COMPETITIVENESS OF U.S. WHEAT AND WHEAT FLOUR INDUSTRIES IN SELECTED COUNTRIES

By

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PREFACE

This study was conducted to provide new knowledge and information pertinent to the U.S. wheat and wheat flour industry in order to expand U.S. wheat and flour exports. The markets underlying the growth in wheat and wheat flour import demand have shifted away from traditional markets of the early 1980s (the former Soviet Union (FSU), the European Union (EU), and China). Currently, import demand growth is occurring in Africa, Asia (outside of China), and the Middle East. Specific objectives of this research were: Paper I--(a) to determine the supply factors affecting the markets shares of the U.S. and other export competitors in each import market; (b) to determine the demand characteristics of specific import markets and analyze how these factors affect the importers buying decisions; and Paper II--(c) estimate accurate demand elasticities of selected import markets; and d) analyze and compare elasticities of government assisted importers with cash importers.

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PAPER I

A COMPARATIVE ANALYSIS OF U.S. AND COMPETITOR WHEAT MARKET SHARES IN SELECTED IMPORTING COUNTRIES

Introduction

World wheat and products trade is dominated by five major exporters: the United States (U.S.), the European Union (EU), Canada, Australia, and Argentina. Together, these exporters provide up to 90 percent of the wheat supply available for export (U.S.Department of Agriculture, 1995-97). For the past 20 years, the United States has been the leading exporter of wheat and wheat products to all international markets. However, the four U.S. competitors have been gaining market share over the past 20 years and are forecast to export record levels in 1996/97 with 1997/98 projections at near-record levels. Strong world prices have been the incentives for a heavily subsidized domestic market in the EU and increased amounts of land area devoted to wheat production in Australia, Argentina, and Canada.

Wheat is one of the main commodities traded to meet the consumption needs of countries all over the world. Wheat is the food staple that supplies the basic survival needs of more than 100 countries around the globe (Halliburton and Henneberry). Over 50 percent of the wheat produced in the United States is exported for international

consumption (USDA, 1995-97). Also, the U.S. population accounts for less than 5 percent of the world's potential wheat consumers, so the majority of wheat consumers are beyond the domestic border of the United States (USDA, 1995-97).

The combination of tight world wheat stocks and an increase in regional import demand over the past twenty years has intensified global wheat trade competition. Import demand from regional markets, in particular Asia, Africa, and the Middle East has been growing quite steadily for the past 20 years. Rapid population growth and movements to more wheat-based diets have been the driving forces behind the import surge since the 1970s. Import demand in these regions continues to remain strong and is highly influenced by unstable domestic production and reduced government involvement in importing activities.

The record levels of wheat produced by the European Union, Canada, Australia, and Argentina in the last several years have had a significant impact on the United States' presence in global wheat trade. Increased production levels by U.S. competitors are driving world wheat exports to record high levels. The U.S. accounts for only 28 percent of total wheat, flour, and products trade; the second lowest level in 10 years. This is a considerable reduction from 47 percent in the mid-1970s. This loss of U.S. market share has been captured by the EU, Canada, Australia, and Argentina. Together, these exporters have increased their market share and account for 65 percent of global wheat and products trade (USDA, 1995-97). Therefore, the primary objective of this study is to examine the overall position of the U.S. wheat industry in the international market, by analyzing the market share of the U.S. and primary export competitors. This study is intended to

improve the understanding of the supply, demand, and quality-related factors affecting the ability of the exporters to gain international market share. This study will determine the current situation facing the wheat exporting countries by examining the market characteristics of a group of selected importing countries. More specifically; the classes of wheat demanded, the types of import purchases and available credit, and the advantages the exporters have in each market will be examined for the studied importing countries. The following importing countries have been selected for this analysis: Japan, Egypt, South Korea, Philippines, Algeria, and Jordan. It was the intent of the authors to provide a complete analysis differentiating wheat and wheat flour, however the main portion of this study will be directed towards only wheat including wheat, wheat flour, and products due to data restrictions. In addition, data reported by the Foreign Agricultural Service, USDA is a combination of wheat, wheat flour, and wheat products.

Competitive Pricing Among Exporters

In order to understand the position of the U.S. wheat industry in the international market, it is imperative to understand the term competitive. In previous literature, a competitive exporter has been defined as a consistent supplier of any good or service that exports these goods before any and all suppliers (Rose, 1997). With this definition in mind, the U.S. is already at an export disadvantage because of its reputation as a residual supplier. The U.S. has always been the highest priced supplier in the international wheat market. Wheat importing countries have been known to purchase the high-quality, lower priced wheat from U.S. competitors (i.e. EU, Canada, and Australia), and then purchase the remaining consumption needs from the U.S. Economic theory suggests that price and

quality are the two main factors which determine the importer's decision to purchase wheat. Furthermore, demand theory explains that quantity demanded is a function of prices and income with the world market prices determined by supply and demand factors within a given market. Therefore, the price and quality of U.S. wheat available to international markets is the determining factor in whether the U.S. can be the "first, consistant" supplier of wheat to the import market. Government intervention has played a major role in the pricing systems in the EU, Australia, and Canada. Because of different agricultural policies and pricing mechanisms, these exporters competing with the U.S. for international market share have been able to offer competitive prices that are considerably lower than U.S. prices. This gives these countries the ability to offer high quality wheat at a lower price than the U.S., therefore these competing exporters are able to gain the competitive advantage over the U.S. Also, the different policy structures within the respective wheat industries directly and indirectly influence movements in the world wheat market and the changes and patterns of prices that are offered to the international buyer by each competing supplier. More detailed information regarding each exporting countries' agricultural policies is discussed later in this study.

Competitive Trade of Bulk, Intermediate and Value-Added Products

The competition between bulk, intermediate and value-added products has been increasing at a rapid rate across all international markets. Rising incomes and changes in consumer tastes and preferences are boosting the sale of value-added foods. While some may view that the future of U.S. agricultural trade is dependent upon exports of highly-processed, value-added products; the demand for basic food staples such as wheat and

other grains remains strong. Excluding the traditional high-profiled markets of China, the European Union (formerly the European Community), and the Former Soviet Union (FSU), wheat import demand from much of the rest of the world has been growing steadily since the early 1970s (see Figure 1) (USDA, 1995-97). As economic development spreads throughout the world, and many countries experience income and population growth, there will remain a strong demand for food. A study conducted by the U.S. Department of Agriculture (USDA), projects world population to be 9.8 Billion by the year 2050. This is a growth of over 73 percent over a period of approximately one hundred years. Developing countries are also expected to grow at a rate of 80 million people annually, doubling their populations by 2050 (USDA, 1995-97). These economies will continue to rely on staple food supplies to meet the nutritional needs of their rapidly growing populations. Therefore, commodities, such as wheat and wheat products, will continue to be essential to the future growth of agricultural trade. In 1995, bulk commodities accounted for approximately 50 percent (see Figure 2) of the value of total U.S. agricultural exports. Also in 1995, wheat alone accounted for 21 percent of the value of total bulk commodities earning $5.4 billion (USDA,1995-97).

Import Demand

World wheat trade reached record high levels in the mid-1980s with a few countries underpinning import demand growth. During this time, the former Soviet Union (FSU), Eastern Europe, and China, were the focal import markets for the U.S. and its competitors. However, wheat import demand has since then declined in all three regions. Economic and political events in each of these traditional importing countries

resulted in a decline in the respective wheat import programs.

Political reform and massive liquidation of livestock in the former Soviet Union dramatically reduced wheat demand for feed in the 1980s. After the move to a democratic government, less wheat was being imported for feed use and the demand for food use was met by trade from within the respective regions.

China became a major wheat importer when the country's exploding population increased wheat demand to record levels in the 1980s. However, the recent increase in domestic production has satisfied the growing demand and China's wheat import program was reduced.

Prior to the early 1970s, the European Union was also a large importer of wheat and wheat products. However, in 1962 the Common Agricultural Policy (CAP) in the EU was introduced to support agricultural producers (USDA, 1996b). A fixed producer price incentive was the main tool under this policy to increase domestic wheat production in order for Europe to ensure food security (Gardner). This economic policy created a large surplus of wheat and the EU pursued a highly subsidized export program. By the late 1970s, the European Commission concentrated on increasing exports to deplete surplus wheat stocks. This moved the EU from a traditional wheat importer to a net wheat exporter (USDA, 1995-97).

While import demand from these traditional markets fell, the demand in much of the rest of the world began to rise. Regional demand from Asia, Africa, the Middle East has grown over 70 percent over the past twenty years and now account for nearly three-quarters of global wheat imports (USDA, 1995-97).

Export Competition

The rivalry among exporters to gain market share in the international wheat market has intensified over the past twenty years with the growth in import demand from several regional markets. As import demand moved away from the high-profiled importers, including China, the European Union, the former Soviet Union, and Eastern Europe, the major exporters changed their export focus to satisfy the growing demand in Africa, Asia (outside of China), and the Middle East (USDA, 1995-97). In this section, we will examine the export competitors' market shares in each of the selected importing countries. The analysis will show which exporter has the advantage in each of the importing markets, and the competitive trends of each exporter over time. Examining the exporters' focus is essential in understanding the competition in each market and the situation facing the U.S. wheat industry. It is the intent of the authors to show with measureable market share data which exporters are competitive in each importing countries and the trend of export competition over time. This market share analysis is not intended to imply that a high market share is or needs to be the goal of the wheat industry and/or wheat traders in the U.S. It is possible for an exporter to have a low market share in a market and increase the quantity or volume of wheat exported to that market. The market share data represent the percentage of U.S. dollar value of exports to these selected importing countries. This market share data was used in order for the reader to easily make the percentage comparison between the competitive exporters in each import market.

Although Argentina is the fifth largest exporter of wheat in the world, this exporter will not be included in this analysis because Argentina is not a major supplier of wheat to

these targeted importing countries. Argentina exports up to 80 percent of its wheat supply to South America, which is not included in this study.

Tables 1, 2, and 3 show the market shares of each competitor in regional markets during the time period 1983-1994. These countries were chosen for this study to represent the regional markets underlying the growth in wheat import demand. The time period was chosen to show an accurate time-series trend of the competition in each market. The market share data are from the USDA, Foreign Agricultural Service United Nations Calendar Year data system.

The market share data clearly show that with the exception of a few years in Algeria and Egypt, the U.S. was the leading exporter of wheat (over 50 percent market share) in all countries. While the U.S. clearly dominated wheat trade in Jordan, Egypt, and the Philippines, a decline in U.S. market share occurred in South Korea. Although U.S. market share in Japan rallied in 1994 after slight fluctuations throughout the time period, U.S. market share in South Korea plummeted. Canada's gain in market share in South Korea is the most notable increase of all the competitors in any of these importing countries. As U.S. market share dropped from 99 percent to only 34 percent, Canada's share of the market increased from not even competing in this market to exporting 42 percent of all wheat supplied to South Korea. In the Philippine market, the U.S. has remained the leading wheat exporter. Movements in the U.S. market share in the Philippines have been moderate, however the U.S. no longer holds 100 percent market once held in the early 1980s. Despite any movement in U.S. market share in these countries, the competitors all have gained market share in respective countries. In the

Asian markets, Australia benefits from the small U.S. loss in the Philippines, while Canada captures the "lions share" in South Korea. All three competitors (U.S., EU, Canada) maintain market share in Algeria, while the U.S. and Australia alternate as top supplier in Egypt. The U.S. remains the dominate supplier of wheat in Jordan, and the U.S., Canada, and Australia experience only slight market share changes in Japan.

Although the U.S. is losing market share in a few individual markets, the situation facing the U.S. wheat industry is not severe. However, Canada, Australia, and the EU are increasing their efforts to gain a competitive advantage in nearby markets.

The EU advantage in the African and Middle Eastern regions is due primarily to the proximity between these nearby markets. The EU is able to supply one large shipment of wheat for a price that is more competitive than the other exporters. Lower transportation and freight costs will reduce the overall cost of the wheat to the importer. Also, Africa is the primary recipient of food aid from the EU and relies heavily on this aid for imports of flour (USDA, 1995-97).

Australia and Canada are gaining an export advantage because of recent increases in wheat production and stock levels. Both countries have a very steady domestic consumption rate and are very dependent upon the international market for depleting wheat supplies. Approximately 70 percent of Canada and Australia's wheat supply is consumed by international markets (USDA, 1995-97). Also, large supplies of wheat available for the international markets will depress world market prices, making it more economical for international markets to import wheat. In the 1980s, Canada and Australia were large suppliers of wheat to the traditional importing markets (former Soviet Union,

Eastern Europe, the EU, and China). The reduced import demand from these regions has directed Canadian and Australian exports to Asia and the Middle East. Both Australia and Canada are developing new quality and marketing tools to gain market share (USDA, 1995-97).

Supply Factors Affecting Export Competition

Production

In order to meet the growing demand for wheat around the world, the United States and its competitors must be able to produce adequate supplies of high-quality, affordable wheat. Wheat production also determines the amount of wheat available for export as the exporters vie for market share. The United States is one of the largest wheat producers in the world, averaging approximately 63 million metric tons each year (USDA, 1995-97). The production of wheat is very important to the agricultural sector in the United States.

Table 4 outlines the supply and distribution of U.S. wheat over the past five years. Relatively higher world wheat prices have encouraged the increase in land area devoted to wheat in the U.S. Despite the continuation of favorable wheat prices, production levels are forecast to decline in the future due to an increase in the area devoted to alternative crops. Producers are making this movement to higher-priced alternative crops because of the 1996 Federal Agricultural Improvement and Reform Act (FAIR). Producers now have the option of planting alternative crops on traditionally allocated wheat acreage. Producers will now be able to make planting decisions based on the price of the open market instead of relying on traditional commodity payments implemented by the

government. Increased competition from other domestic crops, especially feed grains, and lower wheat prices will likely reduce the land area devoted to wheat production and production levels in coming years (USDA, 1997). Despite, an expected decline in winter wheat production, the Economic Research Service predicts lower wheat prices for the future (USDA, 1997). The pressure for lower wheat prices is attributed to slightly larger expected wheat supplies in the U.S. and other major competitors. Also, the decline in winter wheat production is expected because of higher world prices for alternative feed grains. If higher prices on alternative crops remain, pressure will be added to produce these higher priced commodities on traditionally wheat based acreage (USDA, 1997).

Canada, Australia, the European Union (EU), and Argentina have all experienced an increase in wheat production over the last several years. Together, these competitors combined, produced approximately 25 percent of total world wheat production over the last five years (USDA, 1995-97). The increase in production levels in these five countries accounts for 70 percent (approximately 31.5 million metric tons) of the total increase in world production (USDA, 1995-97). Higher world prices and favorable weather conditions throughout much of the world have contributed to a very unusual time period of increased production levels in the European Union, Australia, Argentina and Canada.

