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Cargo Preference and U.S. Wheat Exports

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ABSTRACT

We developed and empirically tested a differentiated products model for analyzing cargo preference legislation. Our results suggest that changes in cargo preference legislation will in aggregate have modest impacts upon the level of U.S. wheat exports, but will affect the proportions of U.S. wheat exports shipped on commercial and concessional terms. The impact on the U.S. export price of wheat depends on where the legislative changes are introduced. If the change is implemented in the market for commercial wheat sales, the U.S. export price will fall. Increased restrictions on concessional wheat sales could raise the U.S. export price of wheat.

Keywords: Cargo preference, wheat, concessional exports.

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SUMMARY

Changes in existing cargo preference legislation have been proposed to Congress. Our analysis suggests that such changes would have modest impacts upon U.S. exports of wheat. If the U.S. Government pays U.S. shippers for the higher costs of U.S. flag vessels, it would cost taxpayers several million dollars.

We analyzed the changes in U.S. cargo preference legislation by developing a differentiated products model which treats wheat exported on a commercial basis as a distinct commodity from wheat shipped on a concessional basis. We used this methodology because current cargo preference legislation applies only to concessional sales, while one of the proposed changes would expand the legislation to include commercial sales. By treating the two types of wheat exports as differentiated products, shifts in the proportion of sales under each type of terms can be determined. Our empirical results suggest changes in these proportions. If additional cargo preference restrictions are imposed upon concessional sales, commercial sales rise. Conversely, extending cargo preference requirements to the commercial market stimulates U.S. concessional sales.

The impact of additional cargo preference requirements on the U.S. export price for wheat depends on whether the legislative changes are implemented for concessional or commercial sales. If the changes are implemented in the commercial market, the U.S. export price will fall. Increased restrictions on concessional sales could raise the U.S. export price.

INTRODUCTION

Changes in existing cargo preference legislation have been proposed to Congress in efforts to support the U.S. merchant marine industry. The "Boggs Bill" (H.R. 1242) is a bulk cargo preference bill that would require 5 percent of all bulk commodities traded by the United States to be carried in U.S. flag vessels in 1984. This percentage would increase 1 percent each year for 15 years until 20 percent of bulk commodity trade is carried on U.S. flagships. The "Jones Bill" (H.R. 2692) is a recodification and modest expansion of existing regulations. It would require that 50 percent of U.S. Government cargo be shipped on U.S. vessels, and that shipments for the Strategic Petroleum Reserve and the National Defense Stockpile of Strategic and Critical Materials be increased from 50 to 100 percent. Because costs of shipping bulk commodities on U.S. flag vessels are considerably higher than costs for shipping on non-U.S. ships, U.S. agricultural exporters are concerned that U.S. exports of agricultural products will decline because of changes in cargo preference legislation.

We examined the consequences of changes in the percentage of agricultural exports required to be shipped on U.S. flag vessels. We developed a differentiated product model of U.S. trade to analyze cargo preference legislation. Using this model, we examined the impacts of changes in U.S. Government restrictions on wheat trade.

CONCEPTUAL FRAMEWORK

The model assumes that the United States exports two bulk commodities, which although similar are differentiated by purchasers overseas. The production process in the model is transporting the U.S. bulk commodities overseas, and is denoted by X_1 and X_2, for commodities 1 and 2, respectively. We assumed each transportation activity was subject to constant returns to scale, and used three factors, the bulk commodity, h_i; transportation services, t_i; and the activity specific sales terms, z_i. The activity specific sales terms include insurance, interest charges, credit guarantees by the U.S. Government, and other transaction costs. The cause of the differentiation by importing nations is the terms under which the bulk commodity is sold, or z_i. Activity 1 is termed commercial sales overseas by the United States. Foreign buyers of the bulk commodity in the commercial market finance purchases with short-term loans (say 120 days) at commercial interest rates subject to premiums and discounts based on the purchasers' credit worthiness. Concessional sales by the United States, activity 2, are financed with longer term loans in some cases, such as P.L. 480 loans with a 10-year grace period and a 30-year repayment period at commercial interest rates with U.S. Government credit guarantees, or at U.S. subsidized below-market interest rates. The blended credit program offered by the U.S. Department of Agriculture is included in z_2. There are two factors that are common between activities, and each activity has a specific sales term.

