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RESTRICTING WHEAT IMPORTS FROM CANADA: IMPACT OF PRODUCT DIFFERENTIATION AND U.S. EXPORT POLICY GOALS

by

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Abstract

Because increasing yearly U.S. imports of Canadian wheat have been a major concern of U.S. wheat interests, a policy restricting Canadian wheat imports may endure for the next few years. However, within the context of product differentiation, placing a restriction on the importation of a product that resembles one which is produced domestically may not benefit domestic producers of the product or the interests of policymakers. This analysis shows for various criteria under which EEP targets and bonus amounts have been chosen, it is unlikely that a restriction on U.S. wheat imports from Canada will have any beneficial effects.

Keywords: Canada, Export Enhancement Program, wheat

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Restricting Wheat Imports from Canada: Impact of Product Differentiation and U.S. Export Policy Goals

Increasing yearly U.S. imports of Canadian wheat have been a major concern of U.S. wheat interests. In July 1994 International Trade Commission (ITC) commissioners decided that the wheat imports were affecting the U.S. wheat price and income support program's costs and markets. It was judged that deficiency payments to U.S. wheat farmers participating in the program were higher than what they would have otherwise been had Canadian wheat not been imported. The ITC recommended restricting wheat imports through either an import quota, tariff-rate quota, or tariffs. After negotiations, the Canadians agreed to limit exports through the Canadian Wheat Board (CWB) to the United States to 1.5 million metric tons (mmt) for one year starting 12 September 1994, and to the formation of a joint commission on grains to examine grain marketing and support systems in each country.

The essential argument for restricting imports was that increased supplies of Canadian wheat were causing the price upon which deficiency payment rate had been calculated to be lower than it would have otherwise been. Prior to 1994, the deficiency payment rate, except in years of extremely low wheat prices, was calculated to be the difference between the policy-determined "target price" and a nationally weighted average market price for the first 5

months of the marketing year.[1] The availability of Canadian wheat increased the rate (the difference between the average price and the target price) and therefore cost the U.S. taxpayer millions of dollars that otherwise would not have been spent.

The ITC rationalized its decision, at least partially, on research submitted to it and subsequently analyzed by its economics analysis staff (1994). With the exception of research presented by Sumner et al.(1994), there was no explicit economic analysis of wheat as a differentiated product. This omission could have been serious in that imperfect substitution between wheat types can cause pricing relationships to diverge from what economic theory predicts when product homogeneity is assumed.

The ITC also ignored the influence of the U.S. Export Enhancement Program (EEP). This omission was technically justified because the EEP has not been a formal part of the U.S. wheat program. Any effect it may have had would have been immaterial regarding the basis upon which the ITC was to evaluate wheat imports. Although excluded, research completed by Haley (1995) (but not submitted to the ITC) concluded that the EEP accounted for 40-48 percent of growth in U.S. imports of Canadian wheat over 1986-93. In another paper, Haley and Skully (1995) have shown that the determination of

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[1]After 1993 the average wheat price is calculated on either a 12-month basis or 5-month basis plus 10 cents per bushel, whichever is lower. See Lynch (1991) for details and for a discussion of the concept of a wheat "loan rate."

EEP targets and bonus amounts has been significantly influenced by Canadian export policies. The EEP and Canadian wheat export practices are probably closely enough related so as to merit consideration when considering the effect of restricting U.S. imports of Canadian wheat.

The purpose of this paper is to analyze what a restriction on the importing of Canadian wheat implies in the context of wheat differentiation by class and source, and in terms of various EEP criteria for targeting of export bonuses. This effort requires consideration of both theory and a realistic application of the theory to actual wheat trade patterns.

The analysis builds off a result examined by Haley (1989) concerning the subsidization of one product (called no. 1) benefitting the producers of another product (called no.2) for a net welfare gain to the subsidizing nation. A subsidy on 1 can increase national welfare if several conditions hold. First, exports of the subsidized good 1 should be low initially. Second, rest-of-world demand for 1 should be elastic, and 1 and 2 should be complementary or weakly substitutable internationally. Third, domestic demand for 1 should be inelastic, and 1 and 2 should be strong substitutes domestically. An agreement of these conditions increases the likelihood of a price rise in 2 when good no.1 is subsidized.

In this paper Canadian wheat will be like good no.1. By placing quota on its importation, more will be forced onto the world market, the same as what would happen if it were subsidized internationally by the U.S. Government. U.S. wheat is comparable to good no.2. Unlike good no. 2, however, it is directly subsidized. A theoretical approach will be developed that derives conditions for a welfare gain due to restricting Canadian imports that explicitly recognizes the operations and objectives of the U.S. EEP. The theory is then operationalized by use of a world wheat model that explicitly incorporates wheat differentiation and allows for the modeling of endogenous EEP targets and bonus amounts. Modeling results (effects on prices, traded quantities, export revenues, and deficiency payments) will be examined to see if they are consistent with the reasoning used by the ITC to justify restricting Canadian imports.

This paper is organized into several sections. The next section discusses wheat as a differentiated product and develops the theory that makes more explicit conditions under which a quota will be welfare enhancing for U.S. producers. The following sections describe the world wheat model, the EEP, and the modeling of targeting criteria. Modeling scenarios are then examined and conclusions are presented.