Wheat Varieties and Uses

Several different varieties are grown in almost all fifty states throughout the U.S. because of the different climates, soils, and topography. These factors determine planting decisions across the different geographical areas (USDA, 1995-97). Each variety of wheat is considered its own class and is determined by its color and hardness of the seed,

and time of planting. There are six different classes of U.S. wheat and each is also characterized by the milling, baking, or consumption use. The six different classes of wheat are Hard Red Winter (HRW), Hard Red Spring (HRS), Hard White (HW), Soft White (SW), Soft Red Winter (SRW), and Durum. Table 5 gives a detailed description of each type of wheat, the consumption purpose, and area of the U.S. each variety is grown. Each of the competitors produce classes of wheat comparable to U.S. varieties. The consumption uses are also similar to the U.S. The hard wheat varieties (red winter and spring) are used for bread, milling and baking, and noodles. The soft wheat varieties are used for flat breads, pastries, cookies, crackers and snack foods. Finally, Durum is used for pastas such as spaghetti and macaroni noodles. These consumption characteristics are another factor affecting the competitiveness of each exporter . The United States is the largest producer of Hard Red Winter wheat and is competitive in the import markets that rely on this particular variety for consumption needs. The EU, Australia, and Canada have the competitive advantage in the countries that consume the white wheat varieties. The EU is one of the largest producers of Soft White wheat, and Canada and Australia are developing new varieties of Hard White wheat. Egypt and Algeria are the largest white wheat consumers and depend on this variety for the milling of bread. The EU, Australia, and Canada have an advantage in these two markets .

Agricultural Policies of Major Exporting Countries

Government Assisted Exporters

Under the Common Agricultural Policy (CAP) in the European Union, the European Commission highly regulates the internal supply-demand structure of the EU.

In order to manage internal pricing and domestic supply, the Commission offers a price incentive for wheat producers. The price incentive was introduced under CAP as a fixed control measure. However, the Commission continually changes the incentive due to variable internal prices and intervention stock levels. The price incentive was first introduced by the Commission in the late 1970s (USDA, 1996b). Also under CAP is a mandatory land set-aside program. The land set-aside program is mandatory for producers to receive the direct producer payment. This set-aside program consists of farmers removing arable cropland from production (USDA, 1996b). The mandatory rate was established under CAP, however with continually changing market conditions, the Commission often changes the set-aside rate as a measure to control the domestic market (USDA, 1995-97). A reduction in the set-aside rate would likely encourage larger wheat plantings and raise stock levels. An increase in the set-aside rate would likely reduce wheat plantings and stock levels and result in a tighter wheat supplies for the domestic market (USDA, 1995-97).

The supply of wheat in Canada and Australia is controlled by their single desk-selling wheat boards. These boards market the wheat collectively using the open market U.S. price only as a reference. Because of this monopolistic management style, all supply and demand information of both countries is kept confidential to their respective industries. However, both boards, the Canadian Wheat Board (CWB) and the Australian Wheat Board (AWB), purchase all wheat destined for international markets. The demand from international markets and the level of government stocks directly affect the farmers' production decisions. In times of weak demand from international markets, and high

levels of government stocks, wheat not purchased by the boards is either sold for domestic use or held as privately-owned, on-farm stocks at the cost of the producer. Wheat producers in these countries must only speculate the amount of wheat the boards will purchase when making production decisions (U.S.General Accounting Office, 1992).

Free Market Exporters

Argentina is the smallest of the five major exporters in wheat production, stock levels, and exports. Higher world prices, increases in the use of agricultural inputs, and improved technology have attributed to the rise in the level of wheat production. With the exception of macroeconomic policies to encourage investment, economic planning, and a more efficient use of resources, the Argentine government has a very limited role in the wheat industry. In recent years, the Government has moved away from any involvement in agricultural policy and marketing decisions to further encourage market developement. In addition, the view of the Argentine government is that the production and export subsidies, implemented by the European Union and the United States have had a negative impact on agricultural wheat trade. Therefore, there are no major policies, programs, or subsidies that would encourage supply decisions made by the producers. Less government intervention has lead to a reduction in input costs and more efficient means of transportation, communication and marketing and port services. The factors that have lead to an increase in Argentine wheat production are an increase in inputs, such as fertilizers, herbicides and fungicides, and farm machinery, and improved cultivation practices. The use of agricultural chemicals has more than doubled in the last few years. No-till cropping and strip or contour plowing have also become relatively common to

maintain soil moisture and prevent wind and water erosion. The increase in Argentina's wheat production is expected to continue in coming years due to improvements in yield. The amount of arable land under cultivation in Argentina is relatively fixed, however any increase in the area devoted to wheat and other grain products will likely depend upon prices of the livestock industries, namely beef and poultry (USDA, 1995-97).

For many years there have been significant changes in each of these policy structures that have impacted the world wheat market and the competition among exporters. The World Trade Organization (WTO) replaced the General Agreement of Tariffs and Trade (GATT) to continue the progress towards an environment of freer trade and less government involvement. In the attempt to reduce and remove trade barriers in the international market, the WTO has prompted changes in subsidy trading practices in the EU and the U.S. EU wheat subsidies have been significantly reduced, while U.S. subsidies have been eliminated. The discriminatory trading and pricing regimes in Canada and Australia (i.e. single desk-selling commodity boards) will be discussed in the 1999 round of the WTO. Although the main objective of this study focuses on the current situation in each of the exporting countries, it is imperative to review the historical events of each of these stuctures and recognize how these changes have influenced the international wheat market. Table 6 gives a brief history of U.S. and competitor export policies.

Export Programs

Export tools and marketing and technical servicing programs (i.e. subsidy, credit guarantee and food aid programs, and foreign direct investment) implemented by the U.S.,

EU, Canada, and Australia are expected to impact the market shares. Changes and increases in these programs have historically pressured world wheat prices and strengthened the competitiveness among exporters. Historically, the EU and the U.S. have both used export subsidies to maintain and increase market shares in the importing countries. The EU continues to supplement wheat exports with subsidies and taxes depending on domestic market conditions, while the U.S. suspended the Export Enhancement Program (EEP) in July of 1995. While Canada and Australia strongly oppose of the use of export subsidies in the wheat export market, both wheat industries use monopolizing, single desk-selling wheat boards to collect and market wheat for export. Argentina is the only competitor that exports wheat on the cash market without additional export or policy tools. These different export programs have been used to increase or maintain market shares in specific countries, and have resulted in an intense competitive export environment.

Government Subsidies

The principal exporting tool for the EU wheat industry is its export restitution (subsidy) program. These subsidies are a function of the internal supply-demand balance regulated under the Common Agricultural Program (CAP) (Gardner). In order to protect the domestic supply of wheat and domestic consumption, the European Commission intervenes with producer incentives to control all price levels within the internal market. Export restitutions are issued for the excess wheat supply resulting from the direct producer payments (Gardner). The Commission uses two different procedures to award restitutions for the export of wheat. Restitutions are offered each week and the

procedures differ depending on whether the wheat is from intervention stocks or the open market (Bourgen and Le Roux). Both types of awards are determined by weekly bids issued by European traders. Intervention refunds are tendered for by lots. Each trader submits a per metric ton bid based on the necessity to export wheat on the international market at a competitive price. The Commission retains the highest bid for each lot and then determines a floor price level corresponding to the traders' bids and the export quantity objectives set by the Commission. All bids above this floor-level price are accepted and the restitutions are awarded for export (Bourgeon and Le Roux).

For open market exports, the Commission buys an export service from the traders who accumulate stocks from within the internal market. The traders submit an anonymous bid to the Commission specifying the export quantity and the desired refund. The refund is requested based on the cost to the trader of supplying the wheat. The Commission ranks the bids in increasing order and then determines a target refund and the corresponding quantity. Any and all bids equal to or less than this target refund have qualified for an export contract. The qualified recipients of the refund receive the amount requested, not the target refund, if the obligation to export is awarded by the Commission (Bourgeon and Le Roux). Not all bids to export are fulfilled, and the Commission has the authority to refuse any and all tender for export at any time. In recent years, the EU has also implemented an export tax to discourage exports when high internal prices occur due to tight domestic supplies (USDA, 1989).

To counteract the price-cutting subsidies of the EU and to maintain market share, the U.S. established the Export Enhancement Program (EEP) in July of 1985. This

subsidy program enables U.S. exporters to export U.S. wheat at prices below the exporter's cost of acquiring the good and to under-cut restitutions and other price-cutting mechanisms offered by U.S. competitors. EEP is administered by the Foreign Agricultural Service, USDA. All EEP wheat sales are made by the private exporter, not the U.S. government. USDA reviews the requested subsidy bids and compares the amounts with other U.S. bids and competing country wheat sales (USDA, 1996c). Before the subsidy is approved by USDA, the exporter must have the terms of the sale (price, quantity, quality, delivery, etc.) negotiated with the prospective buyer. The sale may be contingent upon the approval of the subsidy (USDA, 1996c). Once a requested subsidy is accepted, the Commodity Credit Corporation (CCC) and the exporter enter a contract agreement. This agreement specifies the exact amount of the subsidy, how it is calculated, and the exporter's responsibility to make the sale. Once actual proof of the sale is obtained, the exporter can then request the actual cash bonus. from the CCC (USDA, 1996c).

The combination of U.S. and EU subsidy programs enables U.S. and EU traders to offer wheat at prices below the world price. This also dampens world prices, making it difficult for Canada, Australia, and Argentina to offer competitive prices to foreign buyers that successfully covers domestic costs of production and transportation.

Marketing Programs

Both the Canadian and Australian Wheat Boards (CWB and AWB) have implemented marketing efforts to direct their export focus on particular markets. The CWB and AWB have taken steps to increase their presence in the Asian market. New "designer wheats" have been developed to satisfy Asian demand for the production and

milling of noodles (USDA, 1995-97). Both Canada and Australia have also established joint venture flour mills and long-term purchase agreements in several importing countries throughout Asia. Canada has also implemented technical training programs to educate Asian consumers on the best end-uses for Canadian wheat (USDA, 1995-97).

The government of Argentina (GOA) has recently launched a campaign to challenge wheat producers to improve marketing techniques and quality scales. The GOA is developing a new high quality wheat standard. The new grade is known as "trigo plata" and will have maximum moisture content of 13 percent. In addition, the Government is proposing an improvement in the classification system. Argentina's current system of classification consists of only three quality levels. The improved system of grades will differentiate milling properties, protein levels and specific weights to improve the quality and image of Argentine wheat in international markets. These quality marketing programs will allow Argentina to become more competitive in world markets (USDA, 1995-97).

Commercial Export Programs

Commercial credit guarantee programs are a very important part of the decision to import wheat from any origin supplier. The United States, the European Union, Canada, and Australia offer credit programs for wheat import purchases to the selected countries for this study. The United States and the European Union are the two main suppliers of extensive credit guarantee programs. Australia and Canada both offer very short-term credit lines, however detailed information about these programs and specific participating countries is not available from the respective commodity marketing boards. The U.S. and the EU gain more of an advantage with these guarantee programs because of larger credit

lines and longer repayment terms for the purchasing countries.

The United States issues two credit programs to importing countries through the Commodity Credit Corporation (CCC), United States Department of Agriculture for commercial financing of U.S. agricultural exports. The General Sales Manager 102 and 103 programs (GSM-102/GSM-103) cover credit terms for up to three and ten years respectively. The CCC does not directly provide financing through the GSM-102 and 103 programs, but simply guarantees payments due from approved foreign banks. The guarantee provided by the CCC covers up to 98 percent of principal and a portion of the interest at an adjustable rate. This helps U.S. financial institutions to offer competitive credit terms for importing countries (USDA, 1996e).

Of the fifteen member countries of the EU, France is the only member country that offers a competitive credit line to importing countries. The French Coface line of credit is the major competing program of the U.S. credit guarantee programs. Similar to all of the EU exports, the French Coface line of credit focuses on the African region.

Canada's Credit Grain Sales Program requires repayment in full within 36 months or less from the time of shipment. Credit sales made outside of this program are eligible to be rescheduled for repayment outside of the original maturity dates for periods of 5 to 25 years (Canadian Wheat Board). These extended loans are limited to only a few distinct countries and the countries are chosen after a very thorough credit and liability assessment.

The Australian Wheat Board offers credit sales through the Export Finance and Insurance Corporation (EFIC). There are two types of coverage under the EFIC: normal

and national interest. Under normal coverage, the AWB pays premiums to EFIC and the EFIC provides credit guarantee for up to 80 percent of the sale based on the individual countries risk assessment. The repayment terms are normally for one year. However, under the National Interest coverage, EFIC may refer more risky transactions, or sales that would otherwise be commercially unsound to the Trade Minister for consideration. If these sales are approved, the EFIC enters into the transactions and may take a share of the risk involved. Costs and losses of these credit sales are born by the government (Australian Wheat Board).

Due to the sensitivity of the credit terms and assessments, the U.S. government is the only competitor with historical and available information regarding the selected importing countries participation in the U.S. credit guarantee programs. The credit lines of the U.S. programs are allocated each fiscal year (October-September); therefore, it is difficult to compare the credit lines to the total trade marketing year imports, which are measured on a July-June year by the Foreign Agricultural Service, United States Department of Agriculture. However, examining the importance of credit buying to each individual importer and the impact these programs have on the amount of wheat purchased is essential to this study.

A large portion of the United States' GSM-102/103 programs is used for wheat and flour exports. During the first half of the 1990s, an average of 20 percent of the total value of the 102 program was used for wheat and wheat flour. Although the 103 program is much smaller in value, wheat alone has received up to 78 percent of the total program value. Approximately 28 and 13 percent of the total quantity of wheat exported under the

U.S. GSM-102 and 103 programs respectively is targeted to Egypt, Algeria, Jordan, Philippines, and South Korea. Table 7 provides the actual amount of wheat, in thousand metric tons, imported under the United States General Sales Manager program during Fiscal Years 1990/91 and 1994/95 by each selected country. The total market imports, including cash, concessional, and commercial purchases are also included in this table, however comparisons can not be made between the two figures because of the type of year the data is reported. Credit program units are reported in Fiscal Year (October-September), while the total market imports are reported on a Trade Year (July-June).

Over the last five years, Algeria, Egypt, Jordan and South Korea have participated in the U.S. credit guarantee programs. GSM imports by these participating countries, excluding Egypt, have steadily declined since the early 1990s. Declining program imports are result of higher world prices and lower program allocations by the U.S. government (USDA, 1996e). Although Algeria has been the largest importer under these programs, imports under 102 have declined most rapidly. South Korean imports have also declined considerably. Egypt is the only country in this study that has actually seen an increase in imports under these programs. Jordan's GSM imports have been very minimal and sporadic (USDA, 1996d).

Concessional Export Programs

In addition, the U.S. is the major supplier of wheat under concessional programs. Public Law-480 (PL480) is the U.S. government concessional sales program and is also administered by the Foreign Agricultural Service, USDA. Of the total 4.8 million metric tons of concessional wheat shipped in 1994, 2.2 million metric tons was supplied by the

U.S. Purchases made under U.S. PL480 are either food aid donations for humanitarian food needs, government to government sales under 30 year credit for developing countries, and/or government to government grants to least developed countries for economic development. Over the last ten years, Algeria, Egypt, Jordan, and the Philippines have received concessional wheat imports from the U.S., EU, and Canada. The PL480 program has targeted all four of these countries, while the EU and Canada sales have been to the African region (USDA, 1995a).

Table 8 is a summary of the export programs offered by each exporter.