Each industry is subject to constant returns to scale, and two other restrictions are imposed on the transportation process. The bulk commodity and the transportation services must be used in fixed proportions in producing a joint input (g_i). This stage of the production process is characterized by Leontief isoquants, with an elasticity of substitution between the bulk commodity and the transportation services of zero. We assumed that the joint product from the first stage and the activity specific sales terms were described by a Cobb-Douglas production function. This assumption has two advantages. It is consistent with the constant returns to scale assumption, and if both production functions are of the Cobb-Douglas type, then the elasticity of substitution between the joint input (g_i) and the sales term (z_i) in each activity equals unity. There are no factor intensity reversals which would prevent a monotonic linkage between factor prices and output prices.

Under these restrictions, the following conditions for zero profits hold when both goods are produced:

$$P_i = a_{hi} \cdot w + a_{ti} \cdot f_i + a_{zi} \cdot (r_i + m_i) \qquad i = 1, 2 \qquad (1)$$

The price of the bulk commodity at destination is given by P_i, while the price of the bulk commodity at its origin of shipment is w. The price of transportation services in each activity is denoted by f_i, and the cost of the activity specific factors consists of the market determined costs, r_i, plus any U.S. Government payments designed to compensate shippers and buyers, m_i. The quantity of the jth input in shipping the ith commodity is denoted as a_{ji}. These conditions assume that both commodities are shipped and state that in equilibrium, unit costs as given by the right side of (1) must equal unit revenue, P_i.

The major impact of cargo preference legislation is on f_i. We assumed that there was a distortion in the transportation services market causing the freight rate on U.S. flag vessels (f^u) to exceed the cost on non-U.S flag ships (f) by a factor β. Hence:

$$f^u = \beta \cdot f \qquad (2)$$

The higher costs of U.S. flag vessels results from several factors, including labor union contract bargaining and higher construction costs (Castillo-Manuel). U.S. cargo preference legislation requires that a specified share of exports (α_i) must be shipped on U.S. flag vessels. The cost of shipping in each activity can be expressed as:

$$f_i = \alpha_i f^u + (1 - \alpha_i) f \qquad (3)$$

Since f^u is related to f by (2), a simple substitution gives the expression for f_i, which can be substituted into the zero profit conditions:

$$f_i = (\alpha_i \beta - \alpha_i + 1) f \quad (4)$$

Both the higher costs on U.S. flag vessels (β), and cargo preference requirements (α_i) can be inserted into the zero profit conditions (1).

The production sector for transporting the bulk commodity is completed by adding the factor market-clearing conditions. For the bulk commodity, the market-clearing condition is:

$$a_{h1} x_1 + a_{h2} x_2 = H(w) \quad (5)$$

The function H(w) represents the excess supply function for the bulk commodity by the United States, and we assumed it was a function of only the bulk commodity price. The market for transportation services is treated differently. This model assumes that the supply of transportation services for a specific bulk commodity is perfectly elastic, and the freight rate, f, is treated as a given. The final market-clearing conditions are for the activity specific factors:

$$a_{zi} x_i = z_i \qquad i = 1, 2 \quad (6)$$

To complete the model, we specified the demands for commercial and concessional exports by foreign purchasers. Because the two types of exports are differentiated by buyers, two excess demand functions are necessary. We assumed that for each commodity, the supply activity to foreign purchasers (x_1 and x_2) equals the demand activity by those buyers (C_1 and C_2) and the excess demand functions can be written as:

$$x_1 = C_1 (P_1, P_2) \quad (7)$$

$$x_2 = C_2 (P_1, P_2) \quad (8)$$

The model consists of two zero profit conditions (1), the relationships between the freight rates in the two activities (4), the three factor market-clearing conditions, (5) and (6), and the two excess demand functions (7) and (8).

