FOREIGN DIRECT INVESTMENT AND PROCESSED FOOD TRADE

Edited By

Shida Rastegari Henneberry

Papers Presented at the
Conference of NCR-182 "Organization and
Performance of World Food Systems"
Arlington, Virginia
March 9-10, 1995

Sponsored by NCR-182 Committee and Farm Foundation

Published in Cooperation With the Department of Agricultural Economics, Oklahoma State University

March, 1997

EIGHT

PROCESSED-BULK EXPORT SUBSTITUTION: MAKE OR BUY DECISIONS BY RICE PROCESSORS

H.L. Goodwin, Jr, David Skully, and Ari Kapur

Processed and Bulk Import-Export Substitution in High-Value Products Trade: The Case of Rice[1]

Introduction

This paper presents a case study of US rice exports to examine the substitution between bulk and processed agricultural products in international trade. The topic is at the heart of several research issues at the intersection of international economics and the economics of agricultural trade. The "competitiveness" of US agriculture in international markets is a perennial topic of discussion among agricultural economists as well as policy-makers. Krugman (1994 a, b) has argued persuasively that "competitiveness" is, at best, a vacuous concept and, on average and at the margin, a dangerous concept. "Competitiveness" typically overstates the link between international trade and domestic employment and tends to lead to mercantile reactions.

Neo-mercantilism in economic policy discussions has stimulated research on "strategic trade policy" and the potential for the United States to capture more value-added in its exports. There is a similar research agenda in agricultural economics on agricultural exports. Much of the analysis of value-added or high-valued agricultural trade has been plagued with competing definitions which do not allow for normal scientific discourse. It is essential to develop a definition of high-valued agricultural products which has some basis in economic theory and is empirically operational.

We provide an operational definition in the next section, along with discussion of some of the policy issues surrounding the processed/bulk distinction. Section II is an explanation of the logic and method of the case study. Section III reviews product cycle theories to provide some of the theoretical background to the analysis. Section IV

[1] This paper is a by-product of work sponsored by a cooperative agreement between USDA/ERS/CAD and Texas A&M University. This is one of several cooperative agreements initiated by ERS in 1995 on the topic of trade in high-value agricultural products.

presents conclusions on the determinants of US rice exports at different stages of processing. Section V provides an overview and discussion of US rice trade during the period 1978-1994.

Valued-Added Agricultural Products and International Trade

Measurement

The set of high-valued agricultural products is typically defined by negation: it is all agricultural products not considered bulk commodities.[2] Bulk commodities are generally considered to be those farm commodities for which the USDA administers agricultural programs and includes the major grains, cotton, peanuts, leaf tobacco, soybeans, and sometimes sugar. An alternative system categorizes agricultural commodities along two dimensions: whether commodities are in a raw or processed state, and whether they are intermediate goods or consumer ready products. The United Nations (1971) classifies commodities as follows: 1) primary, mainly for industry; 2) primary, mainly for household consumption; 3) processed, mainly for industry; and 4) processed, mainly for household consumption. This four-way classification, while more informative that the bulk/non-bulk dichotomy, still leads to some awkward groupings and remains difficult to reconcile with international trade theory. We prefer Consumer Ready or Processed [CRP], where the 'or' is a logical 'or' meaning and/or. The CRP rubric yields a four part typology of agricultural products: 1) Not-processed and not-consumer ready -- intermediate goods such as wheat. Most 'Bulk' commodities would fall into this category; 2) Not-processed and consumer ready -- *i.e.*, fresh; 3) Processed and not-consumer ready intermediate goods with significant non-farm value added -- *i.e.*, beef, poultry; 4) Processed and consumer ready -- for example, candy bars and breakfast cereals. It is this last group which is most dependent on brand name and proprietary processes for product differentiation.

The system employed in this paper is based on economic theory and is empirically operational. It serves the purpose of examining the substitution in international trade between adjacent page levels of value-added product in a vertical chain of intermediate goods. We define x_0 as the farmgate or primary market value of an agricultural

[2] This begs the question of "what is an agricultural commodity?" The US Department of Commerce and the US Department of Agriculture have divided the world of commodities between agriculture and non-agriculture. These are administrative, not economically grounded, divisions.

commodity. Let v_i represent the increment of value added at the i th link in the chain of value added between farmgate and final product. Finally, define x_n as the value of the product at the n th level of processing: (note: n is not necessarily the final level of processing). There is an identity among these variables (1), which, rearranged (2), yields an index of value-added (3), α_n: $\alpha_n \in (0,1)$:

$$[1] \qquad x_n = \sum_{i=1}^{n} v_i + x_0$$

$$[2] \qquad 1 = \frac{x_n}{x_n} = \frac{\sum_{i=1}^{n} v_i}{x_n} + \frac{x_0}{x_n}$$

$$[3] \qquad \alpha_n = 1 - \frac{x_0}{x_n} = \frac{\sum_{i=1}^{n} v_i}{x_n}$$

The common-sense interpretation of α_n is that it measures the proportion of post-farm value added in a product at the n th stage of processing. Most "bulk" commodities have a relatively low α value. Most of the value of wheat measured at its f.o.b. export value is comprised by its farmgate value (x_0). Wheat flour, pasta, and bakery products correspond to increasingly greater levels of non-farm valued added and hence have ascending α values. We employ this conceptual framework to examine why international trade takes place at a particular level of processing.