Demand Factors of Selected Import Markets

The six individual importing countries chosen for this study have different consumption and import patterns. These patterns are imperative to understand the demand for wheat from the United States and its competitors as these countries' wheat, flour, and product imports together account for approximately 50 percent of U.S. total group exports. The following information regarding each country was gathered from annual reports prepared by the agricultural attaches of the Foreign Agricultural Service, USDA, 1996. Table 9 describes each individual importer's buying characteristics by type of purchase and exporter tool and Table 10 summarizes import demand characteristics of each import market.

Egypt imports an average of 6 million metric tons of wheat each year and has one of the highest consumption rates of all wheat consumers, averaging approximately 180 kilos per capita per year. Over 70 percent of Egypt's wheat consumption needs will be supplied primarily by the United States, Australia, and the European Union. Soft White

Wheat is the variety preferred by Egypt for the milling of one of the most frequently consumed types of bread--*baladi*, which is supplied by the United States or Australia. Soft and hard red winter varieties are also imported from the United States or the European Union, and used for pasta and the milling of french style breads. The Government of Egypt (GOE) has embarked on a program to increase domestic wheat production. The goal is to attain 70 percent self-sufficiency within the next few years. In order to achieve this goal the GOE implements the following tariffs and fees to all imported wheat: 5 percent customs duty based on CIF value, 10 percent sales tax, 1 percent commercial and industrial profit tax, 1 percent service charge, 3 percent discharging and transportation fees, and 2 percent to open the line of credit.

Algeria is the world's largest food grain consumer and is on average a 4 million metric ton wheat import market. Approximately 72 percent of the total food supply is composed of domestic and imported wheat. Over 65 percent of the Algeria's population is under 20 years old, so it is extremely important to maintain an ample supply of food. Algeria's young society has boosted the growth of per capita wheat consumption dramatically in the last twenty years. Per capita wheat consumption in the 1970 was 80 kg compared to the present rate of 230 kg. The majority of imported wheat is used for domestic consumption plus, there is a very low demand for wheat for feed use. Less than 3 percent of all imported wheat is used for feeding purposes.

Jordan imports an average of slightly less than 700 thousand metric tons and consumes approximately 500-600 thousand tons of wheat each year. The majority of this consumption consists of Hard Red Winter with small amounts of Soft Red Winter and

Hard Red Spring. The major suppliers of wheat to Jordan are the United States, the European Union and Australia. The majority of wheat entering Jordan is under credit guarantee programs and food aid provided by these three suppliers.

South Korea's wheat imports average roughly 4 million metric tons per year. South Korea's domestic production is very minimal, so almost 100 percent of the wheat used is imported. The Korean demand for wheat is equally divided between food use and feed use, however each sector is driven by different factors. Wheat used for consumption (noodles/confectionary items/bread) is driven by mainly quality and milling characteristics, whereas the feed wheat market is driven by price. Per capita consumption of wheat for 1995/96 was 34.5 kg, which is a substantial increase from the .9 kg from the previous year. Soft Red Winter, Hard Red Winter, and Spring Wheat are the main varieties imported from the U.S., Canada, Australia, and the European Union. Canada and Australia are providing the strongest competition by targeting wheat quality specific to Asian diet preferences. Australian Standard White is preferred by South Korea because of its high starch content and shorter cooking time for Korean noodles. Tariff rates for imported wheat have been reduced in the Uruguay Round of the World Trade Organization. The applied rate of 3 percent will be reduced to 1.8 percent by 2004. This equates a tariff rate of 2.64 percent in 1997.

Per capita consumption of wheat in the **Philippines** has increased steadily over the last 15 years. This increase is a result of an annual population growth of 2 percent and a strong economic growth period beginning in 1994. Per capita wheat consumption is now 26 kilos per year. The United States, Canada, and Australia are the primary suppliers of

wheat to the Philippines. The U.S. remains the top supplier of Dark Northern Spring and Soft White to the Philippine market for several reasons. These varieties have a higher protein content and are easier to mill than wheat from other competitors. In addition, the Philippines are accustomed to wheat from the U.S., and the U.S. is capable of combining Dark Northern Spring with the Soft Western White variety in any shipment.

Japan is a very mature wheat import market, yet remains one of the largest markets for the United States and its competitors. Japan purchases approximately 6 million metric tons each year from the United States, Canada, and Australia, and is accustomed to purchasing roughly the same amount of wheat from each supplier each year. Japan is strictly a cash buyer and fluctuations in purchases from each supplier is determined by price. Japan's per capita consumption rate has been a steady 32 kg per year for the last 10 years. The Food Agency of Japan's Ministry of Agriculture Forestry and Fisheries controls all imported wheat as well as both producer and resale prices of wheat. Imported wheat is purchased by the Food Agency and then sold to consumers at prices that are sometimes two and three times higher than the purchase price. The Food Agency allows flour millers to import wheat outside of the Agency, however they must export the equivalent amount. This "free wheat" as it is called is imported at world price and is extremely profitable for the millers. Japan is essentially a cash buyer and imports Hard Red Winter, Hard Red Spring, White Wheat, and Durum.

Concluding Remarks and Implications

Concern over the future of U.S. wheat trade has been growing over the past several years. Wheat producers and traders and wheat policy makers have been striving to

increase U.S. market share to the record levels once attained in the mid-1980s. However, the traditional markets that were once the driving force behind the record levels of wheat trade, are now self-sufficient and are satisfying wheat demand with domestic supplies. However, the attention of the major exporters is now directed to three growing markets underpinning the growth in wheat trade: Africa, Asia (outside of China) and the Middle East. Despite the overall decline in U.S. wheat trade, U.S. market shares in individual markets within these regions have remained fairly stable.

The elimination of the U.S. subsidy program and the reduction of EU restitutions has had a positive affect on the world wheat markets. World market prices have experienced an upward trend and the world wheat market has been able to adjust more freely to supply and demand factors as intervention from U.S. and the EU has weakened. However, the U.S. position in the international wheat market is still being threatened by the presence of price-cutting subsidies and single-desk selling wheat boards in the international wheat market. These intervening price mechanisms will continue to distort the international trade environment and will keep world market prices stalled at low levels. Furthermore, the U.S. will likely remain the highest priced wheat supplier and will lose market share in these importing markets. Elimination of all government intervention in all competing suppliers would allow the world market to move freely to supply and demand signals and would likely create fair competitive conditions in the international market.

Although credit guarantees provided by the exporters (mainly the U.S.) have been reduced, these programs continue to play a very important role in the decision of the foreign countries to import. Japan is the only "cash buyer" that depends on the world

market price to make import purchases. In addition, South Korea is phasing out their participation in government assisted import programs, however the remaining target countries have relied and will likely continue to rely on commercial and/or concessional programs for wheat imports.

Recent increases in area devoted to wheat acreage among the competitors has driven wheat production to record levels. This combined with the intent to increase domestic stock levels, has further intensified the competition among the exporters. Argentina, Canada, Australia and the EU are beginning to focus on nearby markets with improvements in quality standards and varieties, infrastructure, and marketing techniques and services that will satisfy the demand in targeted countries and capture a larger share of the market. Although an in depth analysis of Argentina's export focus was not included in this study, Argentina continues to focus on South America. As Argentina continues to develop a wheat quality system and improve domestic infrastructure, future Argentine wheat exports will likely compete with the "big four" in these growing markets.

It is evident from this analysis that in order to gain an export advantage, price, quality, and export credit programs are necessary to successfully compete in the international wheat market. Although the U.S. market share has not surpassed the record levels once achieved in earlier decades, the U.S. remains the leading force in international wheat trade.

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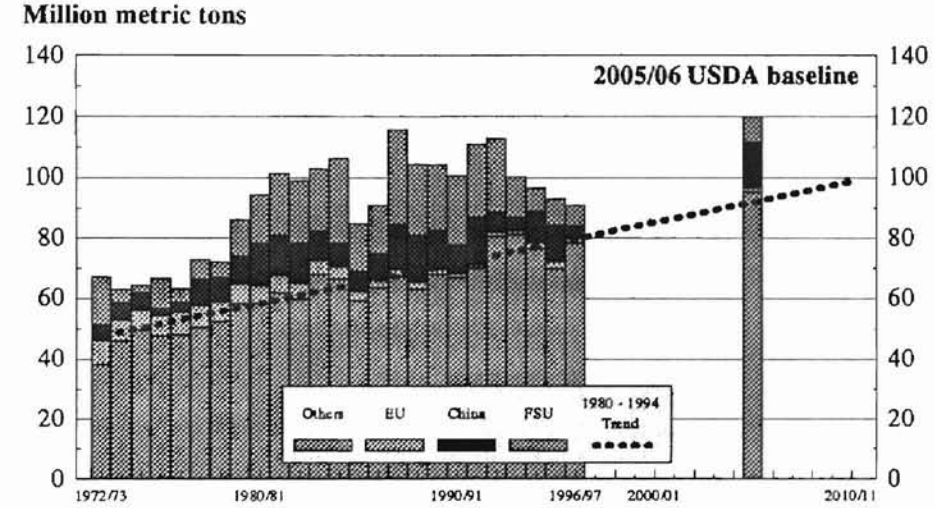
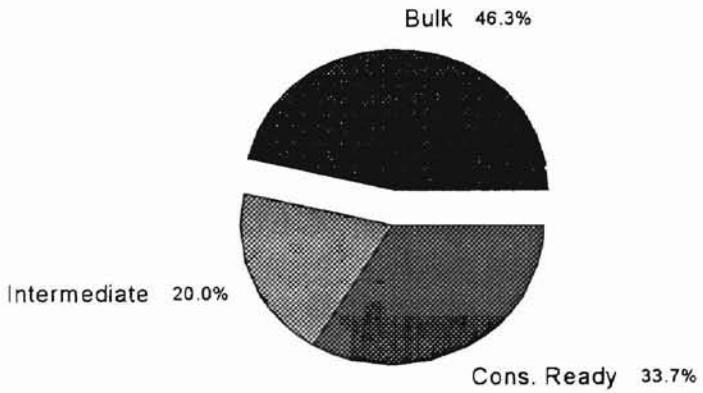
Figure 1: Wheat and Wheat Product Import Demand, Selected Countries, 1972-2010 (projections).



Source: Based on Data from FAS, USDA Grain: World Markets and Trade

Figure 2: Total US Exports of Bulk, Intermediate, and Consumer Ready Goods, Calendar Year 1995.



Source: Based on Data from FAS, USDA Grain: World Markets and Trade

Table 1. Total Market Imports (in thousand Metric Tons) and Export Competition Market Shares (in Percentages) in Selected African Countries, Calendar Years 1983 -1994.

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Algeria												
Total Market Imports	2,129	2,006	3,030	2,623	1,849	2,826	4,580	2,612	2,322	2,329	2,588	a
US[1]	30.4%	20.8%	30.8%	71.7%	61.6%	51.8%	37.7%	32.5%	43.3%	44.2%	43.8%	a
EU[2]	33.1%	34.7%	33.4%	9.1%	7.3%	15.5%	41.9%	41.5%	28.1%	36.7%	25.5%	a
CN[3]	30.1%	39.2%	32.9%	18.8%	30.8%	27.0%	18.1%	24.7%	27.5%	18.9%	30.0%	a
Egypt												
Total Market Imports	2,577	2,721	2,337	3,405	3,633	3,576	3,069	4,456	4,116	4,964	2,340	a
US[1]	48.2%	25.9%	25.6%	34.4%	45.2%	46.2%	66.7%	28.3%	42.%	67.9%	46.7%	a
EU[2]	18.1%	8.3%	.1%	----	7.9%	9.2%	7.9%	20.3%	6.4%	2.4%	13.1%	a
CN[3]	94.0%	17.5%	15.3%	6.4%	8.1%	2.7%	.7%	----	.7%	1.3%	----	a
AUS[4]	----	24.5%	----	5.9%	----	41.9%	23.4%	47.3%	44.4%	28.4%	38.1%	a

Source: Based on data from FAS, USDA United Nations Calendar Year data system, 1983-1994
a 1994 data are not available
[1] United States; [2] European Union; [3] Canada; [4] Australia

Table 2. Total Market Imports (in thousand Metric Tons) and Export Competition Market Shares (in Percentages) in Middle Eastern Countries, Calendar Years 1983 -1994.

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Jordan												
Total Market Imports	319	451	377	271	542	400	172	611	759	553	667	508
US[1]	56.4%	55.1%	56.7%	55.2%	54.1%	13.4%	92.9%	95.4%	55.8%	41.4%	96.4%	97.3%
EU[2]	----	----	----	----	----	.25%	----	.5%	4.4%	.1%	3.6%	.16%
CN[3]	27.5%	28.2%	25.6%	28.6%	28.9%	----	----	1.2%	----	----	----	2.5%
AUS[4]	16.1%	16.7%	17.7%	16.2%	16.9%	----	----	----	----	----	----	----

Source: Based on data from FAS, USDA United Nations Calendar Year data system, 1983-1994.
[1] United States; [2] European Union; [3] Canada; [4] Australia

Table 3. Total Market Imports (in thousand Metric Tons) and Export Competition Market Shares (in Percentages) in Selected Asian Countries, Calendar Years 1983 -1994.

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Philippines												
Total Market Imports	797	766	663	960	672	1,017	2,480	1,889	935	2,652	2,199	2,147
US[1]	100%	100%	98.8%	92.8%	76.6%	98.5%	83.80%	72.3%	91.5%	77.4%	85.7%	92.5%
EU[2]	----	----	----	----	2.5%	----	.04%	----	----	----	----	----
CN[3]	----	----	1.2%	1.4%	20.6%	1.4%	16.03%	27.5%	8.0%	13.9%	4.1%	.95%
AUS[4]	----	----	----	5.8%	.2%	.1%	.09%	.2%	.4%	. 1%	7.8%	6.53%
South Korea												
Total Market Imports	1,854	2,648	2,984	3,449	4,121	4,116	2,275	2,516	4,790	3,546	4,939	6,057
US[1]	99.1%	74.4%	71.2%	62.3%	55.3%	57.7%	80.3%	72.9%	42.7%	50.5%	36.9%	34.51%
EU[2]	----	1.78%	.07%	2.82%	4.5%	----	----	----	----	----	----	3.42%
CN[3]	----	.64%	1.4%	14.5%	27.4%	1.5%	1.7%	8.1%	20.6%	16.5%	37.8%	42.43%
AUS[4]	----	21.4%	27.1%	17.5%	9.7%	3.9%	9.7%	13.7%	23.3%	16.1%	23.2%	18%
Japan												
Total Market Imports	5,816	5,978	5,510	5,620	5,476	5,724	5,578	5,474	5,693	5,979	5,814	6,352
US[1]	56.4%	55.1%	56.7%	55.2%	54.1%	54.8%	52.8%	53.3%	55.3%	55.5%	53.5%	57.8%
CN[3]	27.5%	28.2%	55.6%	28.6%	28.9%	28.6%	29.1%	28.6%	26.8%	27.8%	27.1%	24.1%
AUS[4]	16.2%	16.7%	17.7%	16.2%	16.9%	16.4%	18.1%	18.1%	17.9%	16.7%	19.4%	18.1%

Source: Based on data from FAS, USDA United Nations Calendar Year data system, 1983-1994

[1] United States; [2] European Union; [3] Canada; [4] Australia

Table 4. U.S. Wheat: Supply and Distribution, Thousand Metric Tons/Hectares, Trade Year[a] 1993/94 - 1997/98

	Area Harvested	Yield	Production	Imports Trade Yr.	Exports Trade Yr.	Domestic Total Use	Ending Stocks
1993/94	25,379	2.6	65,220	3,161	33,084	33,738	15,472
1994/95	24,998	2.5	63,167	2,390	32,208	35,014	13,787
1995/96	24,664	2.4	59,400	1,748	33,594	31,024	10,234
1996/97	25,435	2.4	62,099	2,450	26,500	35,312	12,663
1997/98	24,685	2.5	61,547	2,500	27,500	34,291	15,152

Source: Based on data from FAS, USDA

[a]Wheat trade statistics are on July /June years.

