THE IMPACT OF TARIFFS ON U.S. EXPORTS

OF VALUE-ADDED WHEAT PRODUCTS

Joyce Hall Krause
William W. Wilson
Frank J. Dooley

Acknowledgements

Table of Contents

List of Tables

List of Figures

Highlights

Wheat and wheat products from the United States face a variety of entry barriers, including tariffs, as they enter foreign markets. Tariffs on agricultural exports typically increase as the degree of processing increases, creating a bias toward the export of less processed products.

- *This is the case with wheat, flour, and highly processed products. In our sample of 62 countries, ad valorem tariffs on wheat averaged 6 percent, while tariffs on flour averaged 12 percent and tariffs on products averaged 19 percent. Tariffs on wheat ranged from zero to 30 percent, while product tariffs ranged from zero to 60 percent.*

- *This research quantifies the impact of tariffs on the import demand for U.S. exports of prepared breakfast foods, pasta products, and bakery products in a cross sectional analysis of 62 countries.*

- *Product tariffs were found to have a significant negative impact on the demand for imports of U.S. prepared breakfast foods, pasta products, and bakery products, while tariffs on wheat were found to have a significant positive impact on the demand for these products.*

THE IMPACT OF TARIFFS ON U.S. EXPORTS
OF VALUE-ADDED WHEAT PRODUCTS

Joyce Hall Krause, William W. Wilson, Frank J. Dooley*

INTRODUCTION

As world markets for high-value products grow and traditional markets for commodities mature, considerable interest has developed in the United States and other countries to promote high value, including value-added, product exports. Value-added product exports must compete not only with foreign competitors, but they must also compete with U.S. commodity exports. Although the United States has a recognized comparative advantage in exporting bulk commodities, it is argued that exporting processed products would generate additional economic activity (Schulter and Clayton, 1989).

International trade in highly processed wheat products, such as prepared breakfast foods, pasta products, and bakery products has increased dramatically in recent years. Between 1986 and 1990, the volume of global trade in prepared breakfast foods, pasta products, and bakery products grew 60, 79, and 37 percent, respectively (Figure 1). Growth rates in U.S. exports of prepared breakfast foods, pasta products, and bakery products were even greater at 311, 85, and 184 percent, respectively (Figure 2).
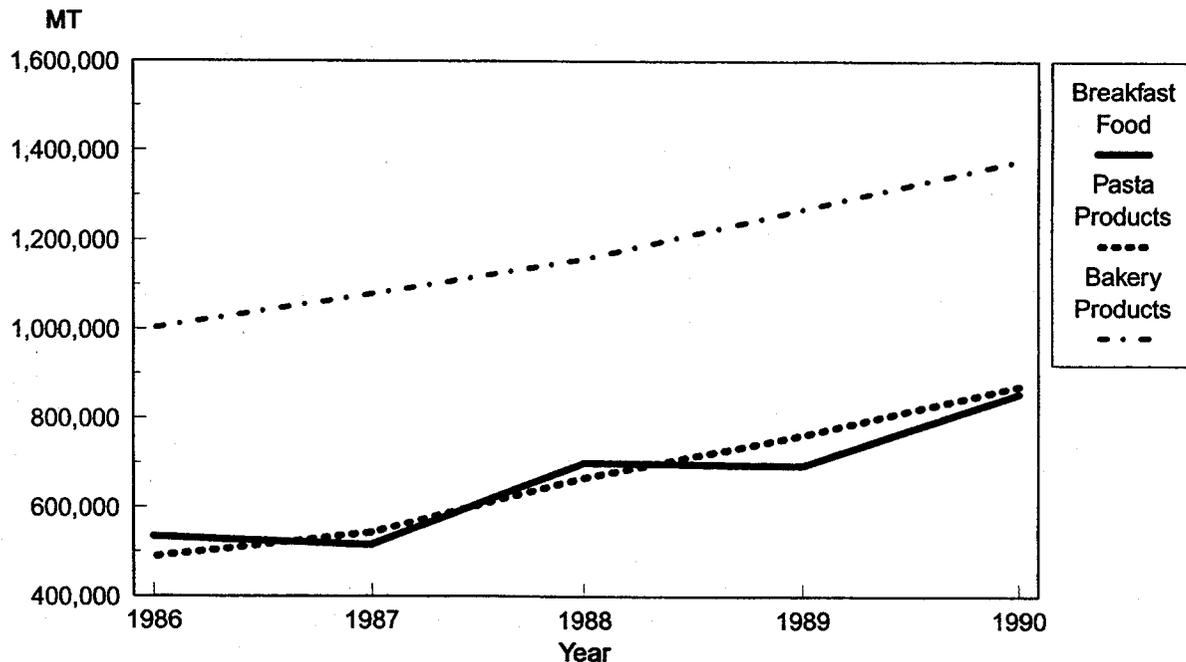