Each stage of processing can be represented as functions mapping factors (inputs) into products (outputs), the production or factor coefficients which underlie international trade theory. This link to international trade theory allows us to reason in terms of factor abundance and comparative advantage. Farm commodities are intensive in land relative to processed agricultural products. Farmland is the classic immobile factor; it is also often a highly specific factor. In contrast, high α or relatively processed agricultural products are, by definition, relatively intensive in non-farm capital goods and services. These factors, even if one makes the strong assumption that they are completely immobile, can still be replicated across borders: skills can be learned, capital goods can be imported, and technology transferred. Processed or high α products are also more dependent on brand names

and proprietary processes for product differentiation than relatively generic agricultural commodities. These factors can be transferred via foreign direct investment (FDI), licensing, mimicry, or piracy.

Because of the relative mobility or replicability of the factors intensive in high α or processed agricultural products, the processing of such products is more likely to migrate to the country of final consumption than relatively unprocessed, or low α, farm products. Determining which agricultural products have long-run export viability and which do not, and which export markets are right for which products are key questions. We wish to isolate the factors that determine which link in the chain of value-added to a commodity between the farmgate and final consumption that international trade occurs and why it occurs.

Trade Policy

There is a perception among many economists and policy makers that the United States lags other exporting countries in the export of "high-valued" agricultural products. Henderson and Frank (1990, 6-7), for example, argue "[w]hereas processed and other high-valued products make up about half of the value of US agricultural exports, these products constitute more than three-fourths of all world trade in agricultural products. This suggests that US food processing industries, as a group, are less competitive in international markets than are similar industries in other exporting countries." Because high-valued products have a greater domestic multiplier than primary or bulk commodities, the conclusion is often drawn that the United States' perceived 'lag' in the export of high-value products costs the US economy potential jobs (Henderson and Frank 1990, 3-5).

It is a tautology that the more valued added between the farm gate and final consumption, the greater the creation of off-farm economic activity. Consequently, the multiplier for higher-valued products is greater than for lower-valued products. It does not follow, however, that the relatively large multiplier for high-valued exports justifies export promotion or even that there is something inherently 'good' about exports. First, this reasoning ignores the fundamental economic concept of opportunity cost. Increasing exports of any product will come either at the expense of domestic consumption if there is no positive supply response, or at cost of transferring resources productively employed in other activities if there is no contraction in

domestic demand, or a combination of these two effects.[3] Second, the multiplier for domestic sales of high-valued products is necessarily greater than that for exports, as domestic transportation, wholesale and retail services comprise a substantial share of the value-added between the farm gate and final consumption.

Finally, there is no clear positive or normative conclusion to be drawn from comparing high-value products' export shares. National differences in factor endowments, their relative prices, incomes, technologies, and private and public preferences are the root cause of international trade. Moreover, recent innovations (or rediscoveries) in trade theory argue that the absolute size of national markets may be a key determinant of the structure of trade. Krugman (1991), among others, has shown that the EU is only gradually becoming a single market. Its geographic concentration of industry is much less than that of the United States, an economic and geographic entity of roughly the same proportions. The relatively low US share of high-value product exports may simply be a result of US per capita consumption of high-value products being so much greater than other exporters.[4]

Case Study Logic

Case studies are essential when studying a heterogeneous class of phenomena, such as trade in high-valued products, because general propositions are too likely to be contradicted by exceptions, and evaluating competing general propositions is not possible. As Vaughan *et al.* (1994) note for Foreign Direct Investment [FDI] and Gray (1988) for Intra-Industry Trade [IIT], an eclectic (heterogeneous) case study approach to evaluate such trade issues has fared best among other alternative constructs. The best hope at this early stage of such research is the development of a classification system which reduces or resolves the heterogeneity of the universal class into relatively

---

[3] A doctrinaire Keynesian might argue that the economy is plagued with involuntary unemployment, but would be more likely to advocate interventions with greater domestic income and employment effects than export promotion. Agricultural fundamentalists too often view exports solely as a means of reducing "domestic surpluses".