We reformulated the model to address changes in cargo preference legislation. Differentiating the zero profit conditions (1), and applying the envelope property gives:1/

$$\theta_{hi} \cdot \hat{w} + \theta_{zi} \cdot \hat{r}_i - \hat{P}_i = -\theta_{ti} \; f_i^{-1} \; (\alpha_i \; \beta\hat{\beta} + (\beta f - f) \; \alpha_i\hat{\alpha}_i) - \theta_{zi} \cdot \hat{m}_i \quad (9)$$

1/Because of the factor market distortion, the envelope property can only be applied to the distorted factor price, f_i.

where "^" denotes the percentage change. From the previous assumption that the freight rate on non-U.S. flag vessels is fixed, $\hat{f} = 0$ and is omitted from (9). The unit cost share of the jth input in the export of the ith commodity is given by θ_{ji}. As the problem is defined, with constant returns to scale, the sum of the unit cost shares for the three factors must equal one. Differentiating the excess demand functions (7) and (8), gives:

$$\hat{x}_1 = \varepsilon_{11}\hat{P}_1 + \varepsilon_{12}\hat{P}_2 \tag{10}$$

$$\hat{x}_2 = \varepsilon_{21}\hat{P}_1 + \varepsilon_{22}\hat{P}_2 \tag{11}$$

where ε_{ij}, is the elasticity of excess demand for activity i with respect to the destination price of export good j.

The factor market-clearing relations are somewhat more difficult because these relations capture most of the interactions on the production side of the model. Differentiating the market-clearing condition for the bulk commodity yields:

$$\lambda_{h1}\hat{x}_1 + \lambda_{h2}\hat{x}_2 = \eta\hat{w} - \lambda_{h1}\hat{a}_{h1} - \lambda_{h2}\hat{a}_{h2} \tag{12}$$

where:

λ_{hi} = the share of the bulk commodity in the shipment of the ith good, i = 1, 2.

η = the elasticity of excess supply of the bulk commodity by the United States.

The sum of the input shares across the activities must equal one. The elasticity of excess supply of the bulk commodity is a quantity weighted average of U.S. domestic demand and supply elasticities. Differentiation of the market-clearing conditions for the activity specific factors produces:

$$\hat{x}_i = \hat{z}_i - \hat{a}_{zi} \qquad i = 1, 2 \tag{13}$$

The envelope property cannot be used to eliminate the percentage changes in the technical coefficients in the differentials of the factor market-clearing conditions. To obtain expressions for these variables, the restrictions imposed upon the production processes in both industries can be used. Because it is assumed that the elasticity of substitution between the bulk commodity and the transportation services in each activity is zero, then these two inputs can be treated conceptually as one (denoted by g). Using the definition of the elasticity of substitution between g and z in each activity gives:

$$(\hat{a}_{gi} - \hat{a}_{zi}) = -\sigma^{i}_{g,z}(\hat{P}_{gi} - \hat{r}_i) \tag{14}$$

where:

$\sigma^{i}_{g,z}$ = the elasticity of substitution between the joint input, g, and the activity specific input, z_i, in activity i, i = 1, 2.

$\hat{P}_{g,i}$ = the percentage change in the price of the joint input in activity i.

Because the unit cost shares, θ_{ji}, sum to one, (14) can be rewritten as:

$$\hat{a}_{zi} = \sigma^{i}_{g,z} (\hat{P}_{gi} - \hat{r}_i)(\theta_{hi} + \theta_{ti}) \quad (15)$$

$$\hat{a}_{gi} = -\sigma^{i}_{g,z} (\hat{P}_{gi} - \hat{r}_i)\theta_{zi} \quad (16)$$

