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An examination of U.S. rice export promotion programs

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AN EXAMINATION OF U.S. RICE EXPORT PROMOTION PROGRAMS

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master Science

in

The Department of Agricultural Economics and Agribusiness

By

Yiqian Wang
B.S., Yunnan University, China, 1996
May, 2005

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ABSTRACT

The United States Department of Agriculture's Foreign Agricultural Service (USDA/FAS) administers two primary promotion programs for rice exports: the Foreign Market Development Program (FMDP) and the Market Access Program (MAP). Based on the literature, a single equation framework is specified to estimate the rice import demand model. Three major U.S. rice importing countries are selected: Mexico, Costa Rica, and Honduras. Single equation analysis methods are applied. The effectiveness of the two programs for rice exports to the Latin American markets is evaluated.

Promotion programs and the competitors' exchange rate as primary explanatory variables for the U.S. rice import demand in the targeted markets are evaluated. The results show that promotion programs are effective in Mexico and Honduras, with an average return of \$10 and \$40 per dollar during 1989-2003. However, promotion programs were not significant for Costa Rica. Estimated own price elasticities are considerably less elastic in the Mexico and Honduras market than in the Costa Rica market. The exchange rate fluctuation of two primary rice competitors, Uruguay and Argentina, show a significant effect to the market demand for U.S. rice.

CHAPTER 1

INTRODUCTION

More than 20 percent of total agricultural products in the U.S. have gone to export markets during recent decades. Export markets have become an important element in government decision-making related to economic development. According to the Foreign Agricultural Service (FAS) of the United States Department of Agriculture (USDA), the export value of agricultural products has grown rapidly over the past two decades. U.S. agricultural export revenues accounted for 20-30 percent of U.S. farm income during the last 30 years and are projected to remain at this level (USDA/ERS). With the productivity of U.S. agriculture growing faster than domestic food and fiber demand, U.S. farmers and agricultural firms rely heavily on export markets to sustain prices and revenues.

Assuming constant or increasing returns to scale in production, combined with improved technical expectations, U.S. grain exports could become even more important than ever. The domestic markets would not be able to absorb the increased supply. Without export development increased, agricultural production would lead to a price decrease. If the government fails to provide an acceptable support price, farmers could be driven out of business. Comparatively, the cost of price-support policy would be much higher than the cost of export promotion projects. Those promotional policies, with additional regional trade agreements and world trade agreements being considered, would create more opportunities for U.S. agricultural producers, with an additional gain in social welfare.

The U.S. government implemented the Foreign Market Development Program (FMDP) and Market Access Program (MAP) as the primary policies to support

agricultural exporters. The programs were aimed at strengthening and expanding the international market for agricultural commodities.

Current researches indicate that promotion programs should be linked to exchange rate changes, since exchange rates play an important role in export shares for the international market. Generally, an appreciation of the dollar would result in a loss of U.S. agricultural exporters' market share. Dollar prices would go up in importer currency terms. An overvalued dollar would depress US agricultural prices and exports.

Another important economic element which can not be ignored is the varying elasticities for different agricultural products. The efficiency of the export promotion program would largely depend on a series of income, demand and supply elasticities in domestic and importing countries.

The U.S. agricultural sector currently faces a relatively strong U.S. dollar (by historical standards) and high trade competition from other competitors. Nonetheless, increasing purchasing power in developing countries provides a strong foundation for the U.S. grain producers and exporters who benefit from global consumption and trade.

1.1. U.S. Rice: Domestic and International View

1.1.1 U.S. Rice Production and Consumption

Rice has been produced in the United States for more than 300 years; it has been a vital part of the agricultural economies of certain Southern states, as well as California. Rice accounts for approximately 2 percent of the total value of field crops produced in the United States (USDA/ERS).

Rice production and marketing is a multi-billion dollar activity in the United States. Rice is produced on over 3 million acres in the U.S. and accounts for \$1.4 billion

in farm revenues. Almost half of the rice produced in the U.S. is exported. The economic health of U.S. farmers and the rice-milling sector is tied to maintaining and expanding access and sales in foreign markets. Milled rice exports would have a tremendous impact on value added sales and could enhance economies in rural America (USDA/ERS).

There are about 15,000 rice producers in the U.S. They are located in six major states: Arkansas, California, Louisiana, Texas, Mississippi, and Missouri. Of those states, Arkansas produces the largest amount of rice. It is important to maintain and increase the rice export markets for those states. Rice exports generate more revenues than any other single agricultural export product for both Arkansas (\$278 million) and Louisiana (\$147 million). For California and Mississippi, rice is listed as the 5th (\$195 million) and 4th (\$81 million) largest export commodity respectively. Rice has been the major income source for local residents and exporters (USDA/ERS). This fact would undoubtedly induce some political lobbying related to the rice industry. The federal government invests large amounts of capital to maintain and develop the rice production and exports (USDA/ERS).

There are approximately 30 rice mills in the U.S. There are three types of rice which are the dominant grain types: long, medium and short grain. Others, like aromatic and specialty varieties have been produced on a smaller scale. The U.S. producers supply more than 90 percent of domestic rice consumed and are one of the major producers in the world market, accounting for about 14% of world trade share which includes all rice varieties. The focus of U.S. exports is high quality rice markets (USDA/ERS).

Environmentally speaking, winter-flooded rice fields provide an important habitat for migratory waterfowl and other species. The 1997 USA Rice Federation survey

indicated more than 1 million acres are being enhanced to provide habitat for migratory waterfowl annually (USDA/ERS).

It can be shown from Figure 1.1, comparatively, rice production increased at a higher rate than planted area since 1994, which could be explained by the increasing rice yield due to technical change. Based on a USDA survey report (Salin et al., 2000), the average variable cost of producing a hundred pounds (cwt) of rice was \$6.00 for U.S. producers, ranging from about \$2 per cwt to more than \$10. The Arkansas Non-Delta area holds more than half of the low-cost farms. California and the Gulf Coast area are considered high cost rice growing regions.

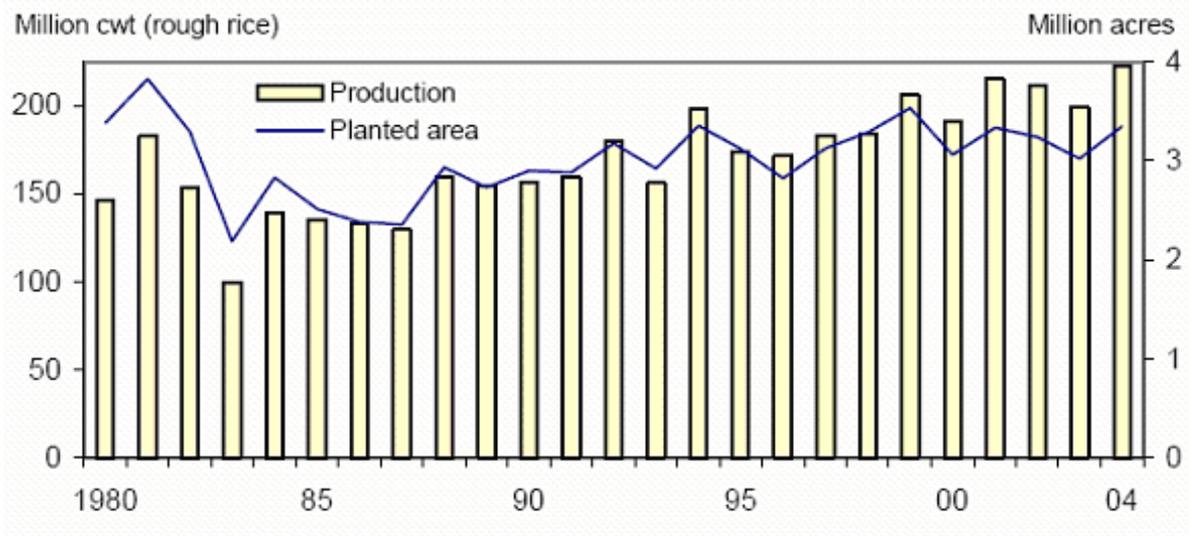
1.1.2 World Rice Trade

International trade in rice is quite small relative to total production. In fact, only 6-7 percent of global rice production is traded each year, well below the trade shares for other grains and oilseeds.

The reason for these market characteristics could be explained by several factors. First, rice is largely produced in Asian countries, where rice is traditionally the major food source for nutrition. Second, besides being a major producing region, Asian countries are major importers of rice. Because of national security concerns, rice production and trade are highly protected and sensitive. The world rice market is much more conservative than other agricultural commodities, which restricts its development.

In addition, the global rice market is heavily segmented by type and quality, with little substitution among types and qualities by producers or consumers. Long grain accounts for more than 75 percent of global rice trade. Medium and short grains together make up around 12 percent; fragrant or aromatic rice accounts for around 10

The 2004 U.S. rice crop is projected at a record 223 million cwt



Source: 1980-2003, NASS, USDA; 2004 USDA projections. Rice Outlook (2004), USDA

Figure 1.1 Rice Acreage and Production in the United States: 1989-2004

percent. Specialty rice, primarily glutinous rice, accounts for the remainder of global rice trade.

1.1.3 U.S. Rice Export Market

Though U.S. rice production in 2001 was 9.5 million tons, which accounts for only 1.62 percent of total world production, the United States exports are approximately 14 percent of the world market trade during the period of 1990-2000. The United States was ranked as the third largest rice exporter during the period, just after Thailand and Vietnam. The United States also is the major rough rice exporter in the world.

Rice exports are very important to major segments of the United State industry. The exports account for more than 40 percent of total production, which makes it critical for US rice producers and exporters to fortify and develop international market activities. Over the past decade, the United States has lost substantial market share in Sub-Saharan Africa and the Middle East. However, rapid expansion in U.S. rough rice exports has offset much of the decline. The newly explored market is mainly in Latin American regions. Table 1.1 shown that Central America, the Caribbean and North America are the primary importers of U.S. rice.

Japan is by far the largest market for short grain rice, importing both milled and brown. Under the Uruguay Round agreement, Japan opened its market to 375,000 tons of imported rice in 1995, which expanded to a 682,200-ton tariff-rate quota by 2000. As a result, Japan has emerged as one of the largest export markets for U.S. rice, with sales increasing from \$31 million in 1995 to \$120 million in 2000. The United States has supplied about half of Japan's rice imports since 1995, and the country is the top destination for U.S. medium- and short-grain rice. Under NAFTA, tariff preferences have

helped to increase U.S. market share for rice in Mexico, from 79 percent in 1994 to nearly 100 percent in 1999. From 1994 to 2000, the value of U.S. rice exports to Mexico increased from \$68 million to \$102 million. (USDA/ERS)

Saudi Arabia, South Africa, Canada, and the Caribbean are the primary U.S. markets for long grain milled white rice; Saudi Arabia and South Africa import mostly parboiled. The European Union is the largest market for U.S. long grain brown parboiled rice. Mexico and Central America are the largest markets for long grain rough rice. The lower import tariff for rough rice as opposed to milled rice and the existence of excess milling facilities are two positive reasons for Latin America to import rough rice. (USDA/ERS)

1.1.4. U.S. Rice Trade with Latin America

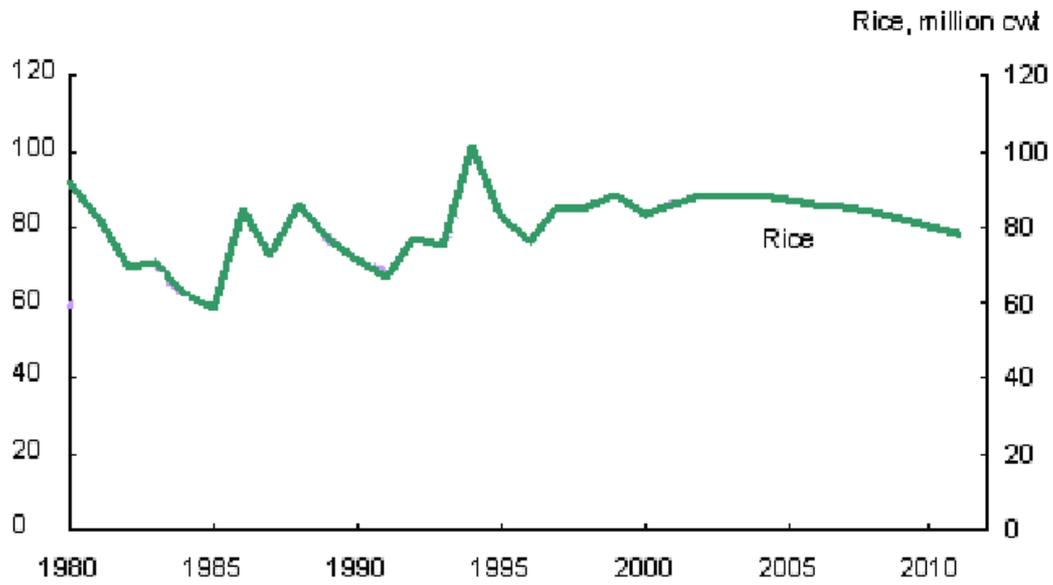
Mexican and Central American production of starchy foods is frequently insufficient to satisfy the needs of the growing populations; therefore, it's necessary to import the products from the rest of the world. Mexican, Honduran and Costa Rican own production could not satisfy growing domestic consumption. Rice imports from the U.S. accounts for less than 50 percent to over 70 percent in domestic consumption from 1989 to 2003. Furthermore, the U.S. has become the sole rice exporter to this region in recent years.

The export of long grain rough rice to Mexico and Central America has become the major expanding market. Since none of the major Asian exporting countries allow rough rice exports, the United States is the only major rice exporter that allows rough rice exports. The primary market for U.S. rough rice is Mexico, and Central American countries. Argentina, Uruguay, and Guyana ship small amounts of rough rice to Latin

America. Under this situation, U.S. rough rice exports have become a larger share of U.S. rice exports, accounting for more than 30 percent in recent years. Rough rice exports have expanded substantially since 1990/91 (USDA/Rice Outlook YB 2002).