[4] If increasing the US value-added agricultural exports were an end in itself, levying a value-added tax on domestic sales of valued-added agricultural products would reduce domestic consumption and divert processed products to the exports which would be tax exempt. Brazil has 'promoted' its soymeal and soyoil exports relative to its soybean exports by taxing export of 'bulk' soybeans. The issue is whether these interventions or other forms of export promotion can be justified in terms of efficiency or distribution effects. General equilibrium analysis is required.

homogenous sub-sets about which general propositions may be plausibly sustained.[5]

Jordan (1993), in an effort similar to this one, undertakes "an in-depth (case) study of Swedish Liquid Pump Trade" to determine, on a firm-by-firm level, what determines Intra-Industry trade in this particular industry in Sweden. His work is based on industrial interviews supplemented and verified with official trade and commercial data. Sweden has a very high level of IIT in liquid pumps, but from his interviews, Jordan is able to show that much of this apparent IIT results from "categorical aggregation" (*i.e.*, the lumping together of products which in reality should not be considered as belonging to the same industry) in trade statistics. After correcting for aggregation, he examines the causes of the remaining, 'real' IIT. By treating individual firms (or managers of sub-divisions of firms, such as purchasing agents) as the primary agents in international trade, rather than treating countries as unified multi-product firms, Jordan is able to categorize the explanations for both horizontal and vertical IIT.

Horizontal IIT occurs when a domestic firm chooses to import a product, although a very close substitute is manufactured domestically. There are many reasons why this occurs: firms wish to diversify supply sources; firms are parts of a transnational corporation; firms have established a relationship with a foreign supplier and have no reason to search for alternative sources; after-business; and differentiation of services by domestic distributors. Vertical IIT involves re-exports, and Jordan finds that most of 'real' IIT can be attributed to re-exporting. Re-exporting is of particular interest to this study, as it involves passing the chain of added value across international borders.

Re-exports are very important in high value-added agricultural product trade. Belgium and the Netherlands engage in considerable re-exportation of agricultural products. Transshipments are often netted out of trade data, but if there is enough value-added activity occurring in the intermediate country, the industrial product classification can change. Crushing soybeans, polishing brown rice, roasting coffee, refining sugar, and other similar intermediate activities are concentrated in port areas. The apparent high proportion of high-valued (or high value-added) agricultural products of the total value of global agricultural trade is due, in large part, to such intermediate product

[5] This suggests that discriminant or cluster analysis would be the appropriate diagnostic methods, were one able to identify the appropriate cluster dimensions and their respective measures.

trade.[6] The determinants of vertical IIT (re-exporting), were found to lie primarily within a nexus of international contracts, either within the branches of a single transnational firm, or within a network of contracts and alliances between independent firms. On reflection, such a Coasian outcome should not be surprising as the analytical approach focuses on the firm, its objectives, opportunity, and transaction costs.

Our investigation of US rice exports parallels Jordan's approach. We conducted industrial interviews with a representative sample of firms and traders, and rice trade association archives and official data were examined with the objective of developing a typology of rice export decisions at the firm level. The focus of our inquiry was why particular institutional arrangements and behavioral patterns have emerged, particularly in the location of rice processing activities. The choice of rice as the subject of our investigation was based on the fact that rice, although considered a 'bulk' commodity in HVP discussions, is exported not as a non-consumer ready and unprocessed product, but generally as a processed product – in fact, as a consumer ready processed product. Using the Commerce Department categories which clearly distinguishes between Agricultural commodities (not processed) and Food and Kindred Products (processed), shows that rice is the anomaly among grains (table 1).

Table 1. Export/Domestic Output Ratios of Select US Agricultural Commodities and Food and Kindred Products

Agricultural Commodities			Food and Kindred Products		
SITC	Title	X/Q*	SITC	Title	X/Q
0111	Wheat	63	204411-3, 6	Flour/grain mill products	7
0112	Rice, Rough	4	2044	Milled rice & by-products	47
0115	Corn	31	2046	Wet corn mill products	19
0116	Soybeans	39	2043	Cereal Breakfast Foods	2
0131	Cotton farm products	41	20415;2045	Flour mixes/dough	1
0132; 21411, 2	Leaf Tobacco	57	2048	Prepared feeds, not elsewhere classified	4
			2051/52/53	Bread, cake, etc.	1
			2075	Soybean oil mill product	18

*X/Q – Export/Domestic Output, 1986-1991 average.
Source: US Department of Commerce (1994): Table 3A.

Rice is generally considered a bulk or, in our terms, a low α product. Rice, however, is an almost pure example of a vertical chain

[6] If intra-EU. trade and much of the trade of Hong Kong and Singapore were netted out of world totals a more representative proportion of high value-added to total agricultural trade would result. For an appropriate comparison within the United States, US interstate commerce would be appropriate. New York, Los Angeles, and Houston are key processing zones for imported intermediate agricultural products, and are analogous to Belgium, the Netherlands, and Hong Kong.

of value added. Rice, unlike the other major grains, is consumer-ready as soon as the hull is removed; it only requires boiling. Wheat, in contrast, is almost always milled and then combined with other products (fats and oils, yeast, etc.) and then baked, boiled, or fried for human consumption. The chain of rice processing is, in engineering terms, a "bit removal" process. Most rice is consumed by households as rice; only a small proportion is mixed or blended with other substances. Consequently, we do not include ricecakes and products containing rice (*i.e.*, dry-mixes, canned soup, breakfast cereals, candy bars), or other prepared products in the case analysis.