Because of the fixed proportions assumption for the bulk commodity input and the transportation services, $a_{hi} = a_{gi}$, and (15) and (16) can be substituted into (12) and (13). This substitution explains the percentage changes in the technical coefficients using the elasticities of substitution in the two activities, and the change in factor prices. Because the price of the joint input in each activity, P_{gi}, is the weighted sum of the individual input the prices differentiation yields:

$$\hat{P}_{gi} = \theta_{hi}\hat{w} + \theta_{ti}(\alpha_i f f_i^{-1} \beta\hat{\beta} + (\beta f - f)\alpha_i f_i^{-1}\hat{\alpha}_i) \quad (17)$$

Given values for $\hat{\beta}$, $\hat{\alpha}_1$, $\hat{\alpha}_2$, $\hat{m}_2$, $\hat{m}_1$, $\hat{z}_1$, and $\hat{z}_2$, the system of differential equations can be solved for $\hat{P}_1$, $\hat{P}_2$, $\hat{X}_1$, $\hat{X}_2$, $\hat{w}$, $\hat{r}_1$, and $\hat{r}_2$. The complete model is given by the differential equation form of the two demand functions, the two zero profit conditions, and the differentials of the three market-clearing conditions.

APPLICATION TO U.S. WHEAT TRADE

We applied this model to U.S. wheat trade, and examined two scenarios. The first scenario considers an increase in U.S. cargo preference requirements on U.S. concessional wheat sales, $\hat{\alpha}_2 > 0$, while not imposing any change in cargo preference requirements for commercial wheat sales, $\hat{\alpha}_1 = 0$. This scenario represents a modest expansion of cargo preference legislation currently in effect and specifies the proportion of concessional sales which must be shipped on U.S. flag vessels. The second scenario considers the effect of establishing cargo preference legislation for commercial wheat sales. Currently, $\alpha_1 = 0$, but proposed cargo preference legislation would require some proportion of U.S. commercial wheat exports to be shipped on U.S. flag vessels, $\alpha_1 > 0$ (H.R. 1242).

Data

The data needed to perform the comparative statics analysis of cargo preference legislation includes cost share estimates for both types of wheat, trade share estimates, freight costs and distortions, the excess demand elasticities, the excess supply elasticities for wheat by the United States, and elasticities of substitution. We calculated the cost share data for commercial export sales from data reported by the

International Wheat Council. By definition, a_{hl} is the ratio of the tons of bulk wheat used in the shipment of 1 ton of commercial wheat, or one. Similarly, a_{tl} is the tons of transportation services used in the shipment of 1 ton of commercial wheat, or one. Hence, $a_{hl} = a_{tl} = 1$, thus, the free on board (f.o.b.) price of wheat for export and the ocean freight rate, each divided by the cost, insurance and freight (c.i.f.) price give the respective cost shares. For commercial exports, we used U.S. wheat shipped from Gulf ports to Japan. For the 4-year period 1977-78 through 1980-81, the cost share for wheat was 0.8778, and that for transportation was 0.1574. Because the cost shares in each industry must sum to one, identifying two of the three cost shares is sufficient to identify the third. This procedure yields a cost share for inputs specific to the shipment of commercial wheat of -0.0352. This suggests that activity specific factors in the commercial market are of little consequence, and that the data are not exact over the 4-year period.

The cost shares in the concessional market are treated somewhat differently because a c.i.f. price for concessional wheat must be calculated using the export unit values and the freight charges for concessional wheat. The export unit values for the U.S. concessional sales are obtained from Foreign Agricultural Trade of the United States (see references), and include long-term credit sales, government-to-government sales, world food program, voluntary relief agencies, and Agency for International Development (AID) Mutual Security. The estimates of freight rates on concessional sales are calculated using (3) and (4). Data on the magnitude of factor market distortions, β and α, presented by Castillo-Manuel, suggest that during 1961-71 foreign flag rates on the Gulf to East Coast-India were about 42 percent of U.S. flag rates, thus $\beta = 2.38$. This procedure yields estimates of cost shares on concessional wheat trade of 0.8359, 0.2510, and -0.0869 for wheat, transportation services, and other factors, respectively. Compared with the commercial market, the share of bulk wheat is less and the share of transport services is more. Activity-specific costs are more important, and the negative value reflects credit subsidies offered by the U.S. Government.

