged. Of course, a more complete explanation would also have to focus on the role of the target price in providing farmers with an incentive to participate in the acreage set-aside program.

and/or by other importing and exporting countries (e.g., Australia) could effect this shift in US preferences. More specifically, an outward shift and an increase in the steepness of the EC supply curve and/or a shift inwards of the excess demand curve has the effect of making US welfare at the Nash equilibrium less than to US welfare under free trade.

Figure 3 illustrates the situation existing in the mid-1970s sub-period and compares it to the situation in the 1960s. There are two major differences between the curves in this diagram and those in Figure 2. The first is that the reaction curves and the free trade curves for the mid-1970s (denoted by subscript 70s) are shifted outwards. This reflects a shift outwards of the excess demand curve for wheat, which in turn was caused by decreases in production in some of the importing nations.

The second difference is that the reaction curves and the free trade curves for the mid-1970s are drawn as discontinuous. As explained above, discontinuities arise if a capacity constraint exits. It is argued that this was the case for both the US and the EC during the mid-1970s. Evidence for the existence of a capacity constraint can be found in the substantial literature that emerged during this period examining the question of the capacity of the food and fibre system.[7]

Although the capacity constraint was short run in nature, it nevertheless had a significant impact. One of the outcomes is that the free-trade and the Nash equilibrium prices are identical. This follows because the reaction functions and free-trade lines are identical at p^{max} and q^{max}. Note also that as a result of the production constraints, the world price is significantly higher than it would be in the absence of such constraints (compare $r^{max}r^{max}$ to r^*r^*). Domestic policy in both regions can be interpreted as one in which output is "restricted" at x^{max} and y^{max} and in which farmers are paid the world price. This explanation is consistent with the observation above that both the US and the EC let the world price govern production decisions in their countries during the mid-1970s.

The capacity constraints that existed in the mid-1970s were short-lived. First, the supply curves in both the US and the EC continued to shift outwards due to technological change. This shift was greater in the EC than in the US; over the period 1960-85, yields in the EC increased 3.6 percent per year, compared to 1.4 percent per year in the US (Carter, et. al.). Second, the export demand curve shifted inwards due to increased production in importing and exporting countries.

The result of these shifts was a return to a world wheat market that had many of the characteristics of the market in the 1960s. The US was once again restricting supply, while the domestic price in the EC was above the world price. A major difference, however, existed between the situation in the late 1970s and that in the 1960s – the EC was now a net exporter. Although the internal price in the EC was similar to that in the 1960s, the shift outwards of

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[7]For instance, see Yeh et al. and Spielmann and Weeks.

the supply curve had resulted in sufficiently increased production that the region was now exporting wheat.

The results of these changes are shown in Figure 4. Under the strategic policy regime, the internal US price ($q^*_{70s/80s}$) is less than the world price ($r^*_{70s/80s}$) and the free trade price ($r^c_{70s/80s}$), while the domestic EC price ($p^*_{70s/80s}$) is greater than the world price. Since V^* and W^* lie below V^c and W^c, respectively, both regions prefer the strategic policy regime to the free trade regime. The implication is that the US has found it optimal to once again restrict output, while the EC has found it optimal to continue its policy of raising the domestic wheat price above the world level.

While both regions gain from the strategic policies that are pursued, Figure 4 indicates that the benefit to the EC is greater than that to the US. This is to be expected, since the strategies pursued by the two regions are in some sense polar opposites. While the EC is attempting to increase production, the US is attempting to reduce production. As a result, the US is acting in a manner that accommodates the EC, while the EC is acting in manner that exploits the US. More specifically, the reduction in output by the US and the resulting world price rise helps to reduce the cost to the EC of raising their domestic price. This makes it less costly for the EC to raise their internal price. The effect of a higher EC internal price is to increase production and reduce the world price, thereby adversely affecting the US.

A number of changes occurred between the early 1980s and the mid-1980s, including a further shift outwards of the EC supply curve relative to the US supply curve, a steepening of the EC supply curve, and a shift inwards of the excess demand curve. The shift outwards of the EC supply curve is a result of continued growth in yields in that region, while the steepening of the EC supply curve reflects the notion that as yields become larger, additional increases in production in the short run become increasingly difficult. The shift inwards of the excess demand curve reflected, in part, continued production increases in countries like Canada and the US. These shifts are reflected in the curves drawn in Figure 5.

As was discussed above, it is possible that shifts in the parameters of the supply curves and the export demand curve can have the effect of making the strategic policy regime less favourable to the US than some other policy regime such as free trade (i.e., V^* lies above V^c). This is the situation shown in Figure 5.

The internal policy shifts that occurred in the US since 1985 are explainable by Figure 5. Since V^* lies above V^c, the US would prefer the free trade solution over the strategic solution. The EC, however, prefers the strategic solution to free trade (W^* lies below W^c). As long as the EC continues to adopt a strategic policy, the best response for the US is to also adopt the strategic policy. The US, therefore, finds itself in a dilemma.