Vertical or "Processed-Bulk" Substitution

The Product Cycle

The product cycle theory of international trade (Vernon 1966) is an important consideration for understanding both the nature and future of processed and bulk exports of the United States. Many agricultural products with high proportions of non-agricultural-specific capital (branding and industrial processes) are more efficiently assembled and processed in, or near, the consuming market.[7] Following the product cycle theory, exporting commences, grows rapidly, then levels off, and declines as production/processing shifts to the importing country. More recently, Krugman (1991, 63), in his discussion of increasing returns to scale and Marshallian non-pecuniary externalities, also invokes a variant of the Vernon argument. "Indeed, surely there is a kind of product cycle, in which emergent new industries initially flourish in localized industrial districts, then disperse as they mature."

The last phase of Vernon's product cycle has the initial exporter and importer shifting roles through FDI, mimicry, and technology transfer. The final phase of the product cycle is unlikely to emerge for agricultural products because of the immobility of agricultural land. For current US agricultural exports, there is a belief among some economists that US poultry meat exports will continue to grow. We find this doubtful. Many poultry export markets have developed their own broiler operations, for which they often import feed and baby chicks (genetic capital). Vocke (1991) presents a concise discussion of this process.[8] One case is the rise of poultry

[7] Consequently, what appears to be a long-term trend of increasing US or global processed agricultural product exports, may be in large part, the envelope of a series of parabolic or ballistic curves.

[8] A current bonanza market for US poultry is Russia; but how sustainable is the trade? Given the relative ease of establishing broiler operations, and the vast supply

exports from Southeast Asia and China displacing US poultry exports to Japan. Since the passage of NAFTA, Mexican poultry producers, using imported US feed and animal stock, have begun to export chicken breasts to the US market, taking the product cycle to its penultimate stage.[9]

When one turns to branded consumer-ready processed products, the substitution of FDI or licensing for exports is even more pronounced. US cigarette, soft drink, or candy bar exports, if favorably received in the importing country, are generally followed by FDI or licensing. Eventually, cigarette exports decline or cease as cigarette production is transferred to the consuming market. US leaf tobacco and other semi-processed inputs to cigarette production rise. For soft drinks, direct sales of bottled beverage are replaced by sales of syrups and other proprietary inputs to bottlers in consuming countries. For candy bars, packaged bar exports are replaced with exports of ingredients, other inputs, and process control and marketing services. Each of these examples can be seen in terms of international shifts along the value-added chain. Product introduction occurs with exports of the final product. All stages of production except wholesale and retail distribution occur in the exporting country. As the product cycle turns, the value-added chain shifts toward the importing country. There are push and pull factors which encourage or inhibit the rate and extent to which value-adding activities transfer to the importer.

Which Link in the Chain of Value Added Crosses the Border? The Case of Rice.

The fundamental question in the economic theory of the firm is "why firms choose to draw their boundaries over a particular set of activities?" We extend this question to inquire not only into firm boundaries, but also firm activity location. For example, if a firm engages in activities J through N, why does it choose to perform activities J through L in the "home" country and activities M and N in the "foreign" country? We discover that for rice, the value-added chain has four distinct patterns, each corresponding to a different link in the chain.

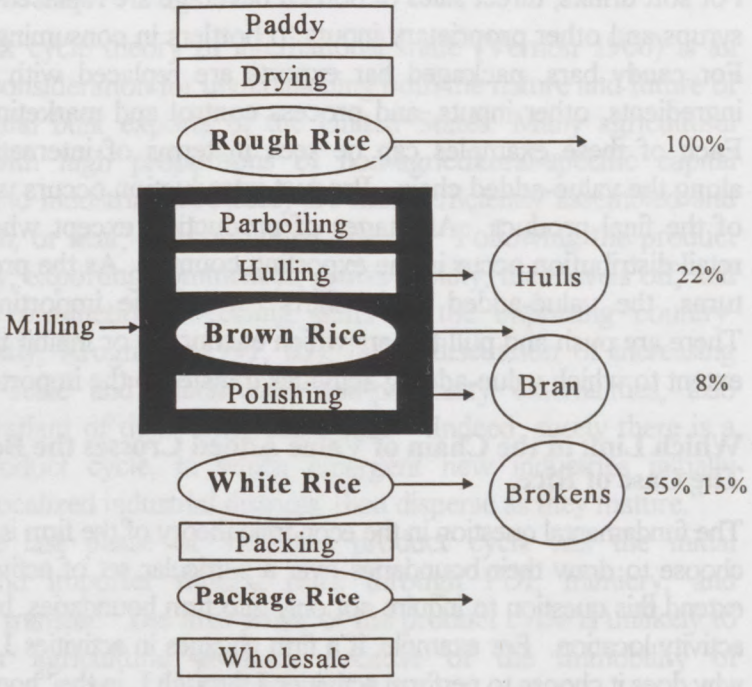
---

of expertise which specializes in transferring this technology, the current boom has perhaps two or three years left to run.