Figure 1. Global Imports of Prepared Breakfast Foods, Pasta Products, and Bakery Products, 1986-1990

MT
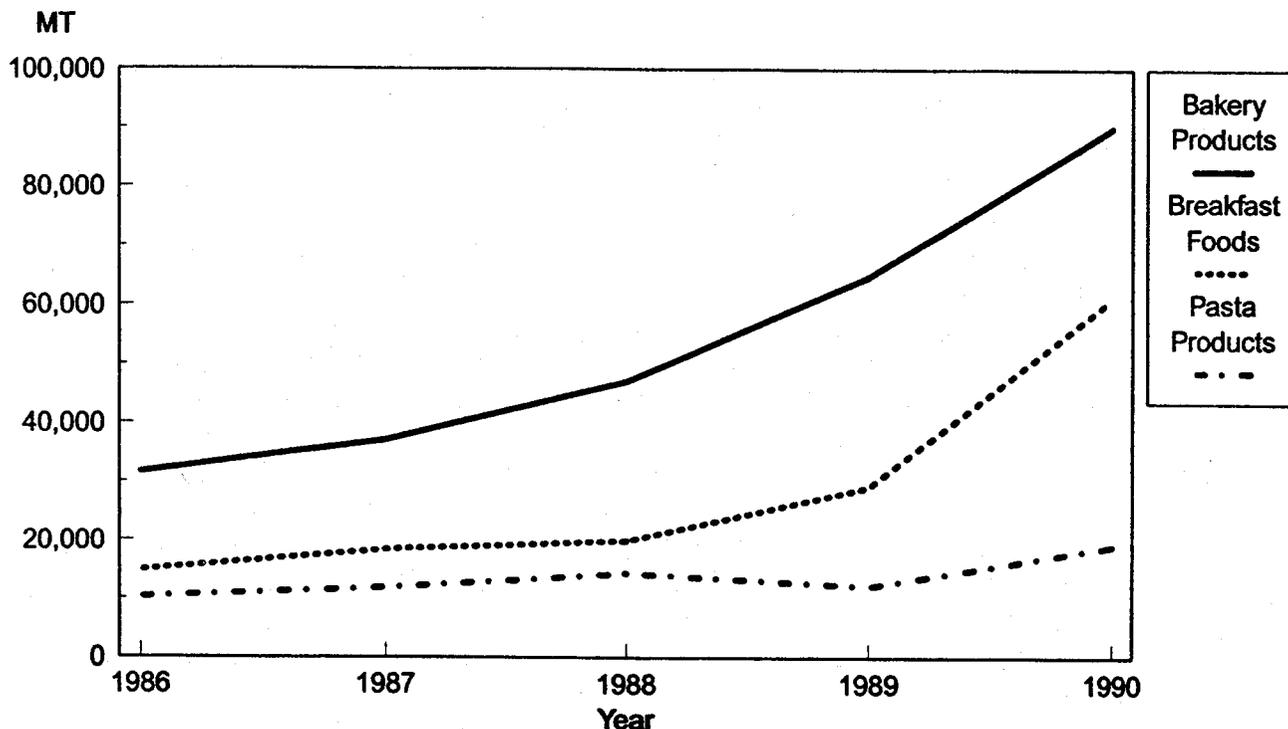
Figure 2. U.S. Exports of Prepared Breakfast Foods, Pasta Products, and Bakery Products, 1986-1990

The largest market for U.S. value-added wheat products is Canada. In 1990, 46 percent of U.S. exports of prepared breakfast foods were shipped to Canada and 19 percent were shipped to the Caribbean and Mexico (Figure 3). Seventy-eight percent of pasta exports and 71 percent of bakery exports were to shipped Canada in 1990 (Figures 4 and 5). The Caribbean and Mexico imported 13 percent and 11 percent of U.S. pasta product and bakery product exports, respectively. Other major markets are Western Europe for prepared breakfast foods and Asia for bakery products.

Despite increases in wheat product exports, the quantity and value remains much smaller than that of wheat exports. Commodity trade will likely continue to dominate wheat product exports from the United States. In most cases, logistics favor commodity trade and shipments. However, as food processing firms face limited growth in the maturing U.S. domestic market, growth must necessarily come from the international market. Also, under the General Agreement on Trade and Tariffs (GATT) negotiations, barriers to agricultural commodity and product trade are expected to be reduced.