Differentiated Wheat and Modeling of Trade Policy

Wheat is primarily used as an input into flour production. Flour in turn is used for producing baked goods. The pattern of flour use differs from one world region to another and, also in many cases, within regions. Important characteristics that differentiate wheat for end-product uses are hardness, protein content, and gluten strength (USDA, 1993).

Although demand for wheat characteristics differs internationally, it is unclear how important it is to account for the differences in economic modeling and policy analysis. Research conducted by Veeman (1987), Henning and Martin (1989), Wilson (1989), and Espinosa and Goodwin (1991) has stressed the importance of end-use differentiation in econometric modeling. More lately, Larue (1991) has rigorously confirmed the results of these researchers and has also found additional evidence for wheat differentiation according to country of origin.

In the applied modeling field, Armington-type trade models have been developed to account for features that differentiate commodities according to where they were produced (Armington, 1969). Several Armington-type wheat trade models were constructed to analyze the effects of the 1980 Soviet grain embargo (Figueroa and Webb, 1986; Abbott and Paarlberg, 1986; and Webb and others, 1989). Additional modeling by De Gorter and Meilke (1987) stressed

the importance of wheat differentiation in analyzing wheat policies in the European Union (EU). Hjort (1988) estimated wheat import demand relationships differentiating wheat by both class and source country. Haley (1994) found wide disparities in modeling results evaluating benefits and costs of the EEP under differing differentiation assumptions.

Application to Canadian Wheat Imports

If wheat were a homogenous commodity, theoretical ambiguities would largely disappear. From a spatial equilibrium perspective, one could argue that the quota would limit regional demand in the United States from being supplied by the least cost supplier, presumably Canada. New world trade flow patterns would imply an upward movement in the world wheat price, thus benefitting U.S. producers at the expense of consumers. Even if wheat were assumed to be a differentiated product, the price would surely rise as a result of the quota if it were the case that the United States was not a major wheat exporter itself.

Canada and the United States compete in many markets, domestically and internationally. For the most part, Canada exports high quality hard spring and durum wheats. The United States exports hard spring and durum wheats as well, but survey evidence indicates that many importers prefer the Canadian product for a variety of reasons, not the least of which is a perception of the higher quality of the

Canadian product (Pick et al.,1995). The United States also exports hard winter and softer red and white wheats. To varying degrees, these wheats are viewed as less substitutable with the Canadian product.

If the United States were to restrict imports of Canadian wheat, a proportion of that wheat would surely find its way to other markets served by Canada. Because the United States and Canada compete in an interconnected world market for wheat, it is likely that the Canadian wheat would displace U.S. wheat in third markets. This effect, by itself, would depress U.S. wheat prices. The dual of this international displacement is the expanded sales opportunities for U.S. producers in the U.S. domestic market. These sales would lead to price increases for U.S. wheats. The overall effect on U.S. wheat prices would therefore depend on the relative sizes of these two effects.

Figure 1 illustrates the effects. The left panel shows the domestic supply and demand schedules (S and D, respectively) for U.S. wheat as a functions of the U.S. price. The right panel shows the international market for U.S. wheat. Larger quantities of wheat supplied than what is demanded domestically are shown as the U.S. excess supply (ES) schedule. Initial equilibrium exports (Q_i) and price (P_i) are shown where excess demand for U.S. wheat, represented as the ED schedule, meets excess supply.