Four countries in Latin American have been listed as top ten U.S. rice buyers in the last 15 years. They are Mexico, Brazil, Costa Rica and Honduras. With the exception of Brazil, the others share some common characteristics. U.S. rice exports to any of these three countries has taken more than 90% of import market share in the past fifteen years, along with an increasing import trend and a decrease in domestic production. Several reasons for this situation are considered. First, the production and milling costs in those countries are generally higher than in the U.S. Second, less federal domestic production support from the government further reduces yield, leading to less domestic supply. Third, sanitary and phytosanitary restrictions keep the competitive Asian rice exporters out of the supply-demand system in the region. Fourth, the importers from those countries generally accept smaller amounts of orders due to the limitation of storage capacities and financial situation, which would increase the transaction cost of each trade (such as transportation cost and other related expenditures). This makes it more convenient to import from the United States than from Asian exporters. Finally, geographically and politically speaking, the United States has a better trade relationship environment and reduces the costs. For example, the sea transportation between destinations of U.S. and of Costa Rica would be more frequent than ones between Thailand and Costa Rica.

Nathan Childs (Zahniser and Link, 2002) indicated that before the mid-1980s, the Mexican government severely restricted rice imports through tariffs and quotas. Since



Source: USDA Agricultural Baseline Projections to 2011, February 2002. USDA/ERS.

Figure 1.2 U.S. Rice Export Quantities (1980-2011)

Table 1.1 Top Regional Markets for U.S. Rice Exports, 2002

Market	Million Dollars
Central America and the Caribbean	175.8
North America	167.5
Middle East	74.7
Japan	90.6
EU	71.4
Others	192.7
Total	772.7

Source: USArice.com (2004).

1982, Mexico has undergone phenomenal changes in its economic policy, becoming much more market-oriented. The government began to phase out its protectionist policies and introduced major policy reforms to reduce the role of government in the economy by the mid-1980s. The rice import tariffs have been subsequently reduced after Mexico joined the General Agreement on Tariffs and Trade (GATT) in 1986. In 1989, Mexico imported a record 189,000 metric tons (milled basis) of rice, as a result of the combined effects of GATT trade liberalization and a drought. The North American Free Trade Agreement (NAFTA) benefits U.S. rice exports to Mexico, with a decreasing tariff for milled, rough and broken rice. Before NAFTA, Mexico imposed import tariffs on U.S. rice, 20 percent on brown and milled rice and 10 percent on rough and broken rice. In 1990, the tariff rate for milled and brown U.S. rice was raised from 10 percent to 20 percent in response to demands from Mexican millers who wanted to maintain a high mill utilization rate. Under NAFTA, Mexico is gradually lowering these rates to zero over the 9-year period that ends on January 1, 2003.

In 2000, the United States exported more than 560,000 metric tons (product-weight basis) of rice to Mexico, making it the largest single-country foreign market for U.S. rice that year. On a milled-equivalent basis, over two-thirds of U.S. rice sales to Mexico are rough rice. (USDA/ERS)

The United States currently has a virtual monopoly on rice trade with Mexico (Figure 1.3.a); more than 80 percent of imported rice in Mexico is from the U.S during 1989-2003. Close geographic advantages and the existence of a regional trade agreement, as well as sanitary and phytosanitary restrictions on Asian rice that Mexico enacted in 1993, strongly consolidates the monopoly power of the U.S. rice in the markets. During

1990-93, Mexico imported substantial quantities of Asian rice, but Mexico's crop was diminished by infestations, which were believed to be from rice imported from Asia. The Mexican government banned the importation of all Asian rice on September 20, 1993, with the consideration of contamination from the Khapra beetle and other infestations. However, there has been no infestation problem with U.S.-grown rice, where the Khapra beetle was eradicated more than 40 years ago (Zahniser and Link, 2002). However, no record has been found officially indicating whether the Central America region has similar sanitary and phytosanitary restrictions.

This absolute ban on Asian rice was released in December 1996 as part of Mexico's compliance with the WTO. Asian rice access to Mexico is now subject to a detailed risk analysis of diseases and pests. Rice imports from Asia are impractical under these rules. Besides the United States, Argentina and Uruguay are the only other major foreign suppliers of rice to the Mexican market. Per capita rice consumption in Mexico has risen slowly since the mid-1990's, reaching almost 13 pounds in 2000, but it is still less than half the U.S. level. Even today, Mexico has one of the lowest per capita consumption rates of any Latin American country, implying substantial room for growth. Rice generally has been the most expensive food grain in Mexico, with consumer prices increasing faster than those for other staple foods. (Zahniser, Link et al. 2002).

Because Mexico's sanitary and phytosanitary requirements effectively ban rice imports from Asia, NAFTA has only a minor positive effect on U.S. rice exports. Given the unique U.S. position in the Mexican rice market, it is worthwhile to consider the Mexico. However, without these strict phytosanitary standards, the tariff advantage enjoyed by the United States under NAFTA would be very important.

Given the unique U.S. position in the Mexican rice market, it is worthwhile to consider the potential impact on various classes of rice should Asian exporters find a way to satisfy Mexican phytosanitary concerns. In the market for milled rice, Thailand and Vietnam would likely have a price advantage over the United States, even when the transportation cost of shipping rice from Asia to Mexico is taken into account.

However, other factors would favor U.S. milled rice over Asian rice. First, improvements in the transportation system to move rice from the United States to Mexico have increased the competitiveness of U.S. producers. Second, Mexican consumers seem to prefer the high quality and consistency of U.S. rice over lower-quality Asian rice and even high-quality Thai rice. Finally, U.S. rice can be shipped to Mexico in a much shorter time and in much smaller amounts than rice from Thailand or Vietnam. However, if both the current ban and NAFTA did not exist, it is quite conceivable that Thailand and Vietnam would export substantial quantities of milled rice to Mexico at prices below the current U.S. level.

From another standpoint, the United States would still be competitive in the rough rice market, even if Asian exporters satisfactorily addressed Mexico's phytosanitary concerns. Several factors are responsible. First, neither Thailand nor Vietnam export rough rice, preferring to gain the value added from milling. In fact, no major rice-exporting country in Asia allows the shipment of rough rice. Although the major South American exporters export some rough rice, these shipments are currently quite small. Second, Mexico places a lower import tariff on rough rice than on milled rice. Thirdly, Mexican millers prefer to import rough rice in order to maintain a high degree of mill utilization and to avoid competition with low-priced foreign milled rice. If the Mexican

market continues rough rice importing, U.S. rice would gain more advantages when compared with its international competitors.

However, with the elimination of Mexico's preferential tariff on rough rice in 2003, it is not yet obvious whether Mexico will continue to import primarily U.S. rough rice or shift to importing mostly milled rice, and if so, from which source. Although the United States would retain its transportation advantage, greater competition from South American exporters in the milled or rough rice market is possible, especially should the proposed Free Trade Agreement of the Americas (FTAA) be completed and implemented. Both Argentina and Uruguay currently ship small amounts of rice to Mexico.

Honduras and Costa Rica are the primary U.S. rice importers in Central America. It could be more significant that U.S. rice has over a 90 percent share in both markets. Honduras has a dramatic decrease for its domestic production, which is directed by less government support and the higher production costs compared to importing rice. Rice imports from the U.S. increased quickly during the past five years, with an average of 90 percent of total domestic rice consumption from the U.S. (Figure 1.3.c). Costa Rica has kept a constant production level during 1989-2003, and the domestic production is still the major source of satisfying domestic consumption. U.S. rice holds almost 99 percent of import market share in the country (Figure 1.3.b).

Costa Rica and Honduras also prefer rough rice imports to milled rice imports in order to support their domestic milling industries. According to the CAFTA agreement signed on May 28, 2004, Costa Rica would give a 50,000MT duty-free quota to U.S. rough rice, increasing by 2 percent annually; the quota for milled rice is 5,000 MT,

Figure 1.3.a

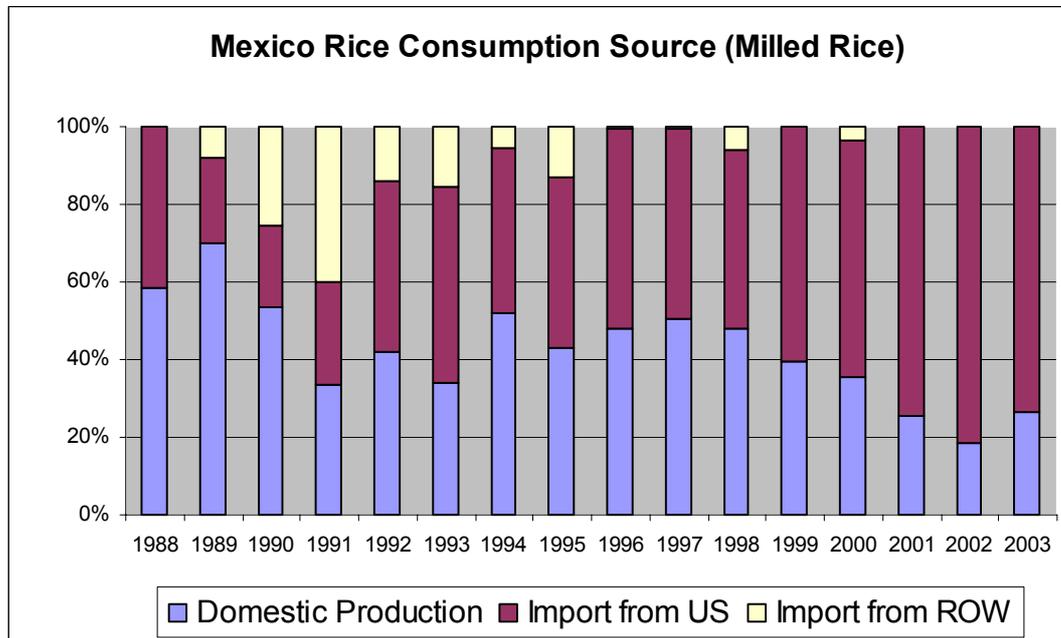
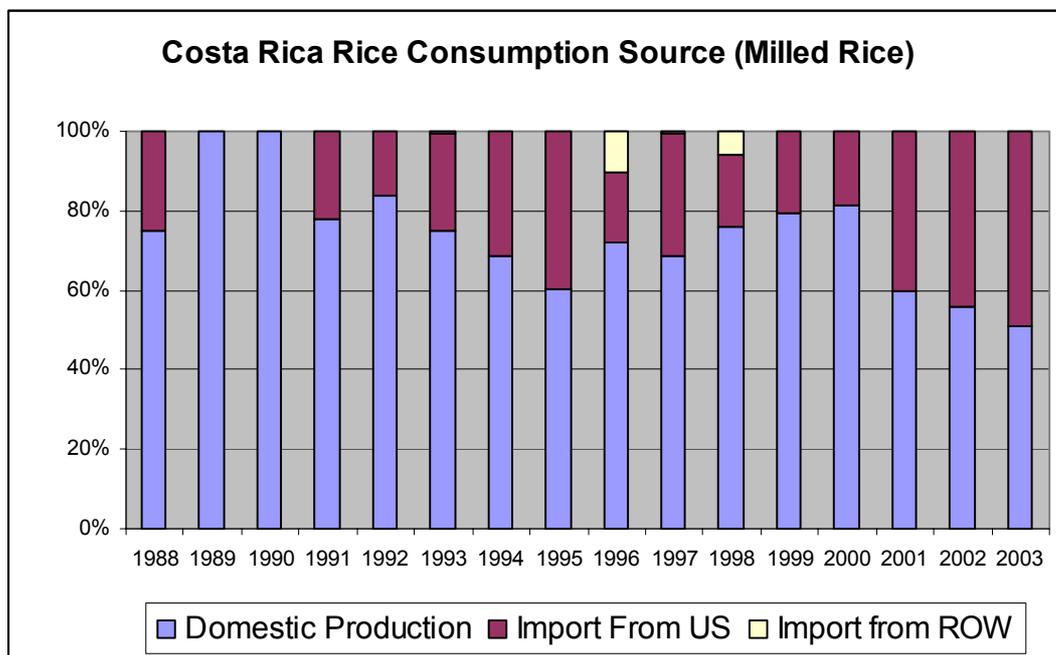


Figure 1.3.b

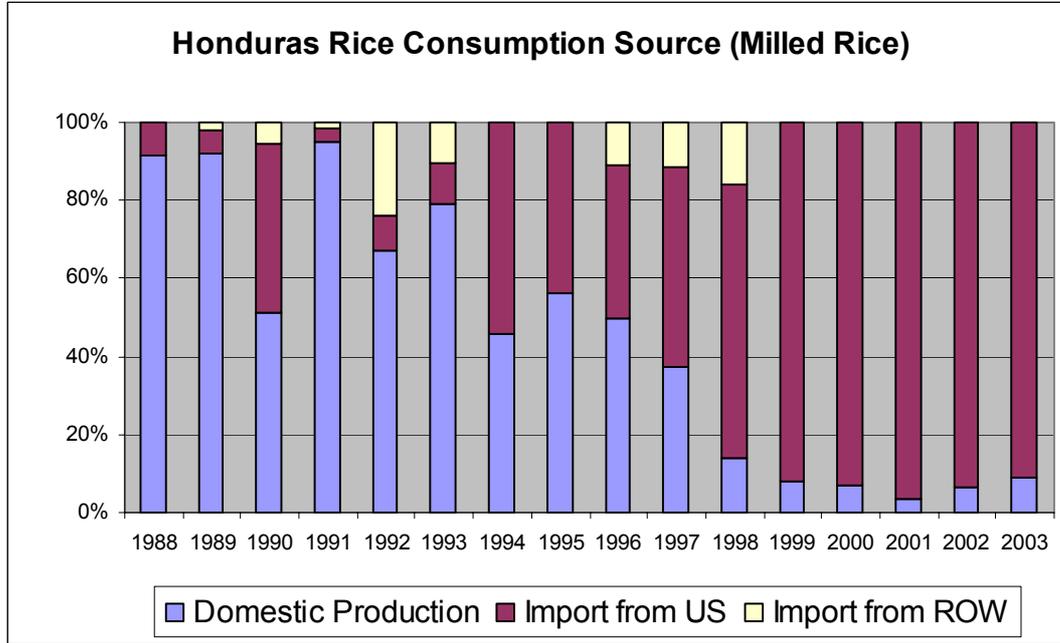


Source: USDA/PS&D data base.

Figure 1.3 Rice Consumption Source in Three Countries, 1989-2003 (Milled Rice)

(table continued)

Figure 1.3.c



growing at 5 percent annually. Honduras provides U.S. rough rice a 90,000MT duty-free tariff-rated quota (TRQ) with 2 percent annual growth, and an 8,500MT duty-free TRQ for milled rice with 5 percent annual growth (USDA/FAS). Rice is a sensitive commodity to bring into trade negotiation, given that the domestic milling industries are highly protected in the targeted countries. This policy would provide little benefit to the U.S. milling industry although it provides the largest gains to U.S. rice producers. However, this current policy would benefit the U.S. rice industry if the sanitary restrictions are relaxed in the future. Asian exporters would still not receive market access, since they are not seeking to export rough rice.