Table 5: United States Wheat Varieties, Consumption Characteristics, and Area Grown

Variety	Description
Hard Red Winter	accounts for 40 % of U.S. wheat crop and exports; used for milling and bread making; 11-12% proteing content; grown in the Great Plain states from the Mississippi River to the Rocky Mtn. States and Texas
Hard Red Spring	accounts for 20% of U.S. wheat exports; used for bread, milling, baking; highest protein content of all wheat: 13-14%; grown in N. Central U.S. (Dakotas, Minnesota, Montana)
Hard White	newest class of wheat grown in the U.S.; used for yeast breads, noodles, flat breads; used primarily in domestic markets, however expected to have the largest increase in exports in the future; grown in California, Idaho, Kansas, and Montana
Soft White	accounts for 20% of U.S. wheat exports; low protein content: 10%; preferred for flat breads, cakes, pasteries, crackers, and noodles; grown in the Pacific Northwest
Soft Red Winter	accounts for 14% of U.S. wheat exports; high yielding wheat; low in protein: 10%; used for cakes, pastries, flat breads, crackers, and snack foods; grown in the eastern one-third (⅓) of the U.S.
Durum	accounts for only 5% of U.S. wheat exports; hardes of all varieties; used for spaghetti, macaroni, and other pastas; small quantities grown in Arizona and California, most is grown in N. Central U.S. (Dakotas, Minnesota, Montana)

Source: Based on data from FAS, USDA.

Table 6. History of U.S. and Competitor Export Policy Programs

United States	***Australian Wheat Board***	***Canadian Wheat Board***	***EU Common Agricultural Policy***
	Established in 1939 to acquire and market wheat for sale to the domestic and international markets	Established in 1935 by the Canadian Wheat Board Act giving the CWB control of acquiring and marketing wheat for domestic and international markets	Established in 1962 to: -increase agricultural productivity -ensure a fair standard of living; to stabilize markets -to guarantee a steady food supply at reasonable prices to consumers
1985:	1948:	1935:	1967:
-Established Export Enhancement Program (EEP) to:	-AUS government established stabilization fund to guarantee unit pool returns to growers; set domestic consumer prices in line with guaranteed price (only on a specified limit)	Canadian Government covers all CWB wheat pool deficits	-uniform prices were established for cereal grains to protect domestic market:
-dispose of excess wheat supplies on the international market	-Enforced export tax when export price>guaranteed price and deficiency payment when export price<guaranteed price	1983:	Target price: optimum price producer should receive
-maintain U.S. wheat market share		-Western Grain Transportation Act established Canadian rail and freight transportation subsidies;	Intervention price: market floor price the Commission pays for purchasing intervention products; used to boost market prices
-counteract competitor price-cutting subsidies		-Elimination of direct payment compensation	Threshold price: minimum price for non-EU imports

Table 6. History of U.S. and Competitor Export Policy Programs (*continued*)

United States	***Australian Wheat Board***	***Canadian Wheat Board***	***EU Common Agricultural Policy***
1995:	1989:	1995:	-Variable levy: tax on imports to ensure imports do not undercut target prices of domestic commodities
-Elimination of Export Enhancement Program (EEP)	-AUS government guarantees AWB borrowings (up to 85% of expected net returns) to pay wheat producers initial payments	-Elimination of rail and freight transportation subsidies; Farmers received direct payments to compensate for the loss of the subsidy	-Export subsidies: when world market prices are below EU market price cash bonus are paid to exporters to enable surplus commodities to be exported competitively to the international market
	-Stabilization fund was eliminated	1996: -Canadian government provides crop insurance, research, and income support to producers	-Export levy: when world prices are above EU market prices a tax is imposed to exporters to prevent disposing of EU products
	-Domestic market was deregulated (AWB no longer had sole authority; must compete with other domestic sellers)		-direct producer payments: amount paid to farmers to increase wheat production
	-Wheat Industry Fund was established as a nonsales source of revenue for the board; wheat growers must pay 2% levy that underwrites domestic trading and serves as a capital base		

Table 6. History of U.S. and Competitor Export Policy Programs (*continued*)

United States	***Australian Wheat Board***	***Canadian Wheat Board***	***EU Common Agricultural Policy***
	-AWB does not pay tax on commodity sales	-CWB pays no taxes to the federal government	- mandatory set-aside rate: specific amount of arable cropland that must be removed from production; set at 17% under CAP 1992 CAP Reform: -support prices reduced by 33% -reduced prices are compensated for by direct producer payments 1997: -mandatory set-aside rate reduced to 5%
The United States currently relies on the world market price to sell all wheat for export	AWB is currently the single seller of wheat in Australia and has authority over all Australian wheat destined for export. Thus, it has a sure source of supply and can use economies of scale to disperce the cost of operations.	CWB currently is the single seller of wheat for export in Canada and has the authority over all Candian wheat destined for exports.	The EU currently issues export restitutions (subsidies) to export excess wheat supplies in order to regulate and control the domestic market

Sources: Based on data from U.S. General Accounting Office (USGAO) and U.S. Department of Agriculture (USDA).

Table 7. Imports (in Thousand Metric) of Wheat and Wheat Flour Under U.S. GSM-102 and -103 Programs, Fiscal Years 1990/91 - 94/95.

U.S. GSM-102	1990/91	1991/92	1992/93	1993/94	1994/95
Algeria					
Total Market Imports[a]	4,600	3,700	3,800	4,813	4,500
Program Imports[b]	1,800	1,500	1,000	935	26
Egypt					
Total Market Imports[a]	5,692	5,807	6,004	5,900	5,850
Program Imports[b]	----	47	158	318	290
Jordan					
Total Market Imports[a]	866	703	576	734	730
Progam Imports[b]	----	----	----	----	50
South Korea					
Total Market Imports[a]	4,206	4,396	3,994	5,647	4,293
Program Imports[b]	1,200	981	1,000	994	592
U.S. GSM-103					
Algeria					
Total Market Imports[a]	4,600	3,700	3,800	4,813	4,500
Program Imports[b]	----	----	100	103	----
Jordan					
Total Market Imports[a]	866	703	576	734	730
Progam Imports[b]	128	51	----	----	----

Based on data from FAS, USDA

[a]Based on trade year July - June.

[b]Based on fiscal year October - September.

Table 8. US and Competitor Available Export Programs

Exporter	Export Programs
United States	GSM-102/103 (credit guarantees) Export Enhancement Program (EEP), 1985-1995 PL480 (food aid)
European Union	Coface (credit guarantees) Export Restitutions (subsidies) Food Aid
Australia	Export Finance and Insurance Program (credit guarantees) Food Aid
Canada	Credit Grain Sales Program Food Aid
Argentina	Free Market Exports

Source: Based on Data from FAS, USDA *Grain: World Markets and Trade*

Table 9. Buying Characteristics of Target Importing Countries.

Country	Type of Buyer	U.S. Program
Egypt	Commercial/Concessional	EEP/GSM-102/PL-480
Algeria	Commercial/Concessional	EEP/GSM-102; 103/PL-480
Jordan	Commercial/Concessional	EEP/GSM-102/PL-480
South Korea	Commercial/Concessional	EEP/GSM-102
Philippines	Concessional	EEP/PL-480
Japan	Cash	-------

Source: Based on data from FAS, USDA

Table 10. Demand Characteristics of Studied Import Markets

Import Market	Total Market Imports[1]	Consumption[4]	% of cons. Imported	Import Policies	Feed Use	Wheat Class Demanded
Algeria	4 MMTs[2]	230 kg	60		<3%	HRW[7]/WW[6]
Egypt	6 MMTs[2]	180 kg	70	21% tariff/fees	<15%	WW[6]/HRW[7]/SRW[8]
Jordan	700 TMTs[3]	15 kg	90		<5%	HRW[7]/SRW[8]/HRS[9]
South Korea	4 MMTs[2]	35 kg	100	3% tariff/fees[5]	50%	HRW[7]/SRW[8]/HRS[9]/WW[6]
Philippines	2 MMTs[2]	26 kg	85		<5%	DNS[10]/WW[6]
Japan	6 MMTs[2]	32 kg	90		<10%	HRW[7]/HRS[9]/WW[6]/Durum[11]

Source: Based on data from FAS, USDA Unpublished Attache Annual Reports

[1] 5 Year Average of July/June Marketing Year

[2] Million Metric Tons

[3] Thousand Metric Tons

[4] Per Capita Per Year

[5] Will be reduced to 1.8% by Year 2004 under World Trade Organization regulations

[6] White Wheat

[7] Hard Red Winter

[8] Soft Red Winter

[9] Hard Red Spring

[10] Dark Northern Spring

[11] Durum

PAPER II

ECONOMETRIC ANALYSIS OF WHEAT AND WHEAT FLOUR IN 5 SELECTED IMPORTING COUNTRIES: THE CASE OF GOVERNMENT ASSISTED IMPORTERS VERSUS CASH IMPORTERS.

Introduction

The extended government role in international trade of wheat and wheat flour has been the subject of controversy for many years. The primary suppliers of wheat and wheat flour to the international market offer government assisted programs to target import markets in order to promote their respective wheat industries. A large portion of world wheat and flour trade is managed under government assistance. In the United States, up to approximately 80 percent of all international wheat transactions are made under some government program (USDA, 1996b). Furthermore, very few wheat countries have import programs that rely on cash purchasing.

Import demand of wheat and wheat flour has changed dramatically over the last twenty years. In the 1970s and 1980s when world wheat trade was growing to record levels, the former Soviet Union (FSU), the European Union (EU), and China were the driving forces behind the demand growth (USDA, 1995-97). However, more recently, economic reform, improvements in production self-sufficiency, and highly regulated

agricultural policies have alluded to a reduction of wheat and flour import programs in these traditional import markets. Currently, the markets underpinning import demand growth have been from Africa, Asia (outside of China) and Middle Eastern regions (USDA, 1995-97).

Little effort has been made in previous literature to estimate wheat and wheat flour international import behavior of individual countries in these regions. Moreover, previous research has not focused on wheat and wheat flour import demand elasticities and how the purchasing behavior of specific importers impact the factors affecting import demand. Algeria, Egypt, Jordan, Japan, and South Korea are a few of the top importing countries in these respective regions that are underpinning import demand growth. Each of these importers have different buying patterns and participate in different U.S. and competitor government programs that influence the purchase decision and the origin of supply. Import demand elasticities would provide valuable information to trade economists of wheat and wheat flour from various sources and therefore would shed light on factors affecting the competitive position of major suppliers in these markets. Moreover, the overall objective of this study is to provide accurate estimates of wheat and wheat flour (where applicable) import demand elasticities from these selected importing countries. More specifically these elasticities will be used to compare the factors affecting demand between government assisted and cash importers. Algeria, Egypt, Jordan, South Korea, and Japan have been chosen for this study because of their importance in international wheat and flour trade and their different import purchasing behavior. Both wheat and flour will be included in this study for Algeria, Egypt, and Jordan, and only wheat will be

analyzed for South Korea and Japan. The reason for this inconsistency in estimation is that Algeria, Egypt, and Jordan import substantial quantities of both wheat and wheat flour, while Japan and South Korea are major importers of wheat. Less than 1 percent of the group expenditure on wheat and wheat flour in South Korea and Japan is used to import wheat flour. Therefore, wheat flour is eliminated from the estimation of South Korea and Japan. Table 1 gives the summary statistics of the expenditure in each import market used for wheat and wheat flour imports.

Accurate import demand elasticities are an important feature of international agricultural research. Policy makers and trade economists rely on precise estimates of demand responses to prices and expenditure to make timely policy decisions and simulations. Recent studies by Yang and Koo, Capps, Tsai, et al, and Hayes, Wahl, and Williams have focused on meat demand in Japan and other Pacific Rim countries. Wilson estimated wheat demand with a transcendental demand function that differentiated U.S., Canadian, and Australian wheat by class, but only in Pacific Rim countries. Very little research has focused on import demand for wheat and wheat flour and the competition among different sources in the individual importing countries that are targeted for this study. Neither has any study differentiated the cash buyers from the government assisted importers.

This study uses the restricted Source Differentiated Almost Ideal Demand System (RSDAIDS) used by Yang and Koo. The model is restricted because the general demand restrictions (homogeneity and symmetry) are imposed on the data. In the RSDAIDS model, quantities, values and prices of imported wheat and wheat flour are differentiated

by source of supply and the expenditure is treated as endogenous (LaFrance). Estimations by Yang and Koo, Capps, et al, and Hayes et al do not concentrate on wheat and wheat flour or these specified importing countries. The wheat demand elasticities estimated by Wilson provide information about the competition among wheat classes, not among the major exporters and only in the Pacific Rim importing countries. The addition of wheat flour elasticities and a variety of importers across geographical regions makes an important contribution to the literature.

This study is organized as follows. The following section discusses government assistance received by the targeted import markets and also the competition among the export suppliers. The demand model considerations of previous literature are described in the third section, while in the fourth section the restricted Source Differentiated Almost Ideal Demand System (RSDAIDS), the model chosen for this study, is specified. In the fifth section the estimation, data and results are presented. In the sixth and final section, the summary and conclusions and policy implications of the study are presented.

Import Behavior of Target Markets

Government Assisted Importers

Over the last twenty years, Algeria, Egypt and Jordan have received substantial amounts of U.S. government assistance to import wheat and wheat flour. All three countries have participated in one or all of the U.S. programs: the Export Enhancement Program (EEP), General Sales Manager credit guarantee programs (GSM 102 and 103), and Public Law 480 (PL480). These three programs that apply to wheat also apply to wheat flour. Over the past 20 years, Egypt and Jordan have imported up to 100 percent

of total wheat and wheat flour imports from the U.S. under EEP (USDA, 1996a). The portion of Algeria's wheat and wheat flour imports that are under the U.S. government programs have been mainly under the GSM-102 and 103 programs. Over the last 10 years, an average of 40 percent of Algeria's wheat and flour imports from the U.S. have been under U.S. credit guarantees (USDA, 1996b). Table 2 provides the actual amount of wheat, in thousand metric tons, imported under the United States General Sales Manager program during Fiscal Years 1990/91 and 1994/95 for Algeria, Egypt, and Jordan. Total market imports, including cash, concessional, and commercial purchases are also included in this table, however comparisons can not be made between the data because of the time of year the data are reported. Credit program units are reported in Fiscal Year (October-September), while the total market imports are reported on a Trade Year (July-June). Wheat and wheat flour gifts or purchases from the U.S. of all five countries under PL480 have been the smallest amount of imports under all U.S. government programs (USDA, 1996b). Accurate time-series data of imports under the PL480 and EEP programs for these three participating countries are not readily available from any consistent data source. Also, due to the sensitive nature of import programs, specific information about the competitor programs is unavailable. However, credit guarantee programs, price-differentiating mechanisms, and export subsidies have and continue to be offered by export competitors to these target importing countries.