[9] A proper study of poultry trade needs to be conducted in terms of parts. US domestic demand for chicken breasts drives domestic production. Because of the jointness of broiler part production (no pun intended) and the relatively inelastic domestic demand for non-breast parts, the US has an 'exportable surplus' of non-breast parts.

Rice is exported in four forms, in increasing order of value added they are: 1) rough rice, 2) brown rice, 3) white rice, in bulk, and 4) white rice, packaged. Figure 1 illustrates this vertical chain of added value. The rectangles correspond to post-harvest activities, the four ovals to product markets, and the three circles to by-product markets. Both inter-and-intra firm international trade occurs in each of these products. We ask why particular rice products dominate the trade to particular markets. Our approach is firm-level rather than market-level. We are not concerned with whether or not there will be a flow of rice from source to destination, but rather with the form in which rice is traded internationally.

Figure 1. Marketing Chain/Product Flow of Rice Product Reduction and Value-Added Processes



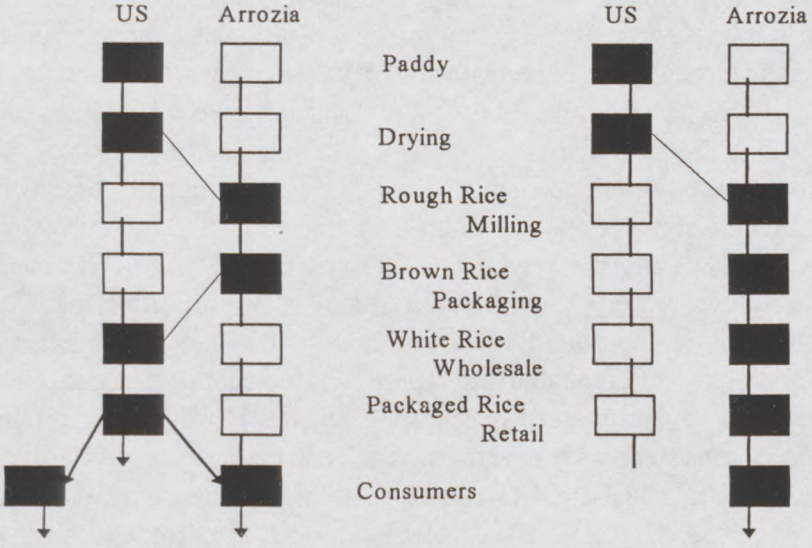
A Dynamic Firm Problem

The individual firm attempts to maximize (risk adjusted and discounted) expected profits by choosing both a contiguous set of activities in the value-added chain to engage in, and a set of locations (either the exporting or importing country). To complicate matters, there is (presumably) free entry into this chain of value, so the firm's individual problem is embedded in that of its rivals or potential rivals, transforming a programming problem into a dynamic game. An example will clarify the firm's problem.

Consider the rice trade between the United States and Arrozia, a not quite industrialized rice importing country with household preferences for long-grain white rice. Suppose a US rice cooperative is considering complete forward integration of its operations, from domestic paddy production to wholesaling in the consuming country. The cooperative would then determine which activities to perform in the United States and which ones to perform in Arrozia dependent upon the relative prices of products, by-products, factors of production and transactions, and monitoring costs.

Consider also that there is an Arrozian wholesale/retail operation which wishes to integrate backward as far as possible. It could import rough rice and mill it in Arrozia or it could construct or purchase a mill in the United States. Conceivably, it could even purchase paddy acreage and engage directly in rice production.[10] Both the Arrozian firm and the US firm are contesting in the same chain of value-added and their decisions are interdependent (figure 2). Determining the optimal arrangement is further complicated when one considers the free entry of other firms, other exporting countries, and the policies and regulatory controls interested governments have at their disposal.

Figure 2. Potential Characterizations of the Hypothetical US-Arrozia Trade/Integration



10 International upstream integration characterized British livestock investment in the United States, Argentina, and Australia during the nineteenth century. The liberalization of the Japanese beef market resulted in considerable Japanese investment in Australian feedlot operations. In the rice market, there is already significant Japanese ownership of California rice acreage.

The determinants of the individual firm's decision may be separated into production costs and transaction costs. Caves and Bradburd make this distinction in their search for the empirical determinants of vertical integration. With regard to transactions cost, they note: "The chief empirical predictors of vertical integration coming from the transaction-cost model are small numbers of transactors on both sides of the market *ex ante* and the prevalence of transaction-specific assets and switching costs that create *ex post* lock-in problems with arm's-length contracts" (1988, 268). For production costs, there are strict significant economies in rice milling; that is, the costs of the three component processes are strictly subadditive. In particular, there are considerable economies of scope and scale in storage and plant overhead (Wailes and Holder, 1987). Hulling and polishing (and parboiling) will be integrated in one operation unless there are very significant relative price differences (over space) within the milling complex (white rice and its intermediate products and by-products). The natural integration of these operations is shown in figure 1 by the large shaded rectangle labeled 'Milling'. In the absence of any significant relative price differences within the milling complex one would expect international trade in brown rice to be nil (save for niches of final demand for brown) and that trade would be limited to rough and white rice. There is, however, a significant amount of brown rice traded. Most of the trade is to the European Union which has quotas on rough rice and high tariffs on white rice but few penalties for brown rice. Because the international brown rice market is exceptionally thin, that is, the volume of trade is relatively low and among only a few independent agents, one finds that EU brown rice imports are almost exclusively intra-firm transfers.