One way out of the dilemma is for the US to adopt a policy that has the effect of making the EC worse off than under free trade. In this way, the US could get the EC to abandon a strategic policy and move to free trade. The problem with this is that in order to make the EC worse off, the US has to make itself worse off. If the EC believes that the US is

not willing to sustain these losses, then it will refuse to alter its policy to any great extent. In order to circumvent this problem, the US needs to make its threat credible, i.e., it needs to indicate that it will not abandon its policies no matter how high the costs.

In this light, the reduction in the loan rate as part of the 1985 Farm Bill and the subsequent introduction of the EEP can be seen as attempts by the US to alter the payoff to the EC of maintaining a relatively high domestic price. For instance, the reduction in the loan rate meant there was an increase in the quantity that the US was willing to export. In Figure 5 this can be interpreted as an increase in the US domestic price from $q^*_{\text{mid 80s}}$ to q^{FB}. In the short run, the EC maintained its internal price at $p^*_{\text{mid 80s}}$ and the world price fell to $r^{FB}_{\text{mid 80s}}$. As a consequence, the welfare of the EC fell to W^{FB}, while the welfare of the US fell to V^{FB}.

Although this policy change had an effect on EC welfare, since W^{FB} lies below W^c, the EC found that it was better off behaving strategically and retaining a high internal price. It should be noted that the optimal internal price for the EC declined as a result of the change in US policy (this price can be found by drawing a line from the intersection of the vertical line Farm Bill and the EC reaction curve ($R^{ec}_{\text{mid 80s}}(q)$) to the p axis). This result is consistent with the moderate decline in support prices that have occurred in the EC since 1985. However, if the US was going to get the EC to fundamentally alter its agricultural policy, a greater change in US policy was required.

The EEP can be viewed as this more substantive change. Figure 6 illustrates the effect of the introduction of the EEP. The EEP is modeled as a vertical line at a US internal price considerably higher than the prices that the US was operating with during the early 1980s. This is appropriate, since in conjunction with the introduction of the EEP, the US continued with relatively high target prices, while removing the acreage set-aside restrictions. The effect of this was to allow unconstrained domestic production at the target price.

In addition to implying a substantial drop in the optimal EC internal price ($p^*_{\text{mid 80s}}$ to $p^{EEP}_{\text{late 80s}}$), the introduction of the EEP also means that the welfare of the EC is substantially reduced from what it would be had the US adopted the Nash strategy (W^{EEP} compared to W^*). The introduction of the EEP can therefore be seen as a way of the US making an alternative policy regime (e.g., free trade) more attractive to the EC. More specifically, since W^{EEP} lies above W^c, the EEC would prefer the free trade regime to a regime where the US was operating the EEP. The EEP can thus be seen to provide backing to the US position at the GATT talks of supporting the removal of all government subsidies.

The success of the EEP in forcing the EC to alter their agricultural policy, however, rests on the degree to which the US is able to make the EEP a credible threat. At one level the EEP is not a credible threat, since as a result of pursuing this policy, the welfare of the US is reduced from V^* to V^{EEP}. This is perhaps one of the reasons why the EC has not offered any major concessions at GATT. At another level, however, the US has been attempting to make the EEP credible by indicating to the world that it will continue the EEP no matter what the

consequences. The failure of the US to respond to criticisms from countries like Canada and Australia that the US has been attacking these countries' traditional export markets, as well as the Bush administration's granting of what is essentially a blank cheque to the USDA to administer the EEP, can be seen as ways of indicating that the US will not back down.

You Can't Get There From Here

The analysis above has provided a framework for examining the agricultural policies implemented by the US and the EC over the last 30 years. The purpose of this section is to use this framework for evaluating the likelihood and direction of changes in policy in the two regions. In particular, it will be shown that while some changes in policy are possible, major shifts in policy are likely to be quite difficult without alterations in the underlying institutional framework. One of the conclusions drawn is that it may be nearly impossible to obtain certain policy solutions given the current starting point.

The focus so far in this paper has been between the strategic regime and the free-trade regime. The free trade solution is a natural comparison point, not only because of its importance in economic theory, but because the opening negotiating position of the US at GATT was very much along these lines. However, despite what has been said about the US making the EEP a credible threat, the possibility of free trade as the foundation for a solution at GATT does not look very promising (see, for example, Runge).

One reason is that moving to free trade involves extremely high economic costs for the EC. Not only is W^{EEP} a much lower level of welfare than could be obtained under other policies, moving to free trade would involve dismantling agricultural policy in the EC. The social and political costs of such a transformation are likely to be extremely large. In addition, while free trade was espoused by the US at the start of the GATT talks, the adoption of other policies can lead to greater levels of welfare for the US. In fact, as long as the US is a dominant player in the world wheat market, it will be advantageous for it to use its market power and move away from free trade.

Of course, the strategic solution discussed above and free trade are not the only alternative international policy regimes. Another possibility is for the US and the EC to adopt a cooperative solution. If the Nash equilibrium is taken as the starting point for negotiations, then the possible combinations of internal prices in the EC and the US that would make both parties better off are given by the contract curve BB'. Note that if the Nash equilibrium is taken as the starting point, then it is implicitly assumed that the EC does not view the EEP as a credible threat.