Cash Importers

South Korea and Japan are considered cash importers. Japan imports wheat only by cash purchases. In past years, South Korea has imported wheat under credit

guarantees (see Table 2) and EEP, however these government assisted purchases have been minimal. South Korean wheat imports under these programs have been less than 20 percent of total market imports from the U.S. Recently, South Korea's participation in these programs was phased out; therefore, for this study South Korea will be treated as a cash buyer.

Export Competition of Major Suppliers

The competition between different sources of supply of wheat and wheat flour has been intensifying in these selected import markets. Production and export levels of wheat and flour in the top wheat supplying countries have increased to record levels over the past tweny years. The United States, the European Union (EU), Australia, and Canada are the top suppliers of wheat and flour to the five import markets selected for this study. These four exporters have been increasing their efforts to gain market share in each of these import markets in order to achieve a competitive advantage. An exporting country is considered as having a competitive advantage in the export market if it consistently exports goods to the international market place earlier than other competing countries (Rose). Gaining a competitive advantage is usually achieved by offering high quality wheat at an affordable price. The government assisted programs offered to import markets by the competing suppliers directly affects the price of the goods and the importers decision to purchase wheat and flour from any origin supplier. All four competitors offer some type of assistance to import markets to promote their product, however each country has been focusing on certain target regions to market their wheat and wheat flour (USDA, 1995-97).

The European Union (EU) offers subsidies, credit sales, and food aid to promote EU wheat. The EU is the only exporter that offers substantial amounts of assistance comparable to the U.S. This assistance is heavily targeted for exports to Africa and the Middle East. The focus on these markets is primarily due to the proximity between Europe and these regions. Because of the nearby location and the government assisted programs, the EU is better able to meet these countries' import needs in the quantity feasible for the port facilities, at a lower price because of the shorter distance to transport, and in a timely manner (USDA, 1995-97).

Canada and Australia's wheat and flour exports are managed by single desk-selling wheat boards. The Canadian Wheat Board (CWB) and the Australian Wheat Board (AWB) are referred to as single desk-selling because they are the only entity in each respective country with the authority to export wheat and flour. Because the wheat is pooled together and sold by one entity to the international market, the wheat boards are able to offer competitive prices to international buyers. In addition, the Canadian and Australian Wheat Boards (CWB and AWB) do offer food aid and credit sales to importing countries, however the amount of assistance offered under these programs is small. The minimal amount of assistance is focused on primarily the Asian region. In the 1970s and early 1980s the main import market for these two exporters was the former Soviet Union (FSU). When the FSU reduced their wheat and flour import programs, Canada and Australia began to focus on exporting to Asia. Also, Canada and Australia focus on this region because of the large growth in import demand and also because of the distinctive consumption needs. Furthermore, CWB and AWB have recently been focusing on

improving the quality of wheat and flour and increasing the marketing activities in the Asian region. New "designer" wheat varieties are being introduced in both countries to satisfy the tastes and preferences of the Asian consumer (USDA, 1995-97).

The United States is the largest provider of government assistance to the international market. Import assistance from the U.S. in allocated in the form of the Export Enhancement Program (EEP), PL480, and GSM-102/103. EEP subsidies were administered by the U.S. government from 1985 to 1995. As of July 1995, EEP was eliminated. During the ten year period, EEP subsidies were used to maintain U.S. wheat and flour market share and to counter-act the price-cutting subsidies of the EU. The PL480 program is the U.S. government concessional sales programs. Purchases made under this program are either food aid donations for humanitarian food needs, government to goverment sales under 30 year credit for developing countries and/or government to government grants to least developed countries for economic development. GSM-102/103 (General Sales Manager) are the commercial credit guarantee programs offered by the U.S. government through the Commodity Credit Corporation (CCC). Under these programs, the CCC guarantees payments due from approved foreign banks for credit terms up to three (GSM-102) and ten (GSM-103) years. The U.S. does not target a specific region, but simply offers these available programs to importing countries that need assistance in attaining the proper consumption needs. Despite the large amount of assistance offered to importing markets, the U.S. is considered the residual supplier of wheat and wheat flour. Because U.S. wheat and flour is the highest priced of all the competitors, import markets first purchase high-quality, lower-priced wheat from other

competing suppliers (i.e. EU, Cananda, and Australia) and then purchase their remaining consumption needs from the U.S. In other words, the U.S. plays the role of being the supplier of the last resort.

Demand theory explains that price and quality are the two main factors which determine the importer's decision to purchase wheat from various sources. Furthermore, quantity demanded is a function of prices and income with the world market prices determined by supply and demand factors within a given market. Therefore, the price and quality of any origin wheat available to the international market are among the factors that determine which export competitor can be the "first" supplier of wheat to the international market.

Model Considerations

The RSDAIDS model has been used infrequently in international demand system models. Previous studies of demand theory have specified the Armington or Rotterdam models (Alston, Carter, et al and Capps, Tsai, et al). The Armington and the RSDAIDS models maintain a similar advantage in that both assume imperfect substitutability among goods from different sources of supply (Yang and Koo). The assumptions of block separability and product aggregation are inherent in the Armington model and are usually assumed in the empirical application of the AIDS model. Block separability assumes that goods are not differentiated by source of supply and product aggregation allows the model to consist only of share equations for a good from different origins (Yang and Koo). These assumptions are not inherent in the restricted SDAIDS model. The Armington model also suffers from homotheticity and single constant elasticities of substitutions

(Yang and Koo) and in the study by Alston, Carter, et al, the Armington model was rejected for cotton and wheat using three alternative testing approaches. The RSDAIDS model is flexible, easy to use and the general demand restrictions (homogeneity and symmetry) are easily enforced if they do not hold for the unrestricted model. Also, the adding-up condition is inherent in the model.

This study uses the RSDAIDS model to estimate wheat demand in Japan and South Korea (recall that these two importers import very little wheat flour) and both wheat and wheat flour demand in Algeria, Egypt, and Jordan. Commodity differentiation among sources of supply is important in wheat and flour import demand analysis in order to measure the competition between exporters. The RSDAIDS model also allows the relationship between wheat and wheat flour to be measured. In the estimation of Japanese meat import demand, Yang and Koo assumed that agricultural products can be aggregated together if all prices move together by the same proportion. This was not the case for the demand for meat products. Because of quality differences, countries view commodities from different sources of supply differently (Yang and Koo). In the extremely unique case of wheat and wheat flour, price distorting mechanisms used by export competitors (such as export subsidies and price segmentation by commodity boards, i.e. selling wheat at different prices in the domestic and international markets) and different transportation costs cause irregular movements of import prices. Homogeneous import price movements among sources seem unlikely for wheat and wheat flour. Similarly, Alston, Carter, et al tested the inherent assumption of block separability (model consists only of share equations for a good from different souces) in the Armington model for wheat and cotton

and concluded that this assumption results in biased demand elasticities.

The RSDAIDS is the model chosen for this study because block separability and product aggregation are not inherent in the model. Recall that the model is referred to as restricted because the general restrictions of demand are imposed on the data. In this study the RSDAIDS model is applied to each importing country separately (Algeria, Egypt, Jordan, South Korea, and Japan).

Specified Model

The RSDAIDS model is the model specified for this study and was derived from Deaton and Meullbauers's AIDS model (Yang and Koo). Block substitutability is assumed as a maintained hypothesis for those countries importing flour (Algeria, Egypt, and Jordan). Block substitutability assumption means that cross-price effects with regard to demand for any good in *i* will be the same with respect to the price of good *j* from different origins. In this study, the block substitutability refers to the cross price effect between the two goods (wheat and wheat flour). This hypothesis is assumed only in the country models that are estimated with both wheat and wheat flour (Algeria, Egypt, and Jordan). The RSDAIDS model with both wheat and wheat flour is specified as:

$$(1) \qquad w_{ih} = \alpha_{ih} + \sum_{k} \gamma_{ihk} \ln(P_{ik}) + \sum_{j \neq i} \gamma_{ihj} \ln(p_j) + \beta_{ih} \ln\left(\frac{E}{P^*}\right)$$

The RSDAIDS model for Japan and South Korea that excludes the wheat flour good and also the block substitutability assumption is specified as:

$$(2) \qquad w_{ih} = \alpha_{ih} + \sum_{k} \gamma_{ihk} \ln(P_{ik}) + \beta_{ih} \ln\left(\frac{E}{P^*}\right)$$

The only difference between the two model specifications is the elimation of the block substitutability assumption in equation (2). This assumption is elimated because South Korea and Japan do not import wheat flour. In both models, W_{ih} is the market share percentage of good *i* from source *h* in each import market, calculated as $(p_{ih}*q_{ih})/E$; p_{ih} is the price of the good *i* from source *j* measured in the import market domestic currency per metric ton; q_{ih} is the quantity of the good *i* imported from source *j* measured in thousand metric tons; *i, j* denote goods (wheat and wheat flour); *h, k* denote products (sources of supply; the number of sources may differ in each importing country); E is the total expenditures on goods *i* and *j* by an importing country measured in the import market domestic currency; α, β, γ are parameters; P* is the Stone's index defined by $\sum_i \sum_h W_{iht-1}$ ln (p_{ih}); and ln $(p_j) = \sum_k W_{jkt-1}$ ln (p_{jk}); In general the RSDAIDS model has M+(N-1)+2 parameters to be estimated in each equation with M being the number of supply sources, N being the number of goods, plus the constant, and the expenditure parameter (Yang and Koo).

The Marshallian and Hicksian elasticities of the RSDAIDS model used by Yang and Koo are:

$$\varepsilon_{ihih} = -1 + \frac{\gamma_{ihh}}{W_{ih}} - \beta_{ih} \qquad \delta_{ihih} = -1 + \frac{\gamma_{ihh}}{W_{ih}} + W_i$$

$$\varepsilon_{ihik} = \frac{\gamma_{ihk}}{W_{ih}} - \beta_{ih}\left(\frac{W_{ik}}{W_{ih}}\right) \qquad \delta_{ihik} = -1 + \frac{\gamma_{ihk}}{W_{ih}} + W_k$$

$$\varepsilon_{ihj} = \frac{\gamma_{ihk}}{W_{ih}} - \beta_{ih}\left(\frac{W_j}{W_{ih}}\right) \qquad \delta_{ihj} = -1 + \frac{\gamma_{ihk}}{W_{ih}} + Wj$$

Where ϵ denotes Marshallian elasticities and δ denotes the Hicksian or income compensated elasticities.

Expenditure elasticity is:

$$\eta_{ih} = 1 + \frac{\beta_{ih}}{W_{ih}}$$

The general demand conditions are specified as:

Adding-up: $\sum_i \sum_h \alpha_{ih} = 1; \quad \sum_h \gamma_{ihk} = 0; \quad \sum_i \sum_h \gamma_{ihj} = 0; \; \sum_i \sum_h \beta_{ih} = 0:$

Homogeneity: $\sum_k \gamma_{ihk} + \sum_{j \neq i} \gamma_{ihj} = 0$

Symmetry: $\gamma_{ihk} = \gamma_{ikh}$

Because product aggregation (goods are not differentiated by source) is not a characteristic of the RSDAIDS model, and each of the individual country models were estimated differentiating goods by source of supply, it is assumed that the decision of the importer to purchase wheat and wheat flour is independent of the decision to purchase any other food or feed grain (i.e. rice, corn, etc.). Therefore, wheat and wheat flour can be assumed separately from all other grains. Furthermore, it is assumed that wheat and

wheat flour can be estimated within the same system because of the nature of wheat to be milled into wheat flour for the final consumable good.

Data, Estimation and Testing Procedures

Data Description

Annual data for wheat and wheat flour for 1970 through 1993 were used for this study. Wheat and wheat flour were imported from different sources with a different number of supply sources. The data for import quantity (metric tons) and value (in U.S. dollars) were obtained from the U.S. Department of Agriculture (USDA), Foreign Agricultural Service United Nations calendar year trade data. The quantities and values in this data set were reported by the importing country and represent all of the costs of the imported goods, i.e. cost, insurance, freight (c.i.f.). These data also include the quantities and values of the goods imported under government assisted programs (EEP, GSM-102/103, PL480). The exchange rate and the Gross Domestic Product of each country were provided by the International Monetary Fund's *International Financial Statistics Yearbook*.

Among the three importing countries importing both wheat and wheat flour, wheat is by far the leading import. The U.S., Canada, Australia, and the European Union were the major suppliers of wheat to these importing countries. All other exporting countries were combined into a rest of world export source. The statistics of the expenditure share for each good and source of each country are summarized in Tables 3, 4, 5, and 6. Algeria and Egypt both have four wheat sources and three wheat flour sources. The United States, the European Union, and Rest of the World supply wheat to both countries,

while Canada is a supply origin to Algeria (Table 3), and Australia is a supply origin to Egypt (Table 4). Both countries receive wheat flour from the United States, the European Union and the Rest of World. Jordan has two main wheat suppliers with the U.S. providing slightly over 44 percent and the Rest of World 26 percent. The European Union is the leading flour source accounting for 12 percent while the U.S. and ROW provide 9 and 7 percent respectively (Table 5). In each of these countries, the U.S. is the predominate supplier of wheat, while the European Union is the dominating source of wheat flour. In South Korea, wheat from the United States accounts for almost 80 percent of the market share. Canada and Rest of World combined supply the remaining 15 percent. The United States supplies just over 50 percent of Japan's total imports, with Canada and Australia accounting for 27 and 17 percent respectively of this market (Table 6).

Estimation Procedures

The import demand model for Algeria, Egypt, and Jordan include 2 goods, wheat and wheat flour, with different numbers of sources of supply. The models for Japan and South Korea include 1 good, wheat. A system of equations for South Korea and Japan including both wheat and wheat flour and assuming block substitutability was also estimated. However, because both countries spend less than 1 percent of total group expenditure on wheat flour, the elasticities representing the cross commodity relationship were conceptually and empirically inferior. Furthermore, the price and income elasticities of both estimations showed the same pattern of response, therefore the block substitutability assumption was eliminated and the cross commodity elasticities are not

reported for these countries. The number of sources for each good in each country include: Algeria--4 sources for wheat and 3 sources for wheat flour; Egypt--5 and 3 sources for wheat and wheat flour respectively; and Jordan--3 and 4 sources for wheat and wheat flour respectively. Both South Korea and Japan have 3 sources for wheat. The major sources of supply for wheat and wheat flour are the United States, Canada, Australia, the European Union, and Rest of the World. The supply sources were chosen in each importing country if a particular country provided at least 5 percent of the good based on the mean value of the selected time period. All other sources were combined in the Rest of the World category.

Algeria and Egypt are estimated with 7 equations (seven sources for wheat and wheat flour), while Jordan has 5, and South Korea and Japan both have 3. An equation was dropped in each country model for estimation purposes in order to avoid the problem of singularity due to the adding up condition. The Rest of the World equation was dropped in each of the countries except for Japan. The Rest of the World supplies Japan with less than 1 percent of all wheat imports therefore was not considered a supply source. Australia was the dropped equation in the Japanese model. The parameters of the omitted equations were obtained by imposing the adding up restriction. Each model was estimated with Seemingly Unrelated Regression (SUR).