1.2 U.S. Rice Export Promotion Programs

The United States Department of Agriculture established several non-price export programs to assist the export of agricultural commodities, which could benefit the domestic producers, exporters and foreign importers, as well as increase export demand by providing advertising, services and information to current and potential importers in the targeted foreign markets.

USDA/FAS has four generally applied categories of export promotion: consumer promotion, trade servicing, technical assistance and export credit guarantee programs. Consumer promotion focuses on the retail level market. The intent is to raise the consumers' awareness for the products, build lasting preference, and increase the final consumption level through marketing activities. The Foreign Market Development Program (FMDP) and the Market Access Program (MAP) are the primary source of support for federal rice promotion.

The Foreign Market Development Program (FMDP) was created in 1955 and includes the Cooperator Market Development program (CMDP) and the Export Incentive Program (EIP), also administered by the Foreign Agricultural Service (FAS) of the U.S. Department of Agriculture (USDA). The goal of the program is to develop, maintain, and expand long-term export markets for U.S. agricultural products, primarily through trade servicing and technical assistance programs. The program fosters a trade promotion partnership between USDA and U.S. agricultural producers and processors who are represented by non-profit commodity or trade associations called cooperators. Under this partnership, USDA and the cooperators pool their technical and financial resources to conduct market development activities outside the United States.

Since 1993, The Market Access Program (MAP) replaced the former Market Promotion Program (1991-1993) and the Targeted Export Assistance Program (TEA) (1986-1990). The MAP is a cost-share program that uses Commodity Credit Corporation funds to support its mission to help U.S. producers, exporters, private companies, and other trade organizations finance promotional activities for U.S. agricultural products. Applicants compete for funding based on the quality of their applications, past export performance and their willingness to contribute their own resources to the program. The MAP encourages the development, maintenance, and expansion of commercial export markets for the U.S. agricultural commodities. Activities financed include consumer promotions, market research, technical assistance, and trade servicing. Three parties are requested in the program: USDA/FAS, domestic cooperator and third-country parties. Though both MAP and FMDP programs are focused on expanding the market for U.S. products worldwide, there is an essential difference: MAP rules require the participators

to prove there have been “unfair trade practices” in the world market which disadvantage the competitiveness of US exporters, such as the governments of importer countries or competing exporters providing subsidies to producers and exporters, or unfavorable tariff treatment faced by US exporters compare to some beneficial regional agreement. Mercado Común del Sur (MERCOSUR) - Common Market of the South - is a good example when discussing the rice trade in the South American region.

Those two public-private cost-share programs generate over \$4 million annually to promote US rice in all varieties and forms to international consumers. For fiscal year 2000/01, the USA Rice Federation has supplemented its request for nearly \$6 million in MAP and FMDP funds with an additional \$1.9 million in special programming requests. In year 2004, \$4.6 million was awarded to promote U.S. rice overseas; MAP funds for the U.S. rice industry topped \$2.9 million for year 2004-2005, up over \$300,000 from funds for the previous program year. The USA Rice Federation also allocated \$1.7 million from FMDP, which is the 6th largest allocation out of 23 cooperation groups. The rice industry award was the 11th largest out of 66 agricultural commodity groups applying for funding. The international rice promotion focuses on educating foreign consumers about the nutrition of rice, emphasize the high quality, versatility and dependability of United States rice. (USA Rice Federation)

Consider the rice promotion programs run in Mexico by USA Rice Federation as an example of how the promotion works. Annual per capita rice consumption in Mexico is about 12 pounds, which is far lower than the average per capita consumption level in the Latin American region. For this reason, Mexico appears to hold some promise for expanding U.S. rice exports. The USA Rice Federation (USARF) and the US Rice

Producer Association (USRPA) are working to increase that demand through consumer promotion programs. The promotion programs run in Mexico focus on building a consumer and foodservice loyalty to U.S. origin rice, while become a contributing factor to increase Mexico rice consumption. Rice is promoted by USARF as “Rice is a very inexpensive ingredient that provides wonderful plate-coverage and allows you to reduce the amount of expensive proteins while increasing portion size. Dishes made with rice have a very high-perceived value.”

In Mexico, television is an effective medium for reaching large numbers of consumers. USA Rice capitalizes on this with regular appearances on a leading nationwide cable television program that reaches an estimated 7 million viewers daily. Because the program focuses on family and women’s issues, it is a good fit for USA Rice’s consumer messages about the quality and versatility of U.S. origin rice. They have large positive responses to television appearances by USA Rice’s spokesperson in Mexico, “Mrs. Rice”. The program generates hundreds of letters from viewers seeking more information about how U.S. rice can be incorporated into the Mexican diet. Another USA Rice activity in Mexico, “Rice Goes to School,” educates young consumers and their parents about the benefits of U.S. rice in their diets. This program targets school children in the classroom, exposing them to the nutritional benefits of rice through a variety of fun activities, including recipe tasting. It is expected that both parents and children could be reached by the message: “ARROZ, Delicioso y Nutritivo” (RICE—Delicious and Nutritious) (USARF).

Other USA Rice promotions in Mexico include the Rice Chef of the Year Contest, cooking contests for student chefs at leading universities, a nationwide Rice Festival,

media tours and cooking demonstrations. USA Rice also was invited to join forces with a Mexican government agency dedicated to helping Mexico's low-income citizens and educating members of this population about how low-cost nutritional alternatives such as rice can be added to the diet.

The USA Rice Federation annual report (2003) indicates that their promotional activities in Mexico have resulted in a 200 percent increase of U.S. rice consumption in restaurants and double the U.S. rice long grain exports from the Mid-South to Mexico from 1998 to 2003, including a twenty four percent increase in 2001-2003. It has been cited by the U.S. Embassy in Mexico City for two consecutive years as a contributing factor to increased consumption of rice in Mexico (USARF).

Through industry groups like USARF and USRPA, U.S. rice producers, millers and exporters come together to develop export promotion effectiveness, increasing the international market demand a variety of U.S. rice forms and types, including rough, brown, white, parboiled, and long, medium, and short grain. Additionally, the promotion arises when rice agencies are trying to find a way to combine trade policy and food aid efforts in markets to maximize the impact of its efforts to open foreign markets to U.S. rice.

1.3 Exchange Rate and U.S. Exports

The Economic Research Service (ERS) released a report in 2001 on exchange rate indexes and U.S. agricultural trade. The report states that the value of the dollar has increased 42 percent relative to the currencies of U.S. competitors over the last several years, making the U.S. less competitive in world markets. The exchange rate has historically accounted for 25 percent of the change in US agricultural export value and

Table 1.2 Three Targeted Markets Import, Per Capita Consumption and Export Promotion Expenditures for Rice, 1988-2003

	Mexico	Costa Rica	Honduras
Total Import (1,000 MT)	5,564.57	962.14	822.93
Per Capita Consumption (kg)	6.03	55.81	11.60
The ratio of US import w.r.t ^a the total domestic consumption	0.48	0.26	0.60
Total Promotion Expenditure	5,424,799.85	87,912.45	133,187.16
Per Million Capita Promotion Expenditure	3,863.55	1,614.03	1,367.23

Source: Rice imports are based on the FATUS data from USDA/FAS. The market share data are calculated from USDA/PS&D. The promotion expenditures are totaled from the data from USARF and USRPA.

a. With respect to.

become a handicap for US agricultural exports. The exchange rate indices can be used to assess the competitiveness of US agricultural products.

The exchange rate is an essential macroeconomic element that influences the United States agricultural products on import, export and competitiveness. American Farm Bureau Federation President Bob Stallman claimed “The exchange rate is the single most important determinant of the competitiveness of our exports” (The Voice of Agriculture, May 1, 2002). The stable exchange rates and proper valuation of the dollar would greatly affect the long run U.S. agricultural economic health. The existence of unpredictable fluctuation of exchange rates is an important source of risk to farmers and ranchers, processors and traders. However, an understanding of the fluctuation would help agricultural producers anticipate the consequences of exchange rate change and take appropriate actions in production, trade, and related decisions.

The exchange rate is the price of one currency in terms of another; they are used to calculate the domestic price into foreign currency and vice versa. Generally, a stronger dollar would make U.S. exports more expensive in other countries, and it would reduce the cost of U.S. imports. So a stronger dollar would benefit U.S. importers; and the producers and final consumers who need import commodities. A weaker dollar would ease exporters and related producers, but would increase the cost of importing products and could increase production costs if it correlated with imported commodities. In most cases, either a currency appreciation or depreciation is short term in nature, this exchange rate change would affect trade during the beginning several months for most commodities, then the market would adjust itself. But for agricultural products, because of a lower

supply elasticity resulting from the lag effect over the plantation period, the effect would last over a plant-harvest season or a year.

A currency like the U.S. dollar is considered a worldwide official or unofficial currency form; many countries adopt the U.S. dollar as international settlement currency. While the U.S. dollar has appreciated relative to the currencies of some trading partners, it could have depreciation relative to some other currencies. This fact complicates the calculation of the final export price at the importers' end and largely influences the U.S. export price competitiveness in the world market. Exchange rates could provide a competitive advantage or disadvantage for U.S. agricultural products in world market. Assume the origin price of the U.S. rice and another rice exporter are keep in a balance at the beginning time. If other exporting countries currencies depreciate with respect to the U.S. dollar, then it would result a price reduction in real dollars. Comparatively, U.S. rice would lose price competitiveness, and the rice importer would switch from U.S. rice exporters to the other. Even there has a price drop in term of U.S. dollar, but it could end with an actual price increase for importer's domestic market.

When it comes to the import of agricultural inputs, the effect would be adverse. The depreciation of the dollar would raise the price of agricultural inputs, and the appreciation of the dollar would reduce input costs. In general, the exchange rate would affect the distribution of social welfare between producers and consumers on both a domestic and an international scale.

Along with the stronger dollar worldwide, current US agriculture has become more dependent on exports when compared to 30 years ago, which directly generates more research on the exchange rate. Schuh (1973) is the first one to suggest that

exchange rates should not be ignored when governments set trade policies and apply promotion programs. Many studies focus on how exchange rates affect U.S. farmers, and a common suggestion is that dollar overvaluation drives U.S. agricultural products out of both domestic and foreign markets.

When it comes to empirical research, the nominal exchange rate could be adjusted into the real exchange rate, which is more accurate when it has been applied to examine specific commodities. It can be derived from the nominal exchange rate. The real exchange rate would be applied in this study to provide a more realistic reflection through the consideration of inflation for both importing countries and exporting countries.

The transition between nominal exchange rate and the real exchange rate is:

$$RER = NER \times (USCPI / FCPI)$$

Where RER = the real exchange rate;

NER = the nominal exchange rate;

USCPI = the US consumer price index;

FCPI = foreign consumer price index.

Mukund (2002) proposes a new theory, which he named RM theory. He claimed that the agricultural yield has an important effect on the exchange rate and not vice versa. Mukund's idea can be derived from the following statement: Arable land is the most critical element of agricultural production, since this input is immobile. The production would depend on the technical change. Heavy investment on agricultural research and development would increase the yield, while improving the competitiveness of agricultural products in world markets, increasing the export sales. Given the total amount by which export sales increase, the demand for the U.S. dollar from importing

nations would increase. Suppose the supply remained constant; the value of the dollar would rise, which would cause an appreciation of the U.S. dollar.

The impact between exchange rates and common export promotion could affect the real comparative advantage in the rice industry, and cause efficiency and competitiveness gain/loss in the long run. The sensitivity of agricultural trade with respect to the change in the exchange rate has been shown in the Figure 1.3. It gives a rough view on how the appreciation of the U.S. dollar would have a negative impact on agricultural exports.

The Figure 1.4 and 1.6 give the real exchange rate fluctuations and rice export amounts in three studied countries: Mexico, Costa Rica and Honduras. The real exchange rate fluctuated differently for each country. In Mexico, the exchange rate goes through two periods, marked by the Mexican crisis which occurred from 1994 to 1995. However, rice export is not influenced much by this change. Honduran devalued lempiras by 40 percent in 1990; the value of one lempiras had been lowered from 0.1 U.S. dollar to 0.06 U.S. dollars. The exchange rate between the U.S. dollar and Honduran lempiras kept steady after the year, rice export to Honduras grew steadily. Costa Rica colones kept a U.S. dollar value ranging from 0.0030 to 0.0034. However, rice imports showed an irregular trend to the exchange rate. A general study based on those three countries' exchange rates and rice imports is necessary to see whether and how fluctuations of the exchange rate affect their rice import demand.

Figure 1.5 presents the real exchange rate fluctuations in two rice exporting countries in Latin America: Uruguay and Argentina. Uruguay pesos and Argentina pesos are strongly appreciated with respect to U.S. dollars since the late 1990s: the Uruguay

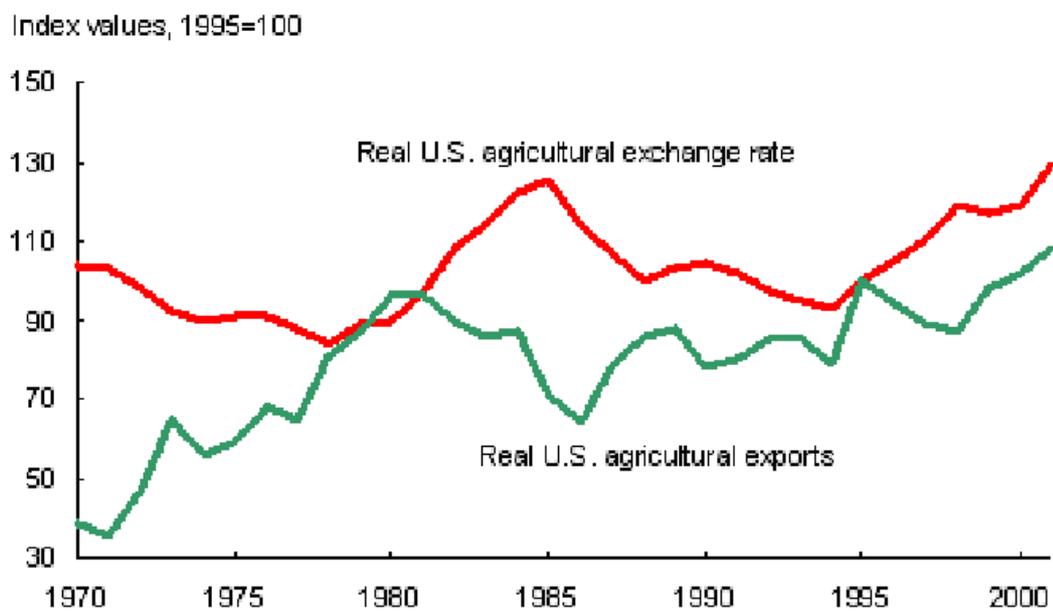
peso exchange rate increased by 110 percent from 1998 to 2003, and the Argentina peso exchange rate increased by 100 percent from 1999 to 2003. Theoretically, the appreciation of those two currencies would benefit U.S. rice exports in the targeted markets, especially considering that Uruguay and Argentina are the only long grain exporters in the world rice market.