The estimates of the share of U.S. wheat exports shipped under the above mentioned programs are also obtained from Foreign Agricultural Trade of the United States reports. The share of U.S. wheat exported under concessional terms in 1977-78 through 1980-81 is 10.50 percent, while commercial wheat exports accounted for 89.51 percent of the total.

The elasticity of excess supply for wheat by the United States can be found by differentiating the U.S. domestic market clearing identity. This differentiation yields:

$$\eta = (\varepsilon_S)\frac{S}{M} - (\varepsilon_F)\frac{F}{M} - (\varepsilon_C)\frac{C}{M} - (\varepsilon_I)\frac{I}{M} - (\varepsilon_G)\frac{G}{M} \qquad (18)$$

where ε_i is the domestic elasticity of supply, feed use, food use, private stocks, and public stocks, respectively, and M is U.S. exports of wheat. Domestic elasticity estimates for the United States are given by Paarlberg, and the data for the quantity weights are obtained from Agricultural Statistics (see References). Using (18), the estimate of the excess supply elasticity for the United States is 1.2722.

The excess demand side of the model is described by four elasticity parameters. We obtained estimates for these parameters by estimating constant elasticity excess demand functions using time-series data from 1960-61 through 1980-81. The volumes of commercial export and concessional export sales of wheat are specified as a function of the unit value of commercial wheat sales relative to the unit value of concessional sales, and a time trend reflecting the growth in income and population overseas. The estimated excess demand elasticities for commercial wheat sales are $\varepsilon_{11} = -0.4880$, and $\varepsilon_{12} = 0.4880$, while for concessional wheat sales the elasticity estimates are $\varepsilon_{21} = 0.5593$, and $\varepsilon_{22} = -0.5593$.

The final set of data needed for the model is the elasticities of substitution between the joint inputs and other factors in each activity. The assumption of a Cobb-Douglas production function yields elasticities of substitution equal to one in each activity. This property guarantees that factor intensity reversals will not occur.

The data used in the construction of the empirical model for U.S. wheat trade appears in table 1.

Table 1--Data used in the construction of the empirical model of U.S. wheat trade, 1977-78 through 1980-81

Variable	Commercial	Concessional
Cost shares:		
Wheat	0.8778	0.8359
Transportation	.1574	.2510
Other factors	-.0352	-.1869
Trade shares	.8951	.1050
Excess demand elasticities:		
Commercial wheat	-.4880	.4880
Concessional wheat	.5593	-.5593
Excess supply elasticity	1.2722	1.2722
Elasticity of substitution	1.0	1.0
Cargo preference distortion	0	.5
Other distortions	2.38	2.38
	1980 dollars/metric ton	
Freight rates (1980)	33.76	57.05

Increase in Cargo Preference Requirements for Concessional Sales

This scenario considers the impact of an increase in the cargo preference requirements for concessional wheat sales from 50 to 100 percent. We assumed that supplies of insurance, commercial credit, U.S. Government credit, and other transaction services are fixed, $\hat{z}_1 = \hat{z}_2 = 0$. Furthermore, the cost differential between U.S. and foreign flag ships in both activities is unchanged, $\hat{\beta} = 0$, and there is no change in cargo preference legislation in the commercial market, or $\hat{\alpha}_1 = 0$.

The model results for an increase in cargo preference requirements on concessional sales from 50 to 100 percent suggest a shift in wheat exports from concessional sales to commercial sales. The higher shipping charges for concessional wheat raise the destination price of concessional wheat by $19.96 per metric ton (real 1980 dollars). This can be seen by referring to the zero profit condition (9). [If the price of the bulk commodity, w, and the returns to the specific factor in activity 2, z_2 remain constant, if $\hat{\alpha}_2 > 0$ 0, then $\hat{P}_2 > 0$]. Using the period 1977 through 1980 as a base, with the rise in the destination price of concessional wheat, sales fall 200,000 tons--(5.4 percent). The higher destination price for concessional wheat induces a substitution of commercial wheat sales for concessional sales. Sales of wheat by the United States on a commercial basis rise by 1.5 million tons (4.7 percent). With the increase in demand for commercial wheat, the destination price rises by $4.24 per ton (2.2 percent). From (9), if the destination price of commercial wheat rises, then the unit costs for that type of wheat must rise. Since bulk wheat is the mobile factor between the activities in this model, increased demand bids up the price (w) by $5.20 per ton. This is the familiar Stolper-Samuelson result from a Ricardo-Viner (fixed factor) model (Dixit and Norman). With the quantity of exports positively related to the price of wheat ($\eta > 0$), the United States exports more wheat in aggregate. The percentage changes are shown in table 2.