Figure 3. U.S. Exports of Prepared Breakfast Foods, by Percent to Country/Region, 1990

Figure 4. U.S. Exports of Pasta Products, by Percent to Country/Region, 1990

CANADA 70.7%

OTHER 4.6%

W. EUROPE 4.9%

ASIA 9.1%

CARIBBEAN 4.1%   MEXICO 6.6%
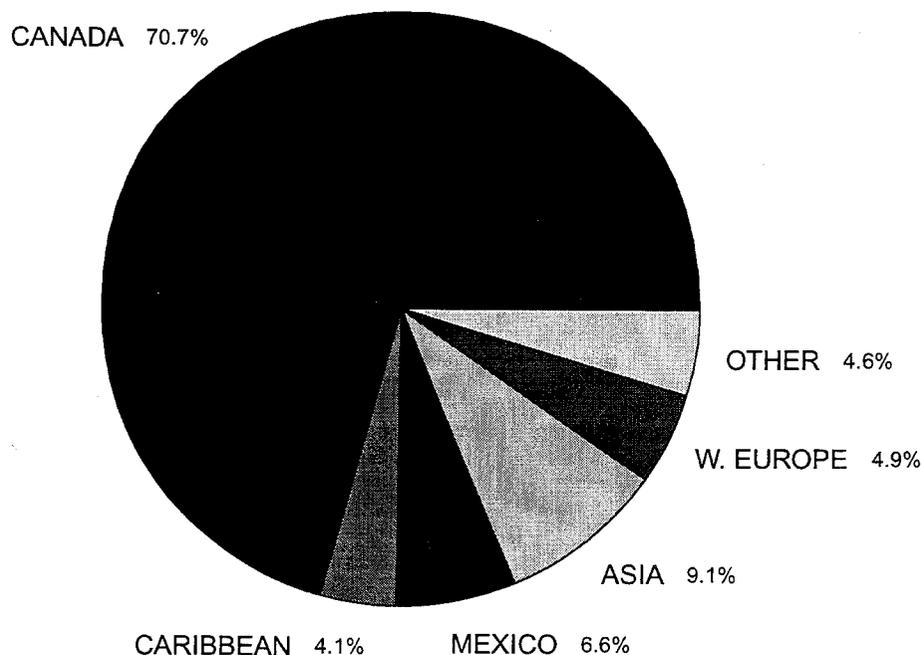
Figure 5. U.S. Exports of Bakery Products, by Percent to Country/Region, 1990
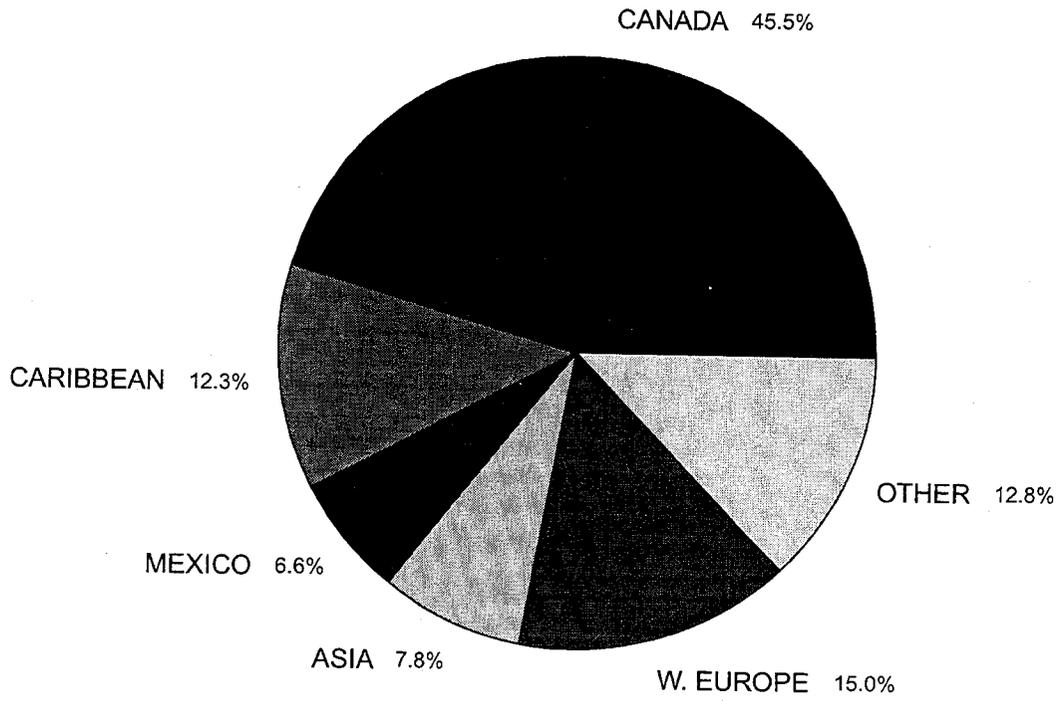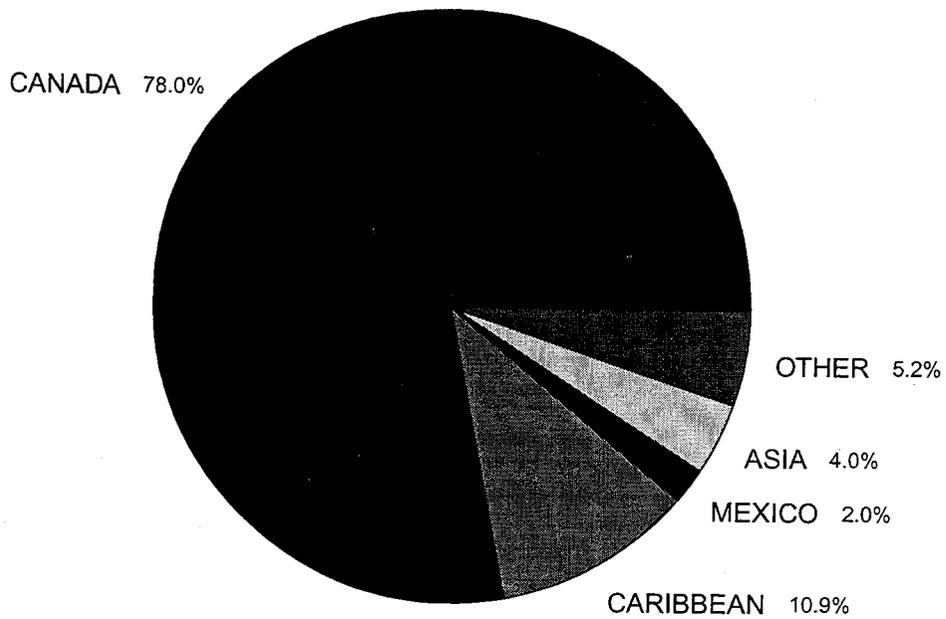
Wheat and wheat products from the United States face a variety of entry barriers, including tariffs, as they enter foreign markets. Tariffs vary substantially across countries and among wheat, flour, and products. Tariffs on agricultural exports typically increase as the degree of processing increases, creating a bias toward the export of less processed products. This is the case with wheat, flour, and highly processed products. For example, in our sample of 62 countries, *ad valorem* tariffs on wheat averaged 6 percent, while tariffs on flour averaged 12 percent and tariffs on products averaged 19 percent. Tariffs on wheat ranged from zero to 30 percent, while product tariffs ranged from zero to 60 percent.

