World Soybean Market Competition:  
The Case of U.S., Brazil, and Argentina*

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I. Introduction

The decline in world market shares of U.S. agricultural exports over time has been explained by the existence of trade barriers, the increased foreign competition, and the real exchange rate. The financial factors in the export competing countries were not treated properly. The increasing foreign liabilities in the competing exporter countries have increased the demand for foreign exchange earnings since the 1960s. To pay off these liabilities, most developing countries have to treat agricultural exports as a top priority not only for self-sufficiency but for foreign exchange earnings. Thus, the demand for foreign exchange earnings of export competing countries becomes one important factor affecting the competitiveness of U.S. agricultural exports. This liability factor is especially important for those products, such as the soybean complex, facing the competition from the third world countries which need foreign exchange earnings the most.

The other important factor is the objective product chosen for export promotion in the exporting countries. While the U.S. dominates world soybean production, Brazil and Argentina set up a policy promoting exports of processed soybeans. Thus, U.S. exports of soybean products are facing strong

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competition in world markets. Moreover, Brazil and Argentina have comparative advantage in soybean production which also puts pressure on the competitiveness of U.S. soybean exports. Even though Brazil/Argentina government is depressing soybean exports through export tax or quota, the after-tax soybean price is also attractive to Brazil/Argentina exporters. It becomes interesting to find out the competitive position of U.S. soybean and the by-product exports in the world market.

Another important factor is the different attitude toward agricultural import policies in major importing countries. The product forms are the most important concern of imports. If the processed agricultural products are highly value added, the tendency to import raw instead of processed products becomes strong. However, the tendency to expand crushing capacity is limited by the volatility of world prices and exchange rates. To reduce the trade risk, importing countries would maintain imports of both raw and processed products for domestic demand. As a result, the raw and processed agricultural products are themselves competitive in the importing countries and thus in the exporting countries.

The objective of this study is to determine the effects of financial and strategic export promotion factors among the export competing countries and the government import policies in the importing country on the long-run competitive power of U.S. soybean exports. The induced discussion will include the forwarding expectation on world soybean export competition after free trade being prevailed. Using annual data from 1970 to 1985, export behavior of competitor (Brazil and Argentina), import behavior of EC-12 and Japan, and U.S. exports are examined. This analysis provides more information to our understanding of the current agricultural trade and the insight of future world agricultural trade competition.

The paper is organized as followings: a) a review of previous researches is synthesized, b) a brief review of the world soybean trade competition is addressed, c) the competition model is developed, d) empirical model and estimation results are discussed, and e) the conclusions are drawn from the estimation results.
II. Previous Research

Previous research on world soybean model has focused on both the market structure of specific products and the export demand function (Griffith and Meilke, Witzke and Houck, Johnson and Grennes and Thursby, Chambers and Just, Collins and Meyers and Bredahl, Longmire and Morey, Belonia, and Haley). On the research of market structure, papers have focused on the formation of detailed disappearance behavioral equations which include acreage harvested, production, demand, stocks, imports, exports, and crushing margin. As a result, a large structural model is specified and the trade competition was indirectly discussed. On the research of export demand equation, many focus on the effects of exchange rate, inflation, and monetary policy on agricultural exports and other explanatory variables in the equating. As a result, the exchange rate, cross-effect price, and other policy variables are argued to be important in the export or import equations. However, none of these researches put efforts directly in the trade competition position among exporting and importing countries.

Haley is the first one to model a complete trade market. World price and traded quantity are estimated in the reduced form. The paper further proves the importance of the exchange rate and policy variables. However, the model did not show the competition among exporting and importing countries and did not consider the competition of related products. As a result, Haley’s model is only adopted as the basic structure for the development of a three-country trade competition model.

Hwang became the first one to develop a three-country trade competition model by endogenize the exchange rate in the market system. The focus was put on the effects of U.S. monetary policy on the trade competition. The result proves that the monetary factor is an important factor affecting the competitive position of U.S. soybean exports through the exchange rate changes. However, the financial factor and the inter-product competition were not discussed. As a result, the trade competition model may need further modification.