Adopting a position along BB' means that domestic prices in both the US and the EC would have to be reduced, which in turn implies a reduction in production. Both parties may find this difficult to accept. In the case of the EC the internal price under a cooperative agreement of this type would be below the world price. This means that the EC would have to introduce an export tax or find some other method of reducing output.

The first of these is outside any current or historical policy set of the EC, while reductions in output may prove difficult without production and yield records for individual producers, something the EC generally lacks. In addition, any reduction in output implicitly involves a value judgment about which farmers should bear the cost and which should benefit. The political difficulties and costs of attempting to make these judgements could be quite large. The only way a reduction in output might be possible would be if it was linked to some other issue such as the environment. In this case selective reductions in output could be possible through the purchase of land for conservation purposes. Such a policy, however, carries a very large government spending burden.

While the US has a policy framework in place for reducing production, it may be reluctant to do so. One reason is that reducing production would give up market share to countries like Canada and Australia, countries that were viewed as free riders during the late 1970s and early 1980s. This suggests a cooperative solution between the US and the EC may hinge on the participation of other countries.

If the EEP is viewed as a credible threat, then the relevant portion of the contract curve is the line CC'. The difficulties associated with choosing a point along this line are similar to those outlined above. In fact, attempts to select a point along B'C' may be even more difficult than reaching a point along BB'. The reason is that points in this region of the contract curve involve an even greater reduction in the output of the EC than is the case in the range BB'. The importance of this is that US attempts (such as the EEP) to alter the payoffs to the EC may not make it any easier to reach a cooperative agreement. In fact, they could lead to intransigency on the part of the EC if it is felt they were an attempt to push the EC into accepting a bargaining outcome in the BC' region.

It was argued at the beginning of the paper that the institutional framework plays an critical part in determining the types of policies that can be put in place. One institutional element that plays an important role in this model is the willingness of the EC consumers to pay the world price.

Suppose it is assumed that EC consumers pay the world price rather than the internal price. This change in assumption reflects an institutional change in who pays the costs and who receives the benefits of agricultural policy, i.e., a reweighting of political welfare weights. As will be seen, it also requires a complete change in the policy instruments that are used.

As a result of this change in assumptions, the objective function for the EC becomes

$$\max_{p} \quad U = \delta p + \frac{\gamma p^2}{2} - (p-r)\, y$$

The first-order conditions for the EC are similar to those derived above for the US, i.e., r - by = p. This implies that the optimal policy for the EC is to always set an internal price below the world price.

Figure 7 shows this result graphically. The reaction curve $R^{ec}_{\Delta}(q)$ lies everywhere below the free trade line, $p^c(q)$, and has a smaller slope (the symbol Δ indicates a change in the objective function). The intersection of this line with $R^{us}(p)$ gives the new Nash equilibrium. At this equilibrium, the internal price in both the US (q^{Δ}) and the EC (p^{Δ}) are less than the world price (r^{Δ}), implying that both regions are cutting back production. The ability of the EC to implement such a reduction depends on its ability to alter its domestic agricultural policy instruments. This, of course, is one of the institutional changes required to reach the Nash equilibrium.

In terms of welfare, the US clearly benefits from the change in the EC objective function, since V^{Δ} lies below V^*. Since the EC has altered its objective function, it is not possible to say whether that region is better or worse off. Since r^{Δ} is greater than p^*, consumers in the EC are worse off. Government expenditures will be less, since export subsidies are no longer required. Thus, tax payers are better off. Producers may be better or worse off. Although the price they receive (p^{Δ}) is greater than what it was previously (p^*), output has been reduced. As outlined above, this institutional change involves a transfer of political weight among different groups in society. This supports Rausser's point that major changes in agricultural policy are only possible through shifts in the relative power of different interest groups.

At least two other conclusions can be drawn from this example. First, it shows that a change in the institutional arrangement is required to get major policy changes. It is in this regard that decoupling should be seen, since an effective decoupling of agricultural policies requires that tax payers (and/or governments) be willing to pay the cost of the income transfers and that farmers be willing to accept their payment in the form of income transfers rather than in the form of a commodity price.

Second, the change in institutions gives rise to other possibilities that were not attainable before. For instance, a cooperative agreement between the US and the EC is now much more likely given the changes outlined above. With the alteration in their objective function, the EC is now a traditional oligopolist like the US. As a result, there is now an incentive for the two parties to reach an agreement where their market power can be utilized. As well, the EC now has the policy instruments in place with which to implement a cooperative agreement.

Conclusion

This paper has developed a political economy model to explain the broad elements of agricultural policy in the EC and the US over the last 30 years. Among the elements

incorporated in this model are political power, international market power, and institutional constraints.

Despite the rather large changes that have occurred over the last 30 years in the world wheat market, it is concluded that agricultural policy in the US and the EC can be explained in terms of a relatively stable set of institutions and political weights. This, however, may not be true in the future. Ttraditional agricultural policies in the EC and the US appear to have evolved to the point where a stable equilibrium no longer exists. The nature of this instability is characterized in terms of the US accommodating the policies of the EC, with the EC exploiting the policies of the US. The introduction of the EEP is one of the manifestations of this instability.