Although the body of research on issues relating to high-value trade is growing, it remains limited in scope. Research has focused on just a few products and has largely used time series approaches. One study that incorporated the impact of tariffs on imports of a U.S. agricultural product is Fuller et al.'s 1992 study on forces impacting the demand for U.S. grapefruit. Using quarterly data from 1969 through 1988 for four countries, they found that per capita imports were significantly responsive to promotional expenditures and exchange rates in all countries and varied by country in the significance of response to price and income. They did not find tariffs to be significant in any country. Other studies with a non-commodity focus have analyzed the impact of the Targeted Export Assistance (TEA) program on U.S. fruit exports using time series for selected countries (Sparks, 1992) and have analyzed

4

the impact of trade agreements, also with a time series, on the U.S. citrus exports to Japan (Lee et al., 1990). Lee et al. (1991) analyzed U.S. exports, in an expenditure share system, of wheat, flour, and products and cattle, beef, and products to seven middle-income developing countries.

The markets for U.S. exports of wheat, flour, and products appear to be distinct from one another. The largest purchasers of products have not been the largest purchasers of wheat. For example, in the 1990 cross section of 62 countries, only 28 countries have imports in all three categories (wheat, flour, and processed products). Only one country has more than a 2 percent share of the total import value of wheat, flour, and processed products in all three categories; and that is Mexico. Mexico, in 1990, imported from the U.S. 70.7 percent wheat, 3.6 percent flour, and 25.8 percent products.

Markets for wheat and flour may be driven more by other policies such as the Export Enhancement Program or Public Law 480, rather than tariffs, whereas product markets may be influenced more by income and demographic factors. Tariffs, which bias trade toward commodities, are a factor. However, the degree to which they impact total consumption and the degree to which they impact the relative consumption of wheat versus flour versus products are elusive. Perhaps the most appropriate way to analyze changes in imports among categories would be an expenditure share analysis over time, including tariffs and other policies. Unfortunately, tariffs are not well documented over time, and the analysis of expenditure share is beyond the scope of a cross section. Also, if all countries had exports in all three categories, additional information could be provided. However, this is not the case.