Based on the criteria that an econometric model needs to be as simple as possible and must include all important variables in the structural equations, all previous researches are important references for the specification of the trade competition model here. These important variables are the exchange rate, inflation, competing prices, and policy factors in each product specific market struc-
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ture. For soybeans and soybean products, the structural equations must be estimated together in order to make arguments on the relationships of inter-product competition. For the competition, two exporting countries are needed to find out the competitive position of each country.

III Soybean Market Competition Background

The demand for soybeans is the derived demand for the processed products: soybean meal, an important ingredient in livestock feed; and soybean oil, a major vegetable oil used for both human consumption and industrial purposes. Production and trade in soybeans have significantly increased since the early 1960s, resulting from the rising demand for livestock products and the changes in preferences for vegetable oils over animal fats.

The trade competition has also exhibited significant increase since the early 1960s, Table 1. The dominant exporters are the United States, Brazil, and Argentina. Over 90 percent of the exports of soybeans and soybean meal are imported by the European Economic Community (EC-12) and Japan. In the EC-12/Japan soybean market, U.S. market share decreased from 90 percent in the early 1970s to 79 percent in the late 1970s. By 1985, the U.S. market share was nearly 65 percent while Brazil/Argentina market share had nearly 35 percent. In the soybean meal and oil markets, U.S. share has decreased significantly since the early 1970s. Brazil/Argentina soybean meal export has competed away U.S. share and become dominant exporter since the mid 1970s. In addition, U.S. exports of soybean oil have never dominated Brazil/Argentina exports. All of these show that Brazil and Argentina have successfully promoted the exports of processed products instead of the exports of raw product.

Associated with the strategic promotion in Brazil and Argentina, other policy changes in the three exporting countries also attributed to the decreasing U.S. market shares. The 1972 change of financial government in Brazil stimulated the production of agricultural products. The boom of poultry industry in 1975 further attracts soybean production (Williams and Thompson). The 1973 embargo of U.S. soybean exports provides the incentive for the major importing countries
to diversify their suppliers.

Although Brazil and Argentina have comparative advantage in soybean production, there are some restrictions for their exports. High freight rates, longer shipping time, and quality are factors constraining Brazil/Argentina soybean exports (Kalmbach, Sharp, and Walker). A lower cost of soybean production may lower the input cost of soybean crush. However, the increasing demand for meal feed in the domestic market frequently force Brazil/Argentina government to restrict exports of soybean meal.

In the importing countries, Japan exhibits a strong tendency to prevent imports of processed products while EC-12 countries have little restrictions on imports. All soybeans and soybean products are imported in these countries duty free. Even though the imports of all three products in EC-12 are free, EC-12 importers have to make the decision on the portions to import either raw or processed products for the intra-regional demand.

Table 1. Export Shares of U.S. and Brazil and Argentina in the EC-12 and Japan Market. (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Soybeans Brazil &amp; U.S.</th>
<th>Soybeans Argentina</th>
<th>Soymeal Brazil &amp; U.S.</th>
<th>Soymeal Argentina</th>
<th>Soyoil Brazil &amp; U.S.</th>
<th>Soyoil Argentina</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965-69</td>
<td>97.11</td>
<td>2.89</td>
<td>91.09</td>
<td>8.91</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>1970-74</td>
<td>89.99</td>
<td>10.01</td>
<td>69.48</td>
<td>30.52</td>
<td>36.36</td>
<td>63.64</td>
</tr>
<tr>
<td>1975-79</td>
<td>79.35</td>
<td>20.65</td>
<td>39.15</td>
<td>60.85</td>
<td>1.93</td>
<td>90.07</td>
</tr>
<tr>
<td>1980</td>
<td>78.99</td>
<td>21.01</td>
<td>36.51</td>
<td>63.49</td>
<td>0.12</td>
<td>99.88</td>
</tr>
<tr>
<td>1981</td>
<td>82.59</td>
<td>17.41</td>
<td>29.51</td>
<td>70.49</td>
<td>1.86</td>
<td>98.14</td>
</tr>
<tr>
<td>1982</td>
<td>89.10</td>
<td>10.90</td>
<td>31.32</td>
<td>68.68</td>
<td>2.84</td>
<td>97.16</td>
</tr>
<tr>
<td>1983</td>
<td>85.36</td>
<td>14.64</td>
<td>29.54</td>
<td>70.46</td>
<td>0.27</td>
<td>99.73</td>
</tr>
<tr>
<td>1984</td>
<td>74.02</td>
<td>25.98</td>
<td>14.94</td>
<td>85.06</td>
<td>0.33</td>
<td>99.67</td>
</tr>
<tr>
<td>1985</td>
<td>64.93</td>
<td>35.07</td>
<td>15.69</td>
<td>84.31</td>
<td>0.15</td>
<td>99.85</td>
</tr>
</tbody>
</table>

