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EC - U.S. SOYBEAN AND SOYBEAN PRODUCT TRADE POLICY ISSUES AND DISPUTES

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I. INTRODUCTION AND BACKGROUND

> It is the sense of Congress that — (1) the European Community's proposed rebalancing of import protections is fundamentally at odds with the important goals of liberalizing world agricultural trade and eliminating trade-distorting policies; (2) such rebalancing could have a particularly severe impact on United States exports of corn gluten feed and oilseeds to the European Community, leaving them vulnerable to unfair treatment and increased trade barriers; and (3) the United States, throughout the remainder of the Uruguay Round of the GATT negotiations on agriculture, should forcefully reject the European Community's proposal to rebalance import protections.
>
> Excerpt from Sec. 1559 Food, Agriculture, Conservation and Trade Act of 1990.

> Status quo. Latin for the mess were in.
>
> Jeve Moorman

The first quote illustrates the vehement opposition of the U.S. Congress to the proposed European Community (EC) policy to "rebalance" the Common Agricultural Policy (CAP). Rebalancing would result in the restriction of trade in corn gluten feed, soybeans, soybean meal and oil and the lowering of overall commodity support. The latter quote expresses the EC's frustration with the current policy of a zero binding duty on corn gluten feed, soybeans and soybean meal. This paper will examine the impacts of the various proposals the EC would like to implement under "rebalancing" and that the United States is so opposed.

THE NEED TO REBALANCE

In the early 1960's, during the Dillon Round of GATT negotiations, the EC negotiated zero binding duties on soybeans, linseed, flaxseed, oilcakes, and cotton. The EC was thus restricted from imposing import duties on these products without directly violating the General Agreement on Tariffs and Trade (GATT). At the time, soybeans were of little importance in international trade, with only 4,090,000 tons being traded in 1961 (Oil

World). Furthermore, there were no varieties of soybeans available that could be grown in the EC. Thus, the Community had no producers to protect and found it in their best interest to keep their borders open to soybeans and their products.

With feed grains, however, the EC was using the very effective variable import levy (VIL). The VIL establishes a domestic support price above the world price and charges a import levy equal to the difference. Consumers and livestock producers then pay higher prices that are created by the VIL. This system was practical until the early to mid 1970's when the high internal prices encouraged surplus production that had to be exported.

To maintain the high domestic support price, the EC created a variable export subsidy (VES) to render EC grains competitive on the world market without driving down the internal price. The VES is essentially a restitution payment for the difference between the internal price and the lower world price. The production of surplus crops and subsidization of exports continued throughout the seventies and eighties. As exports increased so did budgetary outlays. The costs became critical in the eighties when the Common Agricultural Policy (CAP) budget became tougher to balance as VIL revenues were replaced with VES outlays. The budget began to be financed primarily through the value added tax (VAT) collected from the member countries. In 1985, the VAT accounted for 58.3 percent of EC revenues (von Witzke and Houck, 1987). Yet as the VAT increased to finance the CAP, some countries found they were paying to support farmers in other countries more than their own producers. The rising costs and unequitable distribution of funds has served as an impetus to CAP reform.

Meanwhile, the high internal costs of feed grains, forced livestock producers to substitute to the relatively cheaper soybean meal being imported under zero duty binding. Soybeans, also being imported duty free, were being crushed in the EC which led to the development of a large EC crushing industry. The crushing industry also grew due to heavy subsidization. See section 3. The competition between the grains and soybean meal thus aggravated the rising cost of cereal grain protection.

In addition to the competition between feed grains and soybean meal, soybean oil competes with vegetable oils and when used in margarine, contends with butter. Protected vegetable oils in the EC are sunflower oil, olive oil and rapeseed oil. Olive oil has become a primary concern as the accession of Spain and Portugal into the EC is expected to double EC expenditures on its olive oil regime (Davis, et. al., 1986). Furthermore, soybean oil is the main factor in the production of margarine which also competes with butter. These vegetable oils and butter are protected under the CAP and because soybean oil decreases their consumption, serves to further irritate CAP budgetary problems.

This subsidization of oilseeds has come under attack by the American Soybean Association (ASA). In December 1987, the ASA filed a section 301 unfair trade petition with the U.S. Trade Representative, claiming the EC oilseed subsidy was a "thinly disguised import barrier" (Gleckler and Tweeten, 1990b). In response, the GATT dispute settlement panel ruled that the oilseed subsidies violated GATT trading rules. The EC has agreed to eliminate the subsidy unless an accord can be reached in the Uruguay Round.

The GATT ruling coupled with CAP budget problems has led to the "rebalancing" proposals. It is believed by EC policy makers that a

restriction on soybean and meal imports would solve the problems described above by raising revenues and reducing the need for large oilseed subsidies. Restricting soybean and meal imports would complete the CAP by solving the contradiction created by the zero binding duty on oilseed and product imports (Haniotis & Ames, 1988).

THE PROPOSALS

Consequently, there have been many suggested policy solutions. Those to be examined here are as follows:

1. a 75 ECU/mt consumption tax on EEC vegetable oils;
2. a 20% import tariff on soybean meal and an equivalent tariff on soybeans;
3. a 30% decrease in the support price of corn and other feed grains; and
4. a 10% tariff on soybean meal (equivalent bean tariff) and a 15% decrease in the support price of corn and other feed grains.

In 1987, the EC Commission proposed a consumption tax on marine and vegetable oils as a part of its agricultural price package (Haniotis & Ames, 1988). This proposal was met with opposition by the United States, for a tax was viewed as a direct violation of the zero duty binding agreement. The U.S. threatened the EC with an escalation of U.S.-EC agricultural trade disputes if the tax were imposed. This increase in trade tensions would make both countries worse off, through decreased trade, worker displacement and lost productivity (Houck, 1987). However, the EC Commission sees the imposition of a tax as an effective way to decrease the production of soybean oil, and soybean imports, as well as

generating new revenues (Haniotis & Ames, 1988).

The second policy alternative the EC has considered is a tariff on soybean meal and an effective tariff on soybeans. This policy has recently been proposed, but as with the consumption tax has been rejected by the United States. More blatant than a tax, the tariff violates GATT articles and the Dillon Round compromise.

The third option which derives appeal from decreasing subsidy outlays and liberalizing trade ixa decrease in the support price of feed grains. Since soybean meal and feed grains are substitutes, decreasing the EC feed grain support price would make feed grains relatively cheaper to livestock producers. Producers would then substitute back to feed grains from soybean meal, decreasing the demand for soybean meal and its importation. A lower support price would also decrease budget expenditures on feed grain variable export subsidies and alleviate competition between soybean oil, butter and other vegetable oils.

It is likely that the resulting change in soybean and product policy will be negotiated in the Uruguay Round of trade talks. Even if the talks fail, the EC could move unilaterally to rebalance the CAP due to rising internal pressures and costs. The full rebalancing proposal on the table in Geneva has been to restrict imports of soybeans, soybean meal and corn gluten feed in exchange for lowering the overall level of EC commodity support. Support expenditures would be decreased and revenue increased from tariffs or other border measures.

The purpose of this paper is to examine these policy alternatives and determine the best alternative for the EC. The effects of these policies on the United States will also be reviewed since the EC imports over one-

third of U.S. soybean and soybean meal production (Tutwiler & Rossmiller, 1987). Each policy will first be viewed from a partial equilibrium standpoint to determine the price and quantity effects on the EC and U.S. markets. Next, basic welfare analysis of consumer, producer and government surplus will be applied to each policy to ascertain the best alternative from a social welfare perspective.

II. BRIEF LITERATURE SURVEY

Several studies have estimated the effects of "rebalancing." Huyser and Meyers (1985) evaluated the impacts of a 20% reduction of the EC corn threshold price and a 20% import tariff on both soybeans and soybean meal. The analysis was based on a non-linear regional trade model containing ten countries, seven of which were endogenous, including the EC. However, the EC oil market was not treated endogenously. Furthermore, soybean and meal demand in the EC was not related to animal production, a key component in soybean meal demand and thus soybean demand.

In both scenarios, the effect on U.S. soybean export value was approximately a 30% reduction. However, the application of the tariff rate creates a problem. The ad valorem rate is 20% for both beans and meal. By using the same rate and not an effective rate for soybeans, the authors are simulating a scenario in which the soybean price would increase by a relatively larger amount than that of meal. This would encourage EC importers to purchase meal instead of beans, thus undermining the EC's crushing industry. The importance of the EC crushing sector is demonstrated by its high level of subsidization, (see section 3) making it politically unlikely that the EC would impose an equal tariff versus an effective tariff.

Peterson and Auerbach (1985) also examined the consequences of a proposed EC import duty. Similar to other studies on this topic, the authors used a linear programming model to simulate the effects of a policy on a country's feed rations. Using France as a representative country, the authors determined the results of an import duty using a two-part model. A linear programming model was developed to determine adjustments in feed rations resulting from the increased soybean meal price. Price elasticities of feed demand were then calculated using a set of compound feed demand equations. This two-part model was then used to find the impact on demand of soybean meal (and feed) with successively higher levels of protection.

Peterson and Auerbach found that for small increases in meal prices the decrease in demand was moderate. "For price increases of 10% or 20%, the reduction in the demand of soybean meal is likely to range from about 3% to 7%" (Peterson and Auerbach, 1985). In general, they found that the benefits of a restrictive soybean and meal import policy are much smaller than previously thought.

However, the applicability of these results are limited since they examine a single country. France is characterized by producing many of its compound feed ingredients internally. Some of the Northern European countries, in particular the Netherlands, depend on many imported feed ingredients. Because of soybean meal's relatively lower price, due to zero-binding duty, imported beans and meal are relatively more important in their feed rations than is the case in France. Thus Dutch livestock producers are more responsive to soybean price changes than French producers. Therefore, while this study may accurately estimate the

situation in France, the results cannot be transferred to the EC as a whole.

In response to the rising interest in the oil tax due to EC expansion, Davis, et. al. (1986) studied the impact of such a policy on U.S. soybean exports. The authors used a linear-in-logs equilibrium displacement model with the analysis broken down into two sub-models for each trading region; the EC and U.S. One model was for crushing services the other for soybeans. The EC and U.S. models were connected through an international price transmission elasticity. The model employed five equations for the EC and four equations for the U.S. which defined supply and demand in terms of percentage changes for each market. The equations were then solved for percent change in price.

Davis, et. al. found that the change in prices and quantities supplied, demanded and traded of soybeans were minimally affected over a range of possible tax levels and price transmission elasticities. Crushing services in both regions were more responsive to the tax, especially at higher tax rates. Under the most extreme scenario, 200 ECU/mt tax and a .8 price transmission elasticity, EC imports fell .024 percent and world prices fell by .004 percent. Thus the effectiveness of a consumption tax must be questioned.

The underlying problem with Davis, et. al.'s approach, as with other studies, is soybeans are assumed to be homogenous and the detailed interactions among markets are not explicitly allowed for. First, soybeans differ and hence are priced differently depending on origin and protein content. The partial equilibrium approach does not account for the differentiated products. Secondly the definite interactions between

soybeans and corn and livestock markets was not addressed in this approach.

The oilseed tax and its effects on U.S. soybean exports was revisited by Haniotis and Ames (1988). In this case, U.S. exports to the enlarged EC was the focus. The authors addressed the previously ignored problem of differentiated products using Armington's model of differentiated products to determine soybean demand.

The results of this method indicate significant changes in U.S. soybean exports given an oilseed tax for the enlarged EC. Under the assumption of EC enlargement with no tax, U.S. exports increase a mere .91 percent. But enlargement coupled with an oilseed tax would reduce exports 1.34 percent. While Spain and Portugal imports from the United States rise 2.29 percent, EC-10 imports fall a significant 8.9 percent. Although avoiding some of the problems of the above studies, the weakness of the Haniotis and Ames approach is the exclusion of livestock numbers, explicitly or implicitly, when estimating demand for soybeans.