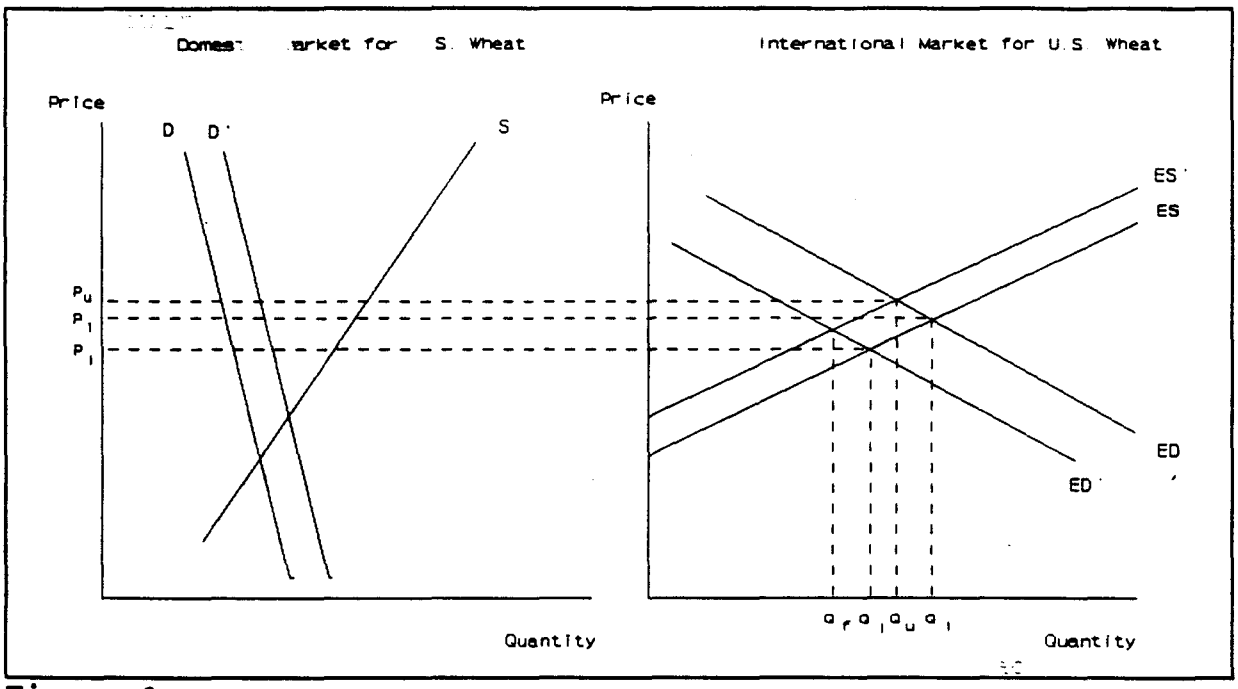

Figure 1 -
Effect of Quota on U.S. Wheat

The direct effect of the quota on wheat imports from Canada is shown as an increase in demand for U.S. wheat (movement of D to D' in the left panel) and, correspondingly, reduced excess supply available for the international market (ES to ES'). Export levels decrease from Q_i to Q_u, and the export price increases to P_u in order to ration export demand. Canadian wheat displaced from the U.S. market would presumably find its way to alternative markets. If U.S. and Canadian wheats were not substitutable internationally, these direct effects would be the final ones.

If U.S. and Canadian wheats were substitutable internationally, Canadian wheat displaced from the United States would in turn displace U.S. wheat from international markets. In the right panel, the excess demand for U.S. wheat would shift leftward to ED'. The

magnitude of the shift would depend on the magnitude of the substitutability. A high degree of substitutability is shown in the panel: ED shifts sufficiently leftward to more than offset the initial upward price movement: the price decreases below the initial equilibrium price as exports decrease to Q_f. The lower price limit would be at P_1 where no domestic substitutability (and hence no leftward movement of ES) is assumed.

Optimal U.S. Policy

The situation described above is one in which U.S. policy response (apart from the imposition of the quota) is held constant. U.S. export policy, basically the operation of the EEP, is not explicitly considered. It is hypothesized that EEP targeting and bonus determination criteria may affect the net benefit of any restriction on wheat imports from Canada may bring.

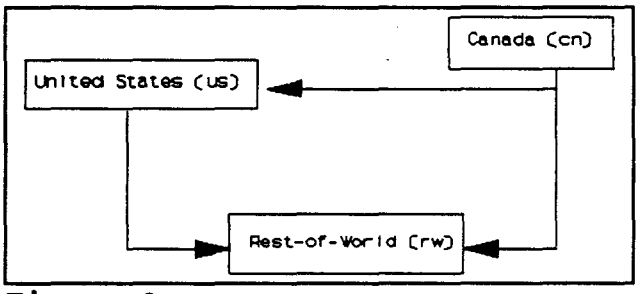

Figure 2
Simplified World Market for U.S. and Canadian Wheat

The simplest representation of the problem is illustrated in figure 2. There are two types of wheat: that from the United States (us) and that from Canada (cn). The United States exports "us" wheat to the rest-of-world (rw); and Canada exports "cn" wheat to the United States and rest-of-world. It is assumed that the U.S. policymakers can control the level of "cn" imports through the setting of an appropriate tariff rate. If it were desirable to increase the level of "cn" imports, a negative tariff (or in other words, a subsidy) could be paid.

To set up the problem symbolically, define the following variables:

X_i^j - exports from/to region j of wheat type i

M_i^j - imports to region j of wheat type i

F(p) - U.S. policymakers' objective function, function of prices ($p = \{p_i^j\}$)

s - U.S. export subsidy

t - U.S. import tariff on Canadian wheat

The policymaker's problem is to optimize the objective function F(p), netting out the costs of subsidies and netting in tariff revenue, all subject to an efficient world market equilibrium in

world wheat trade. Equation 1 sets out the U.S. policymakers' problem with all constraints for an efficient equilibrium shown:

$$Max_{(s,t)}\ F(p_{us}^{us})\ -s*X_{us}^{rw}+t*X_{cn}^{us} \tag{1a}$$

$$-e_{us}*(X_{us}^{rw}-X_{us}^{us}\ (p_{us}^{us},p_{cn}^{us})) \tag{1b}$$

$$-e_{cn}*(X_{cn}^{us}+X_{cn}^{rw}-X_{cn}^{cn}\ (p_{cn}^{cn})) \tag{1c}$$

$$-m_{us}^{rw}*(M_{us}^{rw}(p_{us}^{rw},p_{cn}^{rw})\ -X_{us}^{rw}) \tag{1d}$$

$$-m_{cn}^{us}*(M_{cn}^{us}(p_{us}^{us},p_{cn}^{us})\ -X_{cn}^{us}) \tag{1e}$$

$$-m_{cn}^{rw}*(M_{cn}^{rw}(p_{us}^{rw},p_{cn}^{rw})\ -X_{cn}^{rw}) \tag{1f}$$

$$-r_{us}^{rw}*(p_{us}^{rw}+s-p_{us}^{us}) \tag{1g}$$

$$-r_{cn}^{us}*(p_{cn}^{us}-t-p_{cn}^{cn}) \tag{1h}$$

$$-r_{cn}^{rw}*(p_{cn}^{rw}-p_{cn}^{cn}) \tag{1i}$$

$$-c_{us}^{rw}*X_{us}^{rw}*(p_{us}^{rw}+s-p_{us}^{us}) \tag{1j}$$

$$-c_{cn}^{us}*X_{cn}^{us}*(p_{cn}^{us}-t-p_{cn}^{cn}) \tag{1k}$$

$$-c_{cn}^{rw}*X_{cn}^{rw}*(p_{cn}^{rw}-p_{cn}^{cn}) \tag{1l}$$

The following explanations accompany equation 1:

1a. Optimize U.S. export objective, taking into account the cost of subsidizing U.S. wheat exports, and potential revenue (or costs) from applying a tariff (or subsidy) on wheat imports from Canada.