Source: U.S. Department of Agriculture and Foreign Agricultural Trade of the U.S.

*: na represents data not available. Brazil/Argentina exports are proxy data.
IV. Conceptual Framework

The framework extends Haley's model to a three-country trade competition model for soybeans and soybean products. Two exporting countries, the U.S. and Brazil and Argentina, competing with each other in one importing country, EC-12 and Japan. Equations (1) to (5) represent the complete trade competition model for one product. It can be expressed as follows:

1. The aggregate U.S. exports to EC-12 and Japan: \( \text{USXP} = \text{ESA}(\text{WP}, \text{CAPa}, \text{Za}) \),
2. The aggregate Brazil/Argentina exports to EC-12 and Japan: \( \text{BAXP} = \text{ESB}(\text{EXb*WP}, \text{CAPb}, \text{LIAB}, \text{Zb}) \),
3. The aggregate EC-12/Japan imports from the two exporting countries: \( \text{EJIMP} = \text{ED}(\text{EXm*WP}, \text{Ym}, \text{Zm}) \),
4. Total exports of the U.S., Brazil, and Argentina: \( \text{TXP} = \text{USXP} + \text{BAXP} \),
5. The market clearing condition: \( \text{TXP} = \text{EJIMP} \).

Where ES and ED represent the excess supply and excess demand functions, respectively. The real world price (WP) is the U.S. dollar import price per metric ton at the port of the importing country deflated by the consumer price index. The subscripts represent different groups of countries, "a" for the U.S., "b" for Brazil and Argentina, and "m" for EC-12 and Japan. The exchange rate is represented by EX which is the dollar price of local currency. CAP denotes the export capacity and is defined as the total domestic supply, including the carry-over stocks, over domestic use. LIAB in the Brazil/Argentina export equation represents the net liability to the U.S. in the dollar term. The variable Z represents a vector of other exogenous variables such as policy variables and substituting product prices. The substituting product prices are rapeseed price for soybeans, rapeseed meal price for soybean meal, and palm oil price for soybean oil.

In the system of equations from (1) to (5), the world price in local curr-
rency faced by excess suppliers is positively related to excess exports. If the dollar depreciates (appreciates) against the currency of Brazil and Argentina, \(EX_b\) decreases (increases) and the world price in Brazil/Argentina currency decreases (increases) which will depress (strengthen) foreign competition with U.S. exports. However, the competitive position of U.S. exports also depends on the exchange rate between the U.S. dollar and the currency of EC-12 and Japan. If the dollar depreciates against the currency of EC-12 and Japan, \(EX_m\), and appreciates against the currency of Brazil and Argentina, the competitive position of U.S. exports will depend on the relative magnitude of both depreciation and appreciation. In addition, the world price faced by EC-12 and Japan is negatively related to the imported quantity.