Correcting for the exclusion of animal units in determining soybean and soybean meal demand and other problems and using the theoretical model laid out in Houck, Ryan and Subotnik (1972), Von Witzke and Houck (1987) used a 29 equation model to describe the EC and world markets for soybeans, meal and oil. Using two stage least squares, the authors estimated 11 behavioral equations with data for 1969-1982. Animal production was an endogenous variable in determining meal demand. The data, while not including the most recent EC expansion of 1986, includes the development of CAP and the EC.

Varying the tariff rate for soybean meal between 5% and 20%, Von Witzke and Houck found a tariff depressed world prices and raised EC

prices. Prices were most strongly affected in the meal market where the tariff was imposed. Except for large changes in world bean and meal prices, changes in demand were small especially in the world market where the elasticity of demand was estimated to be small.

An oil consumption tax ranging from 65 ECU/mt to 85 ECU/mt was also simulated in Von Witzke and Houck (1987). The inelasticity of supply and demand again render the effects small. However, the EC oil price rises by a substantial 11.1% to 14.5%. Inexplicably soybean meal is not affected. It would be expected that shifting oil demand by the amount of the tax would shift bean demand since oil is a product of bean crushing. The resulting fall in bean demand should lead to a decrease in beans crushed and thus meal supply. The empirical results, however, do not include this relationship or the effects are too small to be of significance.

The most recent work done on oilseed "rebalancing" is by Gleckler and Tweeten (1990a and 1990b). Their first paper addresses the termination of EC oilseed subsidies and the second the impact of CAP rebalancing on the United States, EC and the rest of the world. Employing the Economic Research Service's static world policy simulation modeling framework the analysis goes beyond research done in the past. Key to this study is that the substitutability and complementarity relationships among commodities are accounted for in the world trade model.

The effects, of oilseed subsidy elimination, were small upward changes in beef, pork and poultry world prices and substantial rises in world prices of oilseeds and oilmeals. EC consumption of the products examined were hardly affected. Production of oilseeds, however, was estimated to fall 33 percent in the EC while wheat production would rise 6 percent. EC

trade was most severely affected in these two commodities with net exports of oilseeds falling 23 percent and wheat and coarse grains rising 24 to 35 percent (Gleckler and Tweeten, 1990a).

Effects on the United States are more tempered with production changing from -.01 percent for pork to 1.4 percent for oilseeds; oilseed consumption falling by 1.06 percent and net exports changing between -4 percent for coarse grains and 8.16 percent for oilseeds. Summed over all commodities, welfare increased $339 million in the EC, decreased $12 million in U.S. and increased $134 million in the rest of the world (Gleckler and Tweeten, 1990a).

Gleckler and Tweeten (1990b) followed up the oilseed subsidy study with a look at the impact of CAP rebalancing on the United States, EC and the rest of the world. In this study, the model was used to determine what uniform level of support under rebalancing would be required to make U.S. producers no worse off. Examining uniform levels of support between 110 and 140 percent of world prices (the actual weighted average is 142 percent above world prices) the authors found that the 120 percent level would be acceptable to the U.S. and rest of world on a change of producer surplus basis. The EC producers, however, would lose $4,360 million. As expected, U.S. oilseed and oilmeal trade fell while wheat and corn trade rose. Finally the net societal welfare effects for the EC and U.S. were positive at a 120 percent level of uniform support, while the rest of the world lost (Gleckler and Tweeten, 1990b).

III. MARKET STRUCTURE AND POLICIES OF SOYBEANS AND THEIR PRODUCTS

THE MARKET

The soybean and soybean product markets are highly interrelated by

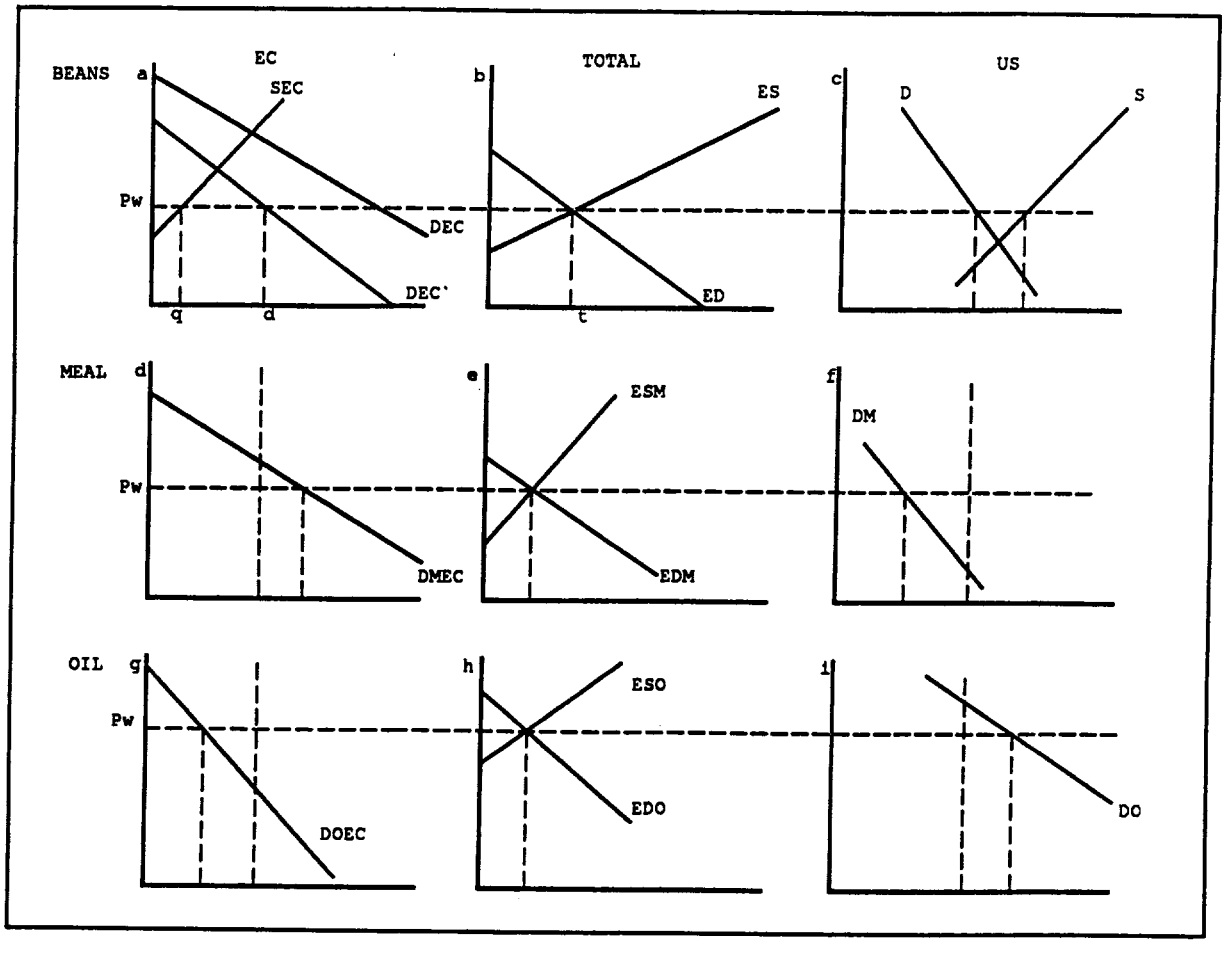
nature. Houck, Ryan and Subotnik (1972) developed a theoretical model which helps explain the world market structure of soybeans and their products. This partial-equilibrium model has been used in several works, including Von Witzke and Houck (1987) and Meyers, et. al., (1986), to explain the interactions between markets in response to policy instruments. The model allows for easy analysis of trade policy effects on prices and quantities between two regions.

Figure 1 illustrates the model with the EC importing beans and meal and exporting oil. The rows of individual graphs show the markets for soybeans, soybean meal and soybean oil, respectively. The outer columns depict the markets for the EC and the United States while the center column demonstrates the world market. The graphs are standard with price measured on the vertical axis and quantity on the horizontal axis.

Let the discussion start from panel a, which depicts the EC retail and derived demands for soybeans. DEC is the retail demand curve for soybeans and is the vertical summation of the soybean meal and oil demand curves, DMEC and DOEC (panels d and g). The second function in panel a is DEC', the derived demand curve for soybeans in the EC. The curve is created by subtracting the crushing margin and handling cost from retail demand.

The horizontal difference between SEC and DEC' in panel a is ED; the excess demand curve in panel b. ED interacts with the U.S. excess supply curve, ES, to form the world price for soybeans. ES is generated by the horizontal difference between the U.S. supply and demand curves in panel c. The world soybean price then determines a quantity demanded of soybeans in the EC. This quantity translates into the supply of soybean meal and oil in the Community, since they are derived in technologically fixed

Figure 1. Model for the EC-U.S. Soybean and Product Markets



proportions. The same occurs in the U.S. market. Because of the technology involved in crushing, these supply curves are fixed for a given amount of soybeans and thus are inelastic.

The same process is portrayed in panels e and h for soybean meal and oil, where the EC imports the former and exports the latter. Thus, the EC has an excess demand curve for meal (EDM) and an excess supply curve for oil (ESO) which combines with the U.S. excess supply and demand curves to create the soybean meal and oil world prices.

The interactions outlined above characterize the standard partial-equilibrium analysis model. The change in consumer and producer surplus will also be measured with this model. This model serves as the framework

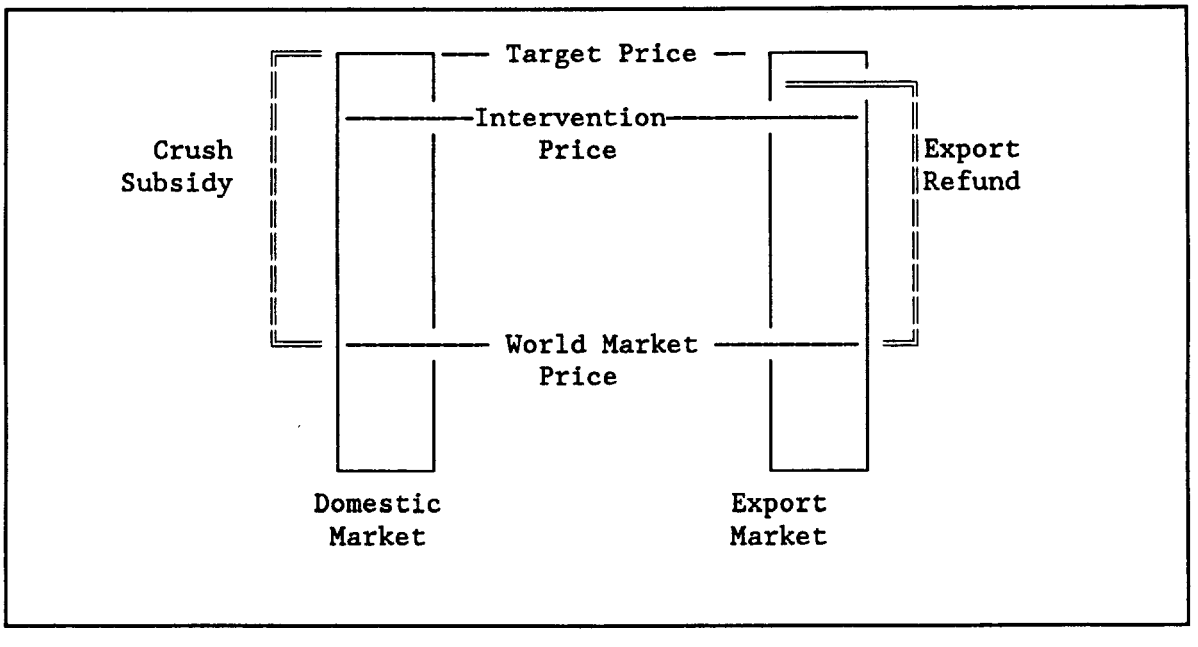
from which to determine policy effects on prices and quantities, as well as welfare.

EXISTING POLICIES

As mentioned in the introduction, soybeans are often thought of as one of the more freely traded agricultural commodities. Indeed, global producer subsidy equivalents show oilseeds to be supported at approximately 15% of producer income. Food and feed grains are subsidized between 25 and 40 percent, while sugar and dairy are between 45 and 55 percent (Bickerton and Glauber, 1990). However, this does not mean that governments do not intervene in the markets. Some countries, like the United States, have little direct intervention into their soybean and product markets, although it is increasing. Yet other countries, like the European Community and Brazil, intervene more substantially.