The future policy direction of the US and the EC is uncertain. One of the conclusions of this paper is that in order for major policy changes to occur, fundamental changes are required in the institutional framework. While such changes are possible, and are all the more likely given the current policy disequilibrium, the nature of these institutional changes is unknown, in part because of a lack of such changes in the past.

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Table 1 Wheat Production, Exports and Market Share, U.S. and EC, 1960-1988

	United States			European Community		
Year	Production	Net Exports (Imports)	Market Share	Production	Net Exports (Imports)	Market Share
	(mmt)	(mmt)	(%)	(mmt)	(mmt)	(%)
1960	36.9	17.8	41	33.7	(10.3)	(24)
1961	33.5	19.5	41	32.1	(10.1)	(21)
1962	29.7	17.7	38	41.9	(4.7)	(10)
1963	31.2	23.0	40	39.5	(5.8)	(10)
1964	34.9	19.7	36	40.5	(3.1)	(6)
1965	35.8	23.2	38	42.9	(4.0)	(7)
1966	35.5	21.0	36	37.7	(4.4)	(8)
1967	41.0	20.8	39	44.2	(2.1)	(4)
1968	42.4	14.8	29	44.4	(2.8)	(6)
1969	39.3	16.4	29	42.5	(1.4)	(3)
1970	36.8	20.2	36	41.3	(6.9)	(12)
1971	44.1	16.6	29	48.3	(2.4)	(4)
1972	42.1	30.9	42	48.4	(0.1)	—
1973	46.6	33.1	45	47.7	(0.6)	—
1974	48.5	27.7	40	52.7	1.9	3
1975	57.9	31.9	43	45.1	2.2	3
1976	58.5	25.8	37	46.6	0.5	1
1977	55.7	30.6	41	44.5	(0.6)	(1)
1978	48.3	32.5	39	55.3	3.6	4
1979	58.1	37.4	40	53.2	5.8	6
1980	64.8	41.2	43	61.5	10.3	11
1981	75.8	48.2	45	58.1	10.0	10
1982	75.3	41.1	38	64.7	11.8	11
1983	65.9	38.9	35	63.8	11.8	11
1984	70.6	38.8	33	82.8	15.3	13
1985	66.0	24.9	25	71.8	12.8	15
1986	56.9	27.3		71.9	14.0	
1987	57.3	43.3		71.6	12.3	
1988	49.6	38.1		76.7	16.0	

Blanks indicate data not available; — indicates zero.

Source: Carter, McCalla, and Schmitz, Table 2-10; United States Department of Agriculture, Foreign Agricultural Service, *World Grain Situation and Outlook.*

Table 2 Historical Wheat Prices, U.S. and EC, 1960-1989

	World	United States		European Community		European Community	
Year	Price[a]	U.S. Target Price	U.S. Loan Rate	Target Price	Threshold Price	Target Price	Threshold Price
		(U.S.$/mt)	(U.S.$/mt)	ecu/mt	ecu/mt	£/ton	£/ton
1960	72.80	65.40	63.93				
1961	75.70	65.77	67.24				
1962	82.30	73.49	74.96				
1963	79.00	73.49	69.08				
1964	59.20	73.49	47.77				
1965	58.80	73.49	45.93				
1966	67.60	94.43	45.93				
1967	58.40	95.90	45.93				
1968	51.10	96.64	45.93				
1969	51.80	101.78	45.93				
1970	56.60	103.62	45.93				
1971	58.10	107.66	45.93				
1972	81.90	110.97	45.93				
1973	165.70	124.56	45.93	114.94	112.80		
1974	154.30	75.32	50.34	127.93	125.10		
1975	137.40	75.32	50.34	139.44	136.45	76.02	74.39
1976	105.80	84.14	82.67	152.00	149.30		
1977	99.90	106.56	82.67	158.08	155.15		
1978	124.20	124.93	86.35	162.39	159.40	102.99	131.09
1979	156.20	124.93	91.86	201.42	197.45		
1980	163.50	133.38	110.23	214.01	209.20		
1981	156.90	139.99	117.58	230.55	225.55	142.63	139.54
1982	144.80	148.81	130.44	250.61	245.61		
1983	141.10	158.00	134.11	261.41	256.43		
1984	137.40	160.94	121.25	259.08	254.05	160.28	157.17
1985	120.50	160.94	121.25	254.98	249.95		
1986	99.90	160.94	88.18				
1987	108.80	160.94	83.78	255.10	251.39	168.04	164.95
1988		155.43	81.20	250.30	245.68		
1989		150.65	75.69	241.08	236.74	169.09	166.05

[a]No. 2 Hard Winter Wheat, Kansas City, ordinary protein

Blanks indicate data not available.

Source: United States Department of Agriculture, Economic Research Service, *Wheat Situation and Outlook Yearbook*; United States Department of Agriculture, *ASCS Commodity Fact Sheet*; Commission of the European Community, *The Agricultural Situation in the Community*.