The export capacity is positively related to the export quantity in the exporting countries. This variable \(CAP\) captures both domestic supply and demand structural behaviors as an important indicator for available excess exports. As long as domestic available supply is relatively higher than domestic use, an increase in exports is expected.

In Brazil and Argentina, the net liability to the U.S. (LIAB) is positively related to their exports. As Brazil and Argentina increase their foreign borrowing for domestic development, the demand for foreign exchange earnings will increase. The falling oil price and world recession in the early 1970s forced Brazil and Argentina to export more agricultural products to support foreign exchange earnings. Thus, it is assumed that the net liability to the U.S. serves as an important stimulator for Brazil/Argentina agricultural exports including soybean exports.

In EC-12 and Japan, the income level \((Y)\) is positively related to their imports of soybeans and soybean products. It is argued that the soybean products are normal goods in the importing country. The income effect on the derived demand for soybeans has to be positive. During the period of rapid economic growth, the consumption behavior changes to the preference of consuming more livestock products and vegetable oil.
Equations (1) to (5) are applied for the markets of soybeans, soybean meal, and soybean oil and a fifteen-equation system is built for the analysis of world soybean trade competition. It is argued that the residual terms of equations in these three product markets may be correlated due to policy induced distortions and the inter and intra-industry competition. Brazil and Argentina encourage exports of processed soybeans while EC-12 and Japan may intend to import raw beans for domestic huge processing capacity. Moreover, EC-12 may prefer the imports of both soybeans and soybean meal from Brazil and Argentina due to an artificially lowered price rather than an increased crushing margin. Thus, the estimation uses the Seemingly Unrelated Regression technique for the fifteen-equation system. Data used are the 1970-1985 annual time series.

Table 2 shows the estimated trade-competition model for the markets of soybeans, soybean meal, and soybean oil. In the world soybean market, U.S. and Brazil/Argentina exports do not exhibit statistically significant response to current real world price in local currency. However, their exports do respond to the lagged export quantities which implies that the export adjustments in the two exporting countries follow a positive relationship to the lagged world price of last period. Thus, the price elasticity of U.S. exports is implicitly greater than that of Brazil/Argentina export.

Brazil/Argentina soybean exports are positively related to their export capacities, their liability to the U.S., and the change of financial government in 1972. Export capacity while U.S. domestic soybean supply has been always larger than domestic demand and export capacity is not a constraint for U.S. soybean exports. Moreover, Brazil and Argentina tend to export more of soybeans while foreign debt is increasing and the changing financial government is promoting exports for foreign exchange earnings.

In the importing country, EC-12 and Japan have a negatively sloped import demand structure and their imports are positively related to the substituting product price and the real domestic income level. As long as the world price in real local currency is increased, resulting from the nominal increase in world price or the stronger dollar or both, EC-12 and Japan will decrease their imports of soybeans. While the rapeseed price is lower than the soybean price, EC-12 as the major importing market will tend to import more rapeseed rather than soy-
Table 2. World Soybean Trade-Competition Model 1970-1985

(Using Seemingly Unrelated Regression)