The import prices in U.S. dollars per metric ton for wheat and wheat flour were calculated by dividing the U.S. dollar values by the quantity of the good imported in metric tons. These unit prices were converted to the domestic currency of each country by multiplying the U.S. prices by the respective exchange rate. Market shares of each

supply origin were determined by multiplying the total import quantity by the domestic currency unit price and then dividing by the total import expenditures in the importing country domestic currency for a product group (wheat or wheat and wheat flour). Stone's index in the RSDAIDS model is the sum of the lagged market shares multiplied by the natural log of the prices for the products in each model. The lagged market shares are used to avoid the endogeneity with respect to price index and to avoid empirical difficulties of annual time-series data (Green and Alston).

Testing Procedures

The null hypothesis of expenditure endogeneity is tested and examined for each model. Also, the Likelihood Ratio Test is used to test each of the general demand restrictions before application to the models and system misspecification testing procedures as suggested by McGuirk, Driscoll, et. al. were used and examined before estimation.

Because the endogenous market share variable is used to calculate the expenditure, the expenditure may also be endogenous when estimating any AIDS model. Expenditure endogeneity may cause certain biases and inconsistencies within the model (LaFrance). This study uses the Wu-Hausman test as suggested in Blundel to determine if the expenditure can be treated as exogenous. This procedure requires the expenditure variable ln(E/P*) to be tested by estimating the following single equation with Ordinary Least Squares (OLS) estimation:

$$\ln\left(\frac{E}{P^*}\right) = \alpha_{ih} + \sum_i \sum_j P_{ih} \ln P_{jkt} + \sigma_{ih} \ln\left(\frac{E}{P^*}\right)_{t-1} + \delta_{ih} \ln Y_t + \nu_{iht}$$

where t=time, Y is Gross Domestic Product (GDP), E is total group import expenditure, P* is Stone's index and υ_{iht} is a random error term. This error term was included in each of the RSDAIDS equations. The models were run to determine the effect of the residual (v_{iht}) on total group expenditure. The Wald Chi-Square statistic was used to complete the endogeneity test. These test statistics for each model are reported in Table 7. Results from this test indicate that The Wu-Hausman test cannot reject the Null hypothesis that the expenditures in each of the models are not correlated with the error terms. These tests confirm that the expenditure variable can be treated as exogenous.

The Likelihood Ratio test is used to test the general demand restrictions. This testing procedure is used because it performs well with small samples. The Likelihood Ratio test statistic compares the unrestricted model to the restricted model and measures whether the data can conform to each of the general restrictions. The results of these tests indicate that the data conforms to both Homogeneity and Symmetry in Japan and South Korea, while the data in Algeria conforms to Homogeneity and the data in Egypt and Jordan conform to symmetry. These restrictions are enforced on the data in the respective models.

McGuirk, Driscoll, et. al suggest a thorough misspecification testing strategy prior to the estimation of a full system of equations. In order to evaluate theory using econometrics, the theory must be viewed in the context of a valid statistical model and verify that the assumptions in the model are adequate for the data used in the estimation procedures. These system tests relate to the distribution and moments of the observable random variables and take into consideration information in, and interactions between all

equations within a system (McGuirk, Driscoll, et. al.) Testing procedures for functional form, parameter stability, homoscedasticity, and autocorrelation are performed for the system as well as for each individual equation. McGuirk, Driscoll, et al define each of these assumptions as follows: (1) Functional form: conditional mean of the exogenous (independent) variables are linear in form; (2) Parameter stability: exogenous variables do not vary over time; (3) Autocorrelation: randomly distributed error terms are not related to lagged (or previous) error terms; (4) Static heteroskedasticity: error terms do not have a dependent relationship with the exogenous variables; and (5) Dynamic heteroskedasticity: error terms are related to the exogenous (independent) and endogenous (independent) variables. The results (in the form of p-values) of the misspecification testing regime are presented in tables A through G in the appendix. The smaller the p-value, the more evidence against the assumption(s) holding (McGuirk, Driscoll, et.al). The results of the misspecification tests for Algeria, Egypt, and Jordan are more significant than expected because of the relatively small and variable amounts of wheat flour imported by these import markets each year. The results of the cash importers (South Korea and Japan) are as expected because of the elimination of the wheat flour good.

Import Market Estimation Results

The Marshallian and Hicksian demand elasticities as well as the income elasticities are reported for each individual country in this section. Marshallian demand elasticities refer to the percentage change in quantity demanded for a product due to a 1 percent change in price when demand is expressed as a function of prices and income. Hicksian

demand elasticities are derived as the percentage change in quantity demanded due to a 1 percent change in the price of a product when the demand is expressed as a function of prices and utility (utility is held constant). The interpretation of Hicksian demand elasticities differs from Marshallian elasticities. The Hicksian own and cross-price elasticities are a function of the import markets' utility as opposed to income in Marshallian elasticities. The Hicksian elasticities reflect the tastes and preferences of the import markets' consumption habits. A consumer's (the consumer in this study is the import market) utility function will not change over a short period of time as a result of price and income changes. Moreover, Hicksian demand results give a long-term view of how changes in prices affect the quantiy demanded by the consumer in respect to the amount of utility the consumer receives from the particular good (wheat and/or wheat flour). The signs of the Hicksian elasticities are expected to be symmetric throughout each elasticity matrix in each individual country model. Significant non-symmetric price elasticities signify price movements in different directions and also that the data may not conform to all the general demand restrictions. Recall from the testing procedures that all of the restrictions did not hold for each individual import market model. In the following discussion of estimation results, only the Marshallian demand elasticities are mentioned, however the Hicksian demand elasticities are presented for the reader.

The Marshallian cross price elasticities show the type of relationship among suppliers. A significant positive cross price elasticity indicates a competitive relationship between sources of supply. A significant negative cross price elasticity reveals a complementary relationship between suppliers. Complementary relationships can be

expected due to the importers behavior of blending the different types of wheat for the milling of wheat flour. Also, international consumers may blend either wheat or flour of lower quality with high-quality wheat to ensure the consumable quality of the final product.

Cross-price elasticities between goods show the type of relationship among wheat and wheat flour. A negative elasticity reveals a complementary relationship which implies that a price increase in one good results in a declining in quantity demanded of the other good. A positive cross-product elasticity reveals that the two products will substitute for each other.

Algeria Import Market for Wheat and Wheat Flour

Tables 8, 8a, and 8b include the Marshallian and Hicksian demand elasticities and parameter estimates for Algerian wheat and wheat flour import demand using a RSDAIDS model. The system R^2 for Algeria is .9903. All own price elasticities have the expected signs and all were significant except for Canada's wheat price and ROW flour price. All of the income elasticities have the expected signs and are significant. The EU and the U.S. are in a favorable trading position in wheat and wheat flour respectively, because each have an income elasticity greater than 1 (EU--1.123; U.S.--1.091). This implies that as Algeria's income level increases, EU wheat exports and U.S. wheat flour exports will also increase to Algeria. Because all of the expenditure elasticities are highly significant, all wheat and wheat flour exports from all suppliers would increase to this market with an increase in Algerian income.

In this market, the supply competition is among the U.S., EU, and ROW. Wheat

from the ROW provides the greatest competition for US exports (.4404), because it is the only positive significant cross-price elasticity for the US. The U.S. wheat provides the most significant competition for EU exports (2.388). Also, EU wheat exports exhibit competition for ROW wheat exports (1.495). Stronger competition between exporters exists in flour trade. Competition among the U.S. and EU is the strongest with positive and significant cross-price elasticities of 5.519 and 2.312 respectively. Also, the EU provides the only competition to ROW flour (3.232). Flour from the ROW has a complementary relationship with European Union flour based on the significant cross-price elasticity of -.8877. Wheat has a significant complementary relationships with flour from the U.S., EU, and ROW, and flour is a substitute for ROW wheat.

Egypt Import Market for Wheat and Wheat Flour

Tables 9, 9a, and 9b present the Marshallian and Hicksian elasticities and parameter estimates for Egypt wheat and wheat flour import demand using the RSDAIDS model. The system R^2 for Egypt is .9599. All own-price elasticities have the expected sign and all are significant except for U.S. and EU wheat and ROW flour. These significant own-price relationships are very elastic and reflect that the quantities of wheat and flour are very responsive to price changes. All income elasticities are positive and significant at the 1 percent level. Australia and ROW are in a favorable trading position in wheat, with elasticities of 1.003 and 1.085 respectively U.S. wheat flour is also in a favorable trading position with an income elasticity of 1.033. Wheat and flour exports of all competitors would benefit from an income increase in Egypt because all income elasticities are significantly positive.

The cross-price elasticities show that the EU and Australia are engaged in the greatest competition for wheat exports to Egypt. Australia's wheat exports would increase from a price decrease in the EU (2.585). Similarly, the EU would benefit from an increase in the price of Australian wheat (1.343). Very little competition exists among suppliers of wheat flour. ROW flour has a slight substitute relationship with US flour (.6321) and ROW flour exports would benefit from a price increase in US flour.

The cross-product price elasticities shows that flour has a complementary relationship to U.S. wheat and also wheat is complementary to flour in all competitive countries.

Jordan Import Market for Wheat and Wheat Flour

Tables 10, 10a, and 10b present the Marshallian and Hicksian elasticities and parameter estimates for Jordan wheat and wheat flour import demand using the RSDAIDS model. The system R^2 for Jordan is .9850. The signs of the own price elasticities are as expected except for ROW wheat, however not all are significant. The U.S. wheat and flour own-price elasticities are significant at the 1 percent level (-1.674 and -3.719). These elasticities show that Jordan's decision to import from the U.S. is very price responsive. All the income elasticities are positive, but only the U.S. wheat and EU flour elasticities are significant, also at the 1 percent level (1.438 and 1.486). The cross-price elasticities do not have the expected signs and are not significant. These results reveal that the U.S. dominates both the wheat and flour market and there is no price responsiveness from other suppliers. Cross-product elasticities show that flour is a complement to wheat in both the US and ROW (-.1926 and -.3066 respectively) and also wheat has a

complementary relationship with flour in the EU (-.9415). This implies that U.S. and ROW wheat exports would benefit from a decrease in the price of flour.

South Korea Import Market for Wheat

Tables 11, 11a, and 11b present the Marshallian and Hicksian elasticities and parameter estimates for South Korea wheat import demand using the RSDAIDS model. The system R^2 for South Korea is .9850. The own-price elasticity signs in the U.S. and Canada are negative as expected, however only the U.S. own-price is significant (-.6772). All income elasticities are positive, but only Canada and ROW are significant (both at the 1 percent level). Both Canada (4.030) and ROW (1.780) wheat exports would benefit greatly from an increase in income in South Korea.

Cross price-elasticities show that the greatest competition among exporters exists between ROW and the U.S. U.S. wheat is a substitute for ROW wheat (1.1719), while Canadian wheat is complementary to ROW wheat (-2.684).

Japan Import Market for Wheat

Tables 12, 12a, and 12b present the Marshallian and Hicksian elasticities and parameter estimates for Japan wheat import demand using the RSDAIDS model. The system R^2 for Japan is .6799. The own-price elasticities are all significantly negative for U.S., Canada, and Australia (-1.468, -.4881, and -2.346 respectively). Also, all the income elasticities are positive as expected. Canada and Australia's income elasticities are significant at the 10 and 1 percent significance level respectively. However, Australia is the only competitor with an income elasticity greater than 1 and Australia's wheat exports would benefit from an income increase in Japan (1.643).

The cross-price elasticities show that the U.S. and Canada have a complementary relationship. Both elasticities are significantly negative (U.S. equation: -.3188; Canada equation: -.4666). Australian wheat is a substitute for U.S. wheat with a significantly positive cross-price elasticity of .9612.

Summary and Conclusions

The results from the RSDAIDS models for Algeria, Egypt, Jordan, South Korea, and Japan provide valuable information about wheat and wheat flour trade and the competition among suppliers. An exporter was considered as having a favorable trading position when income elasticity is elastic and own-price elasticity is inelastic. According to this criterion, U.S. flour is competitive in Egypt and EU flour is competitive in Jordan.

The strength of competition between exporters is measured by the magnitude and significance of the cross-price elasticity. The elasticity between wheat supplied by the U.S. and EU wheat (2.388) in Algeria indicates the most intense competition in all import markets. Also in Algeria, flour supplied by the EU is competitive with U.S. flour (5.519).

The results among government assisted purchasing and cash buyers differ as expected. In Egypt, Algeria and Jordan, where the majority of the goods are imported under assistance, the expenditure elasticities are highly significant and are just around 1 for each of the competitors. It is worthy to note that these three countries continue to pursue economic development and rely on income to make import purchases. Another result of this study is that the price relationships in these three markets are not as significant compared to the developed markets of South Korea and Japan. Perhaps this is becasue these are developing countries which rely on assistance from supplying governments to

meet the consumption needs in these respective countries. The price elasticity results show that quantity of wheat and flour imported from a particular supply source by each government assisted importer is affected by the the price of the supplying source and the price of only one additional competitor. The significant own and cross-price elasticities in each market correspond to the supplier that offers the most government assistance. Therefore, the competitive relationships among suppliers are as expected in these markets. The U.S. and EU are the significant competitors in each of these markets. The EU offers export restitutions and a credit line comparable to the U.S. credit guarantee programs (USDA, 1995-97). The competition between the US and the EU in these government assisted markets can also be explained by the class of wheat purchased by these markets. Both Algeria and Egypt are consumers of large quantities of white wheat. The majority of wheat produced for export in the U.S. is Hard Red Winter. This puts the U.S. at a competitive disadvantage to other exporters (EU, Canada and Australia) who produce more of this variety. Algeria and Egypt will consistently purchase wheat from the white wheat producers before purchasing other varieties from the U.S. Jordan's preferred classes of wheat are Hard Red Winter, Hard Red Spring, and Soft Red Winter. The U.S. is the main supplier of Hard Red Winter, which is reflected in the price elasticities (USDA, 1996a).

Japan's cross price elasticities in the U.S. are highly significant and reflect the consistent buying of wheat from the three major exporters. In contrast, Canada and Australia's cross price elasticities are not as significant as might be expected. Over the last 10 years, Japan consumption patterns have remained relatively stable and Japan

purchases roughly the same amount of wheat from the U.S., Canada, and Australia. Wheat purchases from all three suppliers have followed the same pattern. Despite dramatic swings in price movement, Japan's continuity of purchasing roughly the same amount of wheat from each supply will remain (USDA, 1995-97).

South Korea seems to be the exception to expectations of cash buying behavior. This import market is just recently making the transition from only a small amount of government assistance to cash buying. The cross price elasticity results can be explained by the factors affecting South Korea's purchasing decisions. The decision to purchase wheat from any origin supplier, is based on quality equally to price. Approximately half of all imports from the U.S. are for livestock feeding purchases and wheat for this purpose is based on price. The wheat purchased for domestic food consumption is driven mainly by quality. South Korea depends on a very high protein wheat for the milling and baking of noodles for human consumption. The demand for this high quality wheat is being met by Canada and Australia and displacing U.S. market share. Canada and Australia are developing high-quality "designer" wheats targeted to the consumption needs of South Korea as well as other Asian importers (USDA, 1996a).