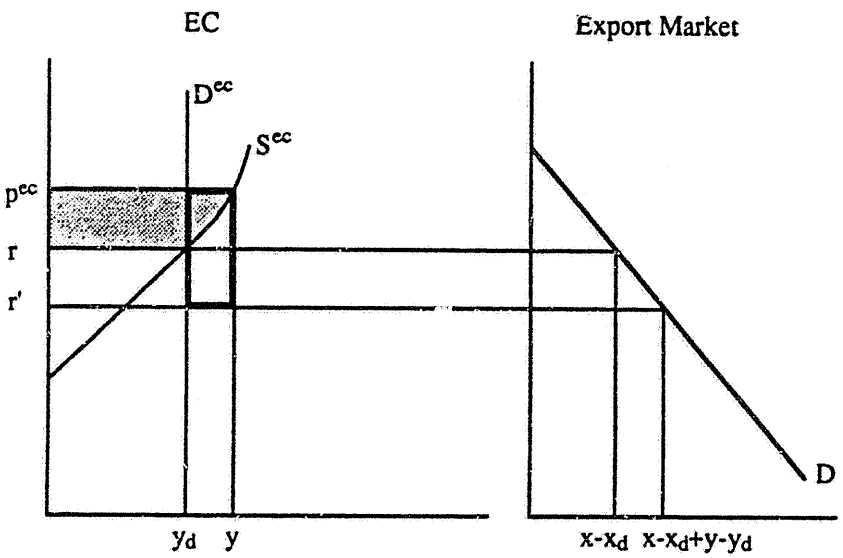

Figure 1 The Economics of Protection in the European Community

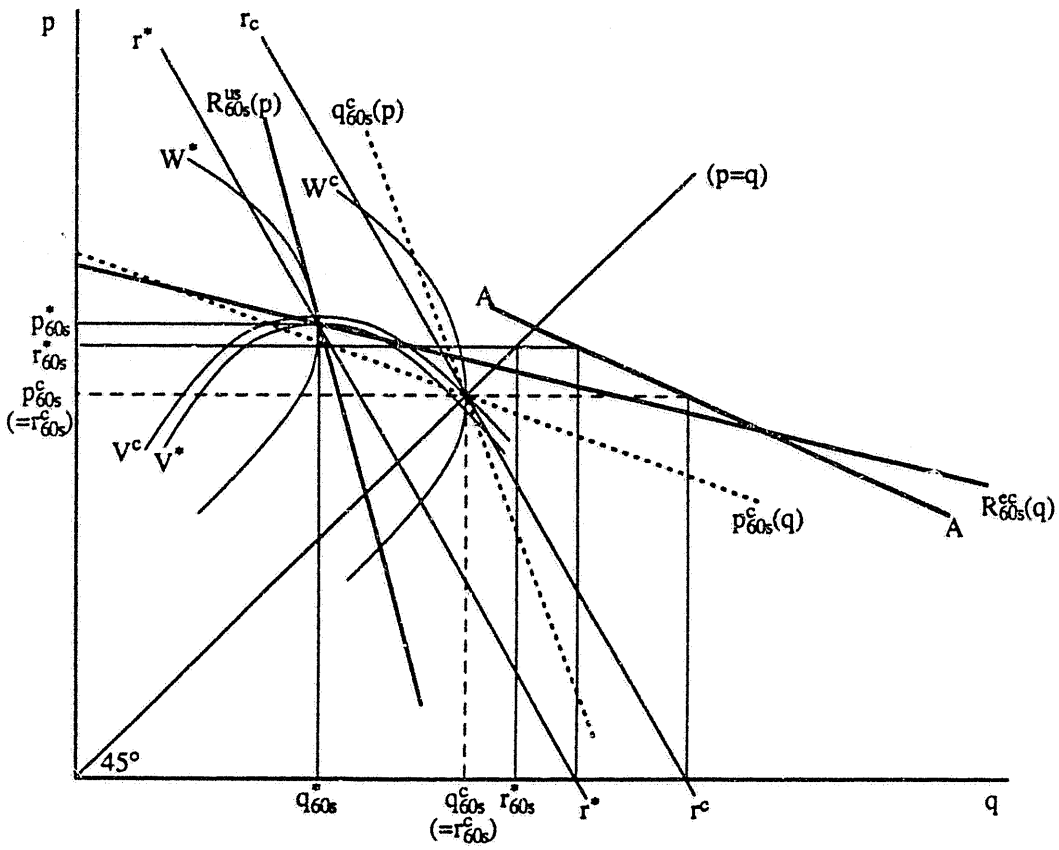

Figure 2 Reaction Functions and Iso-Welfare Curves for the United States and the European Community, 1960s