<table>
<thead>
<tr>
<th>USXP, BAXP and EJMP</th>
<th>Constant</th>
<th>WP</th>
<th>CAP</th>
<th>LIAB</th>
<th>Other Variables</th>
<th>R**2</th>
<th>d.f.</th>
<th>D-W</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Soybeans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. U.S.</td>
<td>5.407</td>
<td>0.066</td>
<td>0.214</td>
<td></td>
<td>0.658***</td>
<td>0.783</td>
<td>11</td>
<td>1.45</td>
</tr>
<tr>
<td></td>
<td>(1.71)/b</td>
<td>(0.08)</td>
<td>(0.17)</td>
<td></td>
<td>(0.11)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Brazil &amp; Argentina</td>
<td>5.649</td>
<td>-0.029</td>
<td>1.887***</td>
<td>0.383***</td>
<td>0.307***</td>
<td>0.920***</td>
<td>0.962</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>(0.66)</td>
<td>(0.11)</td>
<td>(0.35)</td>
<td>(0.07)</td>
<td>(0.05)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. EC-12 &amp; Japan</td>
<td>17.318</td>
<td>-0.502***</td>
<td></td>
<td>0.405***</td>
<td>0.656*</td>
<td></td>
<td>0.938</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>(0.47)</td>
<td>(0.12)</td>
<td></td>
<td>(0.08)</td>
<td>(0.35)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II Soymeal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. U.S.</td>
<td>13.203</td>
<td>0.122*</td>
<td>5.345***</td>
<td></td>
<td></td>
<td>-0.283**</td>
<td>0.710</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>(0.26)</td>
<td>(0.08)</td>
<td>(0.82)</td>
<td></td>
<td></td>
<td>(0.12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Brazil &amp; Argentina</td>
<td>9.985</td>
<td>0.097</td>
<td>0.024</td>
<td>0.560***</td>
<td>-0.122</td>
<td>-</td>
<td>0.963</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>(0.81)</td>
<td>(0.16)</td>
<td>(0.08)</td>
<td>(0.03)</td>
<td></td>
<td>(0.15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. EC-12 &amp; Japan</td>
<td>17.341</td>
<td>-0.321**</td>
<td></td>
<td>0.132</td>
<td>3.333***</td>
<td>-0.176*</td>
<td>0.916</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>(0.66)</td>
<td>(0.14)</td>
<td></td>
<td>(0.14)</td>
<td>(0.59)</td>
<td>(0.11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III Soyoil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. U.S.</td>
<td>9.635</td>
<td>2.527**</td>
<td>-20.325**</td>
<td></td>
<td></td>
<td>-1.167</td>
<td>0.111</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>(2.80)</td>
<td>(1.00)</td>
<td>(7.09)</td>
<td></td>
<td></td>
<td>(1.32)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Brazil &amp; Argentina</td>
<td>4.628</td>
<td>0.116</td>
<td>3.147***</td>
<td>0.547***</td>
<td>-</td>
<td>1.529***</td>
<td>0.977</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>(0.86)</td>
<td>(0.10)</td>
<td>(0.61)</td>
<td>(0.08)</td>
<td></td>
<td>(0.25)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. EC-12 &amp; Japan</td>
<td>13.161</td>
<td>-1.302*</td>
<td></td>
<td>1.393**</td>
<td>5.897**</td>
<td>-0.431</td>
<td>0.850</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>(3.56)</td>
<td>(0.88)</td>
<td></td>
<td>(0.75)</td>
<td>(2.53)</td>
<td>(0.47)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a: The Variables are defined in the next page.

b: Figures in parentheses are standard errors.

---: Variables not included in the equation.

***: Significant level is 0.99.

**: Significant level is 0.90.

*: Significant level is 0.80.
beans for domestic crush. Moreover, the increasing real income level shows the long-run trend of the demand for more meat and thus for soybean imports.

In the soybean meal market, U.S. soybean meal exports show a positive relationship to the world price and the export capacity while Brazil/Argentina soybean meal exports only respond statistically significant to U.S. claims. It implies that Brazil/Argentina soybean meal exports may not put so much attention to the level of world price and export capacity is not a constraint which due much to government policy of promoting exports of value-added products. While crushing capacity in the U.S. is not expanded as fast as that in Brazil and Argentina, export capacity becomes a constraint for U.S. soybean meal exports. Moreover, the 1973 U.S. soybean embargo was the starting point for the importers to search for alternative suppliers of soybean complex because of the uncertainty of U.S. supply.

### VII Variable Definitions

USXP : Quantity of U.S. soybean or soymeal or soyoil exports to EC-12 and Japan, marketing year, FATUS.

BAXP : Quantity of Brazil/Argentina soybean or soymeal or soyoil exports to EC-12 and Japan, marketing year (a proxy data), ATY.

EJIMP : Quantity of EC-12/Japan soybean or soymeal or soyoil imports from the U.S., Brazil and Argentina, marketing year, FATUS and ATY.