Because of the European Community's rising use of imported soybean and

Figure 2. EC Oilseed Support Mechanism



soybean meal, the EC Commission was compelled in 1979 to establish a program to encourage production of soybeans where possible. The Commission sets a support price, called a target price, for soybeans. Oilseed crushers receive a subsidy equal to the difference between the target price and the EC-calculated world price. The "subsidy is payable to oilseed processors as compensation for purchasing domestically-produced oilseeds" (GATT, 1990). Soybean producers then receive payment from crushers at least as large as the intervention price. Refer to figure 2.

Producers sell into government intervention stocks when supply exceeds demand. In this case, they receive the intervention price, which is set slightly below the guide or target price, and is the price that triggers EC purchases. The sale to intervention stocks, however, is rare.

This policy regime came under attack by the American Soybean Association (ASA) in 1987. The U.S. Trade Representative, acting on the ASA's Section 301 petition, argued that the subsidy level was calculated to provide an incentive for EC processors to buy domestic oilseeds rather than imports. The United States claimed that the Dillon Round tariff concessions had been "nullified and impaired" as a result of the processor/producer subsidy regime (GATT, 1990).

The evidence was on the U.S. side, for between 1977 and 1986, the European Community support price for soybeans had been 50% to 200% above the world price. This rate of support gave producers, primarily those in Italy and France, incentive to expand output from 8,000 tons to 1.8 million tons from 1977 to 1987 (Bickerton and Glauber, 1990). Despite this rapid increase in production, the absolute amount of output is small with EC soybean production accounting for approximately one-tenth of EC demand.

On January 25, 1990, the GATT council adopted the dispute-settlement panel report on the U.S.-EC soybean dispute. The Council agreed with the U.S. contention that the subsidy level "over-compensated" processors for purchasing domestic oilseeds. The panel conclusions that were accepted by the Council were that the EC payments to processors were inconsistent with GATT articles, that the subsidy regime had impaired the zero-binding duty concessions and that GATT members should refrain from retaliation until the EC had reasonable time to conform to GATT articles (GATT, 1990). Thus in an attempt to avoid full elimination of their oilseed program, the EC has been trying to negotiate their "rebalancing" proposal into the Uruguay Round.

A GATT agreement that allowed the EC to implement some form of rebalancing would also attack the rising budgetary problems involved in EC subsidies. Because of the open-ended support for soybeans and other oilseeds, EC budget expenditures have risen rapidly. Between 1984 and 1988, EC budget expenditures for oilseeds tripled. This led to a limitation on price cuts at the February 1988 EC Summit. To decrease EC expenditures on oilseeds, production targets were established. These targets are called Maximum Guaranteed Quantities (MGQ) and are set at the beginning of each season. Price penalties go into effect when EC production of soybeans, or other oilseeds or grains, exceeds the MGQ. The 1988/89 to 1990/91 MGQ for soybeans is 1,300,000 tons for the EC-12. In 1988/89, the penalty for each 1 percent of production exceeding the MGQ was a .45 percent decrease in the support price. In 1989/90 the penalty was a .5 percent decrease. These penalties, as of the February 1988 reforms, are not limited in their magnitude (Normile, 1989).

The United States, on the other hand, does not support its soybean and product industries to the extent of the European Community. As with U.S. grains, soybean prices are supported through a non-recourse loan program. Under the program the U.S. Department of Agriculture sets a loan rate at which farmers can borrow. When the loan is due producers have one of two options. If the market price is below the loan rate, producers forfeit the soybeans they put up for collateral and take the loan rate. The government has no recourse against these forfeitures. Of course if the market price exceeds the loan rate the farmer can repay his loan and sell his soybeans at the higher market price. Unlike the grains, there are no deficiency payments for soybeans.

In the 1990 farm bill, however, U.S. soybeans were given more support when a new marketing loan program was established for soybeans. The program allows producers to repay loans, not at the loan rate, but at a lower rate when the world price is less than the established rate. This prevents the U.S. loan rate from acting as a price floor on the world market. The marketing loan is essentially the same as the EC's VES.

However, while vying for more governmental support, soybean growers lost on the loan rate side. The rate was set at $5.02 per bushel which was lowered to $4.92 by a 2 percent assessment. Merle N. (Buck) McCann, president of ASA, says "this farm bill just doesn't do enough to help us recapture the markets we've lost" (Agweek, 1990). The effective loan rate is viewed as being too low to cause a significant increase in U.S. soybean production.

Meanwhile, soybean oil is subject to an import tariff and export subsidies. First, soybean oil imports are subject to a tariff rate as high

as 22.5 percent. Soybean meal and flour is subject to a nominal 3 percent ad-valorem tariff rate. Second, the Export Enhancement Program (EEP) is used to encourage exports of soybean oil, although the effectiveness of the EEP program has been questioned. The program awards generic certificates to exporters that are redeemable for Commodity Credit Corporation (CCC) owned commodities. These certificates are then used to lower the per gallon price of soybean oil.

In the United States, the policies affecting grains also impact soybeans by discouraging their production. Because wheat and coarse grain producers are paid deficiency payments, farmers are encouraged to plant these crops and not soybeans.

While both the U.S. and EC meddle in their soybean and product markets, the commodities are considerably less protected than other commodities. The remainder of this paper will examine how that tradition is at risk.

IV. EMPIRICAL ANALYSIS

Turning from the policies which intervene on soybean and soybean product markets today, we face the theoretical world of examining the effects of the possible policies of tomorrow. Inherent behind the following methodology is the market structure introduced by Houck, Ryan and Subotnik (1972) and outlined in section 3.

PERCENTAGE CHANGE IN VARIABLES

Following the methods in Alston (1985) and Davis, et. al. (1986) we can arrive at the market variable changes through elasticities. By breaking down the elasticity equation into its component parts, we can solve for price or quantity changes. Expressing the supply, demand, excess

demand and supply functions, a market clearing equation and a price transmission elasticity equation in terms of elasticities, we can describe each market under the four scenarios with these five equations.

$$(1)\ dQ^{i}_{j}=\varepsilon^{i}_{j}(dP^{i}_{j}-\alpha)$$

$$(2)\ dD^{i}_{j}=\eta^{i}_{j}(dP^{i}_{j}-\beta)$$

$$(3)\ dT^{i}_{j}=\varepsilon^{i}_{j}(dP^{i}_{t}-\gamma)$$

$$(4)\ dD^{i}_{j}=K^{i}_{j}dQ^{i}_{j}\pm K^{i}_{t}dT^{i}_{j}$$

$$(5)\ dP^{i}_{t}=\lambda^{i}dP^{i}_{j}-T$$

Where

dQ^{i}_{j} = percentage change in quantity supplied of the i^{th} product in the j^{th} country,

ϵ^{i}_{j} = elasticity of supply for i^{th} commodity in j^{th} country,

dP^{i}_{j} = percentage change in price of i^{th} product in j^{th} country,

α = percent shift in supply caused by a policy tool,

dD^{i}_{j} = percentage change in quantity demanded of i^{th} product in j^{th} country,

η^{i}_{j} = elasticity of demand of i^{th} product in j^{th} country,

ß = percent shift in demand caused by policy tool,

dT^{i}_{j} = percentage change in quantity traded of i^{th} product in j^{th} country,

ϵ^{i}_{m} (η^{i}_{x}) = elasticity of excess demand (excess supply) of i^{th} product (from) j^{th} country,

dP^{i}_{t} = percentage change in trading price of i^{th} product to (from) j^{th} country,

γ = percent shift in excess supply or demand curve caused by a policy tool,

K^i_j = percent of country j's consumption of i satisfied by domestic production,

K^i_t = percent of country j's consumption of i satisfied by trade,

T^i = tariff rate imposed on product i,

λ^i = international price transmission elasticity of product i.

After solving the above equations for dP^i_j in each market, the answer is then substituted into equations (1) through (5) to determine the changes in quantities traded, consumed and supplied. Given the changes in price and quantities which can be found from the preceding equations one can proceed with examining the welfare effects.

WELFARE MEASUREMENT

Many economists have enumerated the inadequacies of consumer and producer surplus, while others claim they can be fair approximations of equivalent variation (EV) and compensating variation (CV). Freeman (1979) states that EV does not provide a unique welfare measure when a policy involves changes in more than one price. On the other hand, when more than one policy is being evaluated in order to rank the options, CV may fail to be consistent with individual preferences. Although easier to calculate than EV and CV, consumer surplus does not conform to the theoretical definition of welfare change.

Considering these arguments and the conditions set by Willig (1976), Harberger (1971) and Mishan (1968) for use of consumer and producer surplus we find that all but one market conforms. Farmers and crushers are the producers and consumers in the soybean market. Soybean production can be

raised in the short run only by adding inputs such as fertilizer and water. Thus we assume that this market conforms to the needs of producer surplus. Crushers however, fail the expenditure assumption as soybeans are likely to be a large percent of their expenditures.

In the meal and oil markets, crushers are the producers. In the crushing industry production can be increased in the short run only by adding labor and chemicals; these are very imperfect substitutes for the fixed factor, soybeans. Meanwhile, livestock producers are the primary consumer of soybean meal. Meal is likely to make up only a small portion of a producer's expenditure bundle. Although households are the main consumer of oil, soybean oil will make up a very small portion of their expenditures.

Thus, the assumptions would appear to hold in every case, except for consumer surplus in the soybean market. Needing to be consistent across markets, however, consumer and producer surplus would appear to be a reasonable approximation for the change in welfare experienced under these policies. This is particularly true given the shortfalls of EV and CV explained by Freeman.

Proceeding with the above information, the welfare effects for each market under the different policies can be determined. The method used for calculating the changes in welfare is found in Bale and Lutz (1981).

$$(6)\ NSL_p = \tfrac{1}{2}[Q^i{}_j - Q^i{}_j(1+dQ^i{}_j)] \times [P^i{}_j - P^i{}_j(1+dP^i{}_j)]$$

$$(7)\ NSL_c = \tfrac{1}{2}[D^i{}_j - D^i{}_j(1+dD^i{}_j)] \times [P^i{}_j - P^i{}_j(1+dP^i{}_j)]$$

$$(8)\ G_p = Q^i{}_j[P^i{}_j(1+dP^i{}_j)-P^i{}_j]-NSL_p$$

$$(9)\ G_c = D^i{}_j[P^i{}_j(1+dP^i{}_j)-P^i{}_j]-NSL_c$$

$$(10)\ G_g = NSL_p+NSL_c+G_p+G_c$$

Where NSL_p and NSL_c are net social loss for producers and consumers, respectively. G_p, G_c and G_g are the changes in surplus or welfare for producers, consumers and the government.

Solving for equations (6) through (10) gives us the gain or loss in producer, consumer and government surplus. Summing equations (8), (9) and (10) over the i^{th} country gives us the net change in societal welfare for that country.

V. RESULTS

The data needs of this analysis are not extensive as seen in the last section. The first requirement is elasticities estimates. Several researchers have painstakingly worked through small and large models and derived elasticities for the U.S. and EC soybean and soybean product markets with the results differing widely.

Because of the comprehensive and respectable work done by the Food and Agricultural Policy Research Institute (FAPRI) I have chosen to use their elasticity estimates. These elasticities can be found in table 1. The FAPRI trade model for soybeans and their products is based on the three product, two region theoretical model established in Houck, Ryan and Subotnik (1972) and used in this analysis. Where FAPRI did not estimate an elasticity, estimates from Von Witzke and Houck (1987) and Davis et. al.

(1986) were used. However, because of differing elasticity estimates of various researchers I will perform a sensitivity analysis, varying the elasticities by 20%, to see how the results vary from the FAPRI base.