As a key macroeconomic force that influences the prosperity of the agricultural trade between the United States and those three countries, the exchange rate movements are an important source of risk for rice trade. It would be helpful to give a better understanding of how the exchange fluctuations would affect rice trade and provide guidance on taking appropriate actions in making production and trade decisions.

1.4 Problem Statement

This study investigates the impact of the USDA/FAS promotion programs' impact for the United State rice export to three major U.S. long grain rough rice importing countries in Latin America: Mexico, Costa Rica and Honduras. Econometric models are estimated to examine the dynamic effects of the promotion programs and exchange rate fluctuations during 1989-2003 on U.S. rice trade in the selected countries. The price and promotion elasticities are investigated by the empirical system.

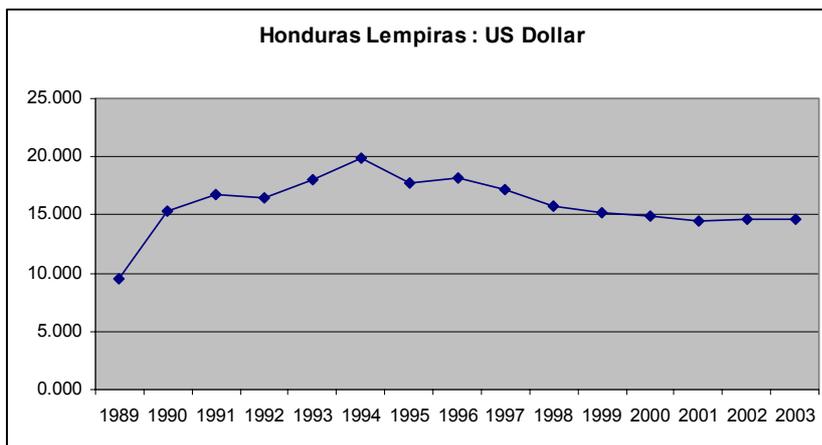
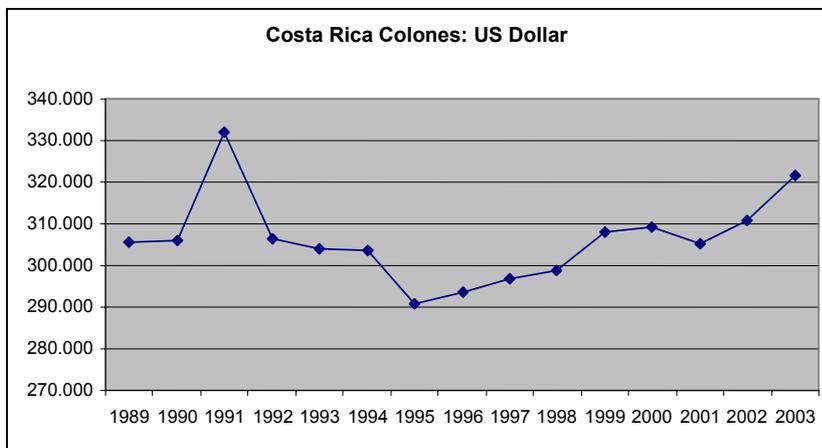
Export promotion has been taken as an important factor in influencing US agricultural exports. But it remains a debated topic in terms of whether the promotion expenditure could increase efficiency of return or not. USDA/FAS reported that generally those promotion programs undergoing are efficient, while a report done by General Accounting Office (GAO, 1997) indicated that the effectiveness is uncertain given more evaluating standards, like total output, employment and tax receipts etc.



Source: USDA Agricultural Baseline Projections to 2011, February 2002. USDA/ERS.

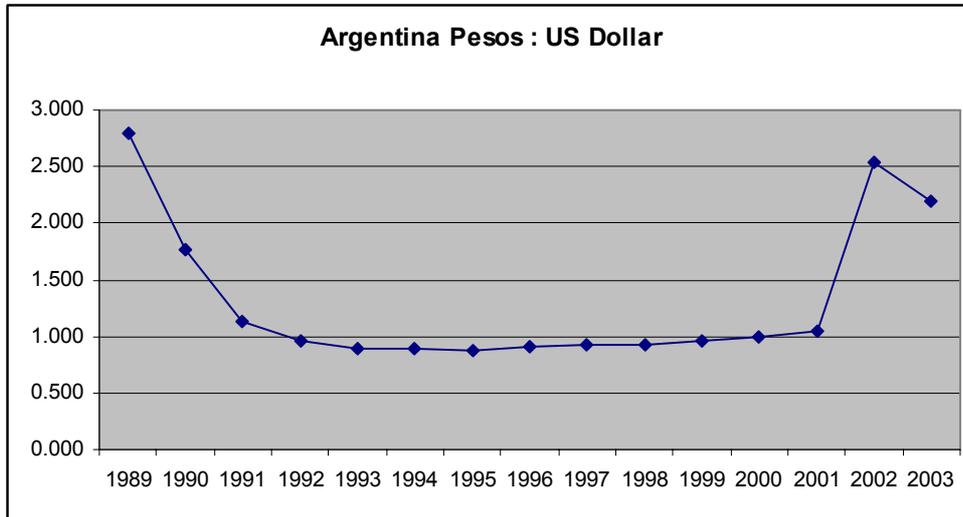
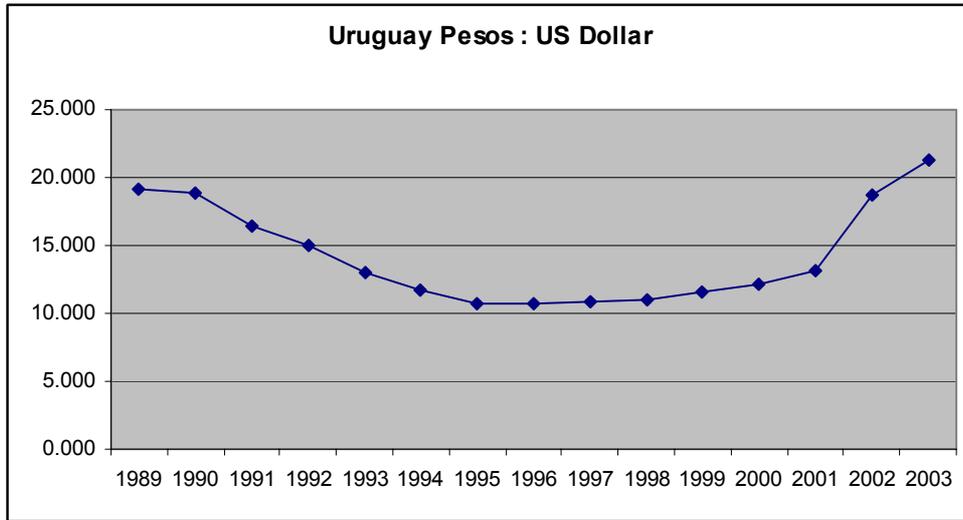
Note: 2001 numbers are estimates based on partial data.

Figure 1.4 Agricultural Exports and Exchange Rate



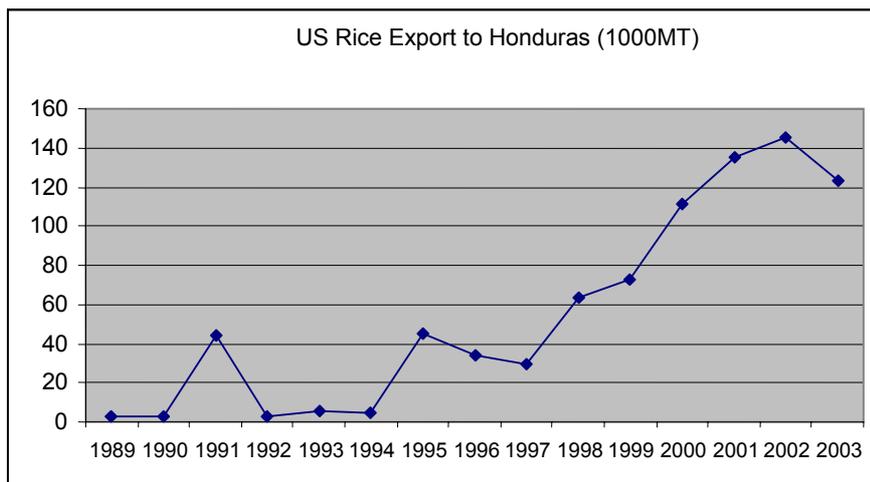
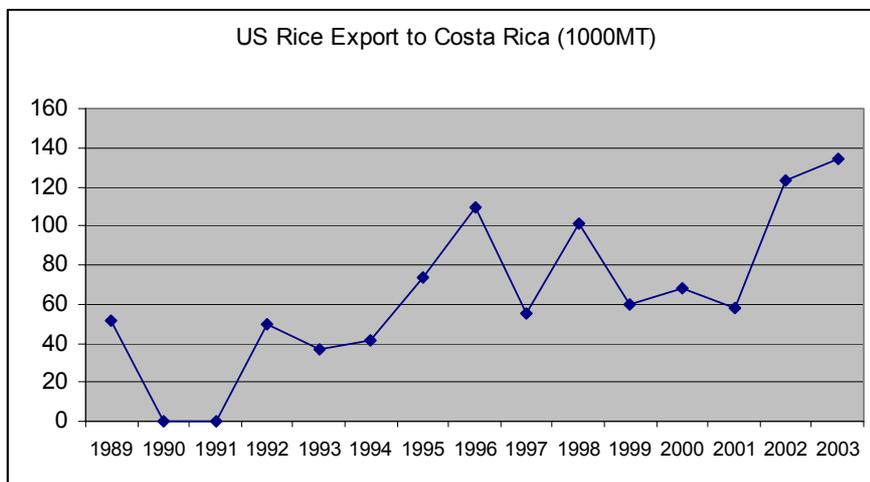
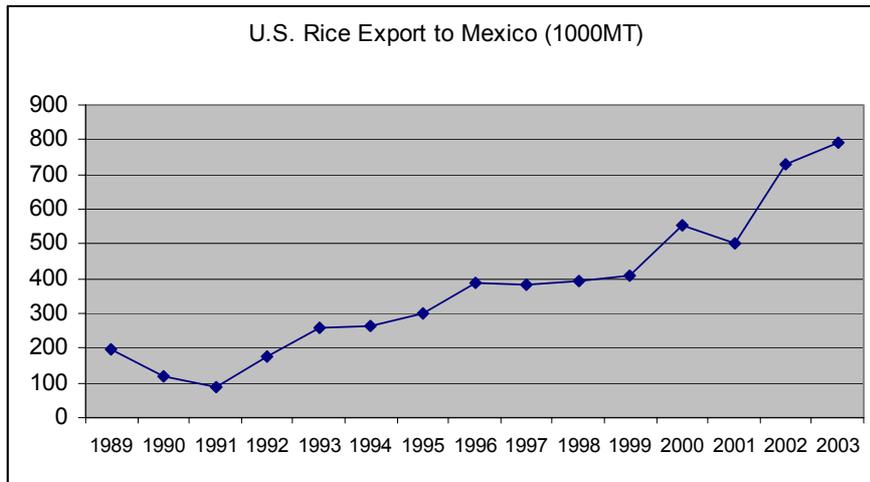
Source: USDA/ERS. Exchange Rate Briefing Room.

Figure 1.5 Real Exchange Rate Fluctuations in Three Importing Countries, 1989-2003



Source: USDA/ERS. Exchange Rate Briefing Room.

Figure 1.6 Real Exchange Rate Fluctuations in Two Competitor Countries, 1989-2003



Source: USDA/FATUS

Figure 1.7 U.S. Rice Exports to the Three Importing Countries, 1989-2003.

Not much literature exists related to evaluating export market promotion efficiency. The related studies started during the 1970s, however, only in the 1990s did this topic gain more attention. The commodities had been studied included cotton, soybean, wheat, poultry meat, almond, walnut, citrus etc, in a quite wide region, including Asia, Europe, and Canada etc. The general limitation to the promotion expenditure analysis is primarily the data availability and the short time horizon. Most of the studies are worked with short time-series data no more than ten years.

Instead of the importance of Latin America rice market and the increased promotion expenditures spend in the region, there has been no related study to estimate the efficiency of the promotion programs (MAP and FMDP). This study would be the first one trying to estimate the USDA rice export promotional programs effect of the U.S. major long grain rough rice importing market in Latin America.

Both the federal government and the rice groups have been working on increasing and maintaining the rice export markets for past decades. However, no quantified study has been done to estimate the effect of the promotion expenditure on rice exports in general. An updated study on the rice promotion programs would be helpful for researchers and policy makers to have a good understanding about the current effectiveness of the promotion programs, a time lag distribution that the promotion programs could have and the factors that influence the rice importing demand in the targeted countries.

1.5. Justification

As a traditional subsidized industry, with decreasing budgets for domestic support, the analysis of expanding potential international market would be an interesting topic.

Both federal government and rice industry participants – rice farmers, ranchers, milling owners and exporters – pay much attention to maintaining current market share, restoring previous markets which declined (examples like Cuba, Iran and Iraq) and exploring new market opportunities.

To investigate the multiple linkages between promotion programs, exchange rates and exports, this study will concentrate on effects of promotion in the U.S. rice export market, in particular attempting to estimate the magnitude of those impacts. Given the reality that the three targeted markets had a comparatively flat exchange rate fluctuation during the studied period, the competitors' exchange rate would be given more emphasis, and applied as a better indicator to evaluate the exchange rate effects.

The analysis is conducted in single equation system. The lag effect of the promotion programs has been given emphasis, in an attempt to determine the long-term effect of international promotion activities, which differs from short term domestic advertising.