1b,c. The United States exports wheat to the rest-of-world, while Canada exports to the United States and the rest-of-world. U.S. wheat competes with Canadian wheat domestically and in world markets. The Lagrangian e_i represents the cost to the objective function (or benefit if negative) from a unit increase in exports of wheat type i.

1d,e,f. The rest-of-world imports wheat from the United States and Canada. The United States imports wheat from Canada. The Lagrangian m_i^j represents costs from a unit increase in region j's excess demand for wheat type i.

1g-i. At an optimum, importer price is equal to the exporter's price adjusted positively by a unit subsidy s or negatively by a unit tax t. The Lagrangian r_i^j represents the cost from unit increase in region j's price for wheat type i.

1j-1. The Lagrangian c_i^j represents cost of suboptimal trade flows. It measures the unit excess cost if exporter supplies market where there is excess cost; that is, where there is a violation of 1g, 1h, or 1i.

For present purposes, the variable of interest is the tariff rate t. Differentiation with respect to X_{cn}^{us} provides a solution for t:

$$t = -m_{cn}^{us} + e_{cn} \tag{2}$$

Further differentiation and substitution isolates the terms needed for the solution of equation 2:

$$e_{us} * \frac{\partial X_{us}^{us}}{\partial p_{us}^{us}} - m_{cn}^{us} * \frac{\partial M_{cn}^{us}}{\partial p_{us}^{us}} = X_{us}^{rw} - \frac{\partial F}{\partial p_{us}^{us}} \tag{3}$$

$$e_{us} * \frac{\partial X_{us}^{us}}{\partial p_{cn}^{us}} - m_{cn}^{us} * \frac{\partial M_{cn}^{us}}{\partial p_{cn}^{us}} = -X_{cn}^{us} \tag{4}$$

$$e_{cn} * \left(\frac{\partial X_{cn}^{cn}}{\partial p_{cn}^{cn}} - \frac{\partial M_{us}^{rw}}{\partial p_{cn}^{rw}} \right) - m_{us}^{rw} * \frac{\partial M_{us}^{rw}}{\partial p_{cn}^{rw}} = X_{cn}^{us} \tag{5}$$

$$-e_{cn} * \frac{\partial M_{cn}^{rw}}{\partial p_{cn}^{rw}} - m_{us}^{rw} * \frac{\partial M_{us}^{rw}}{\partial p_{us}^{rw}} = -X_{us}^{rw} \tag{6}$$

Define Y and Z as follows, these terms representing non-negative values of the determinants of own and cross price elasticity matrices, for the United States and the Rest-of-World, respectively:

$$Y = \left(\frac{\partial X^{us}_{us}}{\partial p^{us}_{us}}\right)\left(-\frac{\partial M^{us}_{cn}}{\partial p^{us}_{cn}}\right) - \left(-\frac{\partial M^{us}_{cn}}{\partial p^{us}_{us}}\right)\left(\frac{\partial X^{us}_{us}}{\partial p^{us}_{cn}}\right) > 0 \qquad (7)$$

$$Z = \left(\frac{\partial X^{cn}_{cn}}{\partial p^{cn}_{cn}} - \frac{\partial M^{rw}_{cn}}{\partial p^{rw}_{cn}}\right)\left(-\frac{\partial M^{rw}_{us}}{\partial p^{rw}_{us}}\right) - \left(-\frac{\partial M^{rw}_{us}}{\partial p^{rw}_{cn}}\right)\left(-\frac{\partial M^{rw}_{cn}}{\partial p^{rw}_{cn}}\right) > 0 \qquad (8)$$

The solution for t becomes:

$$t = \frac{1}{Y} * \frac{\partial X^{us}_{us}}{\partial p^{us}_{us}} * X^{us}_{cn} + \frac{1}{Z} * \left(-\frac{\partial M^{rw}_{us}}{\partial p^{rw}_{us}}\right) * X^{us}_{cn}$$
$$-\frac{1}{Y} * \left(-\frac{\partial X^{us}_{us}}{\partial p^{us}_{cn}}\right)\left(X^{rw}_{us} - \frac{\partial F}{\partial p^{us}_{us}}\right) - \frac{1}{Z} * \left(\frac{\partial M^{rw}_{us}}{\partial p^{rw}_{cn}}\right) * X^{rw}_{us} \qquad (9)$$

The first and third terms show the effects of shifts in excess supply, and the second and fourth terms show the effects of shifts in excess demand. The first two terms are nonnegative. The third term is ambiguous, being dependent on the policymakers' objective function. For the case of export revenue maximization and probably for most cases, it can be shown that the overall term is positive. The first three terms, therefore, support the restriction of

imports through the use of a tariff. The fourth term is negative, and is therefore the only term supporting a nonpositive tariff on imports.