TABLE 1: ELASTICITIES

BEANS		MEAL		OIL	
ϵ^e_b	0.84	ϵ^e_m	1	ϵ^e_o	1
η^e_b	-0.55	η^e_m	-0.19	η^e_o	-0.363
ϵ^m_b	1.57	ϵ^m_m	0.41	ϵ^m_o	0.363
η^m_b	-1.39	η^m_m	-0.19	η^x_o	-0.4
λ^b	0.9	λ^m	0.88	λ^o	0.8
ϵ^{us}_b	0.71	ϵ^{us}_m	1	ϵ^{us}_o	1
η^{us}_b	-0.86	η^{us}_m	-0.41	η^{us}_o	-0.45

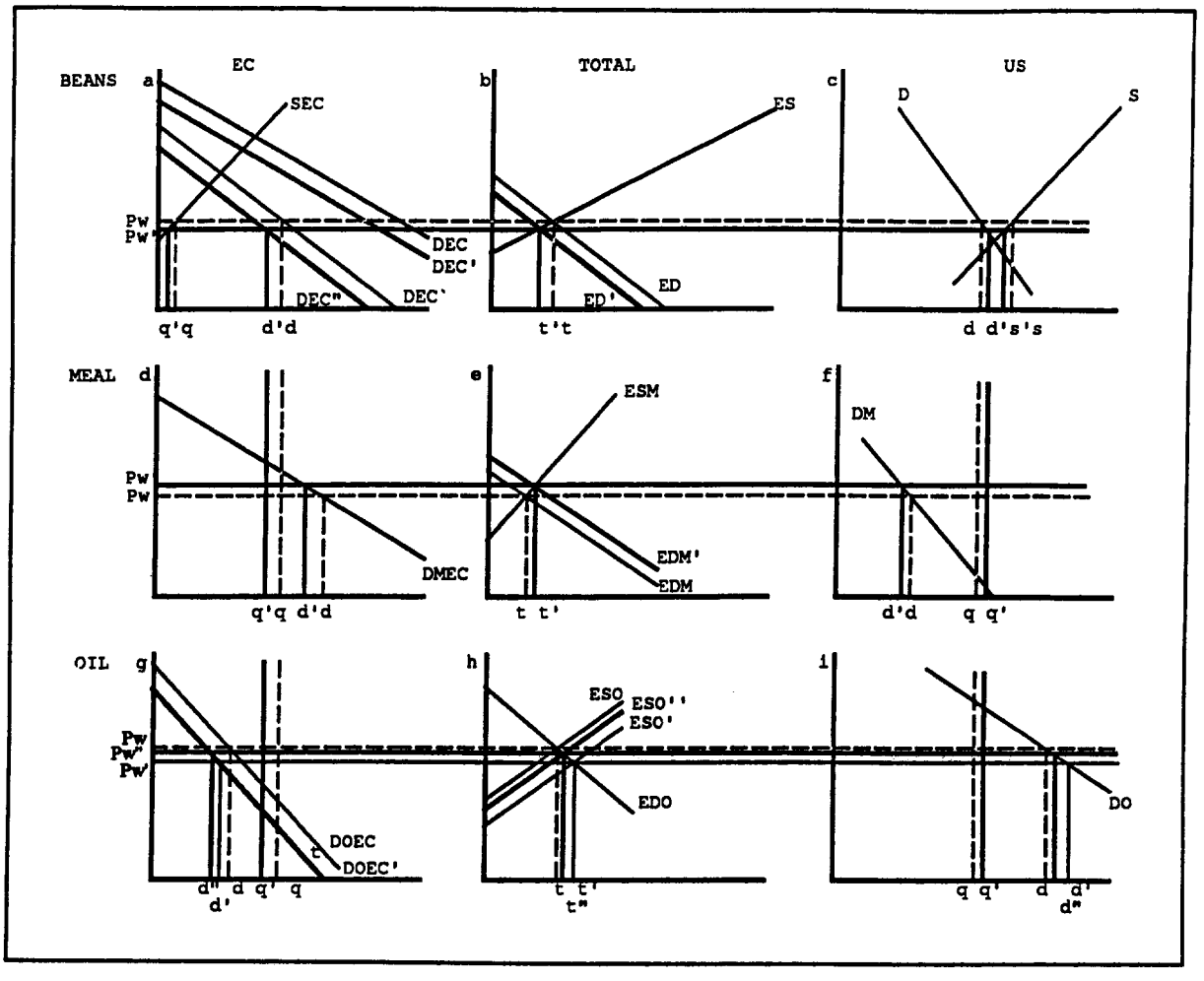
Note: Elasticities for excess supply and excess demand are derived from the supply and demand elasticity estimates.
Source: Meyers et. al., (1986); Von Witzke and Houck (1987) and Davis et. al (1986).

Data on production, prices, imports and exports were taken from Toepfer 1989 and can be found in appendix A1. The data used for this analysis is a three year average of the 1986/87 to 1988/89 marketing years. An average was used to avoid single year anomalies and these particular years were chosen as they include the expansion of the European Community from ten to twelve members in 1986. When the U.S. welfare changes were calculated the U.S. trade data was prorated for the amount traded with the EC.

SCENARIO 1: CONSUMPTION TAX

Figure 3 depicts the effects of a vegetable oil consumption tax on the EC and U.S. markets. The tax effectively decreases the demand for soybean oil at every price, thus shifting oil demand to the left by the amount of the tax (panel g). The excess supply curve in panel h then shifts to the

Figure 3. Scenario 1: Consumption Tax in EEC Vegetable Oils.



left by the amount of the tax, t to ESO'. This decreases exports to t' and pushes down the world price for soybean oil to Pw'.

Because DOEC + DMEC = DEC, the new oil demand curve causes the retail and derived demands for soybeans to fall to DEC' and DEC", respectively. The EC supply of soybeans then falls as fewer beans are imported (panels a and b). The fall in available soybeans to crush causes the excess demand curve for soybean meal to rise to EDM' (panel e). This increase in the excess demand for meal pushes the world meal price up to Pw' and results in increased EC meal imports (panel e). The decreased soybean supply also causes the excess supply for oil to shift back to the left to ESO". Thus

exports of oil decrease from t' to t", although more oil is exported then originally.

The effect on the United States is rather straight forward since it is assumed there has been no retaliation. The lower soybean world price reduces U.S. soybean exports. In panel f, the increased world price of meal leads to an expansion of U.S. meal exports.

TABLE 2: PERCENT CHANGE IN PRICE AND QUANTITY FOR EEC UNDER SCENARIO 1; 75 ECU/mt OIL CONSUMPTION TAX.

BEAN MARKET	BASE	+20%	-20%
EEC PRICE	-1.1240	-0.9919	-1.2967
SUPPLY	-0.9442	-0.9999	-0.8714
DEMAND	-1.5220	-1.9136	-1.1416
IMPORTS	-1.5882	-2.0183	-1.1726
MEAL MARKET			
EEC PRICE	0.8517	1.0260	0.6681
SUPPLY	-1.2054	-1.5156	-0.9042
DEMAND	-0.1618	-0.2339	-0.1016
IMPORTS	0.3073	0.5330	0.1543
OIL MARKET			
EEC PRICE	-5.2695	-5.4738	-5.0672
SUPPLY	-0.2709	-0.3406	-0.2032
DEMAND	9.8485	11.9072	7.8200
EXPORTS	1.8970	2.8376	1.1675

Source: Author's calculations.

The results seen in figure 3 are quantified in the empirical analysis and are found in tables 2 and 3. Under the FAPRI baseline scenario, EC soybean prices fall 1.1 percent, with meal prices rising a mere .85 percent. See table 2. The largest change is in the EC oil market where price falls 5.3 percent. These results are as expected from the

theoretical model and empirical work done by Davis, et. al. (1986) and von Witzke and Houck (1987). The results however, are not desirable from an EC standpoint as meal imports rise contrary to EC goals.

The results for the United States under scenario 1 are as expected from Figure 3. Table 3 enumerates the changes for each variable. The U.S. soybean price falls 1 percent, and the oil price 4 percent. U.S. trade in soybeans and their products, however, are resilient to the effects of a tax. This is especially true in soybean oil since little oil is traded between the United States and EC.

TABLE 3: PERCENT CHANGE IN PRICE AND QUANTITY FOR U.S. UNDER SCENARIO 1; 75 ECU/mt OIL CONSUMPTION TAX.

BEAN MARKET	BASE	+20%	-20%
US PRICE	-1.0116	-1.0713	-0.9336
SUPPLY	-0.7182	-0.9127	-0.5303
DEMAND	0.8700	1.1056	0.6423
EXPORTS	-0.8613	-0.9122	-0.7949
MEAL MARKET			
US PRICE	0.7495	1.0834	0.4704
SUPPLY	0.6890	0.8756	0.5087
DEMAND	-0.3073	-0.5330	-0.1543
EXPORTS	0.0958	0.1149	0.0766
OIL MARKET			
US PRICE	-4.2156	-5.2549	-3.2430
SUPPLY	0.1549	0.1968	0.1143
DEMAND	1.8970	2.8376	1.1675
IMPORTS	0.0087	0.0131	0.0054

Source: Author's calculations.

The welfare effects of a consumption tax on vegetable oil can be seen in tables 4 and 5. In table 4, the EC soybean market has a net gain in

welfare of $33 million as measured here. The meal market loses welfare though not enough to greatly affect the EC. The societal net gain in welfare for the EC is $13 million with the imposition of a 75 ECU tax on vegetable oils.

TABLE 4: WELFARE CHANGE FOR EEC UNDER SCENARIO 1; 75 ECU/mt OIL CONSUMPTION TAX. ($1,000)

BEAN MARKET	BASE	+20%	-20%
PRODUCER RENT	(3,888)	(3,432)	(4,483)
CONSUMER RENT	37,425	32,962	43,257
BUDGET SURPLUS	0	0	0
TOTAL RENT	33,537	29,530	38,774
MEAL MARKET			
PRODUCER RENT	20,439	24,658	16,009
CONSUMER RENT	(42,301)	(50,935)	(33,191)
BUDGET SURPLUS	0	0	0
TOTAL RENT	(21,862)	(26,227)	(17,183)
OIL MARKET			
PRODUCER RENT	(46,010)	(47,811)	(44,229)
CONSUMER RENT	34,286	35,965	32,651
BUDGET SURPLUS	13,271	13,786	12,761
TOTAL RENT	1,547	1,940	1,184
NET CHANGE IN SOCIETY	13,223	5,192	22,775

Source: Author's calculations.

The U.S. in table 5 realizes a net loss of $23 million in societal welfare. The producer welfare loss in the U.S. soybean market totals to $112 million. This is a substantial loss which greatly affects the U.S. soybean and product sector for the worse. Thus the United States is justified in its protest against the oil consumption tax.

TABLE 5: WELFARE CHANGE FOR U.S. UNDER SCENARIO 1; 75 ECU/mt OIL CONSUMPTION TAX. ($1,000)

BEAN MARKET	BASE	+20%	-20%
PRODUCER RENT	(112,619)	(119,377)	(103,838)
CONSUMER RENT	85,584	90,738	78,895
TOTAL RENT	(27,035)	(28,639)	(24,943)
MEAL MARKET			
PRODUCER RENT	36,952	53,364	23,210
CONSUMER RENT	(34,107)	(49,244)	(21,419)
TOTAL RENT	2,846	4,119	1,790
OIL MARKET			
PRODUCER RENT	(97,541)	(121,563)	(75,052)
CONSUMER RENT	98,497	123,352	75,499
TOTAL RENT	956	1,789	446
NET CHANGE IN SOCIETY	(23,234)	(22,731)	(22,706)

Source: Author's calculations.

Although lately losing strength, the consumption tax on vegetable oils, from a budgetary standpoint, is quite appealing for the EC. The tax generates revenue, approximately $13 million in budget surplus (table 4) and releases funds spent on oilseed and olive oil support. While voted down by the EC Commission several times in the past, the tax will test the strength of budget cutters in the political structure. This is especially true given that the tax is the only proposed policy which significantly affects soybean oil prices and thus rising vegetable oil support costs.