Siamwalla and Haykin (1983) show that the world rice market as a whole is very thin. World trade as a proportion or world production (or consumption) is very low (usually less than 5 percent), rice is highly differentiated by variety, and consumer preferences are fairly rigid beyond the preferred variety (table 2). This organization of trade is consistent with the transaction cost literature and is a classic Coasian problem (Klein, Crawford and Alchian (1978), and Williamson (1979, 1985, 1989). When there are too few traders, strategic behavior is likely and market transactions can be very risky. Contracts, alliances, or vertical integration are means to avert the risk and minimize negotiation or coordination costs.

Table 2. Rice: Product/Asset Specificity and Dominant Transaction

Rice Form	"Thinness"	Dominant Transaction
Rough	Liquid	Market
Brown	Very thin	Intra-firm transfer
White	Liquid	Market
Bagged		
generic	Liquid	Market
label	Very thin	Contract
Packaged	Very thin	Contract

US Rice Exports, 1978-1994

During the period 1978-1994, the US participated primarily in four basic markets, loosely identified as: (1) European Union; (2) Africa; (3) Middle East; and (4) Western Hemisphere. The Western Hemisphere is often sub-divided into Canada, Mexico, Central and South America, and the Caribbean. More recently, the dynamics of the world economy and the rice trade have made such distinctions even more meaningful. NAFTA, the Japanese crop failure, governmental stability and fiscal crises in several Latin countries are the main change agents in this dynamic and evolutionary trade system. An historic approach should serve well in sketching a broad picture for background purposes.

Historically, long-grain milled rice has comprised the largest component of US rice exports. In 1978, long-grain rice comprised nearly 40 percent of the 2.1 M metric tons of US rice exports. By 1994, several significant shifts in US rice export patterns had occurred. Long-grain milled rice comprised only 21 percent of the 2.5 M metric tons of US rice exports in that year. This major change is a result of increased total rice exports, decreased long-grain milled rice exports and increased exports of parboiled, brown and rough rice. Each of the five types of rice exported by the US will be discussed in turn in the following paragraphs.

US rice exports for long-grain milled rice for the period 1978-1994 are shown for select years in table 3. Major export markets are identified for all types of rice as Canada, Mexico, Caribbean, Central America, South America, European Union, Other Western Europe, Middle East, Africa, and Other. The most significant occurrence during this period has been the drastic decline in exports to the Middle East, primarily Iran and Iraq. (1978-79 exports to the Middle East

exceeded the total exports for all other parts of the World in 1993-94 by about 50,000 metric tons.) Sizable increases, particularly in percent terms of total US export market share, have occurred over the same period for Mexico (5.4%, 1993-94), Caribbean (11.5%, 1993-94), Central America (7.9%, 1993-94), and Africa (28.4%, 1993-94). A doubling of market share has occurred for Canada (8.5%, 1993-94) as well. Over the same period, market share for the Middle East has decreased from 71 percent (1978-79) to 13.6 percent (1993-94). As a result of these changes, US exports to North America now comprise one-third of all US long-grain milled rice exports and represent the largest market share displacing Africa (2nd) and the Middle East (3rd) as the primary market.

Table 3. US Exports of Long Grain Rice (metric tons) August-July Market Years, 1978-1994

	78/79		84/85		89/90		90/91		91/92		92/93		93/94	
	mt	%	mt	%	mt	%	mt	%	mt	%	mt	%	mt	%
Canada	36202	4.45	23160	5.31	117045	13.10	39066	6.22	42639	10.05	47608	7.36	44448	8.46
Mexico	354	0.04	5	0.00	29196	3.27	30659	4.88	28066	6.62	28066	4.34	28445	5.42
Caribbean	21247	2.61	56499	12.95	116860	13.08	129089	20.57	108244	25.53	133813	20.70	60442	11.51
Central America	3903	0.48	11789	2.70	2965	0.33	69076	11.00	38386	9.05	43820	6.78	41688	7.94
South America	16684	2.05	20737	4.75	138457	15.50	91437	14.57	36067	8.51	15753	2.44	9161	1.74
European Union	9793	1.20	10824	2.48	68358	7.65	14269	2.27	7995	1.89	7383	1.12	18585	3.54
Other West. Europe	6897	0.85	10790	2.47	10644	1.19	1241	0.20	925	0.22	783	0.12	1808	0.34
Middle East	574694	70.64	286689	65.69	293456	32.84	41918	6.68	6224	1.47	110608	17.11	71568	13.63
Africa	101186	12.44	10186	2.33	106419	11.91	197731	31.50	109683	25.86	179168	27.71	149379	28.44
Other	42598	5.24	5774	1.32	10103	1.13	13199	2.10	45832	10.81	79371	12.28	99629	18.97
World	813558	100	436453	100	893503	100	627685	100	424061	100	646564	100	525153	100