Factors that would argue against imposing a restriction include a initial low level of imports (lowering the influence of the first two terms), low substitution between the imported and domestic product (lowering the influence of the third term), and a high degree of substitution between the imported and domestic product in rest-of-world markets (magnifying the effect of the fourth term). The right combination of these effects can negate the rationale for imposing an import restriction. It remains an applied, or empirical, exercise to determine the correct direction regarding restrictiveness (that is, more or less restriction).

World Wheat Model

The world wheat model was originally built in the Static World Policy Simulation (SWOPSIM) modeling framework and later fitted into the GAMS modeling system in order to allow analysis of policy alternatives in an optimization framework. The model framework is static, partial equilibrium, and nonspatial. Supply and demand are functions of own- and cross-prices. Trade is the difference between domestic supply and demand. Domestic incentive prices depend on the level of consumer and producer support and on world prices denominated in local currency. Price transmission elasticities

regulate the extent to which domestic prices change when world prices change. World markets clear when net trade of a commodity across all regions sums to zero.

The model is consistent with the theory of differentiated wheat demand (Haley, 1994). Seven types of wheat are in the model. Six of the wheats are identified with the country-source of production: the United States, Canada, the EU, Australia, Argentina, and Saudi Arabia. The seventh type is a generic wheat category comprising wheat produced elsewhere.

There are 34 regions modeled. The 6 regions mentioned immediately above are wheat exporters. These countries can import wheat from each other. The other 27 regions are wheat importers. They include Mexico and Central America, Venezuela, Brazil, and other South America (Western Hemisphere); Italy, former Soviet Union, Other Western Europe, Eastern Europe (Europe); Morocco, Tunisia, Other North Africa (North Africa); Ghana, Togo, Other Sub-Saharan Africa (Africa); Egypt, Yemen, Other Near East (Near East); Pakistan, Sri Lanka, Japan, South Korea, Taiwan, China, the Philippines, Indonesia, Other East Asia (East Asia); and the Rest-of-the-World.

Armington's methodology is employed to calculate own- and cross-price elasticities for the wheat types. The first set of necessary elements for setting the demand elasticity parameters are an own-price elasticity of demand for standard-quality wheat. These

elasticities were obtained from ERS's trade liberalization studies (Sullivan and others, 1992; and Sullivan, 1990). The other set of necessary elements are estimates of: (1) between-class wheat substitution elasticities, and (2) within-class substitution elasticities differentiating wheat among the seven wheat sources. Estimates of these elements were made by the author, based on wheat import market surveys completed as part of the ERS Grain Quality project (Mercier, 1994). The procedure is explicitly documented in Haley (1994).

Objectives of the U.S. Export Enhancement Program

Since its inception in 1985, there have been a number of criteria which have guided the administration of the EEP:

I. Each EEP offer must have the potential to develop, increase, or maintain markets for U.S. agricultural commodities.

II. EEP subsidies should help U.S. exporters displace the exports of subsidizing competitors in specific countries.

III. The EEP should not have more than a minimal effect on non-subsidizing competitors.

IV. The overall EEP program level and subsidies for individual EEP sales should be maintained at the minimum budget level

necessary to achieve the EEP's trade policy and export expansion goals.

Modeling representation of objectives consists in the selection of EEP targets and amounts that do one or a combination of the following:

- Maximize U.S. wheat export revenue net of EEP costs (I);
- Minimize EU wheat export revenue (II);
- Do not minimize wheat export revenue of Australia or Argentina (III);
- (i) Do or (ii) do not minimize Canadian wheat export revenue (either II or III).

The U.S. position with regard to Canada is ambiguous - The United States and Canada have shared objectives calling for the reduction of EU export subsidies and increased market access in restricted import markets. But the United States has been suspicious of CWB pricing practices and transport subsidies that may have displaced U.S. wheat sales both domestically and internationally.

EEP Objectives and World Wheat Model

The model is solved for each of the objectives expressed in functional form F(p). The total level of EEP expenditure is constrained to $698 million. The solution for objective k produces a vector of optimal EEP targets and bonus amounts E^*_k.

It is likely that no one single objective has been the basis for selecting EEP targets and bonus amounts - rather, all or a subset of objectives have been pursued simultaneously. Haley and Skully (1995) examined EEP criteria and actual targeting and bonus determination for 1986-1993. They used an econometric approach to estimate the contribution of each objective as part of a composite. They estimated the following equation:

$$\hat{E}^{\circ} = \beta_1 * E^*_1 + \beta_2 * E^*_2 + \ldots + \beta_g * E^*_g + \epsilon \qquad \sum_{j=1}^{g} \beta_j = 1 \qquad (21)$$

where E° is the observed vector of EEP subsidy allocations.

The contribution of EEP criteria to actual targeting decisions varied from one year to the next. In no one year was it the case that a single criterion could explain most targeting decisions.

Their results for 1992/93 are relevant for this study. Table 1 reports the results. Maximizing U.S. export revenue and minimizing

Table I
Estimated Composite Objective for 1992/93

EEP Objective	Coefficient Value	Standard Error
Maximize U.S. Export Revenue	0.484	0.139
Minimize Canadian Export Revenue	0.123	0.258
Minimize EU Export Revenue	0.666	0.218
Minimize Australian Export Revenue	1.261*	0.291
Minimize Argentine Export Revenue	-1.535*	0.515

Note: R2 = 0.556; * denotes multicollinearity between variables next to which they appear.