Nonetheless, EC soybean crushers will likely be unhappy with the proposed tax, even though they gain $12 million in net welfare (table 4). It is believed that the EC crushing industry realizes great efficiencies from economies of scale since they often import beans, crush them and

export them again. EC crushers may argue against the tax, for it would decrease their crushing quantities and put them in jeopardy of losing their economy of scale efficiencies. Livestock producers would also oppose this plan since they would be facing higher soybean meal and thus feed prices. They in fact lose approximately $42 million in welfare (table 4).

Furthermore the decision to employ a consumption tax is dependent on the political reaction of the United States. As the Congressional excerpt in section 1 makes clear, U.S. policy makers want no part of rebalancing. From the work in this volume, the United States would realize a net loss of $23 million (table 5) under this proposal. Much of that loss, $112 million, comes from farmers. The heavy support for farmers in the United States is not likely to allow such a loss to occur without retaliatory action.

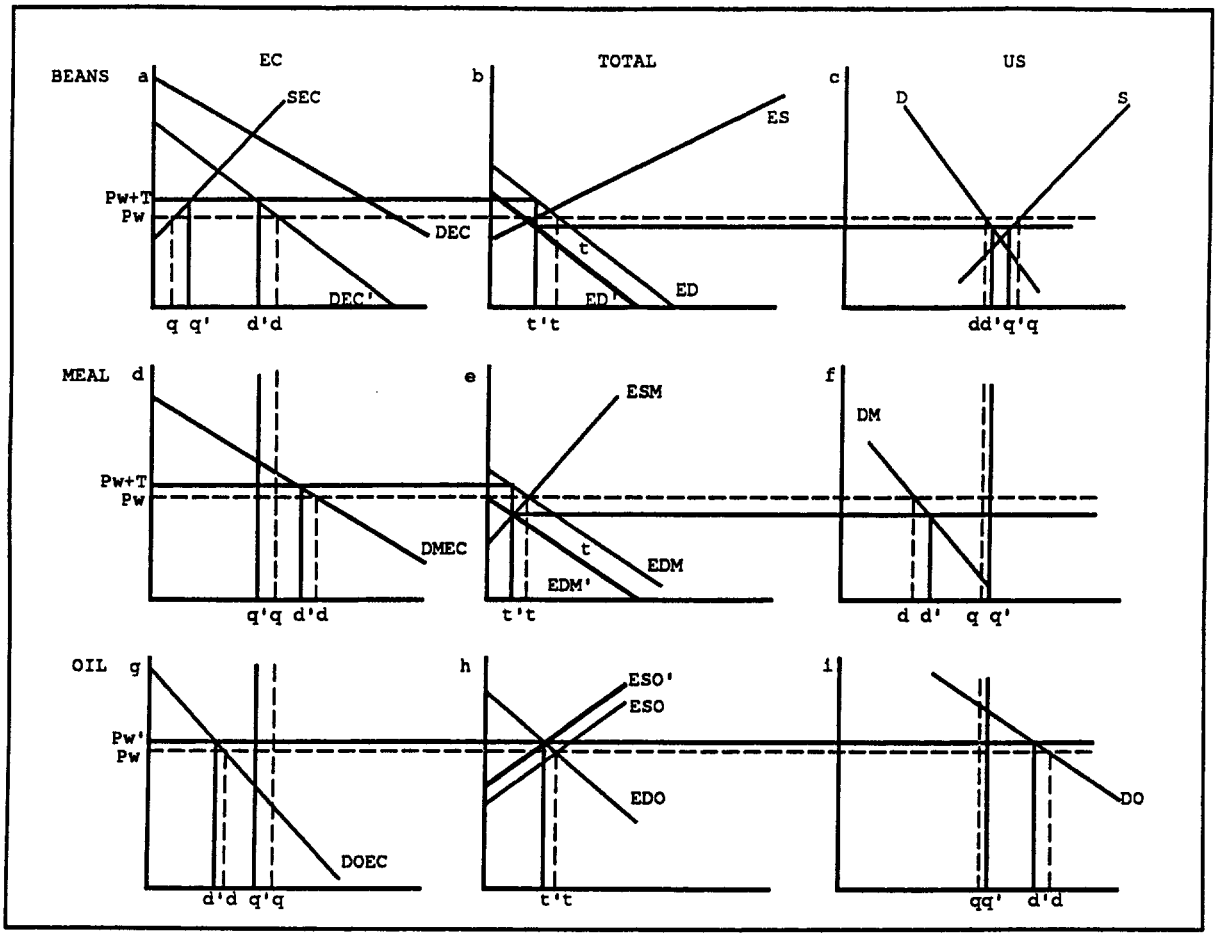
SCENARIO 2: SOYBEAN AND MEAL TARIFF

Figure 4 depicts the theoretical consequences of a soybean meal and equivalent soybean tariff on EC and U.S. markets. A tariff will shift the excess demand curves for soybeans and meal to the left by the amount of the tariff, t (panels b and e). This creates a higher domestic price, Pw+T in both markets, which decreases the demand for soybeans and meal. The higher price of EC meal leads to decreased imports of soybean meal, t' (panel e).

Because the oil market is technologically linked to the soybean and meal markets, oil prices and quantities demanded change. The smaller supply of soybeans means a smaller supply of oil, causing the price of oil on the world market to be pushed upward to Pw'. This price rise decreases the quantity exported of oil to t' (panel h).

The effect of the tariffs on the United States can be found in panels

Figure 4. Scenario 2: Import Tariff on Soybean Meal and Equivalent Tariff on Soybeans.



c, f and i of figure 4. Because of the distorting effects of the tariffs in the soybean and meal markets and decreased demand for imports in the EC, U.S. producers and consumers face lower world prices. This means reduced exports of soybeans and meal. The soybean oil market faces a higher world price, generating a decrease in the quantity of oil demanded (panel i), meaning the United States will import less soybean oil.

The results of a 20 percent meal tariff yielded results roughly consistent with those found by Huyser and Meyers (1985) and Von Witzke and Houck (1987). The EC results for scenario 2 can be found in table 6. The import tariffs yield large changes in EC soybean and meal prices, 8.9 and 2.8 percent increases, respectively. EC imports of these goods are equally

affected with large decreases of 6 and 7 percent for soybeans and meal. The oil market in this case is minimally affected due to its inelastic nature.

TABLE 6: PERCENT CHANGE IN PRICE AND QUANTITIES FOR EEC UNDER SCENARIO 2; 20% SOYMEAL TARIFF AND EQUIVALENT SOYBEAN TARIFF.

BEAN MARKET	BASE	+20%	-20%
EEC PRICE	8.9108	7.8637	10.2796
SUPPLY	7.4851	7.9266	6.9079
DEMAND	-4.9009	-5.1900	-4.5230
IMPORTS	-6.3201	-6.6929	-5.8328
MEAL MARKET			
EEC PRICE	2.8011	2.5609	3.1044
SUPPLY	-3.8815	-4.1105	-3.5822
DEMAND	-0.5322	-0.5839	-0.4719
IMPORTS	-7.1894	-8.5095	-5.8431
OIL MARKET			
EEC PRICE	0.6404	0.6782	0.5911
SUPPLY	-0.8724	-0.9238	-0.8051
DEMAND	-0.2325	-0.2954	-0.1716
EXPORTS	-0.2306	-0.3516	-0.1362

Source: Author's calculations.

The United States, in table 7, is hit relatively hard due to the proposed 20 percent tariff. The high tariff creates a large wedge between the EC and U.S. as prices for soybeans fall 4 percent and 17.5 percent for meal. Soybean and meal exports fall by 3 and 2 percent respectively. The U.S. oil market is relatively immune to intervention in the soybean and meal markets with trade falling by a mere .0011 percent.

TABLE 7: PERCENT CHANGE IN PRICE AND QUANTITIES FOR U.S. UNDER SCENARIO 2; 20% SOYMEAL TARIFF AND EQUIVALENT SOYBEAN TARIFF.

BEAN MARKET	BASE	+20%	-20%
US PRICE	-4.0255	-3.7412	-4.8084
SUPPLY	-2.8581	-3.1875	-2.7312
DEMAND	3.4620	3.8609	3.3082
EXPORTS	-3.0848	-3.7018	-2.4679
MEAL MARKET			
US PRICE	-17.5351	-17.2957	-17.8145
SUPPLY	2.7419	3.0579	2.6201
DEMAND	7.1894	8.5095	5.8431
EXPORTS	-2.2409	-2.6891	-1.7927
OIL MARKET			
US PRICE	0.5124	0.6511	0.3783
SUPPLY	0.6162	0.6872	0.5889
DEMAND	-0.2306	-0.3516	-0.1362
IMPORTS	-0.0011	-0.0013	-0.0008

Source: Author's calculations.

The welfare effects of a 20 percent soybean meal and equivalent soybean tariff can be found in table 8. The price rises in all three EC markets lead to increases in producer surplus and more importantly budget surplus. The EC would in fact see a budget gain of $492 million in tariff revenue. The large budgetary surplus out weighs the losses in consumer surplus for a net EC gain of $161 million. Thus the appeal of the import tariffs.

TABLE 8: WELFARE CHANGE FOR EEC UNDER SCENARIO 2; 20% SOYMEAL TARIFF AND EQUIVALENT SOYBEAN TARIFF. ($1,000)

BEAN MARKET	BASE	+20%	-20%
PRODUCER RENT	29,528	25,998	34,166
CONSUMER RENT	(291,644)	(256,991)	(337,096)
BUDGET SURPLUS	419,849	370,512	484,344
TOTAL RENT	157,734	139,520	181,414
MEAL MARKET			
PRODUCER RENT	68,111	62,340	75,376
CONSUMER RENT	(138,854)	(126,914)	(153,938)
BUDGET SURPLUS	72,411	66,201	80,253
TOTAL RENT	1,667	1,627	1,690
OIL MARKET			
PRODUCER RENT	5,609	5,941	5,175
CONSUMER RENT	(3,967)	(4,200)	(3,662)
BUDGET SURPLUS	0	0	0
TOTAL RENT	1,642	1,742	1,512
NET CHANGE IN SOCIETY	161,043	142,888	184,617

Source: Author's calculations.

In table 9, the United States sees a net loss under scenario 2 of $112 million. All three U.S. markets experience net losses, even the minimally effected U.S. oil sector. Unlike the consumption tax, the tariff not only decreases use of soybean oil, but the instrument also decreases the imports of soybean meal. The tax was unable to do this.

However, a tariff on soybeans and soybean meal would have many political enemies within the EC. EC crushers would likely oppose the tariff since they will lose heavily from higher soybean prices. Table 8 indicates crushers will realize a net loss of $217 million over all three markets.

TABLE 9: WELFARE CHANGE FOR U.S. UNDER SCENARIO 2; 20% SOYMEAL TARIFF AND EQUIVALENT SOYBEAN TARIFF. ($1,000)

BEAN MARKET	BASE	+20%	-20%
PRODUCER RENT	(452,9x)	(421,622)	(540,672)
CONSUMER RENT	368,370	343,024	439,676
TOTAL RENT	(84,558)	(78,598)	(100,996)
MEAL MARKET			
PRODUCER RENT	(855,583)	(842,553)	(869,754)
CONSUMER RENT	827,864	821,767	835,592
TOTAL RENT	(27,719)	(20,786)	(34,162)
OIL MARKET			
PRODUCER RENT	11,828	15,025	8,734
CONSUMER RENT	(11,845)	(15,043)	(8,749)
TOTAL RENT	(17)	(18)	(16)
NET CHANGE IN SOCIETY	(112,294)	(99,402)	(135,174)

Source: Author's calculations.

The EC livestock and dairy industry would also resist a tariff. Not only would feed grain prices be high, but soybean meal prices would also be higher, increasing total feed cost. Livestock and dairy producers face a $138 million loss in consumer surplus. (Table 8). The already heavily supported dairy producers would object to the higher feed prices and most likely ask for greater protection. Since both the tax and the tariff increase feed prices, these policies would also contribute to a decrease in surplus dairy production if dairy farmers were not compensated (Peterson and Auerbach, 1985).

The United States' retaliation is likely to be higher in the case of a tariff given the large potential losses in welfare ($112 million in table

9), the higher price volatility from intervention and the violation of the zero-binding duty concession. The EC will have to weigh the consequences of higher U.S.-EC trade tensions.