Policy Implications

Results from this study have several important policy implications for the U.S. wheat industry and local and national policy makers. One is that wheat and wheat flour import demand from the high profiled import markets (Former Soviet Union, China, and the European Union) of the 1970s and early 1980s has weakened over time. Consumption needs in these countries are now being met by domestic supplies. Currently, wheat and

wheat flour import demand is growing in markets in Africa, Asia (outside of China), and the Middle East. In addition, the majority of these growing markets are also concentrating on economic development and need assistance to purchase goods to satisfy the consumption needs. Government assistance from the U.S. is expected to assist these markets to achieve economic development and to create a positive political environment that may lead to the development and maintainance of a successful relationship for international trade. Another implication for national policy makers is the allocation of Export Enhancement Program (EEP) funds. If supply and demand conditions in the world wheat market necessitate the reimplementation of EEP, the allocation of EEP money would be used more economically efficient in those markets with highly elastic U.S. price elasticities. The markets with elastic price elasticities are more sensitive to changes in the price of U.S. wheat and are likely to seek out the supplier offering the lowest price.

The second policy implication for policy makers is the importance of quality specifications in cash buying markets. Quality plays an important role in the decision to import from any origins of supply. While the U.S. is a consistent producer of high-quality wheat, Canada and Australia are gaining a distinct advantage with high-quality, designer wheats. These supply competitors are making great strides in target regions, specifically Asia, to meet the desired quality needs of the consumer. U.S. producers would benefit greatly from developing and producing varieties and grades of wheat demanded by these growing import markets. Also, identifying marketing strategies that would further increase U.S. wheat exports to targeted markets. Although total U.S. wheat and flour market share is not at the record high level once achieved in the early 1980s, the U.S. remains in a

favorable trading position in the international wheat market. As the competition from other suppliers intensifies, the U.S. wheat industry would benefit from assisting the economic developing countries and increasing the marketing activities in the cash buying countries.

Limitations and Suggestions for Further Research

There are several limitations within this study that give important implications for further research. The first limitation is separability of wheat and wheat flour and other food grains. In this study, wheat and wheat flour are estimated in the same system and are assumed separable from all other food grains. The separability of these commodity groups are not tested and reported, but only assumed. Conducting these tests would contribute additional support to the commodity groupings used in the study. The second limitation is the exclusion of domestic production in each import demand model. Theory suggests that domestic production affects the import decision of a particular market to import any good. However, in this study, South Korea does not domestically produce wheat, and Japan's domestic production allocation is such that it does not change and does not affect the import purchases of wheat. Domestic production in these particular markets would not be an import demand factor. However, further research to determine if domestic production would impact import programs in Algeria, Egypt, and Jordan would be an addition to the literature. The third limitation is the calculated expenditure used for each demand system. The expenditure used in this study is a calculation of the importing countries' group expenditure on wheat and wheat flour (where applicable). The importer's total income may be a better explanation of the expenditure used for importing the two goods. The

validity of the two incomes may differ depending on which entity makes the import purchases and whose utitily is being maximized (government agency versus private industry).

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Table 1. Summary Statistics for Percentage of Expenditure Spent on Wheat and Wheat Flour in Selected Importing Countries for 1970-1993.

Variable	Mean	Std. Dev.	Minimum	Maximum
Algeria				
Wheat	.9003	.1134	.4552	.9999
Wheat Flour	.0580	.1134	.0000	.5447
Egypt				
Wheat	.6804	.1112	.4917	.9265
Wheat Flour	.3195	1112	.0734	.5082
Jordan				
Wheat	.7115	.2829	.1896	.9951
Wheat Flour	.2885	.2829	.0048	.8103
South Korea				
Wheat	.9891	.0186	.9191	1.0000
Wheat Flour	.0108	.0186	.0000	.0808
Japan				
Wheat	.9999	.0000	.9999	.9999
Wheat Flour	.0001	.0000	.0000	.0001

Table 2. Imports (in Thousand Metric) of Wheat and Wheat Flour Under U.S. GSM-102 and -103 Programs, Fiscal Years 1990/91 - 94/95.

U.S. GSM-102	1990/91	1991/92	1992/93	1993/94	1994/95
Algeria					
Total Market Imports[a]	4,600	3,700	3,800	4,813	4,500
Program Imports[b]	1,800	1,500	1,000	935	26
Egypt					
Total Market Imports[a]	5,692	5,807	6,004	5,900	5,850
Program Imports[b]	----	47	158	318	290
Jordan					
Total Market Imports[a]	866	703	576	734	730
Progam Imports[b]	----	----	----	----	50
South Korea					
Total Market Imports[a]	4,206	4,396	3,994	5,647	4,293
Program Imports[b]	1,200	981	1,000	994	592
U.S. GSM-103					
Algeria					
Total Market Imports[a]	4,600	3,700	3,800	4,813	4,500
Program Imports[b]	----	----	100	103	----
Jordan					
Total Market Imports[a]	866	703	576	734	730
Progam Imports[b]	128	51	----	----	----

Based on data from FAS, USDA

[a]Based on trade year July - June.

[b]Based on fiscal year October - September.

Table 3. Summary Statistics for Competitor Wheat and Wheat Flour Market Share in Algeria for 1970-1993.

Variable	Mean	Std. Dev.	Minimum	Maximum
Wheat	.9192	.1134	.4552	.9999
United States	.4098	.1475	.1158	.6849
Canada	.2735	.0888	.1038	.4791
European Union	.1738	.1360	.0000	.4167
Rest of World	.0620	.0614	.0000	.2104
Wheat Flour	.0807	.1134	.0000	.5447
United States	.0072	.0312	.0000	.1538
European Union	.0609	.0630	.0000	.2222
Rest of World	.0125	.0340	.0000	.1688

Table 4. Summary Statistics for Competitor Wheat and Wheat Market Share in Egypt for 1970-1993

Variable	Mean	Std. Dev.	Minimum	Maximum
Wheat	.6804	.1112	.4917	.9265
United States	.2569	.1574	.0000	.6283
European Union	.1173	.1222	.0000	.5345
Australia	.2255	.1201	.0000	.5562
Rest of World	.0805	.0592	.0053	.2150
Wheat Flour	.3195	.1112	.0734	.5082
United States	.0899	.0682	.0000	.2896
European Union	.1251	.0561	.0281	.2371
Rest of World	.0113	.0349	.0000	.1732

Table 5. Summary Statistics for Competitor Wheat and Wheat Flour Market Share in Jordan for 1970-1993.

Variable	Mean	Std. Dev.	Minimum	Maximum
Wheat	.7115	.2829	.1896	.9951
United States	.4476	.2765	.0091	.9660
Rest of World	.2638	.2475	.0012	.8315
Wheat Flour	.2885	.2829	.0048	.8103
United States	.0907	.1833	.0000	.6050
European Union	.1255	.1256	.0010	.3943
Rest of World	.0721	.0751	.0004	.2938

Table 6. Summary Statistics for Competitor Wheat Market Share in South Korea and Japan for 1970-1993

Variable	Mean	Std. Dev.	Minimum	Maximum
South Korea				
United States	.7967	.2117	.3699	.9835
Canada	.0595	.1088	.0000	.3785
Rest of World	.1436	.1371	.0118	.4418
Japan				
United States	.5569	.0348	.4935	.6876
Canada	.2720	.0155	.2356	.2910
Australia	.1710	.0364	.0300	.2531

Table 7. Wald Test Results for Endogeneity

H_o: Expenditure is Exogenous	
Algeria:	
Wald Statistic	.454
P-value	.500
Egypt:	
Wald Statistic	.662
P-value	.415
Jordan:	
Wald Statistic	.266
P-value	.605
South Korea	
Wald Statistic	2.269
P-value	.131
Japan	
Wald Statistic	.401
P-value	.526

Table 8. Marshallian Elasticities of Algerian Wheat and Wheat Flour Demand Using the RSDAIDS Model, Assuming Block Substitutability

	Wheat				Flour		
	US	CN	EU	ROW	US	EU	ROW
Pw_{us}	-2.364***	.3406	2.388**	-1.179			
Pw_{cn}	.7105	-.5965	1.348	.0667			
Pw_{eu}	.3179	-.2825	-1.497**	1.495*			
Pw_{row}	.4404**	-.2991	-.3521	-1.609***			
Pf_{us}					-1.829***	2.312***	.0832
Pf_{eu}					5.519***	-1.229***	3.232***
Pf_{row}					.5536	-.8877***	-.9853
P_{flour}	-.0860	-.0965	-.3144**	.3438**			
P_{wheat}					-5.533***	-1.191***	-3.253***
Exp	.9810***	.9339***	1.123**	.8828***	1.091***	.9968***	.9229***
System R^2 = .9903							

Notes: In column one, P = price and *Exp* = expenditure; w = wheat, f = flour; *us* = United States, *eu* = European Union, *cn* = canada, *au* = Australia, and *row* = Rest of World.

***denotes 1% significance; **denotes 5% significance; *denotes 10% significance

Table 8a. Hicksian Elasticities of Algerian Wheat and Wheat Flour Demand Using the RSDAIDS Model, Assuming Block Substitutability

	Wheat				Flour		
	US	CN	EU	ROW	US	EU	ROW
Pw_{us}	-1.452***	-.2766	1.848*	-1.818			
Pw_{cn}	-.0211	.3047	-2.040***	-.6916			
Pw_{eu}	-.5115	-1.120***	-.5559	.6490			
Pw_{row}	-.4987***	-1.241***	-1.282	-.6973			
Pf_{us}					-1.747	1.318***	-.9100
Pf_{eu}					4.585***	-1.148***	2.288***
Pf_{row}					-.4326	-1.875***	-.9055
P_{flour}	-1.006***	-1.021***	-1.223***	-.5848***			
P_{wheat}					-5.331***	-1.191***	-3.404***

System R^2 = .9903

Note: Refer to table 8 footnote.

Table 8b. Parameter Estimates and t-ratios of Algerian Wheat and Wheat Flour Demand Using the RSDAIDS Model, Assuming Block Substitutability

	Wheat				Flour		
	US	CN	EU	ROW	US	EU	ROW
Pw_{us}	-.5620	.0857	.4238	-.0761			
	(-2.331)	(.5665)	(2.168)	(-.8189)			
Pw_{cn}	.2890	.1054	-.22842	.0021			
	(1.568)	(.9090)	(-1.537)	(.0302)			
Pw_{eu}	.1289	.0804	-.0826	.0915			
	(.9781)	(-.9738)	(-.7674)	(1.801)			
Pw_{row}	.1799	-.0829	-.0598	-.0386			
	(2.070)	(-1.515)	(-.8554)	(-1.139)			
Pf_{us}					-.0059	.1408	.0010
					(-.4539)	(5.369)	(.0774)
Pf_{eu}					.0399	-.0139	.0405
					(4.051)	(-.7339)	(4.057)
Pf_{row}					.0041	-.0540	.0001
					(.3844)	(-2.585)	(.0162)
P_{flour}	-.0358	-.0278	-.05292	.0207			
	(-1.3154	(-1.654)	(-2.286)	(1.992)			
P_{wheat}					-.0379	-.0172	-.0418
					(-10.491)	(-8.978)	(11.172)
Exp	-.0077	-.0180	.0213	-.0072	.0006	-.0001	-.0009
	(-.6128)	(-2.366)	(1.864)	(-1.527)	(.4984)	(-.0624)	(-.7024)

System R^2 = .9903

Note: Refer to table 8 footnote.; t-ratios are in parenthesis ().

Table 9. Marshallian Elasticities of Egyptian Wheat and Flour Import Demand Using the RSDAIDS Model, Assuming Block Substitutability

	Wheat				Flour		
	US	EU	AU	ROW	US	EU	ROW
Pw_{us}	-.6403	-.8270	-.0817	.9617			
Pw_{eu}	-.3727	-.0213	1.343**	-.0239			
Pw_{au}	-.0580	2.585**	-2.5598***	.8148			
Pw_{row}	.6422	-3.232	.3851	-3.2415**			
Pf_{us}					-.9658*	.2500	2.099
Pf_{eu}					.3349	-1.1411***	1.442
Pf_{row}					.6321*	-.0029	-1.256
P_{flour}	-.3323*	-.4655	-.1569	.1662			
P_{wheat}					-.7202***	-.3446**	-3.297**
Exp	.9424***	.9878***	1.003***	1.085***	1.033***	.9305***	.9673***

System R^2 = .9599

Note: Refer to Table 8 footnote.

Table 9a. Hicksian Elasticities of Egyptian Wheat and Flour Import Demand Using the RSDAIDS Model, Assuming Block Substitutability

	Wheat				Flour		
	US	EU	AU	ROW	US	EU	ROW
Pw_{us}	.0252	-1.573	-.8240	.2405			
Pw_{eu}	-1.262**	.6576	.4614	-.8966			
Pw_{au}	-.8455*	1.808*	-1.878***	.0595			
Pw_{row}	-.2818	-4.152**	-.5339	-2.554			
Pf_{us}					-.6432	-.6662	1.186
Pf_{eu}					-.5356	-.8301***	.5634
Pf_{row}					-.3564	-.9924***	-.9376
P_{flour}	-1.0312***	-1.1499	-.8363***	-.4870			
P_{wheat}					-1.016***	-.7114***	-3.639***

System R^2 = .9599

Note: Refer to Table 8 footnote.

Table 9b. Parameter Estimates and t-ratios of Egyptian Wheat and Flour Import Demand Using the RSDAIDS Model, Assuming Block Substitutability

	Wheat				Flour		
	US	EU	AU	ROW	US	EU	ROW
Pw_{us}	.0885	-.0974	-.0182	.0792			
	(.4935)	(-.7056)	(-.1510)	(.9251)			
Pw_{eu}	-.0974	.1147	.3031	-.0011			
	(-.7056)	(.5347)	(2.337)	(-.0116)			
Pw_{au}	-.0182	.3031	-.3516	.0672			
	(-.1510)	(2.337)	(-2.565)	(.8304)			
Pw_{row}	.1638	-.3794	.0869	-.1801			
	(.8632)	(-1.584)	(.5612)	(-1.369)			
Pf_{us}					.0033	.0305	.0236
					(.0699)	(.8690)	(.7784)
Pf_{eu}					.0305	-.0187	.0162
					(.8690)	(-.4417)	(.4537)
Pf_{row}					.0568	-.0004	-.0029
					(1.656)	(-.0163)	(-.1115)
P_{flour}	-.0901	-.0551	-.0351				
	(-1.794)	(-1.053)	(-.8126)				
P_{wheat}					-.0627	-.0490	-.0375
					(-2.978)	(-2.510)	(-2.165)
Exp	-.0147	-.0014	.0006		.0030	-.0086	-.0003
	(-1.266)	(-.1252)	(.0729)		(.5683)	(-2.170)	(-.1048)

System R^2 = .9599

Note: Refer to Table 8 footnote.; t-ratios are in parenthesis ().