Table 2--Impact of changes in U.S. cargo preference restrictions on U.S. wheat Exports

	100-percent concessional sales	20-percent commercial sales
	Percent	
Prices:		
Destination--		
Commercial	2.22	3.00
Concessional	11.94	-1.08
Exports	2.81	-1.18
Quantity:		
Exports --		
Commercial	4.74	-1.99
Concessional	-5.44	2.28

In the past, the U.S. Government offset the cost increase caused by the cargo preference requirements by compensating shippers of concessional wheat. For the U.S. Government to fully offset the predicted impacts on freight costs, it would need to pay exporting firms 159.5 million 1980 dollars, or an increase from base solution U.S. Government costs of 89 percent, according to our analysis. The large increase in outlays caused by the change in cargo preference legislation occurs because the U.S. Government compensates firms exporting wheat on concessional terms on the entire volume, 3.4 million tons, compared to only half the previous volume, 1.8 million tons.

Cargo Preference Requirements on Commercial Sales of Wheat

The second scenario considers the impact of a 20-percent cargo preference requirement on commercial wheat sales, while retaining the existing 50-percent restriction on concessional sales. As in the previous scenario, the supplies of activity specific factors remain fixed, and so is the cost differential between U.S. and foreign flag vessels, β.

For this scenario, the model results suggest a substitution of concessional sales for commercial sales. The cargo preference requirement raises the average shipping costs of commercial wheat by about $10 per ton. This cost increase raises the destination price of commercial wheat by $5.72 per ton (3 percent) (table 2). This interaction is shown by (9). The higher price reduces commercial wheat sales by 600,000 tons (2 percent). From relation (9), the percentage change in unit revenue must equal the percentage change in unit costs. The percentage change in the destination price for commercial wheat (unit revenue) is about 3 percent, while the percentage change in the transportation cost is around 10 percent. Because the role of activity-specific factors in the commercial market is small, the price of bulk wheat at export points must fall to preserve the equality given by (9). For this scenario, the f.o.b. price of wheat falls $2.18 per ton (1.2 percent). The lower f.o.b. price for wheat causes the destination price of concessional wheat to decline by $1.81 per ton (1.1 percent). The lower destination price for concessional wheat increases exports of wheat under concessional terms by 80,000 tons (2.3 percent)(table 2).

As in the previous scenario, the U.S. Government could offset the consequences of the change in cargo preference by compensating exporters for the higher freight costs. To fully offset the increased costs caused by the cargo preference restrictions on commercial sales, the U.S. Government would have to pay firms exporting wheat under commercial terms 290.2 million 1980 dollars. These costs would be in addition to the compensation paid on concessional wheat sales.

Comparisons with Other Studies

The unique feature of the model presented above is that it allows the U.S. Government to impose cargo preference legislation on either or both commercial and concessional sales. This model is developed because there are currently cargo preference restrictions for concessional sales but not for commercial sales. The model can determine shifts between exports of commercial and concessional wheat that cannot be determined by more frequently used analytical techniques. Our concern is whether the aggregate effects of changes in cargo preference legislation predicted by this model differ from those of previous research.