SCENARIO 3: DECREASED SUPPORT PRICE FOR FEED GRAINS

Figure 5. Scenario 3: Consequences of a Decrease in the EEC Feed Grain Support Price.

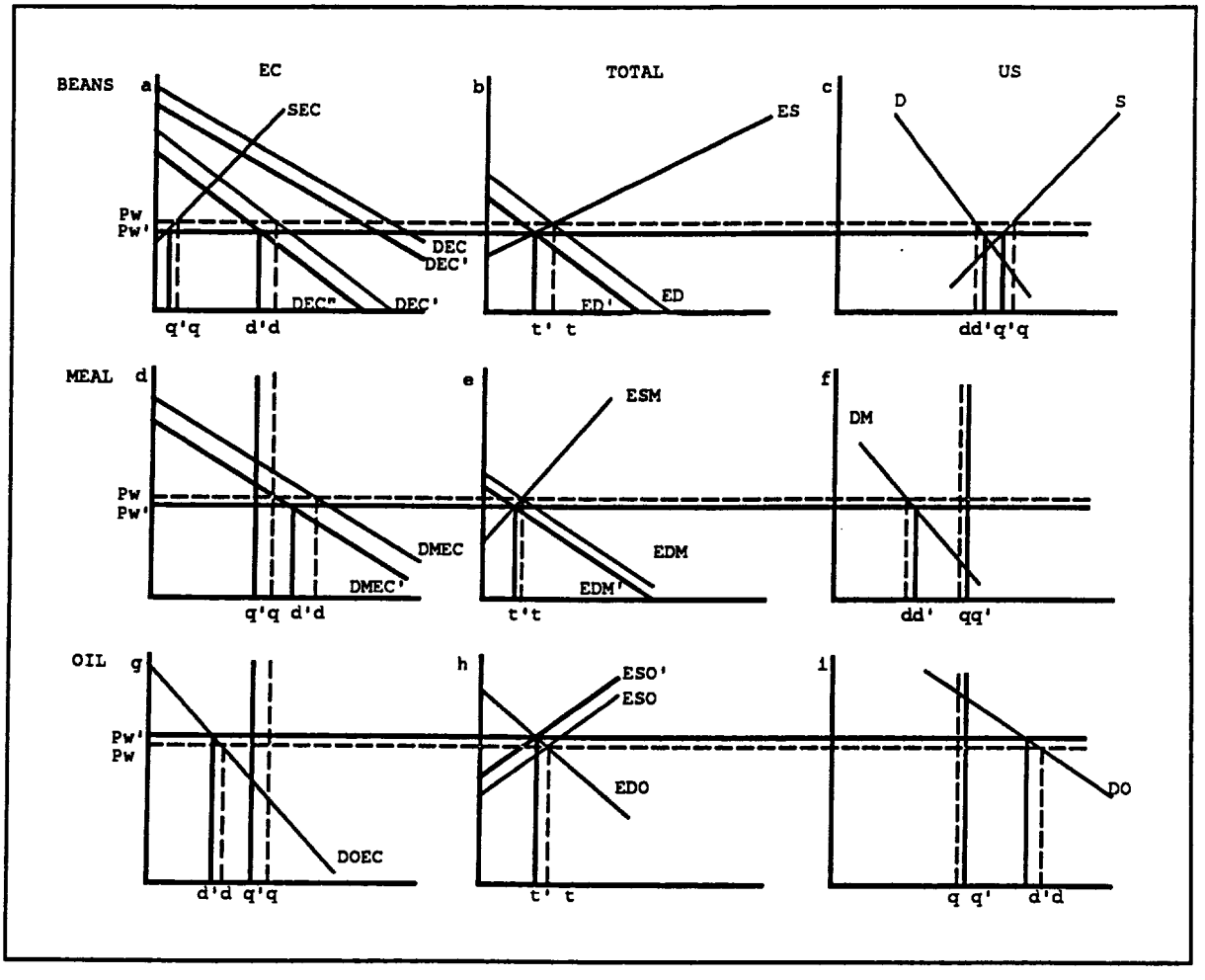


Figure 5 illustrates the effects of a decreased feed grain support price. In panel d, the demand for meal decreases as the price for the substitute feed grains fall. Because of the relationship between the markets, soybean demand at the retail and farm-gate levels fall (panel a). The decreases in soybeans and meal demand lead to a decrease in excess

demand in both markets (panels b and e). The decreased demand pushes down world market prices for soybeans and meal and hence lowers EC imports in both markets. Again the reduced demand for soybeans means a smaller supply of EC soybean oil which drives up the price in this market and causes EC exports to fall.

Since government intervention has been reduced in this case, U.S. producers and consumers will face virtually the same price as the producers and consumers in the EC. Therefore, the United States is exposed to new lower prices in the soybean and meal markets (panels c and f), and a higher

TABLE 10: PERCENT CHANGE IN PRICE AND QUANTITY FOR EEC UNDER SCENARIO 3; 30% DECREASE IN CORN THRESHOLD PRICE.

BEAN MARKET	BASE	+20%	-20%
EEC PRICE	-1.7158	-1.5142	-1.9793
SUPPLY	-1.4413	-1.5263	-1.3301
DEMAND	-2.3233	-2.9211	-1.7427
IMPORTS	-2.4244	-3.0809	-1.7900
MEAL MARKET			
EEC PRICE	-2.6914	-2.8324	-2.5455
SUPPLY	-1.8401	-2.3135	-1.3802
DEMAND	-0.9136	0.6458	0.3869
IMPORTS	-0.9711	-1.4716	-0.5878
OIL MARKET			
EEC PRICE	0.3036	0.3760	0.2312
SUPPLY	-0.4136	-0.5199	-0.3102
DEMAND	-0.1102	-0.1638	-0.0672
EXPORTS	-0.1093	-0.1949	-0.0533

Source: Author's calculations.

price in the soybean oil market (panel i). The United States will face lower exports of soybeans and meal while their imports of oil will fall.

The consequences of decreasing the support price for feed grains are similar to those found by Huyser and Meyers (1985).

The empirical results of a 30% decrease in the corn support price are found in tables 10 and 11. The cross price elasticity for EC corn and soybean meal is .25 (Meyers et. al., 1986). In table 10, the EC realizes a 2 percent decrease in soybean prices and a 3 percent fall in meal prices. In both markets, imports fall by 2.4 percent for soybeans and .97 percent for meal. The EC oil market is nominally affected. The United States, in table 11, is affected in much the same way. U.S. soybean and meal prices fall 1.5 and 2.4 percent respectively. Exports also fall. Again soybean oil variables are left virtually the same.

TABLE 11: PERCENT CHANGE IN PRICE AND QUANTITY FOR U.S. UNDER SCENARIO 3; 30% DECREASE IN CORN THRESHOLD PRICE.

BEAN MARKET	BASE	+20%	-20%
US PRICE	-1.5442	-1.7661	-1.0261
SUPPLY	-1.0964	-1.5047	-0.5828
DEMAND	1.3280	1.8226	0.7060
EXPORTS	-1.1833	-1.4200	-0.9467
MEAL MARKET			
US PRICE	-2.3685	-2.9910	-1.7920
SUPPLY	1.0518	1.4435	0.5591
DEMAND	0.9711	1.4716	0.5878
EXPORTS	-0.3027	-0.4587	-0.1832
OIL MARKET			
US PRICE	0.2429	0.3610	0.1480
SUPPLY	0.2364	0.3244	0.1257
DEMAND	-0.1093	-0.1949	-0.0533
IMPORTS	-0.0005	-0.0009	-0.0002

Source: Author's calculations.

The welfare effects for the EC under scenario 3 can be found in table 12. This trade liberalizing policy in fact makes the EC better off in the net without hurting consumers as much as the scenario 2 import tariffs. The Common Market gains $120 million primarily from the rise in consumer surplus in the soybean and meal markets.

TABLE 12: WELFARE CHANGE FOR EEC UNDER SCENARIO 3; 30% DECREASE IN CORN THRESHOLD PRICE. ($1,000).

BEAN MARKET	BASE	+20%	-20%
PRODUCER RENT	(5,949)	(5,252)	(6,859)
CONSUMER RENT	56,898	50,060	65,831
BUDGET SURPLUS	0	0	0
TOTAL RENT	50,949	44,808	58,972
MEAL MARKET			
PRODUCER RENT	(64,789)	(68,343)	(61,136)
CONSUMER RENT	133,164	141,236	126,766
BUDGET SURPLUS	0	0	0
TOTAL RENT	68,375	72,894	65,629
OIL MARKET			
PRODUCER RENT	2,653	3,287	2,019
CONSUMER RENT	(1,882)	(2,330)	(1,433)
BUDGET SURPLUS	0	0	0
TOTAL RENT	771	957	586
NET CHANGE IN SOCIETY	120,094	118,659	125,187

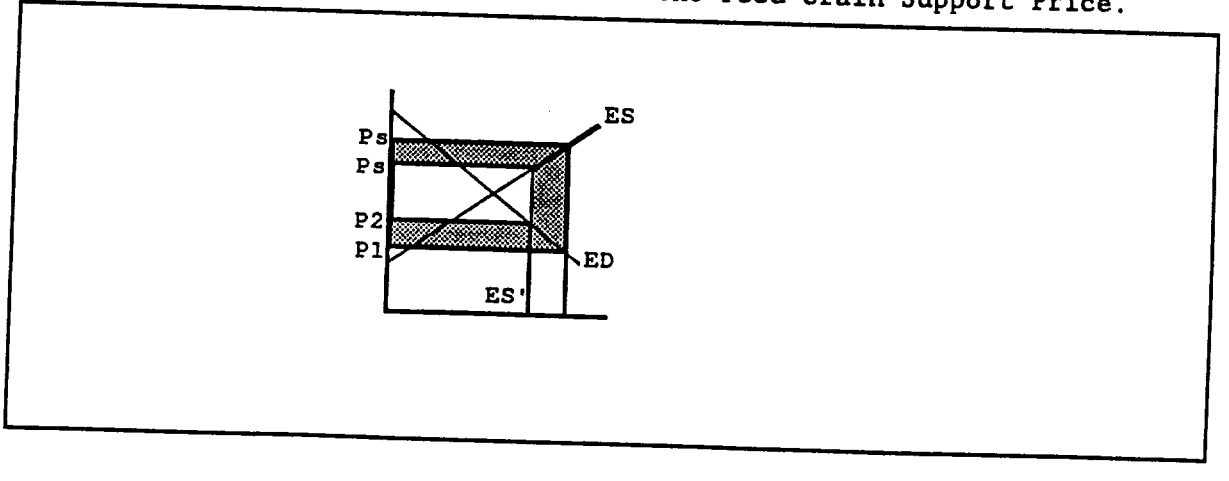
Source: Author's calculations.

Meanwhile the United States realizes a loss in table 13. The United States indeed loses $49 million mostly from producers in the soybean and meal markets. This definite loss of social welfare is somewhat ironic since this is the one policy the United States is supporting. Nevertheless, it is reasonable that the United States would support this

policy since decreased price supports would be a definitive move towards liberalized trade by the EC. Furthermore, U.S. feed grain producers would be better off as world feed grain prices would rise (see figure 6) and U.S. producers would become relatively more competitive against the EC's subsidized exports.

In Figure 6, the budgetary effects of a decrease in the feed grain support price is depicted. The graph shows the world market for feed grains with the EC as an exporter. ES is the excess supply curve for the EC and ED is the excess demand curve for the rest of the importing world. When the support price is at Ps, the EC's budgetary outlays for a variable export subsidy are Ps - P1 per unit. Yet if the EC were to decrease its support price on feed grains to Ps', the resulting world price would be P2. Hence, the EC would be expending Ps' - P2 per unit and would gain the shaded area in budgetary surplus. This exercise only reinforces the fact that a decrease in feed grain price supports would result in a net welfare gain to the EC.

Figure 6. Budget Gains From a Decrease the Feed Grain Support Price.



The decreased feed grain price support levels, would meet great

protest by EC feed grain producers as they would be facing lower prices. However, feed grain support prices have recently been lowered in the face of decreasing budgetary costs, although it remains to be seen how far prices can be cut before farmer's objections are given more weight than they now have.