1. 6. Objectives

The main objective of the study is to analyze the effect of promotion programs and exchange rates with respect to rice exports to the three major U.S.-grown long grain rough rice importers in Latin America: Mexico, Costa Rica and Honduras. To accomplish this, several specific objectives have been identified:

1. Present the background of the current U.S. rice export market, and the attention to the Latin American long grain rough rice market, primarily on Mexico, Costa Rica, and Honduras.

2. Develop a theoretical framework to analysis the economic factors which would affect the import demand in the three importing countries.
3. Develop a model to estimate the import demand for Mexico, Costa Rica, and Honduras and analyze the results.
4. Evaluate the effectiveness of the promotion programs in expanding the rice export in the targeted markets. The decaying effect of the promotion programs would be presented.

1. 7. Outline of the Study

The thesis will be organized as follows: Chapter Two will consist of literature review on the relationship among exchange rates, agricultural policy and export. Some early work devoted to other agricultural products will be introduced. The economic theory behind this research will be discussed. Chapter Three will present the econometric framework and procedures applied to analyze the data set. The results and further analysis from the model will be discussed. Finally, Chapter Four will focus on the implications of the results and provide a summary of this study.

CHAPTER 2

THEORY BACKGROUND AND LITERATURE REVIEW

The analysis of the promotion programs' effectiveness began in the 70s, but the large attention in research started in the 1990s. The historical studies have evaluated the impact of the U.S. export promotion programs for various agricultural commodities and importing countries. This study is the first to examine US rice export promotion in Latin America.

In general, previous studies have found that export promotion has a positive impact on import demand for US products. However, the results are mixed in terms of statistical significance of the promotional elasticities. Since different methodologies, different commodities and different markets have been researched, it is hard to generalize the overall performance of US export promotion. However, it would be useful to review the method and result of those studies. Exchange rates enter into each demand function as a key factor affecting the importing countries demand.

Ward and Tang (1978) estimated demand for US fresh grapefruit in Canada, Japan and the aggregate of the European Economic Community (EEC) by seemingly unrelated regression (SUR). They specified imports of US fresh grapefruit per quarter as the independent variable, and FOB price in the US, per capita GNP of the importing country, seasonal dummies and time trend as exogenous variables. Israeli grapefruit price enters into the model as an exogenous variable for the EEC equation, since Israel maintains a large market share in EEC countries, so the grapefruit from Israel would be considered as a substitute for US grapefruit. The results showed that the income and Israeli grapefruit price were significant. A one percent increase in Israeli grapefruit price

would increase US exports by 4.55 percent in the EEC market. They also indicated that the price elasticities differ with or without the presence of the exchange rate in the model.

Fuller et al. (1992) studied the U.S. fresh grapefruit export market, specifically the effect of fresh grapefruit promotion programs and trade policy in four major importing countries, Japan, France, Canada and the Netherlands. Those countries import about 90 percent of US grapefruit. Four import demand functions were specified and estimated by joint generalized least squares based on the sample period 1969 to 1988. Per capita imports are the dependent variables, FOB price, real exchange rate, GDP of importing countries, substitute commodities' price, promotion program expenditures on importing countries, valorem tariff rate and quota in importing countries and time trend variables measuring changes in tastes and preferences for US fresh grapefruit over the study period are included as exogenous variables. A seemingly-unrelated-regression (SUR) procedure was used. The results showed that promotion expenditures had a statistically significant and positive influence on fresh grapefruit exports. Holding all other variables constant, each additional 1,000 dollar promotional expenditure increased per capita imports of US grapefruit 0.00026, 0.00061 and 0.0034 pounds per quarter in Japan, France and the Netherlands, which could be interpreted as an import increase of 14.4, 15.2 and 22.7 metric tons in respective countries based on 1988 population. The estimated promotion elasticities are 0.11, 0.23 and 0.15 for Japan, France and the Netherlands, respectively. The effect of FOB price and exchange rate give different effects. A one percent price decrease and a one percent dollar depreciation will both impact the demand, while the later yields not only a price effect but also an income effect for large US product buyers. The authors also suggest that even though producers have no

ability to change most of the exogenous variables, promotional expenditure is an exception and can be applied to affect producers' welfare.

Halliburton and Henneberry (1995) study the effect of the FAS/USDA almond export promotion programs in the Pacific Rim from 1986 to 1992. Five Pacific Rim countries' cross-sectional time series data are pooled into three models: the Cobb-Douglas, linear and exponential forms. The dependent variable is total almond import volume; the explanatory variables include the price of almond, the price of almond substitutes and complements, the GDP, promotion expenditures. Time trend dummy and intercept dummy are used to capture the effect of changing taste and measures the different intercept each country holds respectively. This research ends with a very conservative result. Partial estimation of the import demand models indicates promotion programs run in Japan, Taiwan and Hong Kong are effective while the promotions in South Korea and Singapore show ineffectiveness.

Le, Kaiser and Tomek (1998) estimate the export promotion effect for US red meat in select Pacific Rim countries and regions: Hong Kong, South Korea, Singapore and Taiwan. Pooled time-series cross-section data were used to estimate a single equation import demand model. The results indicated that US export promotion had a positive and significant impact on red meat imports by South Korea. One-year lagged promotion expenditure indicated that promotion had an immediate and carryover effect on imports. However, the promotion programs are not significant for the other three markets.

Rosson, Hamming and Jones (1986) first applied the pooled cross-section time-series data to estimate the foreign market development expenditures. The results turned out to be significant. Marginal returns to an additional dollar of export promotion for

apples and tobacco were \$60 and \$31 respectively. However, the response to poultry promotion was not significant in this study. The importance of the exchange rate has been specified in their study.

Onunkwo and Epperson (2000) did three studies focusing on nut import demand in the Asian and EU markets. Three commodities are separately analyzed in three papers: pecan, walnut and almond. The models include only the own price, substitute price and the promotion programs expenditures allocated for them. A negative marginal return per dollar for those three nut markets implies a mature market characteristic.

Armah and Epperson (1997) estimated the export demand for US frozen concentrated orange juice based on annual observations from 1984 to 1992. Five importing countries had been listed as research target market. A positive relationship between the promotion programs and import demand has been proved.

There have been numerous articles focusing on the exchange rate. Schuh (1974) is the first researcher who outlines the relationship between exchange rates and agricultural trade. He suggests that the role of exchange rate policy should be introduced as an essential part of the study of agricultural trade, as well as other macroeconomic elements, like the inflation rate, domestic research and development investment, and export support. Either an overvaluation or undervaluation of the dollar would realign the social welfare between producers, domestic consumers and foreign market consumers. He argues that the overvaluation of the dollar would reduce foreign demand on US agricultural products, though export subsidies and the price support programs could partially offset the effect of the overvaluation of the dollar. The dollar overvaluation caused domestic price decreases since more supply exists, domestic agricultural products price would decrease, and the

agricultural resources (land and labor) would be under-valued. The undervaluation would result in more demand on technical change, which would result in more investment on agricultural research and development. From another side, an undervaluation of dollar would help agricultural exports and increase domestic price.

Schuh (1975) continually examined the general inelasticity of agricultural export supplies, especially in the short run. Schuh indicated that whether an agricultural export is elastic or not also depends on the export ratio in terms of total production. The export supply function is an excess supply function whose elasticity is a weighted aggregate of the domestic price elasticities of supply and demand. If the export is a relatively small proportion in total production, it would result in very elastic export supply. For the objectives of this research, rice fit in this category, and we would view rice as having high export supply elasticity.

While the studies of the impact of exchange rates on agricultural trade have been widely valid, Dallas and Michael (1984) indicate that it is necessary to distinguish the nominal exchange rate's effect from real exchange rate's effect. The later is taken as a more reasonable type with which to do analysis, since only change in real magnitudes influence trade flows. Dallas et al. (1992) demonstrate that the exchange rate is not the only element which determines exports. Examples show that the trade fluctuation between countries could not be consistently explained by this two-variable comparison. They employed a log-linear equation which accessed the relative impacts of foreign economic activity and real exchange rates on export volume. The results showed that changes in foreign income have been primarily responsible for the changes in foreign demand for US agricultural exports from 1971 to 1984. The negative effect of exchange

rates on export could be dominated by the level of real GNP in import countries and regions.

Many studies have examined the influence of exchange rate movements on agricultural trade. While the basic result – real appreciation of dollar would decrease exports and depreciation of the dollar would increase exports, the disagreement persists on the magnitude of the effects on different agricultural commodities.

Vellianities-Fidas (1976) studied 20 countries that had devalued or revalued their currencies at once during 1960-69. He found out that countries did not significantly change levels of imports after their currencies revalued. The inelasticity of supply and demand in the agricultural sector suggested that exchange rate changes do not greatly impact agricultural trade. The different commodities they chose are affected at different levels. Another study proposed by Collins et al. (1980) also supported this result; there exist some other factors that affect the relation of trade and the exchange rate. The size of the exchange rate impacts depends on crop, year, country, governmental influence in markets, elasticities, measured price variables, alternative prices and the definition of the exchange rate effect.

Machlup (1980) argues that the lagged relationship between exchange rates and trade should be taken into consideration, given time-consuming long distance transportation in international trade. One of the objectives of the U.S. farm bill is to mitigate the adverse impacts of a strong U.S. dollar which decline the US exports and stimulate US imports. Rosson et al. (2001) provided a systematic study on the relationship between exchange-rate-linked policies and trade. They claim five major impacts exist on exchange rate management policies and export. First, the comparative

advantage would be masked by managing the exchange rate of the U.S. dollar; resource misallocation would lead to less efficiency and decline in competitiveness in long run. Second, the market price signals and trade would be distorted, then over or under investment in agriculture would happen, the production factor price would be distorted, and reduce competitiveness. This is also a widely accepted idea. Third, the export-leading devaluation would conflict with the objective of inflation control. Fourth, the diversity of world exchange rate regimes with respect to the U.S. dollar cause effective exchange rate management mechanism to become impossible. Finally, agricultural interests would no longer be the priority for current U.S. economic policy.

Many studies already focus on the relationship between exchange rates and U.S. export promotion programs, as well as produced different promotion elasticities and rates of returns with different modeling approaches. Besides that, little research directly leads to the analysis of the relationship between the export promotion programs and exchange-rates-linked export competitiveness.

Laxmi, Murali etc. (2002, 2003) worked on several papers focusing on the analysis of exchange-rates-linked subsidies for non-price export promotion targeted such as cotton, wheat and soybean export markets separately. The results of their study could be summarized into four points. First, an increased federal expenditure on export promotion with a U.S. dollar appreciation always increases U.S. producer surplus and strengthens the marketing position of US agricultural firms in the international market. The net producer return per last dollar spent on export promotion expenditure tended to be higher in short run than in long run. Secondly, promotion expenditure expressed in U.S. dollars and other countries' currencies do not demonstrate a crucial difference in

terms of the returns and incremental costs. Third, export promotion programs should take exchange rate change into consideration in order to increase the welfare of domestic producers and subsidy schemes. Fourth, studies on measuring the impacts of U.S. Export Promotion Program for wheat resulted in own-price and exchange rates having negative impact on export demand of wheat, while the real GDP, price of corn (substitute of wheat) and export promotion expenditure had positive and significant impacts.

CHAPTER 3

AN EMPIRICAL ANALYSIS OF PROMOTION PROGRAMS EFFECT FOR U.S. RICE EXPORT TO LATIN AMERICA

3.1. Theoretical Framework

Export market demand is based on many factors. Basic economic theory points out that price would be the essential element, having a negative effect on demand. In international markets, the final price in a foreign market would be determined not only by the domestic output price, but also by other factors which come together to form the final cost paid by the consumers in the importing countries.

The three targeted markets in this study are Mexico, Costa Rica and Honduras. For the U.S. rice exporters, these countries share some similar characteristics. They are the major rice importers of long-grain rough-rice markets and the rough rice importers share a much lower tariff level, or even no tariff. While the domestic support to rice production is decreasing, the milling industries in those countries are supported by the trade policy. Their trade policies are favorite The U.S. is their major agricultural trade partner and has an advantage with respect to location.

Wheat is chosen as a substitute for rice in the targeted markets, since rice and wheat are generally the most basic food grain. According Salin et al. (2000), pasta soup, corn tortillas and rice comprise the main Mexican food staples. This food pattern is considered as a proxy for the three targeted markets in this study.

The U.S. wheat exporters, as well as the U.S. rice exporters, share monopoly power in those three markets, which makes it is appropriate to apply the U.S. export prices in the analysis. Based on the USDA/FATUS data set, the U.S. wheat import market shares are 70%, 89% and 90% in Mexico, Costa Rica and Honduras, respectively. Costa Rica and

Honduras do not produce wheat by themselves, with wheat consumption depending on imports. Mexican wheat production has shown a slow decreasing trend with increasing demand for wheat imports.

Given the declining domestic production in Mexico, Honduras and Costa Rica in the past five years (1999-2003), rice imports from the U.S. are becoming the dominant power in this market. U.S.-grown rice accounts for over 50 percent of total domestic consumption, and almost 100 percent of import market share (Figure 1.3). Given the convenient geographic location, decreasing local government support to rice production, and beneficial trade agreements gained through NAFTA and CAFTA, rice trade between the U.S. and these three countries appears to have significant potential. The low per capita consumption level in Mexico and Honduras left more possibility for efficient promotion programs.

Exchange rates have directly effected the final payments for imported commodities. The higher exchange rate between local currency and the U.S. dollar, an appreciation of one currency, would increase the country's export price, which would reduce the importers' demand for the commodities, increase the domestic supply level and reduce the domestic price. In contrast, the devalued currency in an exporting country would reduce the import cost and stimulate imports, which would lower the international market price and domestic production. The importers' demand of the devalued-currency country's commodities would increase, causing a shortage in the exporting country's domestic market and a higher price. Generally, the effects of a depreciation of the exporter's currency have the same effects as an appreciation of the importer's currency for the trade partners. Kost (1976) claims that there is an upper limit on how much price

and quantity change can occur with respect to an exchange rate change. The maximum that price and quantity can change is by the same percentage of the exchange rate change. The price maximum is found when export supply is perfectly inelastic and the quantity maximum is found when export supply is perfectly elastic. Kost expects only a small impact on agricultural trade as a result of a change in exchange rates and what effect there is will be on price rather than quantity.

As an effective method of increased sales, promotion programs could help to increase exports, and create opportunities to strengthen the long-term economic viability of the industry. Compared with the increased revenue and profit, promotional programs can be successfully applied by investing small expenditure and gain large revenue. For effective promotional programs, the investment on promotion would be positively related to the total export amount in the importing market.