The purpose of this report was to quantify the impact of factors influencing imports of U.S. prepared breakfast foods, pasta, and bakery products, including tariffs. Tariff data for this research were collected in two ways: through letters of inquiry to foreign embassies and via the assistance of The International Trade Commission.[1] Sixty-two countries that had imports of one or more of these U.S. products and that provided tariff information were included for 1990, the last year of reliable world export data (Table 1). The results suggest that product tariffs have a significant negative impact on the demand for U.S. imports of prepared breakfast foods, pasta products, and bakery products, while tariffs on wheat have a significant positive impact.

The remainder of this paper is organized into five sections. The first two sections present an overview of international trade in processed wheat products and the tariffs on wheat and wheat products, respectively. The empirical estimates, results of the empirical estimates, and a summary are presented in sections three, four, and five, respectively.

Table 1. Sixty-two Countries Included in the Analyses

Region/Country	Region/Country
Caribbean & Mexico	**Europe**
Bahamas	Austria
Caribbean Basin[*]	European Union
Dominican Republic	Finland
Guatemala	Iceland
Mexico	Norway
North America	Sweden
Canada	Switzerland
Latin America	**Africa & Middle East**
Argentina	Cyprus
Bolivia	Egypt
Brazil	Ghana
Chile	Israel
Colombia	Jordan
Ecuador	Kuwait
Peru	Oman
Uruguay	Qatar
Venezuela	Saudi Arabia
Asia	Turkey
China	United Arab Emirates
Hong Kong	**Oceania**
Indonesia	Australia
Japan	New Zealand
Korea	
Malaysia	
Philippines	
Singapore	
Thailand	

[*]The following Caribbean Islands are included in this group: Antigua and Barbuda, Barbados, Dominica, Grenada, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago.

TARIFFS ON WHEAT AND WHEAT PRODUCTS

Tariffs on Wheat and Flour

Average *ad valorem* tariffs vary significantly across regions and countries. Average *ad valorem* tariffs, by region, are presented in Table 2. The tariffs presented are those facing the United States. Tariffs facing other countries may be different. All tariff data were collected by the authors through letters of inquiry to foreign embassies and via the assistance of The International Trade Commission.

Table 2. Average *ad valorem* Tariffs on Wheat, Flour, Prepared Breakfast Foods, Pasta Products, and Bakery Products, by Region*

Products	Wheat	Flour	Breakfast Cereals	Pasta Products	Bakery Products
Central America & Caribbean	5.3	18.7	31.6	32.5	33.4
North America	0.6	8.0	7.8	9.3	6.7
South America	7.9	12.5	16.0	15.3	16.2
Asia	8.4	12.5	27.4	26.2	27.8
Europe	15.2	18.1	23.7	23.4	24.3
Middle East	2.9	4.4	11.8	16.0	19.1
Oceania	0.0	6.7	11.5	12.1	10.0

*Wheat includes durum. In some countries, durum is assessed a different tariff than other wheat. However, differences are usually small and are ignored for purposes of illustration.

In North America, wheat entering Canada faces a duty of $1.94 (U.S.) per ton, while flour faces a duty of $2.47 (U.S.) per ton. Wheat entering Mexico faces a zero tariff, but has been subject to relatively restrictive import licenses. Under the NAFTA, licenses are replaced with tariffs which will be phased out over time. Flour faces a 15 percent *ad valorem* tariff entering Mexico.

7

Central American and Caribbean tariffs range from zero on wheat and durum in most Caribbean Island nations to 12.5 percent in the Bahamas. Flour tariffs range from zero in the Bahamas to 45 percent for nine Caribbean Basin countries, including Antigua, Jamaica, Trinidad, and Tobago. Several Caribbean nations require licenses for the import of flour and pasta from non-Caribbean origins. Tariffs on wheat in South America range from 2.5 percent in Argentina to 15 percent in Peru and Venezuela and average 8 percent for the nine countries reporting. Tariffs on flour are higher than those on wheat in five countries, ranging from 5 percent to 20 percent, and are equal to those on wheat for four countries.

Except for Japan and the Philippines, wheat and durum face relatively moderate or zero tariffs, in Asia. In most Asian countries, flour faces a higher tariff, ranging up to 40 percent for Thailand. However, in Japan and Indonesia tariffs on flour are lower than those on wheat. Australia charges zero tariffs on wheat, durum, and flour. New Zealand charges zero tariffs on wheat and durum, but charges a 13.5 percent tariff on flour.

The tariffs presented are those facing the United States. Tariffs facing other countries may be different. All tariff data were collected by the authors through letters of inquiry to foreign embassies and via the assistance of the International Trade Commission.