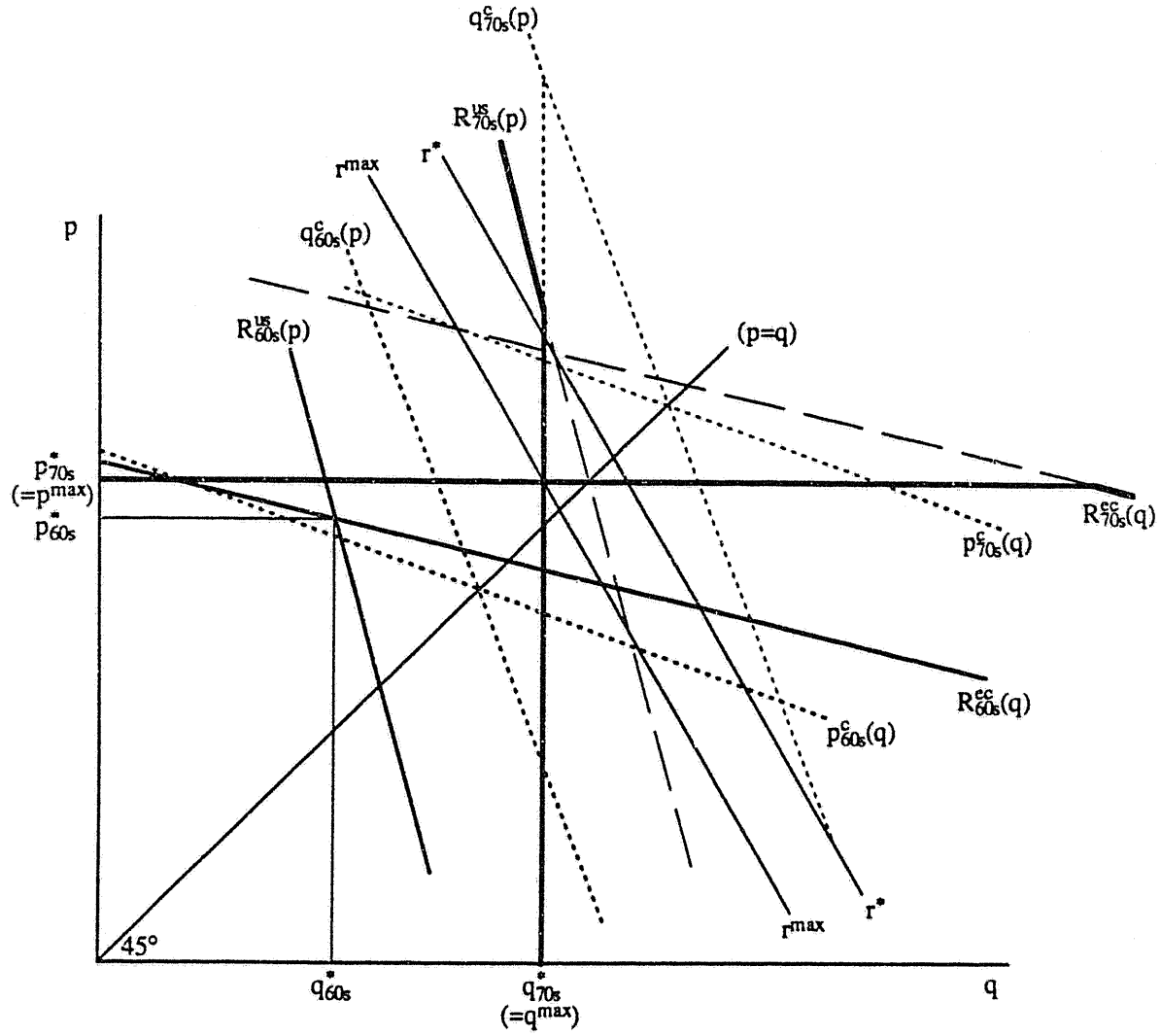

Figure 3 Reaction Functions for the United States and the European Community, Mid-1970s