Table 10. Marshallian Elasticities of Jordanian Wheat and Wheat Flour Import Demand Using the RSDAIDS Model, Assuming Block Substitutability

	Wheat		Wheat Flour		
	US	ROW	US	EU	ROW
Pw_{us}	-1.674***	-2.032*			
Pw_{row}	.3290	1.614			
Pf_{us}			-3.719***	-.0586	2.256***
Pf_{eu}			.0471	-.0372	-.8775
Pf_{row}			-.0339	.4899	-.0485
P_{flour}	-.1926***	-.3184***			
P_{wheat}			-.1567	-.9415***	-.2911
Exp	1.438***	.2153	.4638	1.486***	.6453*
System R^2 = .9850					

Note: Refer to Table 8 footnote.

Table 10a. Hicksian Elasticities of Jordanian Wheat and Wheat Flour Import Demand Using the RSDAIDS Model, Assuming Block Substitutability

	Wheat		Wheat Flour		
	US	ROW	US	EU	ROW
Pw_{us}	-.7672	.7104			
Pw_{row}	-.2915	-1.528			
Pf_{us}			-3.479***	-.9238	1.314
Pf_{eu}			-.8945	-.0227	-1.796***
Pf_{row}			-1.000	-.4028	.2143
P_{flour}	-.7778***	-1.256***			
P_{wheat}			-.8267***	-.8842***	-.8319***

System R^2 = .9850

Note: Refer to Table 8 footnote.

Table 10b. Parameter Estimates and t-ratios of Jordanian Wheat and Wheat Flour Import Demand Using the RSDAIDS Model, Assuming Block Substitutability

	Wheat		Wheat Flour		
	US	ROW	US	EU	ROW
Pw_{us}	-.2142	.3331			
	(-.7726)	(1.172)			
Pw_{row}	.1990	-.3271			
	(.6589)	(-1.059)			
Pf_{us}			-.2511	-.0018	.1605
			(-1.897)	(-.0199)	(2.667)
Pf_{eu}			-.0018	.0864	-.0665
			(-.0199)	(1.125)	(-1.365)
Pf_{row}			-.0065	.0659	.0668
			(-.0999)	(1.184)	(1.683)
P_{flour}	-.0296	-.1437			
	(-.7489)	(-3.667)			
P_{wheat}			-.0488	-.0748	-.0392
			(-2.371)	(-4.903)	(-4.221)
Exp	.1960	-.2070	-.0486	.0610	-.0255
	(1.7853)	(-1.906)	(-.7652)	(1.303)	(-.9049)

System R^2 = .9850

Note: Refer to Table 8 footnote.
t-ratios are in parenthesis ().

Table 11. Marshallian Elasticities of South Korean Wheat Import Demand Using the Restricted SDAIDS Model

	US	CN	ROW
Pw_{us}	-.7418***	-.6546	-.0251
Pw_{cn}	.1250*	-1.847*	-1.007
Pw_{row}	.0882	-.9459	-1.272***
Exp	.5285***	3.447***	2.304***
System R^2=.6932			

Note: Refer to Table 8 footnote.

Table 11a. Hicksian Elasticities of South Korean Wheat Import Demand Using the Restricted SDAIDS Model

	US	CN	ROW
Pw_{us}	-1.117***	1.092	.8109
Pw_{cn}	-.8434***	-1.701*	-1.870***
Pw_{row}	-.8354***	-1.450*	-1.084***
System R^2=.6932			

Note: Refer to Table 8 footnote.

11b. Parameter Estimates and t-ratios of South Korean Wheat Import Demand Using the Restricted SDAIDS Model

	US	CN	ROW
Pw_{us}	-.0935 (-.8773)	.0772 (1.299)	.1456 (1.523)
Pw_{cn}	.0772 (1.299)	-.0417 (-.6684)	-.1335 (-1.337)
Pw_{row}	.0163 (.1892)	-.0354 (-.7127)	-.0121 (-.2269)
Exp	-.3756 (-5.443)	.1458 (3.822)	.1873 (2.923)
System R^2=.6834			

Note: Refer to Table 8 footnote.

Table 12. Marshallian Elasticities of Japanese Wheat Import Demand Using the Restricted SDAIDS Model

	US	CAN	AUS
Pw_{us}	-1.468**	-.4666*	.4533
Pw_{cn}	-.3188**	-.4881*	-.0299
Pw_{au}	.9612***	.3788	-2.346***
Exp	.9096***	.5755***	1.643**
System R^2=.6799			

Note: Refer to Table 8 footnote.

Table 12a. Hicksian Elasticities of Japanese Wheat Import Demand Using the Restricted SDAIDS Model

	US	CAN	AUS
Pw_{us}	-1.518***	-1.146***	.3684
Pw_{cn}	-1.071***	-.6035***	-.5830
Pw_{au}	.1168	-.5227**	-2.234***
System R^2=.6799			

Note: Refer to Table 8 footnote.

Table 12b. Parameter Estimates and t-ratios of Japanese Wheat Import Demand Using the Restricted SDAIDS Model

	US	CAN	AUS
Pw_{us}	-.2889 (-2.082)	-.1912 (-2.668)	-.1388 (1.183)
Pw_{cn}	-.1912 (-2.668)	.1078 (1.593)	.0247 (.1822)
Pw_{au}	.5267 (4.395)	.0833 (1.303)	-.2114 (-2.067)
Exp	-.0503 (-.4269)	-.1154 (-1.734	.1099 (.8288)
System R^2=.6799			

Note: Refer to Table 8 footnote.

APPENDIX:

MISSPECIFICATION TESTING RESULTS

Table A. Government Assisted Importers' Wheat and Wheat Flour Demand Models: The p-values for Full-System Misspecification Tests

	Algeria	Egypt	Jordan
Individual Tests			
Functional Form	.0064	.0015	.0390
Parameter Stability	.0394	.1864	.6564
Heteroskedasticity			
Static	.0000	.0012	.0003
Dynamic	.0000	.0155	.6301
Autocorrelation	.0000	.0000	.0120
Joint Tests			
Overall Mean Test	.0009	.0000	.0002
Parameter Stability	.0355	.3062	.2591
Functional Form	.0906	.0354	.0046
AutoCorrelation	.3938	.0000	.0020
Overall Variance Test	.0001	.0000	.0227
Parameter Stability	.6675	.2632	.9441
Static Hetero.	.0000	.0000	.0276
Dynamic Hetero.	.1111	.1959	.7032

Table B. Non-Government Assisted Importers' Wheat Demand Models: The p-values for Full-System Misspecification Tests

	South Korea	Japan
Individual Tests		
Functional Form	.2055	.9757
Parameter Stability	.8797	.5225
Heteroskedasticity:		
Static	.0163	.3976
Dynamic	.5853	.0600
Autocorrelation	.7299	.0109
Joint Tests		
Overall Mean Test	.5932	.0761
Parameter Stability	.5600	.4621
Functional Form	.1571	.7881
AutoCorrelation	.8975	.0086
Overall Variance Test	.1056	.0000
Parameter Stability	.9513	.0000
Static Hetero.	.0355	.0092
Dynamic Hetero.	.3748	.6825

Table C. Algeria Wheat and Wheat Flour Demand Model: The p-values for Equation by Equation System Misspecification Tests

	WHEAT				***FLOUR***		
	United States	Canada	EU	R of W	US	EU	ROW
Individual Tests							
Functional Form	.0677	.7100	.2008	.0186	.6232	.4727	.8408
Parameter Stability:							
Variance	.6876	.8865	.6730	.8887	.8893	.4503	.9001
Mean	.1016	.5986	.3607	.4452	.8833	.2549	.9427
Heteroskedasticity:							
Static							
US wheat	.8808	.3798	.5364	.9299	.8623	.1697	.0998
Can wheat		.9174	.6875	.2182	.1007	.7067	.1691
EU wheat			.6156	.7254	.0256	.0472	.1430
ROW wheat				.9219	.9270	.0948	.3086
US flour					.6232	.7147	.2404
EU flour						.3118	.8468
ROW flour							.7160
Dynamic							
US wheat	.2847	.0969	.6567	.4773	.4507	.5422	.3527
Can wheat		.0823	.0372	.0121	.2974	.1590	.3843
EU wheat			.7620	.1771	.3789	.2598	.6936
ROW wheat				.6945	.2541	.7533	.3174
US flour					.4802	.7072	.5077
EU flour						.2828	.6130
ROW flour							.5032
Autocorrelation	.5228	.0129	.9161	.2676	.8569	.2752	.9805

Table C. Algeria Wheat and Wheat Flour Demand Model: The p-values for Equation by Equation System Misspecification Tests *(continued)*

	WHEAT				***FLOUR***		
	US	Canada	EU	ROW	US	EU	ROW
Joint Tests							
Overall Mean Test	.4214	.4420	.5053	.1684	.2088	.5428	.7924
Parameter Stability	.2483	.0636	.1663	.7629	.5631	.7202	.3345
Functional Form	.7644	.6414	.7423	.2940	.1113	.5516	.6435
AutoCorrelation	.2201	.3539	.4768	.2602	.7601	.8199	.9746
Overall Variance Test	.2347	.0519	.7954	.7733	.1105	.0720	.3701
Parameter Stability	.5107	.9240	.9539	.6922	.9964	.3848	.4816
Static Hetero.	.1382	.0266	.6652	.6967	.0808	.0429	.3119
Dynamic Hetero.	.1954	.1178	.5895	.6241	.7093	.5627	.6229

Table D. Egypt Wheat and Wheat Flour Demand Model: The p-values for Equation by Equation System Misspecification Tests

	WHEAT				***FLOUR***		
	US	EU	AU	ROW	US	EU	ROW
Individual Tests							
Functional Form	.6021	.0842	.0513	.3160	.4401	.8019	.4204
Parameter Stability:							
Variance	.8175	.4282	.6187	.2054	.0378	.0642	.0600
Mean	.4411	.3531	.9675	.0856	.4450	.6267	.3167
Heteroskedasticity:							
Static							
US wheat	.7909	.8407	.3957	.7093	.8542	.0281	.8352
EU wheat		.0007	.2139	.1822	.5685	.0902	.3516
AU wheat			.0032	.5451	.8281	.2146	.4336
ROW wheat				.0434	.5249	.2547	.9138
US flour					.0586	.0017	.7600
EU flour						.8848	.7755
ROW flour							.7202
Dynamic							
US wheat	.9078	.0317	.8576	.0622	.7812	.3635	.9041
EU wheat		.9884	.0259	.7853	.8146	.9124	.0995
AU wheat			.1078	.0070	.7917	.4300	.2418
ROW wheat				.0789	.3587	.6034	.9703
US flour					.1339	.0143	.2210
EU flour						.4480	.9728
ROW flour							.2144
Autocorrelation	.0039	.1395	.6797	.2796	.4543	.9005	.1128

Table D. Egypt Wheat and Wheat Flour Demand Model: The p-values for Equation by Equation System Misspecification Tests *(continued)*

	WHEAT				***FLOUR***		
	US	EU	AU	ROW	US	EU	ROW
Joint Tests							
Overall Mean Test	.3366	.0727	.9293	.8879	.0182	.8084	.6897
Parameter Stability	.7705	.1445	.3049	.6021	.0079	.5632	.2968
Functional Form	.4336	.1024	.8283	.9834	.0113	.7422	.5032
Autocorrelation	.0769	.0022	.9745	.5035	.8020	.3242	.9795
Overall Variance Test	.0383	.0000	.0018	.1479	.3552	.3593	.2057
Parameter Stability	.2022	.9317	.3731	.2204	.7964	.6751	.0657
Static Heteroscedasticity	.0353	.0000	.0025	.1864	.5189	.4037	.2194
Dynamic Heteroscedasticity	.9560	.7311	.6486	.0892	.1220	.1126	.2332

Table E. Jordan Wheat and Wheat Flour Demand Model: The p-values for Equation by Equation System Misspecification Tests

	WHEAT		***FLOUR***		
	US	ROW	US	EU	ROW
Individual Tests					
Functional Form	.9650	.9447	.0071	.7939	.0810
Parameter Stability					
Variance	.0547	.0547	.8476	.8546	.9921
Mean	.7057	.9389	.6297	.9431	.9290
Heteroscedasticity:					
Static					
US wheat	.0079	.0079	.4914	.4007	.2162
ROW wheat		.0079	.1650	.0038	.2162
US flour			.4571	.3325	.9433
EU flour				.5604	.3577
ROW flour					.0316
Dynamic					
US wheat	.9967	.9967	.0265	.8066	.0340
ROW wheat		.9967	.3130	.3035	.0340
US flour			.9837	.1149	.7884
EU flour				.6524	.4061
ROW flour					.4121
Autocorrelation	.2615	.1339	.0247	.0130	.4576

Table E. Jordan Wheat and Wheat Flour Demand Model: The p-values for Equation by Equation System Misspecification Tests *(continued)*

	WHEAT		***FLOUR***		
	US	ROW	US	EU	ROW
Joint Tests					
Overall Mean Test	.7790	.6856	.0065	.0070	.1093
Parameter Stability	.4276	.5786	.6927	.7323	.2338
Functional Form	.8636	.7409	.0226	.0414	.0403
Autocorrelation	.2689	.1168	.0216	.0105	.2451
Overall Variance Test	.2051	.7209	.5112	.2500	.0268
Parameter Stability	.8513	.3884	.4233	.5923	.0444
Static Heteroscedasticity	.1280	.5844	.3191	.1531	.0112
Dynamic Heteroscedasticity	.7390	.9476	.7233	.5289	.1158

Table F. South Korea Wheat Demand Model: The p-values for Equation by Equation System Misspecification Tests

	US	CAN	ROW
Individual Tests			
Functional Form	.9997	.2641	.8119
Parameter Stability:			
Variance	.3809	.4575	.2973
Mean	.8460	.8059	.7838
Heteroscedasticity:			
Static			
US wheat	.2624	.1651	.1006
CAN wheat		.0366	.3556
ROW wheat			.1921
Dynamic			
US wheat	.7501	.0783	.2298
CAN wheat		.5544	.3064
ROW wheat			.4652
Autocorrelation	.8654	.9664	.3829
Joint Tests			
Overall Mean Test	.9988	.2653	.8562
Parameter Stability	.8013	.7732	.8674
Functional Form	.9880	.0880	.8926
Autocorrelation	.8458	.8887	.3933
Overall Variance Test	.6870	.3078	.2226
Parameter Stability	.9356	.8370	.6557
Static Heteroscedasticity	.5203	.1759	.1712
Dynamic Heteroscedasticity	.4325	.4579	.0933

Table G. Japan Wheat Demand Model: The p-values for Equation by Equation System Misspecification Tests

	US	CAN	AUS
Individual Tests			
Functional Form	.8767	.9977	.4219
Parameter Stability:			
Variance	.7342	.0020	.0447
Mean	.7379	.3504	.6449
Heteroscedasticity:			
Static			
US wheat	.3765	.2712	.0062
CAN wheat		.5477	.1953
AUS wheat			.8187
Dynamic			
US wheat	.9155	.1583	.5449
CAN wheat		.0472	.6594
AUS wheat			.3979
Autocorrelation	.5938	.0142	.6264
Joint Tests			
Overall Mean Test	.9751	.1606	.1705
Parameter Stability	.7844	.3318	.5513
Functional Form	.9257	.8728	.0605
Autocorrelation	.5902	.0230	.1970
Overall Variance Test	.5035	.0027	.0000
Parameter Stability	.2923	.0008	.0018
Static Heteroscedasticity	.2251	.0309	.0000
Dynamic Heteroscedasticity	.4396	.3159	.0650

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