With the exception of the Nordic countries (Finland, Iceland, Norway, and Sweden) which have zero tariffs on wheat, Europe has some of the highest tariffs on wheat, ranging from 10 percent to 30 percent. In most cases, tariffs on flour are equal to or just slightly higher than those on wheat.

The Middle East has relatively low tariffs on wheat, durum, and flour, ranging from zero in five countries to a high of 12 percent in Saudi Arabia. Tariffs on flour are equal to those on wheat, except for Cyprus and Turkey, where higher tariffs are imposed on flour.

Tariffs on Wheat Products

Tariffs on products are, on average, considerably higher than those on wheat or flour, ranging from zero to 60 percent in our sample. The highest tariffs by region are found in Central America and the Caribbean, where product tariffs average 32 to 33 percent (Table 2). Asia and Europe also have average product tariffs that are relatively high, ranging from 23 to 28 percent. The Middle East has product tariffs, ranging from 12 to 19 percent. Canada, Mexico, Australia, and New Zealand have moderate product tariffs, ranging from 8 percent to 13 percent.

Tariff differences between products and wheat are the highest for bakery products, being on average 15 percent higher. Tariffs on prepared breakfast foods are 13 percent higher than tariffs on wheat. The tariff on pasta is 14.0 percent higher than the tariff on durum. Central America and the Caribbean have the largest differences in tariffs charged on products and on wheat, ranging from 15 percent to 28 percent higher for products. Asia also has

relatively high tariff differences, ranging from 15 percent to 19 percent higher on products than on wheat. North and South American countries, Europe, and the Middle East have relatively smaller differences. A similar regional pattern emerges for the differences between tariffs on products and on flour.

DATA AND METHODS

Data from 1990 were used for this study. The year 1990 was the last year of reliable data published by the United Nations (UN) and was the limiting factor in the currentness of the data. Data for 1991 and 1992 were available at the time this work was completed. However, as the UN updates data as it is received, there were still numerous incidents of missing data in these two years. Data on U.S. exports and prices of U.S. exports were taken from the U.S. Bureau of Census data. All quantity data are reported in metric tons (MT). Prices are unit values, free-alongside-ship. Data on competitor prices were taken from the United Nations bilateral trade base.

Data on income (gross domestic product), population, and exchange rates were taken from *World Tables*. Tariff data were collected by the authors as described in the previous section. The majority of import tariffs for processed wheat products are implemented as *ad valorem*, (i.e., as a percent of the value). Those that are implemented as a fixed charge based on weight were converted to a percent for this study.

The prepared breakfast foods products are those products with the standard international trade classification (SITC) of 0481. The pasta products are those with SITC 0483, and the bakery products are those with SITC 048.

The total quantity of imports from the U.S. were estimated as:

$$Q_{ij} = \alpha_0 + \beta_0 DCANADA + \beta_1 DCARMEX + \beta_2 DEUROPE + \beta_3 DASIA + \beta_4 PUS_i$$
$$+ \beta_5 PCOMP_i + \beta_6 INC_i + \beta_7 EXCH_i + \beta_8 POP_i + \beta_9 TAR_{ij} + \beta_{10} TAR_{i,wheat}$$

where Q_{ij} is the total quantity imported, in MT, i is the country, and j equals 1 to 3 corresponding to prepared breakfast foods, pasta products, and bakery products. The variables DCANADA, DCARMEX, DEUROPE, and DASIA are dummy intercept shifters for the regions of Canada, the Caribbean and Mexico, Europe, and Asia, respectively. The variable PUS is the price of the U.S. imports (FOB origin) in local currency; PCOMP is the price of the competitor that has the largest market share in that imported product in local currency, also FOB origin. EXCH is the exchange rate vs. the U.S. dollar, POP is the population, and GDP is the total gross domestic product in local currency. Exchange rate is included as a separate variable as it has been noted that not including exchange rates separately can lead to an overstatement of the importance of price and income variables (Chambers and Just, 1979). TAR_{ij} is the *ad valorem* tariff for each product, and $TAR_{i,wheat}$ is the *ad valorem* tariff on wheat.[2]

9

Total quantity rather than per capita quantity was chosen as the dependent variable for a specific reason. Countries that have port activities may have high per capita imports, if exports are not attributed to their final destination. Countries that are popular tourist destinations also have high per capita imports. Distance to markets and, thus, transportation costs are not accurately reflected in FOB origin prices. By allowing the dependent variable to be total quantity and having regional dummy variables, these factors can more accurately be reflected in the intercept terms.