WP: Real world price in local currency. World soybean price at Rotterdam, world soymeal price at European ports, and world soyoil price at Rotterdam are deflated by consumer price index and multiplied by the exchange rates, ATY.

CAP : Export capacity in exporting countries. Total domestic supply, including stocks, is divided by total domestic use, USDA.

LIAB : U.S. net claims to Brazil and Argentina, IMF, IFS.

LXP : Lagged dependent variable.

SWP : Nominal prices of substitutable products of soybeans, soymeal, and soyoil, ATY.
GNP : Real gross national income of EC-12 and Japan, IFS.
D72 : Dummy variable equals 0 prior to 1972 and 1 otherwise for Brazil/Argentina equations.
D73 : Dummy variable equals 1 in 1973 and 0 otherwise for U.S. and EC-12/Japan equations.
FATUS : Foreign Agricultural Trade of the U.S., USDA.
ATY : Agricultural Trade Yearbook, Foreign Agricultural Organization.
IFS : International Financial Statistics International Monetary Fund.

The same as the soybean market, EC-12 and Japan face a negatively sloped soymeal import demand structure while the real domestic income level and the 1973 U.S. embargo are statistically significant factor affecting the imports. The magnitude of the import price elasticity of soybean meal is smaller than that of soybeans. It dues largely to both the price and non-price incentives in Brazil/Argentina soybean meal exports. Brazil and Argentina tried to lower their export prices to compete with U.S. exports and was once accused to dump soybean meal to EC-12 in the early 1980s. The demand for foreign exchange earnings of Brazil and Argentina further promote soybean meal exports despite of the level of the world price. Since the soybean meal price paid by EC-12 importers is distorted by Brazil/Argentina exporters, the substituting meal price is not significantly related to EC-12/Japan imports. Furthermore, the 1973 U.S. embargo also affected the imports of soybean meal in EC-12 and Japan.

In the world soybean oil market, the price elasticities are elastic except for the distorted Brazil/Argentina exports. It reflects the largely spread suppliers and importers around the world oil markets. U.S. soybean oil exports to EC-12 and Japan will increase significantly in the magnitude if the world price increases and vice versa. The export capacity is negatively related to U.S. exports to EC-12 and Japan which implies that a large amount of U.S. soybean oil is exported to the rest of the world market which reflects in the shrinking U.S. market share in the EC-12/Japan market. On the other hand, Brazil/Argentina soybean oil exports respond significantly to their export capacity, liability to the U.S., and the changing financial government in 1972. This situation further proves that Brazil/Argentina government support the exports of processed products and EC-12
countries are the target markets.

The imports of soybean oil in EC-12/Japan market respond negatively to the world price in local currency and positively to the substituting product soybean oil and is largely produced in Southeast Asia such as Malaysia. As long as the price of palm oil is increased, EC-12/Japan importers will import more soybean oil for domestic consumption. The positive relationship between the real income level and soybean oil imports further provides the evidence of the changing consumption preferences from animal fats to vegetable oil in EC-12 and Japan.

Based on the estimation results, the elasticities of the world price, exports, and imports with respect to Brazil/Argentina liability to the U.S. can be calculated as shown in Table 3. An one percent increase in Brazil/Argentina liability to the U.S. will result in more Brazil/Argentina soybean and by-product exports which will lower the world prices in the three markets. As the world prices are lowered, EC-12 and Japan would increase imports and hence both U.S. and Brazil/Argentina exports will increase.

The elasticities shown in Table 3 express some ideas of possible competitive results. As long as Brazil/Argentina liability to the U.S. increases one percent, the world prices of soybeans, soybean meal, and soybean oil will be decreased. The soybean meal price decreases at a degree greater than other two prices which is because of the large market share of Brazil/Argentina soybean meal exports in EC-12 and Japan. However, soybean meal and oil exports of the U.S. will be increased more in percentage than that of Brazil and Argentina. It turns out that Brazil/Argentina liability to the U.S. may serve as a stimulator for Brazil/Argentina exports but may not serve as the factor to increase the competitiveness of soybean meal and oil exports. The reason for this situation may be because that Brazil/Argentina exports are not responding statistically significant to the world price. The only possibility to increase Brazil/Argentina competitiveness is when U.S. exports are also not responding to the world price.