3.1.1. Model Specification

Fundamental economic theory indicates that a strong U.S. dollar would negatively affect exports and promotional expenditure would positively affect the agricultural products export. However, no previous studies have been conducted to evaluate how those factors would affect rice trade between the U.S. and major U.S. rice competitors in Latin American rough-rice markets. This study assumes that the important economic variables affecting total export demand are promotional expenditure through federal government programs (MAP and FMDP), export rice price, the substitute price (wheat), total domestic supply (sum of the initial stock and domestic production), total domestic consumption, and competitor's exchange rate with respect to the U.S. dollar (two options:

Uruguay and Argentina). The export demand equation for U.S. rice in selected countries is specified as follows:

$$(1) \quad Y_{i,t} = f(\text{PRO}_{i,t}^*, \text{Pr}_{i,t}^*, \text{Pw}_{i,t}^*, \text{TDS}_{i,t}, \text{TDC}_{i,t}, \text{UEX}_{i,t})$$

$$(2) \quad Y_{i,t} = f(\text{PRO}_{i,t}^*, \text{Pr}_{i,t}^*, \text{Pw}_{i,t}^*, \text{TDS}_{i,t}, \text{TDC}_{i,t}, \text{AEX}_{i,t})$$

Where the dependent variable $Y_{i,t}^*$ represents the total import amount of U.S. rice exports to selected country i in year t .

For the explanatory variables, $\text{PRO}_{i,t}^*$ denotes the promotional expenditure invested on country i in year t deflated by the United States CPI index; $\text{Pr}_{i,t}^*$ and $\text{Pw}_{i,t}^*$, denotes the unit export price for rice and wheat, respectively, deflated by the CPI of importing countries; $\text{TDS}_{i,t}$ denotes the total importing countries' annual domestic supply, including the initial stock and the domestic production. $\text{TDC}_{i,t}$ denotes the total importing countries' annual domestic consumption. $\text{UEX}_{i,t}$ and $\text{AEX}_{i,t}$ denote the real exchange rate value of the competing exporting countries' currency in term of the U.S dollar (Uruguay Pesos and Argentina Pesos). “*” denotes the transformation of data by applying the appropriate CPI index to minimize the influence of inflation or deflation for the selected rice importing countries and the U.S. during the studied period.

Based on economic theory, a relationship between the dependent variable and explanatory variables could be expected. $\text{PRO}_{i,t}^*$, $\text{Pw}_{i,t}^*$, $\text{TDC}_{i,t}$, $\text{UEX}_{i,t}$ and $\text{AEX}_{i,t}$ are expected to be positively correlated with demand for rice imports; while $\text{Pr}_{i,t}^*$ and $\text{TDS}_{i,t}$ are expected to be negatively correlated with $Y_{i,t}$.¹

¹ An optional lagged dependent variable which corresponds to habit persistence of rice consumption is considered as alternative variables to reflect the dynamic consumer behavior in the model. However, it does not match to the model system. So the result would not be listed.

3.1.2. Data Description and Analysis

Annual data for the period January 1989 through December 2003 were used to estimate the export promotion effect. The Federal promotion program expenditure data (FMDP and MAP) used in the model were obtained from the USA Rice Federation (USARF) and USA Rice Producers Association (USRPA), who are the only two money recipients of the USDA/FAS promotional programs fund during the period studied. The data set contains 15 times-series observations for each country (1989-2003).

The data represent the aggregate expenditures distributed by the United States Department of Agricultural (USDA). Since MAP programs are processed by market-year (July-June) and FMDP programs are processed by calendar year, the MAP data were adjusted into a calendar-year basis data set by applying a two-year moving average method. Then, the total MAP and FMDP expenditures are summed to represent the rice export promotional expenditure. Only federal promotion program investments would be included in the study. Other promotional investment sources would not be included due to the lack of data available. As previous studies show, ignoring this could still make a plausible study, since program participants usually contribute a certain percentage of matching funds, officially speaking, at a one to one ratio. The magnitude of the investment could still be proportionally distributed into federal shares and private party shares. Onunkwo and Epperson (2000) make the assumption that private parties would keep the same contribution through the years and no evidence shows that private funds can substitute for federal funds. This assumption is utilized in this study.

The import amount of U.S. rice is modeled at the annual level because there is no record related to monthly promotional program expenditure. It has been discussed

whether a fifteen year annual data set is long enough to be applied in the analysis, and it would be useful to obtain monthly data to give more variation. However, for a study focusing on foreign agricultural products market demand, it would still have good explanatory power. The promotion programs are viewed as having a long-term effect on exports, since the promotion programs are basically focused on the long run positive demand shift for U.S. rice instead of short run improvement which could be distinguished month by month. It can not be expected that the imports would increase because a large promotional campaign occurred in the last month because of a more complicated transaction, which would slow the response for increasing demand. Another reality is that the importers are the final decision makers for final import amount instead of the consumers. From the business point, the importers pay more attention to the price fluctuation, the processing, storage capacity and distribution. It takes time to make decisions based on those restrict elements. From the supply side, agricultural products are different from industry products, since the production of agricultural products would depend on natural conditions and could only be harvested season. Only if there has extra storage for rice in the short run, the increasing demand could be satisfied by the suppliers in a short term.

Though there are no previous studies indicating how and when the USDA/FAS money would be applied, it is worth noting that the expenditure data does not always record the exact time actual expenditures occur. Records could indicate when the FAS reimbursed the program participant. A program participant may not ask for reimbursement for a number of months and then reimbursement requests may entail expenditures over a period of several different months. From this point, even though

monthly expenditure data could be available, without detailed understanding of the real distribution through months, it would not give more useful information and could be partially biased.

Traditionally, advertising is claimed to increase the market share at two levels. At the initial time, the advertising would increase the consumption until the market becomes comparatively mature, and consumption increases at a decreasing rate. Costa Rica appears to be a mature rice market with a higher per-capita rice consumption level, 50.21 kg per capita. In contrast, the lower per capita consumption level in Mexico (6.03 kg) and Honduras (11.6 kg) indicates those two countries could have more market potential to be developed. The promotion programs used in saturated markets with high per capita consumption level would be easy to be accepted by the public. However, it would be hard to be efficient, since not much market share is left for the new suppliers. In this case, brand advertising campaign maybe better than generic promotion. The latter one focuses on increasing the total consumption, while the former focuses on increasing the market share. However, brand promotion is out of range of this study. The USDA/FAS promotion programs are generally applied to the generic advertising to increase general rice demand for U.S. rice. Mexico and Honduras would be better targets to be focused on within the study. These two countries have the lowest per capita rice consumption level among the Latin American region.

The rice export quantities and unit values are obtained from the publication Foreign Agricultural Trade of the United States, United States Department of Agriculture (USDA/FATUS). The export unit value derived from the total import value and quantity of each importing country is used as a proxy for the U.S. rice export price in each market.

The CPI index for the importing countries and the United States are collected from International Financial statistics, published by International Monetary Fund (2003). The dependent variable Y and explanatory variable P_r are specified at the milled rice base, which is the official data available. There was no separate data available for all export varieties (rough rice, broken rice and parboiled rice etc). However, Rice Outlooks, published by USDA/ERS, claims that most rice exports to the region is long grain rough rice (over 80 percent). A variables description and simple statistics included in the model are presented in Table 3.1 and Table 3.2.

3. 2 Estimation Procedures

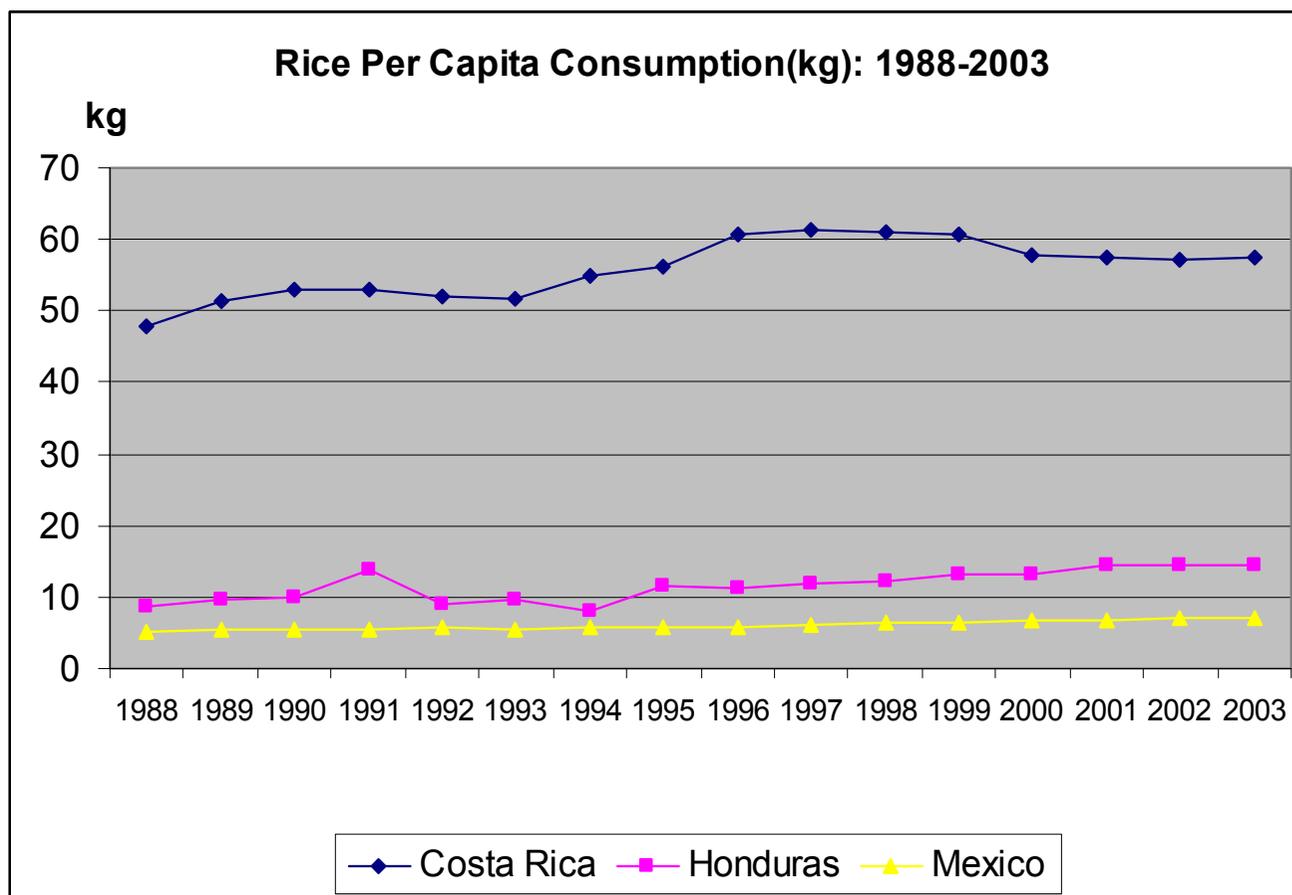
This study assumes that, based on the different domestic and general import situations (import from U.S. and rest of world), the efficiency of promotion would differ in those three countries. The primary hypothesis to be tested is that U.S. export promotion expenditures have had a positive impact on the rice imports of selected Latin American countries. To test this hypothesis, two sets of econometric models have been applied. First, the single equation model tests the effect of the promotion programs and exchange rate fluctuation for each country. The single-equation structural demand equation has been a popular method and remains in use for three reasons. First is that demand for the studied commodities can be modeled independently with variables deemed necessary to determine demand for the commodity. Second, the data required is quite flexible. The final advantage is computational ease. Another popular method in the literature is the Almost Ideal Demand system (AIDs). The independent variable of AIDs is market share. However, in this study, the U.S. rice imports market shares in three of four countries are

over 90% in the studied period (1989-2003). This means that it may not be appropriate to apply AIDs.

Binkley (1981) suggested that single-equation methods are appropriate for estimating import demand when the supply faced by importers is exogenous, which is the case when a larger portion of the commodity is consumed domestically by exporters, leaving a relatively small portion for the export market. In addition, the supply is highly elastic and reduces the likelihood of bias that in the estimated demand elasticity must be minimized. This condition could be recognized in international rice trade where most of the rice producing countries are the major consumers, and leave only a small margin to be traded on the world market. For the United States, this is applicable since it consumes more than 50% of domestic rice production. In previous research, a single equation model has been specified to analyze the impact of promotion programs on export demand for several agricultural commodities, such as grapefruits (Fuller et al, 1992), and almonds (Halliburton and Henneberry, 1995).

Ordinary Least Square (OLS) estimation is normally conducted as the first step to observe the relationship between explanatory variables and dependent variables. It holds strong estimation power in econometric analysis. The collinearity test, heteroscedasticity test, and autocorrelation test are conducted to determine the efficiency of the single equation system result. A Generalized Method of Moments (GMM) fitness test is conducted to correct the efficiency problem caused by heteroscedasticity in the OLS result.

The models considered in the study for the single country analysis are shown in equations (1) and (2) respectively.



Source: IMF/IFS (2003) and USDA/FATUS (2004)

Figure 3.1 Rice Per Capita Consumption Difference in the Three Markets: 1988-2003

Table 3.1 Variables Description

variable	Source	Unit	Description
Y	USDA/FATUS	1,000 MT	Volume of U.S. exports.
Pro	USARF and USRPA	\$1,000	Annual promotional programs expenditure, adjusted by the U.S. CPI (Consumer Price Index) ^a . TEA/MPP/MAP and FMDP included.
Pr	USDA/FATUS	\$/MT	Export unit value ^b of rice-paddy, milled, adjusted by the U.S. CPI ^a .
Pw	USDA/FATUS	\$/MT	Export unit value ^b of wheat, unmilled, adjusted by the U.S. CPI ^a .
TDS	PS&D	1,000 MT	Total annual domestic rice supply of the importing country, the sum of initial stock and domestic production.
TDC	PS&D	1,000 MT	Total annual domestic rice consumption of the importing country.
UEX	ERS	index	The real annual exchange rate between the Uruguay pesos and U.S. dollars.
AEX	ERS	index	The real annual exchange rate between the Argentina pesos and U.S. dollars.

Notes: a. CPI base year 1995 = 100.

b. The Unit Value is calculated by dividing the sum of the value by the sum of the quantity converted to the FAS unit of measure to three decimal places (USDA/FATUS).