Separate equations were estimated for each product. Sixty-two countries in the sample (N= 62) had imports of U.S. bakery products, and 56 had imports of U.S. prepared breakfast foods. A linear model was estimated using ordinary least squares (OLS) for bakery products and for prepared breakfast foods. The fact that some products have zero tariffs limits the choice of functional form. Although bakery products and prepared breakfast foods do have a small number of zero quantity observations and, thus, could be considered for a tobit analysis, any inconsistency introduced by doing an OLS will be small. Greene (1993) stated that it is a "striking empirical regularity that the maximum likelihood estimates can be obtained by dividing the OLS observations by the proportion of nonlimit observations." Only 36 countries had imports of pasta products. Thus, a tobit regression was performed for pasta products. All equations were estimated in LIMDEP.

EMPIRICAL RESULTS

The regressions for prepared breakfast food, pasta products, and bakery products are presented in Table 3. The equations for prepared breakfast food (N=57) and bakery products (N=62) are estimated by OLS. The Breush-Pagan test for heteroskedasticity was 50.9 and 33.5 with 11 degrees of freedom, respectively, for prepared breakfast foods and bakery products. The five percent significance level is 19.68; thus, the test was highly significant for both equations; and both models were corrected for heteroskedasticity. The model for pasta products (N=62) was estimated as a Tobit model as only 36 importers had positive imports of U.S. pasta. The pasta products model was also corrected for heteroskedasticity.

The equations for prepared breakfast foods and bakery products perform quite well. The R-squared values are very high at 0.93 and 0.99, respectively. However, this largely reflects the importance of the regional markets, especially Canada, to U.S. exports. The regional dummy variables are significant and positive for the regions of Canada and the Caribbean and Mexico for both products. The regional dummy for Asia is also significant and positive for bakery products. The exchange rate is positive and significant in the case of breakfast foods, but not for bakery products. As the number of foreign dollars per U.S. dollar increases, there is a positive impact on breakfast food purchases. The U.S. price of breakfast foods is negative and significant; but competitor price is not significant, indicating that U.S. products are viewed as unique. However, in the case of bakery products, the U.S. price of bakery products is negative and significant and the competitor price is positive and significant, indicating that competitor products are substitutes for U.S. products.

10

Table 3. Results of Regressions for Prepared Breakfast Food, Pasta Products, and Bakery Products

	BREAKFAST FOOD	PASTA PRODUCTS	BAKERY PRODUCTS
	COEFF(t-stat)	COEFF(t-stat)	COEFF(t-stat)
Constant	349.55(2.2)*	-45.02(-1.0)	529.11(3.3)*
DCANADA	27512(198.3)*	14891(80.0)*	70728(460.7)*
DCARMEX	745.63(2.0)*	269.5(3.2)*	684.20(2.1)*
DEUROPE	204.57(0.5)	-228.0(-2.5)*	-236.98(-0.7)
DASIA	471.07(1.5)	39.90(0.5)	883.49(2.0)*
INCOME	-0.10E-11(-0.8)	0.23E-12(1.0)	-0.45E-12(-0.3)
POPULATION	0.77E-06(1.3)	-0.14E-07(-0.0)	0.80E-06(1.5)
EXCHANGE$_{US}$	1.58(2.1)*	--0.111(-0.6)	0.778(0.80)
B.FOOD PRICE$_{US}$	-0.317(-2.4)*		
B.FOOD PRICE$_{COMP}$	-0.096(-1.0)		
B.FOOD TARIFF	-16.92(-1.7)*		
PASTA PRICE$_{US}$		-0.043(-0.9)	
PASTA PRICE$_{COMP}$		0.019(0.1)	
PASTA TARIFF		-3.71(-2.3)*	
BAKERY PRICE$_{US}$			-1.27(-2.5)*
BAKERY PRICE$_{COMP}$			0.705(3.1)*
BAKERY TARIFF			-19.85(-2.4)*
WHEAT TARIFF	15.33(1.6)*	11.85(2.7)*	20.79(2.3)*

*Indicates significance at the five percent level.

Notes: The equations for prepared breakfast foods and bakery products were estimated with OLS. Pasta products is estimated with a Tobit analysis.

The tariff on breakfast foods is negative and significant, while the tariff on wheat is positive and significant for breakfast foods. The same effects are found for bakery products; the tariff on bakery products is negative and significant, and the tariff on wheat is positive and significant. This indicates that as the tariffs on products increase, product purchases decrease, and as tariffs on wheat increase, product purchases increase.

The results for pasta products were not as revealing, perhaps due to the limited geographical scope of U.S. pasta exports. As expected, the regional dummy variables for Canada and the Caribbean and Mexico were significant and positive. Also, the regional dummy for Europe was significant, but negative. There were no significant price effects, and the exchange rate was not significant. The tariff on pasta products was negative and significant while the tariff on wheat was positive and significant, as was found for prepared breakfast foods and bakery products.