EU export revenue were important objectives. Exerting pressure on the Canadians was less important an objective. Multicollinearity prevents a separate, individual analysis of the Australian and Argentine cases. However, the sum of the coefficients is negative, indicating that EEP targets were not selected to intentionally exert pressure on the two exporters, jointly considered.

The coefficient values from table 1 are used below in the modeling scenarios.

Modeling Scenarios and Results

The objective of this paper is to show various effects of a

restriction on U.S. wheat imports from Canada, considered from perspectives of differing EEP targeting criteria for differentiated wheat. The 1992/93 July-June marketing year is chosen for analysis because that is the latest year for which a differentiated wheat trade model has been constructed (Haley, 1994). Imports in 1992/93 were 1,369 thousand metric tons. It is assumed that imports are restricted to actual levels occurring three years before (1989/90), or 331 thousand metric tons. This is a drop of about 1 million metric tons.

Theoretical considerations indicate reduced U.S. wheat exports. There are two effects: (1) U.S. wheat is diverted from world markets to substitute for the withdrawn Canadian product - the excess supply effect from figure 1; and (2) Canadian wheat displaced from the U.S. markets drives out U.S. wheat in third party markets - the excess demand effect from figure 1. The first effect should raise the U.S. wheat price, and the second effect should decrease the U.S. wheat price. The chief factor that favors a price decrease is a stronger substitutability between U.S. and Canadian wheats internationally than domestically (equation 9).

Four EEP targeting criteria are considered: (1) maximize U.S. export revenue; (2) minimize Canadian export revenue; (3) minimize EU export revenue; and (4) an estimated composite objective representing a linear combination of (1)-(3) as well as the minimization of harm to non-subsidizing exporters, Australia and

Argentina (table 1).

To arrive at results, the world wheat model is solved two times: first, to produce a non-restricted import solution for each of the criteria - called a base solution below; and second, to produce a restricted import solution from which to examine changes from the first solution for several key variables.

The model is initially calibrated to reproduce actual wheat trade

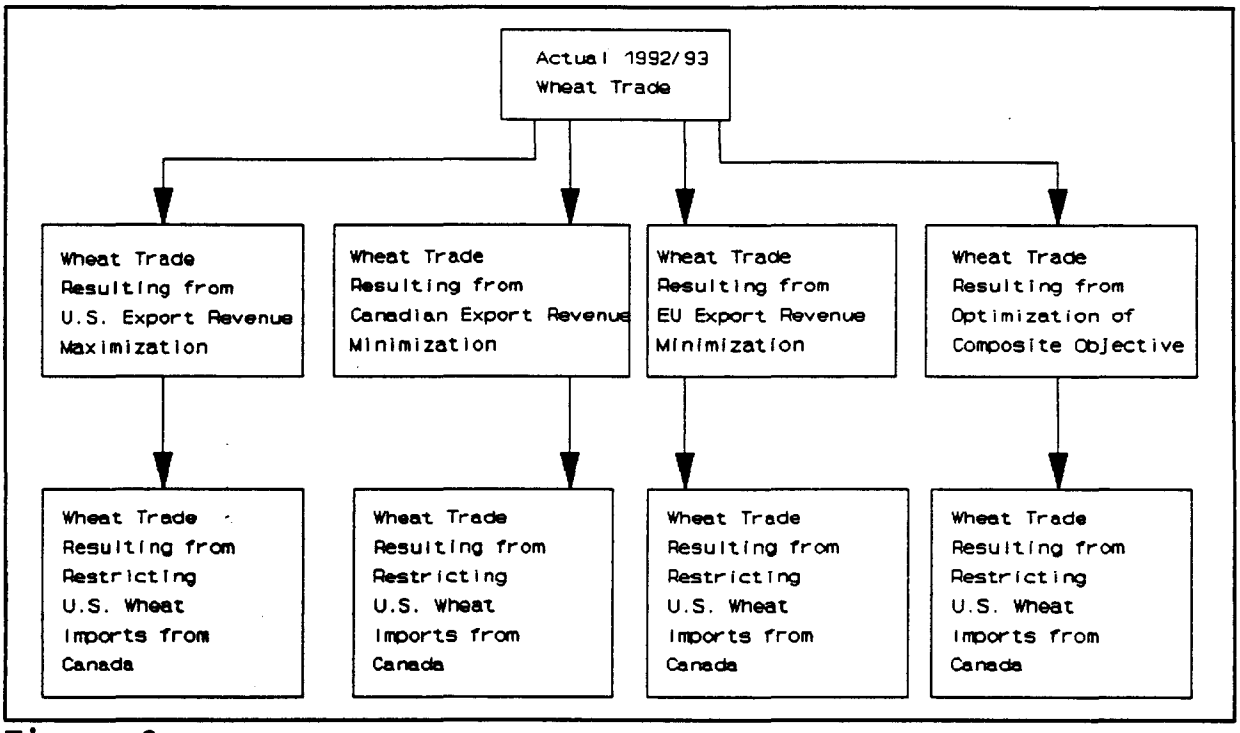

Figure 3
Modeling Runs: Four Objectives for EEP Targeting and Bonus Determination

flows for 1992/93, given actual EEP allocations. The first running of the model corresponds to a reallocation of EEP targets and bonuses that would have to result in order to accomplish the stated

objective (e.g., maximization of U.S. export revenue). The second running of the model uses the first solution as its base, and U.S. imports are restricted to 331 thousand metric tons. In order to isolate on changes stemming from the restriction alone, changes are examined with reference to the first model solution rather than the actual historical record. Figure 3 is a schema of the procedure.