As a result, U.S. soybean and soybean product exports are facing strong competition from Brazil and Argentina in the EC-12 and Japan market. The competition pressure is greater in the magnitude for soybean meal than that for soybeans which due much to the policy oriented distortion of Brazil/Argentina agricultural exports. In the oil market, U.S. exports face even greater competing
pressure from Brazil and Argentina and the rest of the world in the EC-12/Japan market. In the rest of world vegetable oil market, U.S. soybean oil may find a way to expand its exports but not in the EC-12/Japan market.

The market distortion may be originated by the expanding Brazil/Argentina liability to the U.S. which forces Brazil/Argentina government to urge the demand for foreign exchange earnings and thus exports of soybean meal and oil. However, liability to the U.S. may not serve to increase the competitiveness of Brazil/Argentina soybean meal and oil exports. The important reason is that Brazil/Argentina exports may not respond to the changes in the world prices.

Moreover, the structural equations further provide that there are inter-industry competition among all three related products. All traders in these three countries are willing to export or import soybeans, soybean meal, and soybean oil. However, U.S. exporters favor more on the exports of soybeans while Brazil/Argentina exporters prefer more to the exports of soybean meal and oil. The EC-12/Japan importers, however, prefer the imports of both soybeans and soybean meal from the two major exporting regions. For the import of soybean oil, EC-12 and Japan importers would be more elastic on their choice of import sources.

Table 3. The Elasticities of the World Price, Exports, and Imports with respect to Brazil/Argentina Liability to the U.S. (1970-1985 average)/*

<table>
<thead>
<tr>
<th></th>
<th>World</th>
<th>United States</th>
<th>Brazil&amp;</th>
<th>EC-12&amp;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(WP)</td>
<td>(Export)</td>
<td>(Export)</td>
<td>(Import)</td>
</tr>
<tr>
<td>Soybeans</td>
<td>-1.99</td>
<td>1.20</td>
<td>3.63</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.83)</td>
<td>(0.17)</td>
<td></td>
</tr>
<tr>
<td>Soymeal</td>
<td>-2.70</td>
<td>2.17</td>
<td>0.73</td>
<td>1.87</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.40)</td>
<td>(0.60)</td>
<td></td>
</tr>
<tr>
<td>Soyoil</td>
<td>-0.74</td>
<td>48.13</td>
<td>0.46</td>
<td>1.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.02)</td>
<td>(0.98)</td>
<td></td>
</tr>
</tbody>
</table>

*Figures in the parenthesis are average export market shares.
VI Conclusion

This paper investigates the soybean trade competition between the U.S., Brazil, and Argentina in the EC-12 and Japan importing market. It is argued that the net liability to the U.S. may have great impacts on the demand for foreign exchange earnings and hence the demand for more agricultural exports in Brazil and Argentina. In addition, Brazil and Argentina follow a trade policy of devaluing their currency against the U.S. dollar in response to their domestic rate of inflation. Therefore, both the net liability and the devaluation in Brazil and Argentina may have important impacts on the competitive position of U.S. soybean exports.

It is further argued that there is inter-industry competition in all trading countries. While the U.S. dominates world soybeans, in EC-12 and Japan, the importers wish to increase their profitability of imports and choose the import combination between soybeans and soybean meal and oil. The fast expanding crushing capacity in EC-12 and Japan may attract the imports of soybeans rather than soybean meal.

A three-country trade competition model with nine behavioral equations are built for the exports and imports of soybeans, soybean meal, and soybean oil. Two exporting countries are the U.S. and Brazil, and Argentina and one importing country is the EC-12 and Japan market as a whole. Empirical estimations adopt the Seemingly Unrelated Regression technique on the nine simultaneous equations for the period between 1970 and 1985.