Livestock producers would, however, hail this proposal, as feed prices would be lowered significantly. Not only do grain and meal prices fall, but producers realize a $133 million gain in consumer surplus from the fall in soybean meal prices. The EC would also be confident that the United States would not retaliate even though the U.S. loses welfare in the soybean and product markets.

TABLE 13: WELFARE CHANGE FOR U.S. UNDER SCENARIO 3; 30% DECREASE IN CORN THRESHOLD PRICE. ($1,000).

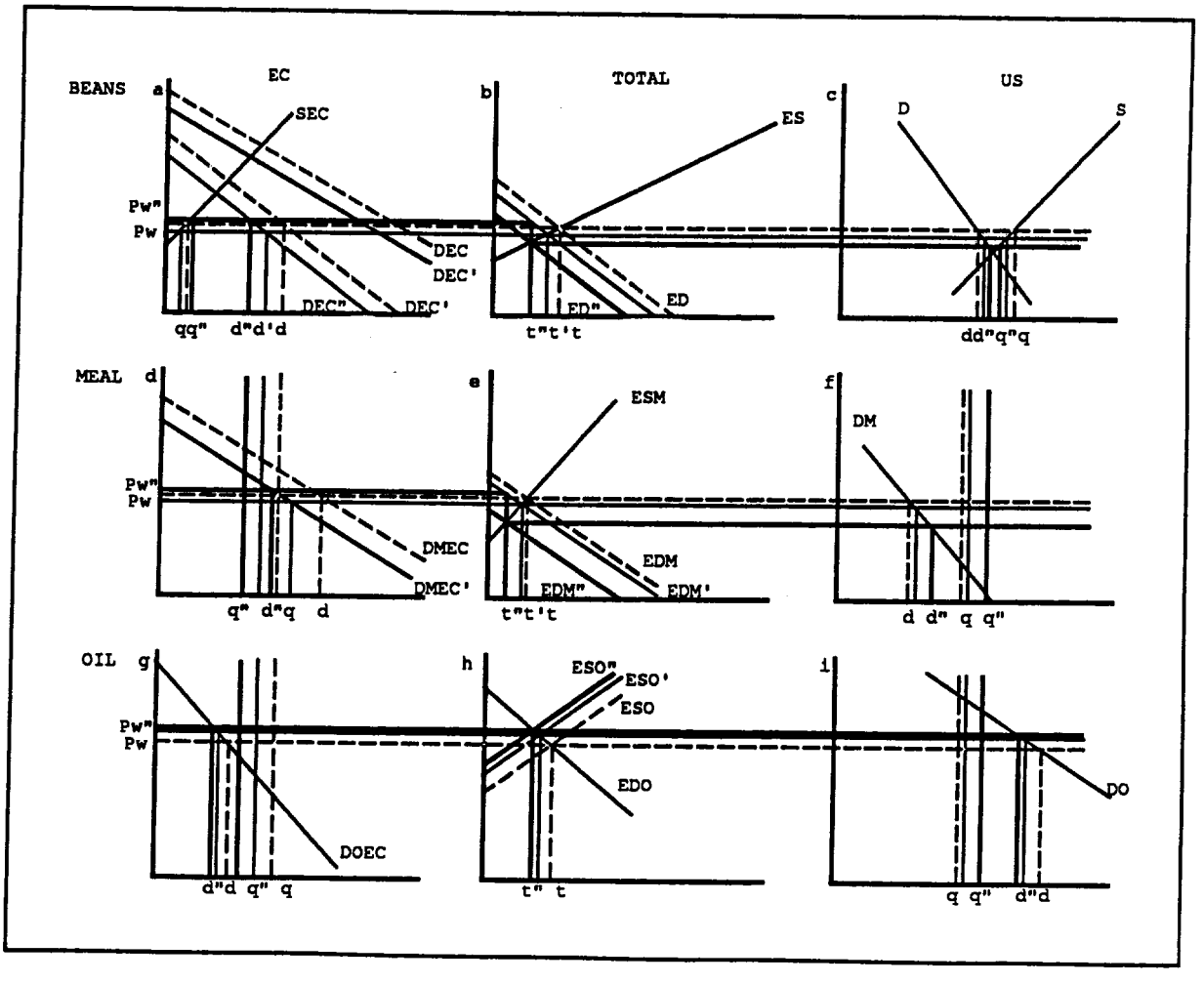
BEAN MARKET	BASE	+20%	-20%
PRODUCER RENT	(172,234)	(197,385)	(114,154)
CONSUMER RENT	130,940	150,124	86,738
TOTAL RENT	(41,294)	(47,261)	(27,416)
MEAL MARKET			
PRODUCER RENT	(116,554)	(146,901)	(88,406)
CONSUMER RENT	108,464	137,315	81,409
TOTAL RENT	(8,090)	(9,586)	(56,496)
OIL MARKET			
PRODUCER RENT	5,618	8,345	3,245
CONSUMER RENT	(5,619)	(8,347)	(3,424)
TOTAL RENT	(1)	(2)	0
NET CHANGE IN SOCIETY	(49,386)	(56,848)	(33,912)

Source: Authors' calculations.

SCENARIO 4: TARIFF AND DECREASE IN FEED GRAIN SUPPORT PRICE

The most plausible policy from an EC standpoint is a combination of scenarios 2 and 3. Figure 7 depicts the effects of import tariffs on soybean and soybean meal and a decrease in the feed grain support price. As can be seen in figure 7, this policy causes many functions to shift and many feedback reactions. Briefly the decreased support price shifts DMEC and EDM to the left as feed grains and soybean meal are substitutes. Since

Figure 7. Scenario 4: Import Tariff and Decrease in EEC Feed Grain Support Price.



DMEC is a component of soybean demand DEC, DEC' and ED fall as well. The

soybean and meal tariffs are then placed on top of these shifts, resulting in further decreases in soybean and meal excess demand. After all the functions have shifted, the final result should be slight increases in EC soybean and product prices. World prices of soybeans and meal should fall while EC imports and U.S. exports also fall.

TABLE 14: PERCENT CHANGE IN PRICE AND QUANTITY FOR EEC UNDER SCENARIO 4; 10% SOYMEAL TARIFF AND 15% DECREASE IN CORN THRESHOLD PRICE.

BEAN MARKET	BASE	+20%	-20%
EEC PRICE	2.2930	2.0236	2.6453
SUPPLY	1.9262	2.0398	1.7776
DEMAND	-2.8947	-3.2958	-2.4707
IMPORTS	-3.4470	-3.9071	-2.9575
MEAL MARKET			
EEC PRICE	0.3728	0.1869	0.5864
SUPPLY	-2.2926	-2.6102	-1.9568
DEMAND	-0.7833	-0.0426	-0.0891
IMPORTS	-3.9655	-4.8229	-3.1446
OIL MARKET			
EEC PRICE	0.3783	0.4242	0.3278
SUPPLY	-0.5153	-0.5866	-0.4398
DEMAND	-0.1373	-0.1848	-0.0952
EXPORTS	-0.1362	-0.2199	-0.0755

Source: Author's Calculations,

Table 14 and 15 substantiate these theoretical results. The EC soybean price rises 2.3 percent while meal and oil prices both rise a mere .37 percent. See table 14. Indeed EC imports of soybeans and meal fall 3.4 and 3.97 percent, respectively. Again the oil market is minimally affected.

The United States, in contrast, faces large decreases in soybean and

meal prices; 2 and 9.7 percent respectively. U.S. trade is reduced by 1.7, 1.2 and .0006 percent in soybeans, meal and oil. See table 15.

Finally the welfare effects of this "rebalancing" policy can be seen in tables 16 and 17. The combination of policies would result in an EC gain of $41 million. Most of the gain is from tariff revenues.

TABLE 15: PERCENT CHANGE IN PRICE AND QUANTITY FOR U.S. UNDER SCENARIO 4; 10% SOYMEAL TARIFF AND 15% DECREASE IN CORN THRESHOLD PRICE.

BEAN MARKET	BASE	+20%	-20%
US PRICE	-2.1956	-1.8990	-2.8880
SUPPLY	-1.5588	-1.6179	-1.6404
DEMAND	1.8882	1.9598	1.9869
EXPORTS	-1.6825	-2.0190	-1.3460
MEAL MARKET			
US PRICE	-9.6719	-9.8027	-9.5872
SUPPLY	1.4954	1.5521	1.5736
DEMAND	3.9655	4.8229	3.1446
EXPORTS	-1.2360	-1.5033	-0.9802
OIL MARKET			
US PRICE	0.3026	0.4073	0.2098
SUPPLY	0.3361	0.3488	0.3537
DEMAND	-0.1362	-0.2199	-0.0755
IMPORTS	-0.0006	-0.0010	-0.0003

Source: Author's calculations.

The United States, on the other hand, loses from this combination of policies. In fact the United States loses $68 million. See table 17. The bean and meal markets are greatly affected with large producer loses and consumer gains.

While scenarios 1, 2, and 3 have all been suggested and even voted on in the case of the consumption tax, they are not likely to be implemented

in their absolute forms. First of all, the tax and tariff would certainly be attacked by the United States as violating GATT. On the other hand, decreasing the support price on feed grains to affect soybeans and their

TABLE 16: WELFARE CHANGE FOR EEC UNDER SCENARIO 4; 10% SOYMEAL TARIFF AND 15% DECREASE IN CORN THRESHOLD PRICE. ($1,000).

BEAN MARKET	BASE	+20%	-20%
PRODUCER RENT	7,818	6,895	9,026
CONSUMER RENT	(75,821)	(66,775)	(87,657)
BUDGET SURPLUS	108,041	95,345	124,638
TOTAL RENT	40,038	35,465	46,007
MEAL MARKET			
PRODUCER RENT	8,994	4,515	14,123
CONSUMER RENT	(18,457)	(9,286)	(29,132)
BUDGET SURPLUS	9,637	4,830	15,158
TOTAL RENT	175	60	150
OIL MARKET			
PRODUCER RENT	3,307	3,710	2,865
CONSUMER RENT	(2,344)	(2,628)	(2,032)
BUDGET SURPLUS	0	0	0
TOTAL RENT	963	1,082	833
NET CHANGE IN SOCIETY	41,175	36,607	46,989

Source: Author's calculations.

products significantly would be met with great protest by EC grain producers. The riots and protests recently in Brussels and Paris indicate the deep aversion to such a policy among EC producers.

Given the limitations of each policy, the realistic solution to the EC's problem is a combination of policies, likely a tariff and a lower feed grain support price negotiated in the Uruguay Round. EC policy makers and trade negotiators will face the same pro and con arguments as outlined

before. Yet the clamor by EC interest groups and the U.S. may not be as

TABLE 17: WELFARE CHANGE FOR U.S. UNDER SCENARIO 4; 10% SOYMEAL TARIFF AND 15% DECREASE IN CORN THRESHOLD PRICE. ($1,000).

BEAN MARKET	BASE	+20%	-20%
PRODUCER RENT	(245,448)	(212,356)	(322,986)
CONSUMER RENT	186,690	159,530	245,687
TOTAL RENT	(58,758)	(50,826)	(77,299)
MEAL MARKET			
PRODUCER RENT	(474,902)	(481,184)	(470,556)
CONSUMER RENT	449,526	457,518	443,794
TOTAL RENT	(25,376)	(23,667)	(26,762)
OIL MARKET			
PRODUCER RENT	6,996	9,414	4,850
CONSUMER RENT	(6,999)	(9,416)	(4,855)
TOTAL RENT	(4)	(2)	(4)
NET CHANGE IN SOCIETY	(84,138)	(74,495)	(104,066)

Source: Author's calculations.

loud. A 10% tariff on soybean meal and a 15% decrease in the corn support price restricts EC soybean and soybean meal imports more than a 30% decrease in corn support price, while imposing a smaller consumer welfare loss in the EC than a 20% tariff.