Source: US Department of Commerce, Bureau of the Census

The greatest change in US rice trade has been the dramatic increase in exports of parboiled rice (table 4). Parboiled exports in 1993-94 were 808,000 metric tons, up from 299,000 metric tons in 1978-79 but down from the all time high of 950,000 metric tons in 1989-90. The largest market shares of US parboiled rice continue to be the Middle East (Saudi Arabia) and Africa (South Africa and Ivory Coast), both of which have roughly doubled their use of US parboiled rice over the study period. The greatest percentage increase in parboiled exports has been to the Caribbean and South America, whose market shares have increased from 0.87 percent and 0.01 percent in 1978-79 to 7.2 percent and 5 percent in 1993-94. In addition, the European Union has more than tripled its importation of US parboiled rice (32,400 metric tons to 110,600 metric tons 1978-79 to 1993-94) thereby increasing its market share to 13.7 percent in 1993-94.

Increases to *all* export markets were experienced over this 15 year period, signaling a major change in US rice export patterns worldwide.

Table 4. US Exports of Parboiled Rice (metric tons) August-July Market Years, 1978-1994

	78/79		84/85		89/90		90/91		91/92		92/93		93/94	
	mt	%	mt	%	mt	%	mt	%	mt	%	mt	%	mt	%
Canada	5925	1.98	15631	1.90	32402	3.41	31416	3.82	27845	3.64	29384	3.33	27883	3.45
Mexico	5	0.00	26	0.00	50918	5.36	18404	2.24	12787	1.67	14430	1.64	14490	1.79
Caribbean	2613	0.87	24700	3.00	48907	5.15	49878	6.07	60166	7.86	51076	5.79	58113	7.19
Central America	196	0.07	1053	0.13	16434	1.73	24583	2.99	7163	0.94	8147	0.92	15396	1.91
South America	25	0.01	231	0.03	9231	0.97	32860	4.00	12309	1.61	21735	2.46	40733	5.04
European Union	32384	10.84	65658	7.97	154779	16.30	178888	21.76	121795	15.91	113993	12.92	110580	13.69
Other West Europe	23677	7.92	59370	7.21	77537	8.17	95783	11.65	94242	12.31	74404	8.44	81068	10.04
Middle East	116536	39.00	347642	42.21	217403	22.90	246630	30.00	201024	26.26	315665	35.79	233441	28.90
Africa	116490	38.98	307499	37.34	287078	30.24	12044	1.46	205644	26.86	205247	23.27	202513	25.07
Other	989	0.33	1723	0.21	54733	5.76	131718	16.02	22608	2.95	47924	5.43	23521	2.91
World	298840	100	823533	100	949422	100	822204	100	765583	100	882005	100	807738	100

Source: US Department of Commerce, Bureau of the Census

Medium grain export patterns are shown in table 5. Excluding the 1993-94 year, which was greatly distorted by massive export quantities (400,000+ metric tons) to Japan, medium grain exports had declined markedly worldwide, down more than 50%. Examination of historical data show the virtual disappearance of exports to South America, Western Europe and Africa even prior to the 1993-1994 Japanese-dominated export market. Exportation to Canada and the Middle East have remained fairly constant over the same period. Early in this 15 year period, Korea represented a significant medium-grain export market, one which ended in the early 1980's.

Table 5. US Exports of Medium Grain Rice (metric tons) August-July Market Years, 1978-1994

	78/79		84/85		89/90		90/91		91/92		92/93		93/94	
	mt	%	mt	%	mt	%	mt	%	mt	%	mt	%	mt	%
Canada	13491	2.58	6487	1.75	5875	2.18	8635	3.42	7739	2.59	10416	4.05	12510	2.39
Mexico	110	0.02	15	0.00	165	0.06	785	0.31	825	0.28	1240	0.48	606	0.12
Caribbean	1203	0.23	1117	0.30	215	0.08	2948	1.17	375	0.40	5313	2.07	829	0.16
Central America	248	0.05	1925	0.52	766	0.28	8560	3.39	2119	0.71	1042	0.41	1593	0.30
South America	71414	13.65	22	0.01	23615	8.77	8530	3.38	2364	0.79	632	0.25	1134	0.22
European Union	12356	2.36	1460	0.39	12176	4.52	4033	1.50	2746	0.92	7456	2.90	7246	1.38
Other West Europe	34642	6.62	1533	0.41	6963	5.90	5117	2.03	2670	0.89	3270	1.27	3544	0.68
Middle East	53046	10.14	11596	3.13	196259	72.89	146975	58.23	180190	60.27	192637	74.95	47142	8.99
Africa	113311	21.66	255555	69.03	1000	0.37	27412	10.86	41998	14.05	2712	1.06	2964	0.57
Other	223309	42.69	90515	24.54	22228	8.26	39426	15.62	57969	19.39	32295	12.57	446704	85.20
World	523130	100	370225	100	269262	100	252421	100	298995	100	257013	100	524272	100