Two sets of results receive focus: one for Canada (Table 2) and one for the United States (Table 3). Four variables constitute the Canadian set: exports to the United States, exports to the rest-of-world, export price, and export revenue. Four other variables constitute the U.S. set: producer price, estimated deficiency payments, exports, and export revenue.

The Canadian wheat sector is negatively affected because of the U.S. import restriction, regardless of the U.S. criterion for EEP targeting and bonus determination.[2] The impact effect is a reduction in exports of 1,040 thousand metric tons. Canadian wheat at a level of about 514 thousand metric tons is diverted for export to alternative rest-of-world markets, for a net export loss of about 526 thousand metric tons. As seen below, the diverted Canadian wheat becomes directly competitive with U.S. wheat in shared rest-of-world markets. The Canadian export price decreases

[2]The most significant effect revealed by the table is not the subject of this paper: if the EEP targeting criterion for 1992/93 had been U.S. export revenue maximization, the Canadians would have benefitted through higher export prices. Haley and Skully (1995) show that targeted countries under this criterion are not large consumers of Canadian-style hard spring wheats.

about $3.50/mt, and estimated export revenue declines by about 4.7 percent. The Canadians are clearly worse-off because of the U.S. import restriction.

According to model predictions, the U.S. wheat sector is less well-off when imports are restricted. This non-conventional result is a sign of the decline in excess demand for U.S. wheat outstripping the decline in excess supply. The pressure for increased consumption of domestic U.S. wheat, which would tend to increase the price in conventional analysis, was not strong enough to counter the stronger competition to U.S. wheat in shared foreign markets.

Excepting Canadian export revenue minimization, results agree across EEP targeting criteria. Producer price drops about $0.51/mt or 1.4 cents per bushel. U.S. exports decline about 57 thousand metric tons, and export revenue declines about $27 million or 0.6 percent.

The quota restriction is most nearly a reasonable policy option when the EEP targeting and bonus determination criterion is the minimization of Canadian export revenue. Producer price drops only $0.36/mt or 1.0 cents per bushel. U.S. export revenue declines by only about $7 million as U.S. wheat exports actually increase by 43 thousand metric tons. In this instance, EEP bonuses can be adjusted optimally to counter Canadian competition in markets to which

Canadian wheat has been displaced. In table 2, the decline in Canadian export revenue is greatest in this case - about 5.2 percent compared to 4.5 percent for the other cases.