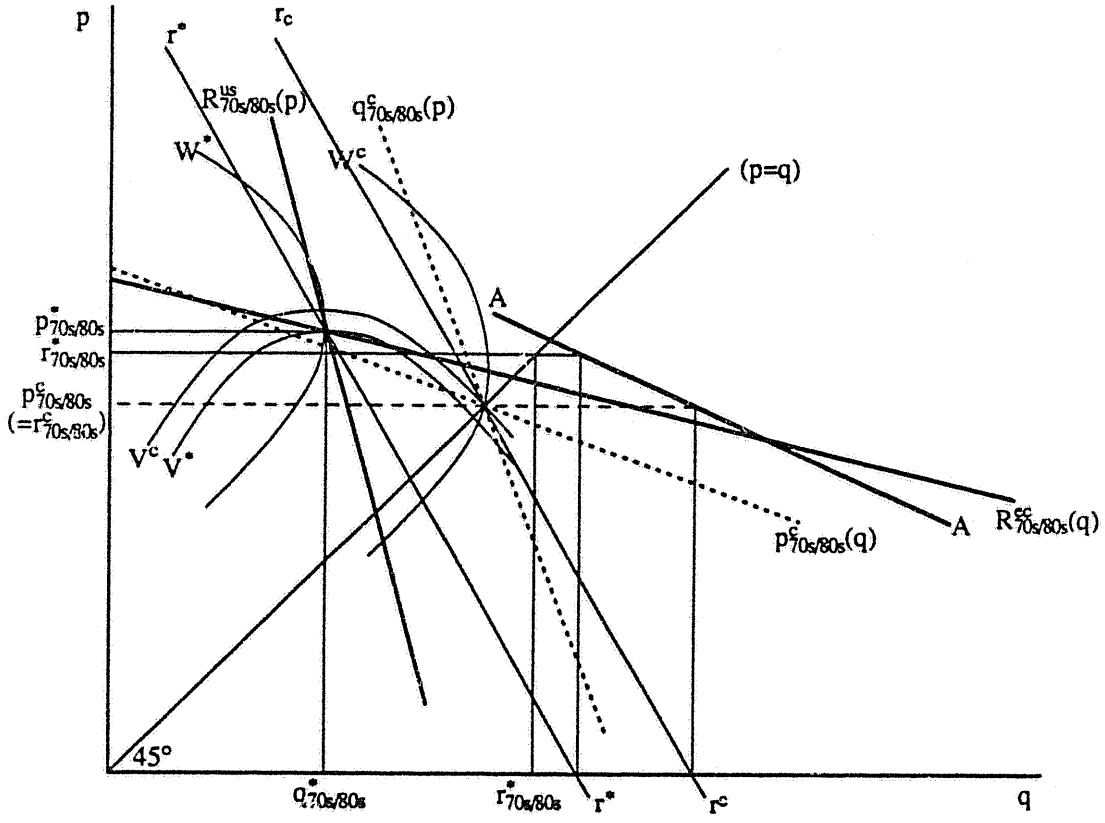

Figure 4 Reaction Functions and Iso-Welfare Curves for the United States and the European Community, Late 1970s/Early 1980s

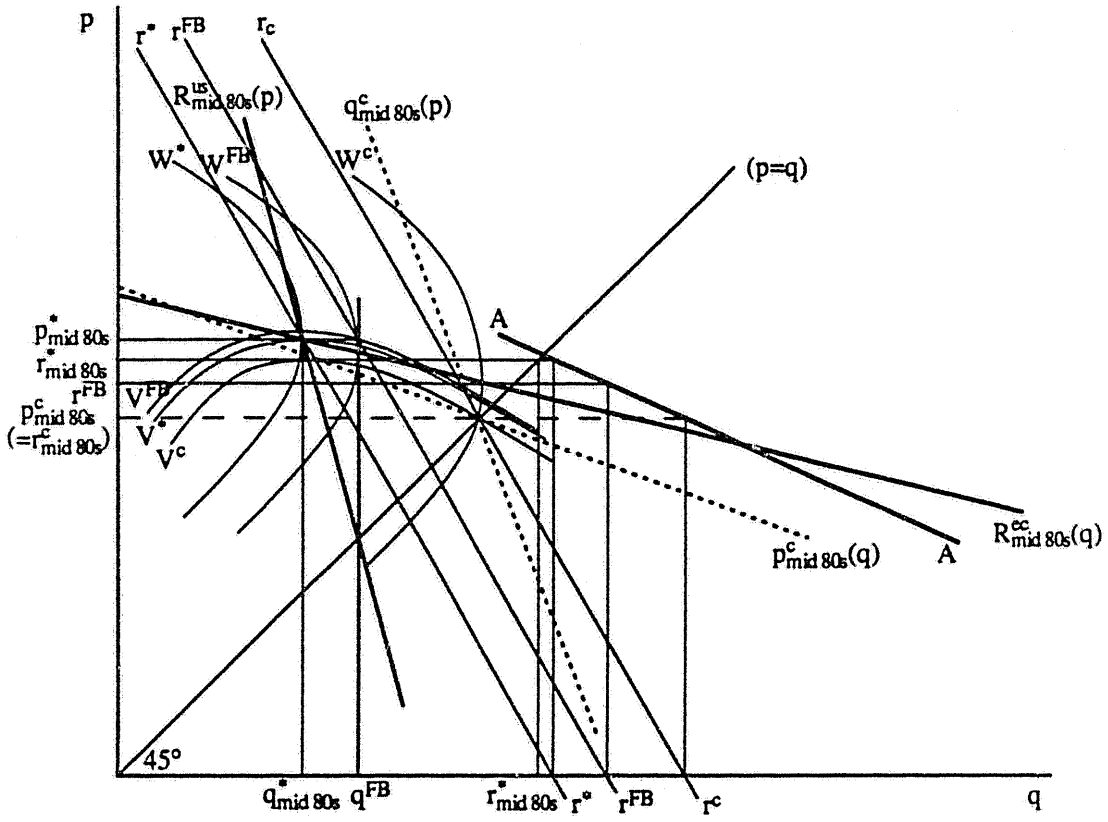

Figure 5 Reaction Functions and Iso-Welfare Curves for the United States and the European Community, Mid 1980s