Under the GATT negotiations, tariffs on agricultural commodities and products are expected to be reduced. If, for example, tariffs on wheat and products are reduced by an equal percentage, then we may expect a relative increase in the demand for products. Relatively few countries have announced their tariff reductions, but those that have will serve as an illustration.

Korea, for example, has announced a 60 percent reduction in *ad valorem* tariffs on wheat, flour, and processed wheat products. Tariffs on wheat will be reduced from 3 percent to 1.8 percent, tariff on flour from 7 percent to 4.2 percent, and tariffs on prepared breakfast foods from 9 percent to 5.4 percent. However, other countries may reduce tariffs by different amounts for different commodities and/or products. Thailand, for example, has announced that tariffs on pasta will be reduced by half, from 60 percent to 30 percent, and tariffs on prepared breakfast foods and bakery products will be reduced by two-thirds, from 60 percent to 20 percent.

SUMMARY

Tariffs that U.S. agricultural commodities and products face in import markets typically increase as a product is further processed, contributing to a bias toward exporting less processed products. Wheat, flour, and the highly processed products of prepared breakfast foods, pasta, and bakery products follow this pattern. This research quantifies the impact of tariffs on the import demand for U.S. exports of prepared breakfast foods, pasta products, and bakery products in a cross-sectional analysis of 62 countries.

Product *ad valorem* tariffs were found to have a significant negative impact of the demand for U.S. exports of prepared breakfast foods, pasta products, and bakery products. In contrast, the tariff on wheat was found to have a significant positive impact on the demand for U.S. exports of all products. If, as may be expected under the GATT, tariffs are reduced by a given percentages, then one would expect larger real reductions in product tariffs than in

wheat tariffs; thus, one would expect a positive impact on product exports. However, product tariffs may be subject to more exceptions than commodity tariffs.

Although the body of research on trade in high value and value-added agricultural products continues to grow as the trade in these products grows and as interest in trade promotion and removing trade barriers grows, the research is still limited in scope. Data availability is a major limiting factor, especially for time series analyses. Analyzing the impact of tariffs and other trade barriers in a cross section may have benefits over time series analysis in the scope of the information contained in the study. Concentrating research on only a few countries that have significant trade with the United States seriously limits the information base about the global impacts of trade barriers and impacts of changes on markets that may grow in importance in the future.

REFERENCES

Chambers, R. G. and R. E. Just. (1979). "A Critique of Exchange Rate Treatment in Agricultural Trade Models." *American Journal of Agricultural Economics*. Vol. 61:249-57.

Fuller, Stephen, Haruna Bello, and Oral Capps, Jr. (1992) "Import Demands for U.S. Fresh Grapefruit: Effect of U.S. Promotion Programs and Trade Policies of Importing Nations." *Southern Journal of Agricultural Economics*. Vol. 24(1):251-260.

Greene, William H. (1993) *Econometric Analysis*. Macmillan Publishing Company. New York.

International Bank for Reconstruction and Development (IBRD)/World Bank. *World Tables, 1992*.

Lee, Jonq-Ying, James L. Seale, Jr., and Pattana A. Jierwiriyapant. (1990) "Do Trade Agreements Help U.S. Exports? A Study of the Japanese Citrus Industry." *Agribusiness: An International Journal*. Vol. 6(5):505-14.

Lee, Jung-Hee, David Henneberry, and David Pyles. (1991) "An Analysis of Value-Added Agricultural Exports to the Middle-Income Developing Countries: The Case of Wheat and Beef Products." *Southern Journal of Agricultural Economics*. Vol. 23(2):141-54.

Schluter, Gerald and Kenneth C. Clayton. (1989, November) "Exporting Processed Instead of Raw Agricultural Products." Washington, D.C. U.S. Department of Agriculture, Economic Research Service, Agricultural and Rural Economic Development, Staff Report No. AGES89-58.

Sparks, Amy. (1992) "Impacts of the Targeted Export Assistance Program on U.S. Exports of U.S. Apples, U.S. Table Grapes, and California Citrus." *Journal of International Food and Agribusiness Marketing*. Vol. 4(2):1-22.

United Nations. United Nations Bilateral Trade Data Base. New York.

U.S. Bureau of Census. Wheat Product Export Data, 1983 - 1991. Washington, D.C.

ENDNOTES

1. We would like to thank Dr. Cathy Jabara, Division Chief, Agriculture and Products Division, U.S. International Trade Commission, for her assistance in obtaining this data.

2. In the case of pasta products or breakfast cereals, the import choice would be between wheat or the product. However, for bakery products, the import choice could be wheat, flour, or the product. The tariff for flour was included in the bakery product equation, but it was not significant and was dropped.