Table 3.2 Simple Statistics for Variables Included in the Rice Import Model, 1989-2003

Variable	Mean			Standard Deviation			Range		
	Mexico	Costa Rica	Honduras	Mexico	Costa Rica	Honduras	Mexico	Costa Rica	Honduras
Y	370.97	64.14	54.86	207.15	39.69	51.68	702.85	134.53	142.97
PRO	344314.78	5351.90	7890.55	168369.68	6260.35	12690.88	696034.28	18001.24	45995.42
Pr	236.39	234.41	270.77	82.27	144.02	112.19	289.01	592.33	390.48
Pw	146.99	167.65	151.80	32.03	32.80	28.53	102.44	108.83	93.23
TDS	353.67	181.27	39.13	49.41	31.16	16.75	185.00	93.00	51.00
TDC	562.73	194.33	69.40	95.91	28.80	20.18	285.01	80.00	57.00
AEX			1.32			0.66			1.91
UEX			14.29			3.66			10.64

Source: Based on USDA /FATUS, USDA /ERS, USDA /PS&D and IMF/ IFS (2003).

(1)

$$y_{i,t} = \beta_0 + \beta_1 * tds_{i,t} + \beta_2 * tdc_{i,t} + \beta_3 pr_{i,t} + \beta_4 * pw_{i,t} + \beta_5 * pro_{i,t} + \beta_6 * uex_{i,t} + e_{i,t}$$

(2)

$$y_{i,t} = \beta_0 + \beta_1 * tds_{i,t} + \beta_2 * tdc_{i,t} + \beta_3 pr_{i,t} + \beta_4 * pw_{i,t} + \beta_5 * pro_{i,t} + \beta_6 * aex_{i,t} + e_{i,t}$$

Where the subscript t refers to time, and subscript *i* represents the three importing countries, Mexico, Costa Rica and Honduras. β_0 is the intercept and $e_{i,t}$ is the error term.

Domestic gross production and one year lagged promotion expenditures for each country are introduced into the model as two optional explanatory variables in the model, but those two optional variables do not show significance and show collinearity problem with other variables (P_r and tdc), so this study would only keep the original model results.

3.3 Results and Implications

3.3.1. Single Regression Estimation

The parameter estimation of the export demand equation for U.S. rice is shown in Table 3.3-3.5 for Mexico, Costa Rica, and Honduras respectively. In general, F values for most of equations are significant, and the measures of goodness-of-fit for the estimated equation are high. The adjusted R^2 value for Mexico, Costa Rica and Honduras are 0.97, 0.93, and 0.97, respectively, indicating that about 97%, 93% and 97% of the variation in U.S. exports of rice to those three markets are explained by the models.

The Durbin-Watson statistic tests and the collinearity diagnostics tests do not indicate difficulties with autocorrelation and collinearity for the three markets. The heteroskedasticity test is obtained from the White test statistic. The null hypothesis for the test is that the variance of the residuals is homogenous. However, the chi-square value

ranges from 10-13, compared with the critical value 27.58. This indicates that there is a heteroskedasticity problem for the model. With the presence of heteroskedasticity, the covariance matrix is incorrect; the estimation is unbiased and consistent, but inefficient. With error variance relationship unknown, the GMM method is applied as a remedial measure to solve the problem. The correction to the standard error uses the Newey West correction.

For the most part, the estimated parameters displayed signs consistent with prior expectations, and significant. The own-price parameters are consistently negative and significant for the three countries; the demand and price are inversely related. The price for wheat has a positive sign, which indicates that wheat is a substitute for rice in these three markets. Generally, the import demand of the three countries is more responsive to own-price than promotion expenditures. The estimation of the wheat price suggests that wheat is an elastic substitute for rice in Mexico and Costa Rica, but less elastic for Honduras market. This result partially supports a previous study which focuses on Mexican rice import markets (Salin et al 2000). Salin et al. indicates that pasta soup and corn tortillas, combined with rice, consist of Mexican main food pattern.

The result indicates a negative relationship between the total domestic supply and the export demand. The more domestic production and initial stock, the less rice would be demanded from the foreign market. Honduras shows a significant relationship between the domestic supply and import demand (-0.34/-0.56). This could be expected from the illustration of Figure 1.3.c. There has been a decreasing trend in Honduras domestic grown rice during the studied period. In 1989, over 90 percent of total rice consumed in Honduras was domestic-grown. However, this ratio decreased to around 50 percent by

the middle of the 1990s, and further decreased to less than 10 percent since 1999. It then remains at this low domestic production level until the present. The total domestic rice supply also shows a negative relationship in Mexico (-0.29/-0.435) and Costa Rica (-0.22/-0.13). The positive parameter estimation for total domestic consumption shows the demand for rice imports would increase with an increasing total domestic consumption level.

The promotion expenditures show to be positive and significant in the Mexico and Honduras markets. It indicates that each dollar of promotion expenditure generated a positive quantity of rice exports from the U.S. rice exporters to those two importing countries. Given the estimation results, every additional \$1,000 investment in promotion expenditures increases gross rice sales by \$3,257/2,093 in the Mexico market. This return for the Honduras market is \$8,820/11,226. However, it should be realized that this is the gross return without accounting for the production and export cost. Also, only the federal government's money is included, which may exaggerate the promotion programs' effect. If the promotion programs' expenditure is the same as the private group expenditures, the return of promotion programs could be divided by two to obtain the actual dollar return per dollar invested. However, the result indicates that use of the promotion programs in Mexico and Honduras have generated more than a one-to-one return on investment. In addition, the promotion expenditures will likely have longer term impacts.

The exchange rate between the competitors' currency and the U.S. dollar is significantly positive, which suggests that a strong competitors' currency would benefit U.S. rice exporters. The strong currency would increase U.S. exports. Assume that rice produced in Uruguay and Argentina holds the same quality as US-grown rice, if the price

differences (including transportation cost) are not large given the initial exchange rate level, then the appreciation of the Uruguay and Argentina pesos would increase the demand for U.S. rice. Both countries are experiencing a strong currency against U.S. dollars, which may be the reason why U.S. rice holds such a large market share in the three importing markets after the competition from Asia decreased.

The estimation results are shown in equation forms and in table forms (Table 3.3-3.5).

a. Mexico

$$y_t = (-991.02) + (-0.435) * tds_t + (1.7) * tdc_t + (-0.72) * pr_t + (1.54) Pw_t + (0.009) * pro_t + (11.55) * uex_t + e_t$$

$$y_t = (-688.29) + (-0.29) * tds_t + (1.48) * tdc_t + (-0.78) * pr_t + (1.08) Pw_t + (0.014) * pro_t + (77.62) * aex_t + e_t$$

b. Costa Rica

$$y_t = (-263.42) + (-0.13) * tds_t + (1.06) * tdc_t + (-0.094) * pr_t + (0.65) Pw_t + (0.18) * pro_t + (3.45) * uex_t + e_t$$

$$y_t = (-193.69) + (-0.22) * tds_t + (1.02) * tdc_t + (-0.08) * pr_t + (0.53) Pw_t + (0.17) * pro_t + (15.64) * aex_t + e_t$$

c. Honduras

$$y_t = (-61.19) + (-0.56) * tds_t + (1.89) * tdc_t + (-0.11) * pr_t + (0.084) Pw_t + (0.042) * pro_t + (1.29) * uex_t + e_t$$

$$y_t = (-31.62) + (-0.34) * tds_t + (1.83) * tdc_t + (-0.12) * pr_t + (0.03) Pw_t + (0.033) * pro_t + (8.79) * aex_t + e_t$$

Table 3.3 Parameter Estimation for Mexico

	OLS		GMM	
Intercept	-688.29*	-991.02**	-688.29**	-991.02**
	(-2.07)	(-2.95)	(-3.02)	(-2.54)
Rice Export Price	-0.78	-0.72	-0.78*	-0.72*
	(-1.50)	(-1.16)	(-2.09)	(-1.91)
Wheat Export Price	1.08**	1.54**	1.08**	1.54***
	(2.32)	(2.92)	(2.65)	(4.25)
Total Mexican Domestic Rice Supply	-0.29	-0.435	-0.29	-0.435
	(-1.03)	(-1.24)	(-0.96)	(-1.01)
Total Mexican Domestic Rice Consumption	1.48**	1.70***	1.48***	1.70**
	(3.26)	(3.38)	(4.06)	(2.45)
Promotion Expenditures	0.014	0.009	0.014*	0.009
	(1.59)	(0.90)	(1.85)	(1.08)
Exchange rate Argentina Pesos: US dollars	77.62**		77.62***	
	(3.34)		(6.00)	
Exchange rate Uruguay Pesos: US dollars		11.55**		11.55**
		(2.52)		(2.30)
Durbin-W F value	2.806	2.611	2.806	2.611
	65.37***	48.61***	-	-
Adj. R ²	0.9650	0.9533	0.9650	0.9533

Note: Single asterisk (*), double asterisk (**), and triple asterisk (***) denote rejection of H_0 at 0.10, 0.05, 0.01 significance levels respectively.

Table 3.4 Parameter Estimation for Costa Rica

	OLS		GMM	
Intercept	-193.69** (-2.33)	-263.42** (-3.01)	-193.69** (-2.50)	-263.42** (-3.28)
Rice Export Price	-0.08* (-1.84)	-0.094* (-2.27)	-0.08*** (-3.96)	-0.094*** (-5.17)
Wheat Export Price	0.53** (2.82)	0.65*** (3.58)	0.53*** (4.12)	0.65*** (4.17)
Total Costa Rica Domestic Rice Supply	-0.22 (-0.94)	-0.13 (-0.60)	-0.22 (-1.38)	-0.13 (-0.85)
Total Costa Rica Domestic Rice Consumption	1.02*** (3.40)	1.06*** (3.76)	1.02*** (3.32)	1.06*** (3.85)
Promotion Expenditures	0.17 (1.27)	0.18 (1.44)	0.17 (0.98)	0.18 (1.08)
Exchange rate Argentina Pesos: US dollars	15.64* (1.97)		15.64** (2.81)	
Exchange rate Uruguay Pesos: US dollars		3.45** (2.31)		3.45*** (4.10)
Durbin-W F value	2.983 8.66***	3.188 9.91***	2.984 -	3.188 -
Adj. R ²	0.9265	0.9325	0.9265	0.9325

Note: Single asterisk (*), double asterisk (**), and triple asterisk (***) denote rejection of H_0 at 0.10, 0.05, 0.01 significance levels respectively.

Table 3.5 Parameter Estimation for Honduras

	OLS		GMM	
Intercept	-31.62 (-0.89)	-61.19* (-1.87)	-31.62 (-1.22)	-61.19* (-2.23)
Rice Export Price	-0.12** (-3.12)	-0.11** (-3.24)	-0.12** (-2.57)	-0.11** (-3.20)
Wheat Export Price	0.03 (0.18)	0.084 (0.65)	0.03 (0.23)	0.084 (0.86)
Total Honduras Domestic Rice Supply	-0.34 (-1.42)	-0.56** (-2.46)	-0.34* (-2.04)	-0.56*** (-3.73)
Total Honduras Domestic Rice Consumption	1.83*** (6.83)	1.89*** (7.98)	1.83*** (9.33)	1.89*** (10.09)
Promotion Expenditures	0.033 (1.26)	0.042 (1.77)	0.033** (2.46)	0.042** (2.68)
Exchange rate Argentina Pesos: US dollars	8.79* (2.04)		8.79** (2.75)	
Exchange rate Uruguay Pesos: US dollars		1.29 (1.56)		1.29*** (4.01)
Durbin-W F value	2.850 64.82***	2.951 81.86***	2.850 -	2.951 -
Adj. R ²	0.975	0.972	0.965	0.972

Note: Single asterisk (*), double asterisk (**), and triple asterisk (***) denote rejection of H_0 at 0.10, 0.05, 0.01 significance levels respectively.

3.3.2 Elasticity Estimation

The elasticities for the own price and promotion are derived through transforming the previous model into log-log form. The results are shown in Table 3.6. The own price elasticities for Mexico are -0.97 and -0.96 for the model using the Uruguay exchange rate and the Argentina exchange rate, respectively. Every one percent increase of the promotion programs would result in a 0.96 percent decrease in the import demand. The promotion expenditures elasticities differ in the two equations, which are 0.0134 and 0.0240 for Uruguay and Argentina equations respectively.

For Honduras, the own price elasticities are -0.828 and -0.615, and the promotion expenditure elasticities are 0.036 and 0.031 for the Uruguay and Argentina equation respectively. Costa Rica has very high price elasticity levels, with -5.15 and -5.09 for Uruguay and Argentina equation, respectively. This is understandable. The Costa Rica market acts more sensitively than the other two, since the U.S. rice import ratio only accounts for an average 26 percent in the studying period. The promotion elasticity is higher than the other two markets, 0.153 and 0.136 for Uruguay and Argentina, respectively. However, they are not significant.

Generally, the estimations of the elasticities of own price and promotion expenditures are consistent with expectations. This implies that promotion expenditures did have a significant impact on rice imports in Mexico and Honduras. For the Costa Rica market, promotion is not found to be significant, which may indicate that promotion expenditure did not have a significant impact on rice imports in the Costa Rica market. The lower per capita consumption level in Mexico and Honduras gives more promise to the generic promotion programs. In the Costa Rica market, with a higher per capita

consumption level, it could be less sensitive to the generic promotion programs. Perhaps more investment in the brand rice advertising in the market could influence more consumers than a generic one.

The promotion expenditure return could be calculated using the elasticities obtained from this section. According to the information from several previous studies (Halliburton and Henneberry 1995, Onunkwo and Epperson 2000 et al), the average marginal return on promotion expenditure for each country could be obtained by multiplying the elasticity by mean value of export expenditures, and then divided by the mean value of export promotion expenditures. Based on the elasticities shown in Table 3.6, the return ranged from 3 to 5 dollars for the Mexico market, and the return ranged from 39 to 45 dollars for Honduras market with respect to each one dollar investment in promotions during 1989-2003. However, this method still provides a gross return without considering the production and export cost, and is overestimated by not including the private sector's promotion investment.

3.3.3 Promotion Programs Lags

Lags in consumer behavior in response to advertising programs would happen between current sales and future sales. The effect of the advertising programs is assumed to be significant not only in the initial year, but has a finite declining effect. Because of the consumption habit persistence and lags in consumer behavior, time lags must be considered in the model. Distributed lags analysis is a specialized technique for examining the relationships between import demands and advertising programs that involve some delay.