Scenario 4 is also more appealing to EC leaders because it will have to be negotiated under GATT and thus avoids foreign trade retaliation. However, the policy must be negotiated. The U.S. and CAIRNS group may not allow such a policy bargain and have in fact already objected to this proposal. Even if agreed upon in Geneva Congressional sentiment may lead to a defeat of the GATT package.

SENSITIVITY ANALYSIS

Because estimation techniques for elasticities differ between studies, I varied the elasticity values by 20 percent to determine how sensitive the variables were to elasticity values. To determine the variability of each of the 47 variables I constructed 95 percent confidence intervals around their means. Refer to appendix A2 for actual intervals.

The percent change for EC and U.S. prices and quantities tend to vary within a narrow interval. For example, the confidence interval for the percent change in EC soybean price is (1.22, 3.020). The narrow intervals indicate that elasticities have little effect on the percentage change in price and quantities.

The welfare variables, however, are characterized by large confidence intervals. For example, EC soybean meal consumer surplus has a 95 percent confidence interval of (-37,376, 3736) in millions of dollars. Thus 95 percent of such intervals would include the true value for EC soybean meal consumer surplus. The wider intervals for the welfare measures indicate that the elasticity estimates are important to the accuracy of the welfare estimate.

VI. SUMMARY AND CONCLUSIONS

Having enumerated the empirical results and political realities of each scenario, what is the "best" policy per the results found in section 5? Table 18 summarizes the societal welfare changes for each scenario. The import tariff on soybean meal and beans provides the largest net welfare gain of the four; $161 million. But this gain masks the loss of $435 million in EC consumer surplus.

TABLE 18: SUMMARY OF SOCIETAL WELFARE RESULTS (MILLION $)

	EEC	U.S.
SCENARIO 1	$13	-$23
SCENARIO 2	$161	-$112
SCENARIO 3	$120	-$49
SCENARIO 4	$41	-$84

Source: Author's calculations.

The consumption tax, meanwhile, would appear to be the least appealing alternative with a net gain of $13 million. Remember from table 2, the consumption tax also raised soybean meal imports, only intensifying the competition between meal and feed grains.

A 30 percent decrease in the corn support price level appears the most appealing option from a welfare perspective. The net gain is $120 million for the EC, yet the losses are only $73 million. Of course when accounting for political realities, scenario 4 is the most likely to be implemented.

The United States, on the other hand, would be best off with a consumption tax since there is little trade in soybean oil between the United States and EC. The tariff, because of its protectionist bias, gives the U.S. its biggest welfare loss of all four options. The trade liberalizing policies would bring losses to the U.S. soybean and product markets as well, yet would likely benefit substitute markets.

This paper has examined the impacts of four policy scenarios concerning EC-U.S. soybean and product trade. While the United States politically favors a scenario like the third, the EC is likely to bargain for an option more similar to scenario 4. The idea of the EC decreasing price supports at all was unthinkable a year ago. However, an increasing

CAP budget, rising EC stocks, economic and monetary union, and Community enlargement are leading to increasing EC sentiment to reform the CAP. For example, EC farm spending is expected to rise to 32 billion ECU in 1991, accounting for 60 percent of the EC budget, and to rise another 12.5 percent in 1992. Furthermore, stocks of EC beef, butter, skimmed milk, and cereals are rising rapidly (Gardner, 1991).

Internal political pressures have also spurred sentiment for CAP reform. The CAP is a disaggregating policy for the EC. Similar to the United States, the EC's farm policy results in 20 percent of EC producers receiving 80 percent of the farm budget. Because farmers in each country have varying degrees of efficiency, farm policy benefits are spread unevenly over the 12 EC countries. In addition, the possible enlargement of the EC to include European Free Trade Area (EFTA) countries and even eastern-European countries presents some difficulties for the current CAP. The prospect of heavy grain producing states such as Poland, Hungary and Czechoslovakia joining the EC means that the CAP will have to be reformed as the structure of EC agriculture changes further (Gardner, 1991).

In response to these pressures, the EC agricultural commissioner, Ray MacSharry, has proposed reforms which would cut target prices by up to 50%, eliminate the MGQ and other regimes which discourage production and pay small farmers regardless of output (Agweek, 1991). The EC Commission recently approved a "reflection paper" presented by Mr. MacSharry, which was then sent to the EC Council for further debate (Krucoff, 1991).

In the paper, Mr. MacSharry developed a reform proposal which addresses the growing difficulties of rising stocks, the environment and ineffective income policies. To increase the competitive position of EC

cereal grains, target price levels would be cut substantially. Production controls would be eliminated as well. EC farmers, however, would not be left to the woes of the market. Farmers would be compensated on a per hectare basis with a fixed amount determined by market and stock conditions.

> Full compensation would apply up to a certain level of area. Partial compensation would apply thereafter. Beyond a certain size the payment of the aid per hectare would be conditional on the withdrawal from production of part of the area devoted to arable crops...(Krucoff, 1991).

A similar regime would be developed for the livestock sector. Milk quotas would be reduced and sugar, tobacco and mutton would also be reformed similar to the cereal sector.

The implementation of such a proposal would go a long way to ending the GATT stalemate. If the EC Council approved the plan, other countries would likely increase their pace of agricultural policy reform, including the United States. World agriculture under GATT would thus, look very different than it does today. Not only would the new EC proposal act as a starting place for an extensive GATT agreement to liberalize agricultural trade, but grain and oilseed prices would likely rise.

In particular, the price and quantity changes for the soybean and product sectors would be similar to the results found in section 5 for scenario 3. However, the changes are likely to be more dramatic as the proposed decrease in price supports is larger than those simulated here and more feed and cereal grains are affected. Furthermore, a cut in the target price of oilseeds would discourage production in the EC and further raise world soybean prices.

Of course it is likely that the proposal will be rejected. At a two-

day meeting in early February 1991, a small majority of the 12 farm ministers opposed the plan (AgWeek, 1991). Without approval it is likely that no GATT agreement will materialize. If this is the case, the agricultural trade war will escalate. Not only would U.S. "snapback" provisions established in the 1990 farm bill induce increased export subsidies, but it is likely that the EC would retaliate by eliminating the Dillon Round concessions.

The dilemma in which the EC finds itself concerning the soybean and product markets is only a symptom of the greater illness of the CAP. The CAP no longer serves the small farmer of Europe nor does it encourage environmental conservation. The regime is becoming more costly and less effective and will become more so as the EC expands. Indeed the CAP is in dire need of total reform.

Although soybeans and their products have aggravated CAP difficulties, the problems are in reality due to the changing structure of agriculture and the EC. However, soybeans and their products have taken the blame so much that many CAP reform proposals have centered around these sectors. Those proposals have included a consumption tax on vegetable oils, a tariff on soybeans and soybean meal, a decrease in the support price of feed grains and a mixed policy including a tariff and decreased price supports.

The simplicity of the partial equilibrium, three product, two country model used here and consumer and producer surplus leads to shortfalls in measurement. Nonetheless, the results give the reader a general idea of what can be expected. In light of the recent developments in the EC, I would not suggest applying a more rigorous model to the scenarios examined

here. Instead, the new proposal could have profound affects on the EC and U.S. soybean and products markets, that warrant investigation because of the growing importance of soybeans and their products in world trade.

APPENDIX A1: DATA

	3 YEAR AVERAGE		3 YEAR AVERAGE
SOYBEAN PRODUCTION		SOYBEAN EXPORTS	
USA	49083333	USA	18980000
EC-12	1456667	EC-12	0
SOYBEAN IMPORTS		SOYBEAN MEAL PRODUCTION	
USA	0	USA	24410000
EC-12	12740000	EC-12	10266667
SOYBEAN MEAL EXPORTS		SOYBEAN MEAL NET IMPORTS	
USA	5713333	USA	0
EC-12	1613333	EC-12	11126667
SOYBEAN OIL PRODUCTION		SOYBEAN OIL EXPORTS	
USA	5661667	USA	683333
EC-12	2296667	EC-12	663333
SOYBEAN WHOLESALE PRICES		SOYBEAN MEAL WHOLESALE PRICES	
USA	226	USA	203
EC-12	236	EC-12	232
SOYBEAN OIL WHOLESALE PRICES		EXCHANGE RATE FOR ECU	
USA	409	1 ECU =	1.11
EC-12	380		

Note: Prices are a three year average of nominal wholesale prices for 1986 to 1988.
SOURCE: Toepfer International (1989).

APPENDIX A2: 95% CONFIDENCE INTERVALS FOR SENSITIVITY ANALYSIS

	AVERAGE	STD. DEV.	95% CONFIDENCE INTERVAL	
EEC PRICE AND QUANTITY CHANGES				
SOYBEAN MARKET			(	,)
EEC PRICE	2.1162	4.50	1.22	3.02
SUPPLY	1.7458	3.69	1.01	2.48
DEMAND	-2.9033	1.34	-3.17	-2.63
IMPORTS	-3.4360	1.90	-3.82	-3.06
MEAL MARKET				
EEC PRICE	0.3407	2.07	-0.07	0.75
SUPPLY	-2.2994	1.06	-2.51	-2.09
DEMAND	-0.2401	0.45	-0.33	-0.15
IMPORTS	-2.9592	3.10	-3.58	-2.34
SOYBEAN OIL MARKET				
EEC PRICE	-0.9883	2.59	-1.51	-0.47
SUPPLY	-0.5168	0.24	-0.56	-0.47
DEMAND	2.3431	4.62	1.42	3.27
EXPORTS	0.3662	1.03	0.16	0.57
US PRICE AND QUANTITY CHANGES				
SOYBEAN MARKET				
US PRICE	-2.2425	1.33	-2.51	-1.98
SUPPLY	-1.5783	0.91	-1.76	-1.40
DEMAND	1.9117	1.10	1.69	2.13
EXPORTS	-1.7017	0.94	-1.89	-1.51
SOYBEAN MEAL MARKET				
US PRICE	-7.2129	7.39	-8.69	-5.73
SUPPLY	1.5141	0.87	1.34	1.69
DEMAND	2.9592	3.10	2.34	3.58
EXPORTS	-0.9250	0.97	-1.12	-0.73
SOYBEAN OIL MARKET				
US PRICE	-0.7917	2.13	-1.22	-0.37
SUPPLY	0.3403	0.20	0.30	0.38

DEMAND	0.3662	1.03	0.16	0.57
IMPORTS	0.0017	0.00	0.00	0.00
WELFARE CHANGES FOR THE EEC				
SOYBEAN MARKET				
PRODUCER RENT	6963.97	15016.19	3961	9967
CONSUMER RENT	-69129.2	147622.0	-98654	-39605
BUDGET SURPLUS	133560.8	183495.9	96862	170260
TOTAL RENT	71395.57	54479.15	60500	82291
SOYBEAN MEAL MARKET				
PRODUCER RENT	8358.06	50052.14	-1652	18368
CONSUMER RENT	-16820.2	102779.7	-37376	3736
BUDGET SURPLUS	20707.53	32003.85	14307	27108
TOTAL RENT	12245.40	35634.98	5118	19372
SOYBEAN OIL MARKET				
PRODUCER RENT	-8623.73	22593.26	-13142	-4105
CONSUMER RENT	6535.40	16779.21	3180	9891
BUDGET SURPLUS	3318.16	6006.75	2117	4520
TOTAL RENT	1229.83	433.59	1143	1317
NET CHANGE IN SOCIETY	84870.80	63343.99	72202	97540

WELFARE CHANGES FOR THE US				
SOYBEAN MARKET				
PRODUCER RENT	-251302	149677.6	-281237	-221366
CONSUMER RENT	183543.3	146275.9	154288	212799
TOTAL RENT	-47086.2	37895.9	-54665	-39507
SOYBEAN MEAL MARKET				
PRODUCER RENT	-352739	360746.4	-424888	-280590
CONSUMER RENT	338248.2	348458.5	268557	407940
TOTAL RENT	-14490.7	13469.66	-17185	-11797
SOYBEAN OIL MARKET				
PRODUCER RENT	-18341.9	49177.23	-28177	-8506
CONSUMER RENT	18587.48	49716.22	8644	28531
TOTAL RENT	260.49	563.92	148	373
NET CHANGE IN SOCIETY	-68198.8	39081.4	-76015	-6038

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