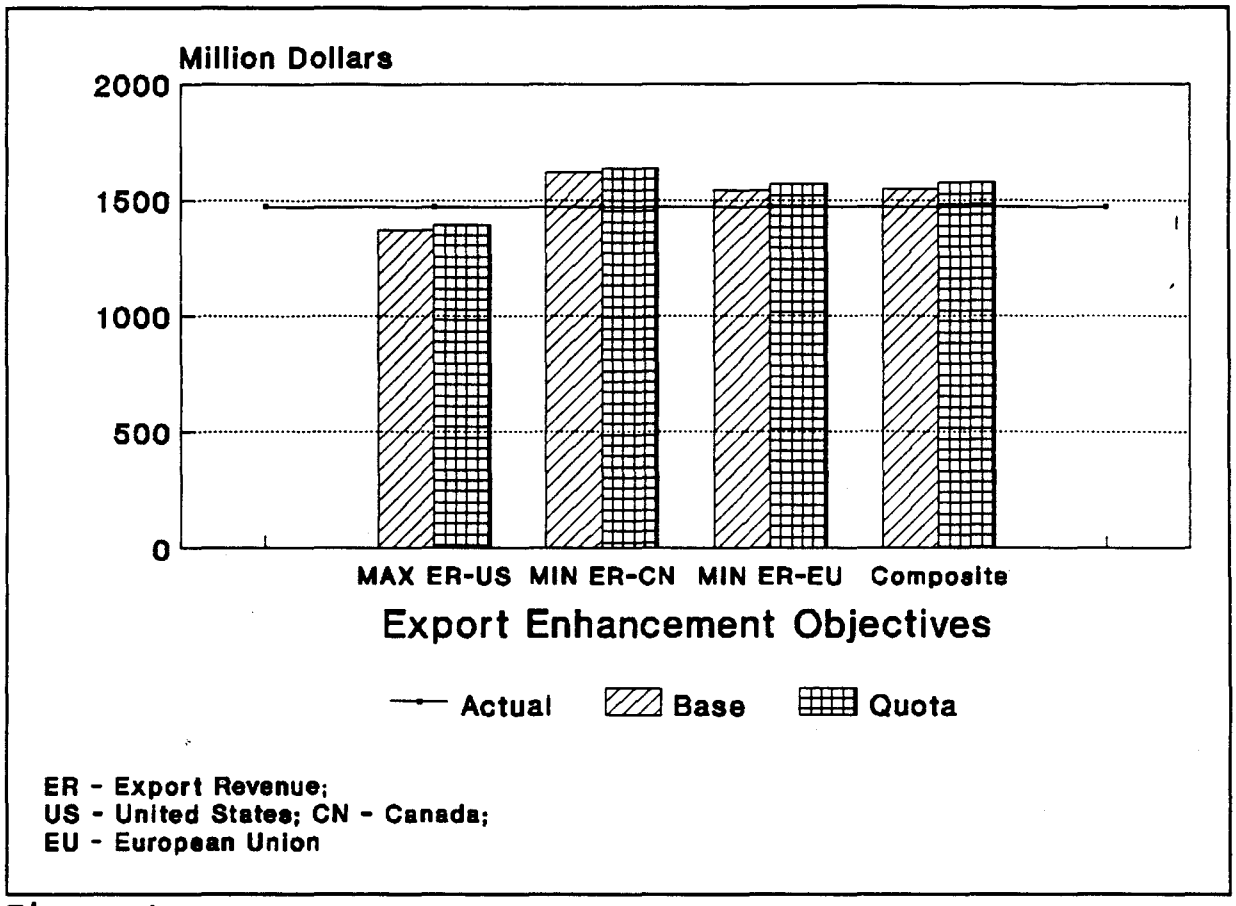

Figure 4
Deficiency Payments: Simulated Effects of EEP Objectives and Quota for 1992/93

Second row of table 3 and figure 4 show the effect of the restriction on estimated wheat deficiency payments.[3] Because the producer price has decreased, it is no surprise that deficiency

[3]Actually what is modeled is deficiency payment rate, or the difference between the U.S. target price and the U.S. producer price. Deficiency payments are estimated by multiplying the rate times the eligible base acreage of farmers participating in the program, further multiplied by the program yield.

payments have increased, about 1.1 percent for the Canadian export revenue minimization case and about 1.7 percent for the others.

Conclusions

Increasing yearly U.S. imports of Canadian wheat have been a major concern of U.S. wheat interests. Given the recent ITC ruling and trade negotiations with Canada, wheat imports will now be lower, for at least one year and likely longer. This paper has presented analysis, theoretical and applied, concerning the effect of a quota in consideration of differing objectives for the U.S. wheat EEP. It differs from other work in that it uses a set of world wheat models that explicitly incorporate product differentiation among wheat classes and source countries.

Within the context of product differentiation, placing a restriction on the importation of a product that resembles one which is produced domestically may not benefit domestic producers of the product. If the domestic product is exported, and if the importable product substitutes more easily for it in third markets than it does domestically, then a policy seeking to enhance producer price might actually favor increased imports rather than decreased imports through a restrictive import policy such as a quota.

The theoretical approach shows that an optimal policy response

regarding a quota or tariff must take into specific account the policy objective pursued by policymakers. In terms of this analysis, four objectives are considered for EEP targeting and bonus determinations: maximization of U.S. export revenue, minimization of Canadian export revenue, minimization of EU export revenue, and an estimated composite objective.

Only in the case of Canadian export revenue minimization goal does it seem possibly consistent to place an import restriction on Canadian wheat shipments to the United States. In all cases, U.S. producer price decreases ($0.48/mt), deficiency payments increase (1.6 percent), and export revenue declines (0.5 percent), although for Canadian export revenue minimization case, the effects are less severe than for the other cases. Canada itself is unambiguously worse-off in all cases.

This paper is primarily suggestive: its conclusions provide support to those who believe additional research should be pursued regarding the effect of increased Canadian wheat in the U.S. market. It underscores some of the insights of new trade theorists who show that optimal policy actions require more attention to product differentiation issues, as well as others like market structure and strategic behavior.

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Table 2 -- Effects of Quota on Canadian Wheat Exports

Item	Actual	MAX Export Revenue - United States		MIN Export Revenue - Canada		MIN Export Revenue - European Union		Composite Objective	
		Base	Quota	Base	Quota	Base	Quota	Base	Quota
Exports to United States (1000 MT)	1,369	1,302	331	1,435	331	1,344	331	1,402	331
Exports to Rest-of-World (1000 MT)	17,751	18,597	19,111	16,736	17,264	17,638	18,122	17,234	17,763
Export Price (Dollars/MT)	181.00	186.36	183.19	174.69	170.96	180.06	176.54	177.76	174.19
Export Revenue (Million Dollars)	3,460.72	3,708.24	3,561.63	3,174.21	3,008.03	3,417.88	3,257.63	3,312.76	3,151.89

Table 3 -- Effects of Quota on U.S. Wheat

Item	Actual	MAX Export Revenue - United States		MIN Export Revenue - Canada		MIN Export Revenue - European Union		Composite Objective	
		Base	Quota	Base	Quota	Base	Quota	Base	Quota
Producer Price (Dollars/MT)	117.21	119.24	118.77	114.25	113.89	115.82	115.29	115.70	115.16
Estimated Deficiency Payments (Million Dollars)	1,473.45	1,372.94	1,396.21	1,620.00	1,637.83	1,542.27	1,568.51	1,548.21	1,574.95
Exports (1000 MT)	36,948	37,668	37,612	35,808	35,851	36,287	36,233	36,368	36,308
Export Revenue (Million Dollars)	4,585.56	4,765.21	4,739.31	4,316.73	4,309.75	4,440.46	4,413.87	4,447.74	4,419.54

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