As with other domestic advertising, international promotion programs also hold a decaying effect. A consistent investment in promotion programs would effectively increase the rice consumption demand and maintain the market share in the targeted importing countries in long run. Given factors in addition to the domestic market, the international promotional programs could require more work to analyze.

The polynomial distributed lag models are applied to the analysis of the impact of generic promotion on the demand for rice in three targeted markets. The current year promotion programs have much more impact on the rice import demand for Mexico and Honduras, then decay for the following years. Generally, the effective period would be three years, after which the effect would be quite limited. For Costa Rica, there has been a slow lag time for the promotion programs to take effect. A possibility for this result is that the Costa Rica market is a mature market for rice consumption with a much higher per capita consumption level than the other two countries. A mature market could already have its own taste, consumption patterns, and loyalty to a certain type of rice. It would take a longer time for the new supplier to get adjusted to the market and learn its characteristics. The strategies to gain market share in such a market would be a consistent persuasive advertising pattern to attract and switch the consumer appetites and purchasing habits. However, only the estimated results for Honduras is significant, with the first year promotion effect of 0.19, decreasing to 0.07 in the second year. The insignificance of the results may be due to data limitations; a short time-series of fifteen observations would inflate the error term and decrease the t value.

Table 3.6 Elasticities Estimation for Own Price and Export Promotion in studied countries, 1989-2003

		Own price elasticity	Promotion Expenditure Elasticity
Mexico	UEX ^a	-0.97*	0.0134**
	AEX ^b	-0.96*	0.0240*
Costa Rica	UEX ^a	-5.15***	0.153
	AEX ^b	-5.09***	0.136
Honduras	UEX ^a	-0.838**	0.036*
	AEX ^b	-0.62	0.031*

Notes: Elasticities are calculated by the method of OLS with log-log model, show in each cell in three lines from up down respectively. Single asterisk (*), double asterisk (**), and triple asterisk (***) denote rejection of H_0 at 0.10, 0.05, 0.01 significance levels respectively.

a: The elasticities are derived from the model with Uruguay exchange rate.

b: The elasticities are derived from the model with Argentina exchange rate.

Table 3.7 Estimate of Lag Distribution: Decaying Promotion Effect

Lag variable	Mexico		Costa Rica		Honduras	
	Estimate	t value	Estimate	t value	Estimate	t value
lPro_0 ^a	0.42	1.77	-0.14	-1.1	0.19***	108.07
lPro_1	0.25	1.01	0.02	0.33	0.07***	53.59
lPro_2	0.14	0.52	0.12	0.85	-0.01***	-7.29
lPro_3	0.08	0.36	0.13	0.91	-0.06***	-33.86
lPro_4	0.08	0.77	0.07	0.81	-0.07***	-44.23

Note: lPro_0, lPro_1, lPro_2, lPro_3 and lPro_4 represent the lag distribution from 0 to 4.

3.4 Discussion of the Results

The econometric model was developed to estimate own price, the promotion program and the third competitor exchange rate effect on importing demand of U.S rice in three major long grain rough rice market: Mexico, Costa Rica and Honduras. The validity of the promotion effect for those importing countries is estimated. In addition, various lag lengths are included in the model specification, besides the original current value of the promotion expenditures, in an attempt to test the promotion effect in the current year and long run. The results indicate a tendency for promotion to have the highest effect in the current year import demand in Mexico and Honduras market. For Costa Rica, the promotion programs could come into effect in the long run. However, generally the results support the hypothesis that the promotion programs have a positive impact on U.S. rice exports to Mexico and Honduras, and to a less extent for Costa Rica. This empirical evidence from regression analysis supports the positive promotion programs effect.

The empirical analysis consists of three parts. The first part in section 3.3.1 contains the regression estimation results and the interpretation of the promotion expenditure and exchange rate pass-through from competitor's currencies. In the second part, the elasticities for the own price and promotion expenditure were derived. The regression results are presented and examined in section 3.3.2. The average return of each one dollar investment would result in \$5 and \$39 in Mexico and Honduras market by using the Argentina exchange rate, \$3 and \$45 in those two market respectively by using the Uruguay exchange rate. Finally, the lag effects of the promotion programs are tested to investigate the trend of the long-run decaying positive promotion effects. In all, the

empirical evidence from the regression analysis is supportive of the promotion programs and exchange rate effect of competitors' currency fluctuation with respect to U.S. dollars.

CHAPTER 4

SUMMARY AND CONCLUSIONS

This study addressed the issue of rice import demand due the promotion programs and exchange rate movements in the U.S. and the three selected Latin American major long grain rough rice importing countries: Mexico, Costa Rica and Honduras. The effectiveness of the promotion programs were investigated by examining the advertising elasticities. The hypothesis is that the promotional programs could have a positive impact on U.S. rice exports to those markets. The exchange rate is another potential factor. The exchange rate effect enters into the model in form of the competition countries' currency value with respect to the U.S. dollar. The expectation from the economic theory is that the U.S. rice exports could take advantage of its competitor's high currency value, given the assumption that there does not exist a large price difference between the U.S.-grown rice price and the third country's price. Uruguay and Argentina are treated as competitors of the U.S. in Latin American markets, given that these two countries are the only ones that allow rough rice exports besides the U.S.

The introductory background study is presented in Chapter 1, which contains an introduction of the Latin American rice market, export promotion programs and the exchange rate effect on agricultural trade. Chapter 2 presents the theoretic background and the literature review of the previous studies focus on the effect of promotion programs and the exchange rate on the import demand of U.S. agricultural commodities. The limitation of the promotion programs research is generally restricted by the difficulty of obtaining the historical promotion expenditure data set. Most of the literature that studied the promotion programs has to work with a time series of no more than ten years.

Data are generally suggested to be pooled under this situation to fit the requirements of econometric analysis. However, the results from the literature end with big varieties for the agricultural commodities. This study is conducted from the importers' prospective and analyzes a different model form with the introduction of the total domestic supply and consumption, own price, substitute price, promotion programs and the competitor's exchange rate into the system to estimate import demand of the long grain rough rice markets.

The empirical analysis procedures are presented in Chapter 3. Import demand functions were estimated for Mexico, Costa Rica, and Honduras, which are historically the major long grain rice importers in Latin America. Special attention was focused on the effect of U.S. promotion expenditures and the exchange rate. Trade policies, as a result of regional trade agreements have also been discussed as an important reason for the United State becoming a dominant figure in the region.

The results show that a single equation model can well explain the effect of the independent variables to the rice import demand in those markets. The single equation sets produce results that indicate the characteristic difference for the three countries. Mexico and Honduras would come into the same category with a lower rice per capita consumption level, which directly influences the price elasticities and promotion elasticities of those two countries in relation to the U.S. rice exports. Costa Rica differs from the former countries, with a much higher per capita consumption level and a higher domestic supply ratio in total consumption. In addition, the rice price is more elastic and generic promotional programs have less promise to improve the export.

4.1. Summary of the Study

An import demand equation for the U.S. rice was estimated, with special focus on the two major export promotion programs: Foreign Market Development Program (FMDF) and Market Access Program (MAP). The Ordinary Least Squares method was used to estimate the equation based on annual exports to Mexico, Costa Rica and Honduras from 1989 to 2003. These countries represent the major export markets for U.S. long grain rough rice, which became the fastest increasing rice export market. Their preference for rough rice distinguishes their position in the world rice market, which would benefit U.S. rice exports.

There were three major concerns of this study. To estimate the effectiveness of the rice export promotion programs in the Latin American region, the impact of the fluctuation of other rice exporting countries' exchange rate with respect to U.S. dollar and the import price elasticity for rice in the targeted markets must be jointly considered.

Among the results of this study, the promotional programs in Mexico and Honduras market should be given more emphasis. However, the promotion in Costa Rica did not show significant effectiveness, which could be due to the difficulty of switching long-established consumption habits to U.S. rice consumption. Further information on local rice consumption patterns could be helpful to understand this market.

It should be noted that MAP and FMDF expenditure data in this study only include funds from the USDA/FAS. Private money spent in promotion through rice groups is not included. However, the federal expenditures are assumed to be a one-to-one ratio between the promotion expenditure sources. The result of this study could be over evaluated, but still kept as a proxy of the effectiveness of the promotion programs run by

the USARF and USRPA in the targeted markets. The marginal return gain from the result could be adjusted if the private expenditure could be obtained. However, if the theoretical one-to-one ratio is accepted, the MAP and FMDP effect could be explained by equally dividing the current marginal promotion returns into two.

It is worth noting that because of the regulation of MAP and FMDP, the MAP/FMDP money received by the rice organization could be distributed in a way to offset expenditures already spent by the rice organizations several months or even one year prior. The recognition of this point would be helpful to better understand the result of this study. This point has been ignored by most of the previous research; the reason could be simply because of difficulty to track each promotional program one by one in each country. Lack of detailed understanding could lead to an obscure explanation.

Fluctuations in the United States government budget also have much to do with final availability of promotional fund. This would randomize the real promotion programs and break the consistency of the programs. However, this point is out of any range of theoretical study and uncontrollable.

There may be some similarities between international promotion and domestic advertising, but they are not identical in their way of the performance. For the international market, there was more subtle demand and opinions would be involved into trade, which makes it is hard to reach a satisfactory result through short-term advertising, especially for an underdeveloped market such as Mexico and Honduras, where the consumption pattern is different from a mature market. More work should be done to determine the taste and consumption habits in the market. The market would grow quite slowly at first. The international promotion programs are a kind of advertising media that

project the product as more than a commodity, but also focus on consumption patterns. Compared with generic domestic advertising, international programs cost more, which would make it necessary to get support from the federal government, especially for the bulk export commodities such as grains. However, a more detailed welfare analysis at the country level would be more persuasive than a general description.

Marketing activities should continue and more emphasis could be put upon branded promotions and other avenues for creating niche markets for U.S. specialty and quality rice. In addition, with the overall low level of consumption, providing nutritional information related to rice could help formulate more healthy diets and increase rice consumption in lower income areas of the importing countries.

It should be pointed out that even though promotion programs effectiveness in one market is not shown to be significant, the importance of maintaining the market share and the consumers' loyalty to the U.S.-grown rice in long run must be considered as well, the promotion programs still need to be continued. Future research should also involve rice consumption patterns in targeted markets. Continuous efforts to ascertain better forms of rice promotion are also of paramount importance.

The substitution of wheat for rice in the region indicates that a spillover effect exists between the two commodities' promotion programs. Export promotion expenditures for U.S. rice adversely affect U.S. wheat exports. Given that the U.S. is a major wheat exporter in the markets and both U.S. rice groups and wheat groups are investing in promotion programs in those markets, the strategy of the rice and wheat promotion in those markets should be jointly considered.

Elasticities obtained from this study can be considered as only a crude indicator for the estimation of the effectiveness of the promotion programs, given that there have been some social and commercial effects which are hard to be evaluated from pure econometric system. It would be more efficient to apply the result combined with the promotion programs in detail. The details of how the promotion programs are applied in each country would be quite helpful to understand the efficiency. For example, given the same amount of promotion expenditure, two different promotional forms, (for example, TV programs and in-store sample) would end with different efficiency. Further case studies for individual markets would be necessary to understand why promotional expenditure should continue while the evaluated elasticity of promotion expenditure is low.

4.2. Implication and Recommendations

The study only showed promotion expenditures to be significant for Mexico and Honduras, and the average return to Honduras show effectiveness. This does not necessarily mean that promotion does not work in other two markets; it may mean that the promotional expenditures should be reduced. In the case of Mexico, given this correlation between consumption and U.S. exports, perhaps the expenditures should be targeted on increasing consumption.

Given the returns over the promotion expenditure cost, the promotion programs should be continued in the targeted markets. The increase in the demand for U.S.-grown rice in those markets would continuously become a source of expanding the U.S. rice sales.

Also, for markets with different levels of per capita consumption, the promotion programs should be designed separately. For the Mexico and Honduras markets, the promotion programs should be more consistently applied to increase consumption. In markets which already consume large quantities of rice, the emphasis should be left on gaining more market share from local producers and other rice exporters. Given this, further study focusing on the price elasticity and other exporters' competitiveness would be more important.

There was one important situation in this analysis. The U.S. rice exports to those three targeted countries: Mexico, Honduras and Costa Rica hold nearly 100 percent of the import market in recent years. If this situation is changed due to the release of the previous sanitary restriction on Asian-grown rice, the Asian exporters could become strong competitors in those markets. The existing cost and price advantage of Asian rice exporters may shrink the current US rice market share in the Latin American market. If the rice imported from the Asian markets are substitutable for U.S. rice, then price would become a dominant decision making elements for consumers and importers in importing countries. MAP and FMDP focus more on the generic advertising than on brand sales, which means that even the consumption demand increased, the advertisers may not benefit from the money they spent for promotion. Local rice producers and other exporters could easily act as free-riders and take away market share from the new-established mature market aggregated by previous intensive generic market promotion done by U.S. rice group. It would give promotion expenditure more flexibility by spending money not only for generic advertising but also at the brand level. Brand loyalty

could be a more consistent motive than the general knowledge of the benefits of rice, such as better nutrition, ease of cooking and combining to local food taste.

Future research should involve a complete data set, encompassing observations that include not only promotion programs but also credit guarantee programs held by the USDA. In case of a complete analysis for the spillover effects among the promotion for rice and wheat, the promotion program expenditure data for the substitute should also be presented in the model to do the analysis.

4.3. Limitation of the Study

The study focuses on the U.S. long grain rough rice export markets in Mexico and two other major importers in the Central American region. The model specified in the study emphasized several factors that were hypothesized as keys to U.S. rice trade. However, several other factors were not included in the model, which could be important determinants in studying the market. For example, the potential of Asian exporter competition in the markets after the release of sanitary restrictions, importing countries milling cost, and alternative trade policies could be included to enhance the model.

Despite this, there is no indication as to when this sanitary restriction could be released. Even if this restriction were released, Asian access to this market may be limited due to preferential treatment received by U.S. producers under the NAFTA and CAFTA agreements. Given that rice is a sensitive commodity in the region, it is difficult to predict trade liberalization that may occur through the World Trade Organization negotiations.

Future research may include the supply and demand systems in world long grain rice trade, which would provide further understanding of the rice markets in the Latin

American region. Details on the long grain rice production cost in the exporting countries and importing countries, the transportation costs, trade policies, and importing market's rice market development could be considered in future studies of the market.

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