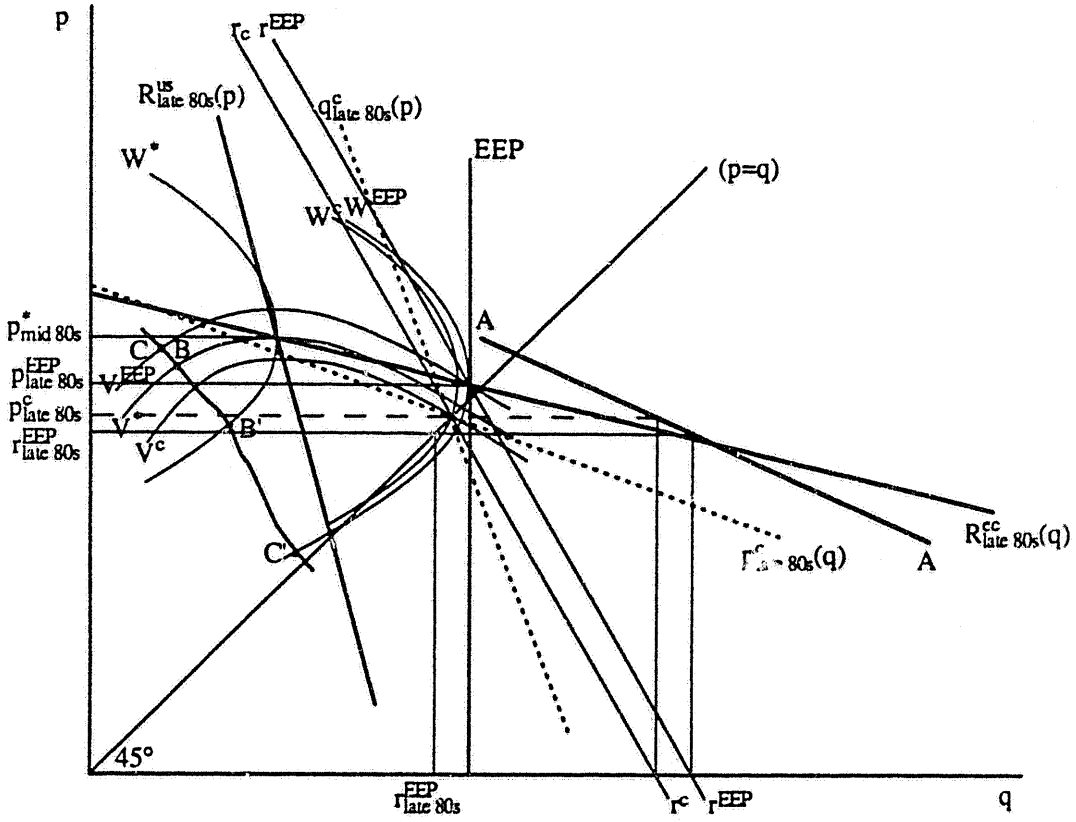

Figure 6 Reaction Functions and Iso-Welfare Curves for the United States and the European Community, Late 1980s

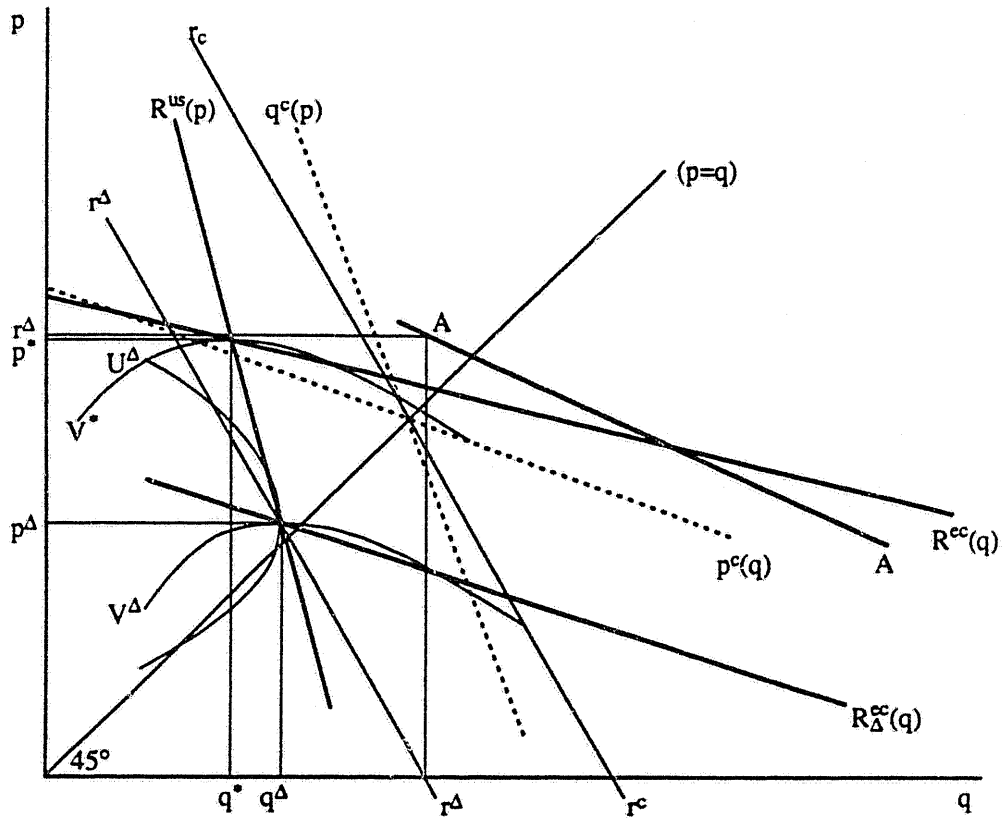

Figure 7 The Effect of Institutional Change on the US and the EC