Castillo-Manuel used a spatial equilibrium model of the world grains market to examine several alternative U.S. cargo preference schemes. These scenarios are introduced into the model by changing the matrix of freight rates. While none of the scenarios considered by Castillo-Manuel corresponds exactly to those considered in this analysis, they are similar. The scenarios provided by Castillo-Manuel which are most similar to this study are the 1/3 preference on all U.S. sales with a rate differential of between 200 and 100 percent. For these scenarios Castillo-Manuel predicted declines in U.S. wheat exports of between 0.88 and 1.77 percent. The scenario for 20-percent cargo preference for commercial wheat exports and 50-percent cargo preference for concessional sales analyzed in this study predicts a decline in total U.S. wheat exports of 1.55 percent. The two studies predict similar impacts on trade volume.

The two analyses differ considerably in their predictions of the price impacts. In the spatial equilibrium model, the U.S. export price of wheat falls between 4 and 8 percent, while in the differentiated products model the U.S. export price is only 1.2 percent lower. One reason for this difference is that in the differentiated products model, the expansion of concessional sales puts some offsetting upward pressure on the U.S. wheat price. For the destination prices, the Castillo-Manuel model predicts price rises of between 1 and 2.7 percent. The differentiated products model predicts a price rise of nearly 3 percent for commercial wheat at destination and a price decline of 1.1 percent for concessional wheat at destination. In addition to the differentiated product characteristic of the model, excess demand is less elastic than excess supply, and more of the price incidence is felt on the demand side. The results from the spatial equilibrium model suggest the opposite pattern of elasticity as the exporting country bears a greater incidence.

An econometric model has been used at Michigan State University to analyze the affects of U.S. cargo preference legislation (Mitchell). In this model the cargo preference requirement of U.S. grain and soybean trade is increased 1 percent annually from 5 percent in 1983 to 12 percent in 1990. The results predict that over this period annual U.S. wheat exports will be between 100,000 and 400,000 tons lower (or less than 1 percent). Because the level of cargo preference requirement is only 12 percent versus 33 percent in the spatial equilibrium model, and 23 percent (aggregate) for the differentiated products model, the expected trade volume impacts are similar in all three studies. The econometric model results predict that U.S. wheat price declines between 2.0 and 1.7 percent over the period. Adjusting the level of cargo preference restrictions suggests that the econometric model's predicted price impacts are less than the predictions of the spatial equilbrium model, but slightly greater than the predictions of the differentiated products model.

CONCLUSIONS

This study estimates the impacts of changes in U.S. cargo preference legislation on U.S. agricultural exports. Because current cargo preference legislation is only applied to U.S. concessional sales, but may be expanded to include commercial sales, we developed a differentiated products model. The advantage of the differentiated products model is that we can determine the effect of changes in U.S. cargo preference legislation upon the composition of U.S. exports.

An empirical application to U.S. wheat exports suggests several conclusions. The aggregate price and trade volume impacts appear to be modest, even for relatively major changes in cargo preference requirements. Changes in cargo preference requirements on one type of sales terms induces a substitution of exports in favor of the other type. Increased restrictions on concessional sales encourage exports on a commercial basis and vice versa. Changes in cargo preference legislation will alter the destination price of commercial wheat relative to concessional wheat. The effect on the U.S. export price is ambiguous and depends upon which type of sales is subject to additional restrictions. If additional restrictions are implemented for commercial sales, the U.S. export price falls. If the additional restrictions are imposed upon concessional sales, because exports are stimulated, the U.S. export price rises. This ambiguous result is caused by the interaction of the changes in the export price of wheat and other factor prices with the change in the destination prices in the differentials of the zero profit conditions. Specifically in the differential of the zero profit condition for commercial wheat, with the unit cost share of activity specific factors small, and with no change in the cost of transportation services in that market, the percentage change in the destination price of commercial wheat is directly reflected to the percentage change in the f.o.b. price of wheat. The U.S. Government can offset the impacts of changes through compensation to exporters. Our analysis suggests that such action would cost taxpayers several million dollars.

A comparison of our study with two studies using more conventional methods, a spatial equilibrium model and an econometric model, suggested that the results are similar. The predicted changes in aggregate trade volume from all three models are similar. The spatial equilibrium model predicts the greatest impact on U.S. export prices.

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