The estimation results suggest that the structural model captures the policy differences among the trading countries. In all three markets, U.S. exports possess higher price elasticities than Brazil/Argentina exports. The price elasticity of soybean imports is greater than that of soybean meal imports. In addition, the demand elasticity of soybean oil is the largest in magnitude due to the widely spread of suppliers and the demand from the rest of the world. However, both U.S. and Brazil/Argentina exporters show great interests to export soybean oil.
Due to increasing liability to the U.S. in Brazil and Argentina, U.S. exports of all three products face strong competition from Brazil and Argentina. It is obvious that Brazil/Argentina soybean meal exports respond to their net liability to the U.S. with high statistical significance. This further proves that Brazil and Argentina have the policy of encouraging the exports of processed of value-added products rather than the exports of raw soybeans. However, the increased Brazil/Argentina exports are not resulted from the increased competitiveness but from policy distortion. As the world prices are decreased because of the increased Brazil/Argentina exports for the foreign exchange earnings. U.S. exports become more competitive than Brazil/Argentina exports in the world soybean meal and oil markets.

Empirical results further suggest that the U.S. is focusing on the exports of soybeans while Brazil and Argentina are promoting exports of soybean meal and oil. U.S. soybean exports are not constrained by its export capacity while Brazil and Argentina are not constrained by their export capacity of soybean meal. This competitive situation is further strengthened by the attitude of EC-12/Japan imports. The importing countries are searching for the diversification of suppliers to guarantee the imports of beans and meal. As long as the U.S. does not provide certainty of supply to importing country and Brazil/Argentina show great interests to export. EC-12 and Japan would increase their imports from Brazil and Argentina. As a result, U.S. exports of soybeans and soybean meal are losing the competitive power to Brazil and Argentina.

The results further suggest some policy implications under the development of freer world trade. The devaluation of Brazil/Argentina currency may distort the trade competition condition. If the exchange rate is not allowed to distort, U.S. exports may face a lower degree of competition from Brazil and Argentina. Furthermore, U.S. competitive power may be stronger if export subsidies are not allowed under free trade. The only possible factor to depress the future U.S. export competition may be the comparative advantage of Brazil/Argentina soybean production. Therefore, it becomes inevitably for U.S. to force world trade liberalization of agricultural products through GATT (the general agreement of trade and tariff).

Finally, the suggested future interesting research topics would be two
fold. For exporting countries, the would market structure such as price variability and supply and demand schedules would change for each product. It is interesting to further understand the possible impacts of alternative trade liberalization policies on domestic welfare redistribution. For importing countries, decreasing import restrictions may cause the shift of domestic market structure toward a more correlated structure with world market. The price transformation and domestic price level would be more important in the small country case. Finally, the impacts of an overall economic and trade liberalization on both importing and exporting countries are worth of detailed researches.

References


World Soybean Market Competition: The Case of U.S., Brazil, and Argentina

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摘 要

本研究設定一個世界大豆及其產品之貿易競爭模型以分析競爭結構，其中包括兩大出口競爭國家，即美國以及巴西和阿根廷，一大進口國家包括了歐洲共同市場 1 2 國以及日本。研究假設巴西與阿根廷之對外負債須透過鼓勵大豆產品出口以取得外匯，因而成為美國大豆出口之強大競爭，另外，重要政策如匯率、物價以及產品間互動關係等重要因素均予考慮在模型設計中。

研究結果顯示此模型適當地表達不同國家的貿易相關政策。世界的大豆價格受巴西與阿根廷外債影價而降低，並且美國大豆出口佔世界市場份額 (share) 亦逐年減少。以大豆為例之結果得以引申出何以美國力求世界農產品貿易自由化以作爲挽救其國內農業之一重要手段，進出口國家將來更應注意在全球農產品貿易自由化之趨勢下所可能受到之衝擊。

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