Source: US Department of Commerce, Bureau of the Census

Total US exports of brown rice increased by 49 percent over the period 1978-79 to 1993-94 (table 6) to 470,000 metric tons. Significant increases in exports to Canada (38,000 metric tons), Mexico (47,000 metric tons), and Caribbean (69,000 metric tons) and the other world markets (44,000 metric tons) more than offset the 160,000 metric ton decrease in US brown rice exported to the European Union. This pattern is similar to that observed for long-grain milled rice. That is, North America now comprises 34.5 percent of the market share of US brown rice exports compared to 30 percent market share for the European Union.

Table 6. US Exports of Brown Rice (metric tons) August-July Market Years, 1978-1994

	78/79		84/85		89/90		90/91		91/92		92/93		93/94	
	mt	%	mt	%	mt	%	mt	%	mt	%	mt	%	mt	%
Canada	17387	5.53	43237	11.38	32698	9.06	30937	6.56	39410	11.33	35168	9.36	45289	9.64
Mexico	94	0.03	18	0.00	31833	8.82	11285	2.39	19023	5.47	55510	14.78	47256	10.06
Caribbean	1041	0.33	2396	0.63	64630	17.92	97289	20.64	66711	19.19	57265	15.25	69693	14.84
Central America	3664	1.17	0.0	0.00	167	0.05	1502	0.32	14659	4.22	7162	1.91	476	0.10
South America	366	0.12	257	0.07	6881	1.91	79231	16.81	47247	13.59	7830	2.08	17590	3.75
European Union	202777	64.49	166992	43.87	79589	22.06	112135	23.79	91333	26.27	140243	37.34	140554	29.93
Other West. Europe	22900	7.28	14973	3.93	37366	10.36	34858	7.39	24678	7.10	19603	5.22	25811	5.50
Middle East	8913	2.83	1867	0.49	6761	1.87	9575	2.03	496	0.14	16647	4.43	16878	3.59
Africa	11891	3.78	38641	10.15	95425	26.45	82224	17.44	36742	10.57	34145	9.09	16189	2.45
Other	45391	14.44	112286	29.50	5386	1.49	12410	2.63	7419	2.13	2005	0.53	89925	19.15
World	314424	100	380667	100	360736	100	471446	100	347718	100	375578	100	469661	100

Source: US Department of Commerce, Bureau of the Census

Rough rice exports are perhaps the most volatile from year to year, influenced largely by the presence or absence of Brazil in the market (table 7) and the entry of Mexico and disappearance of the European Union as markets for US rough rice. In 1984-85, for example, the European Union accounted for 98.4 percent of all US rough rice exports. By 1990-91, Brazil accounted for 61.8 percent of all US rough rice exports. Brazil's imports of US rough rice increased to 165,000 metric tons in 1991-92. Mexico became the leading export market for US rough rice in 1992-93 (117,800 metric tons) and by 1993-94 accounted for 65.2 percent of all US rough rice exports. Indications are that in 1994-95, Brazil will once again be the major US rough rice export market; preliminary figures indicate over 400,000 metric tons have gone to Brazil.

The historical data presented indicate a basic movement toward increased export of parboiled, brown and rough rice compared to traditional milled medium and long-grain rice. Additionally, geographic shifts toward greater reliance on North and South America as export markets in the Middle East decline due to political instability. These

shifts will be examined in the final section of this paper using the case study methodology.

Table 7. US Exports of Rough Rice (metric tons) August-July Market Years, 1978-1994

	78/79		84/85		89/90		90/91		91/92		92/93		93/94	
	mt	%	mt	%	mt	%	mt	%	mt	%	mt	%	mt	%
Canada	70	0.06	1224	0.83	1736	2.40	8967	4.04	2739	0.93	7338	3.24	2219	1.34
Mexico	0	0.00	2	0.00	16307	22.56	33408	15.19	69747	23.56	117842	52.09	107886	65.22
Caribbean	50	0.04	929	0.63	132	0.18	172	0.08	699	0.24	2695	1.19	145	0.09
Central America	361	0.29	66	0.04	5	0.01	4526	2.04	57217	19.33	27545	12.18	31128	18.82
South America	300	0.24	0	0.00	8	0.01	136931	61.83	165295	55.83	14120	6.24	11467	6.93
European Union	120258	95.41	144874	98.42	39947	55.26	14590	6.59	251	0.08	46126	20.39	5316	3.21
Other West. Europe	2047	1.62	4	0.00	302	0.42	268	0.12	0	0.00	128	0.06	0	0.00
Middle East	7	0.01	0	0.00	13653	18.89	8122	3.67	0	0.00	9396	4.15	4173	2.52
Africa	2846	2.26	55	0.04	0	0.00	58	0.03	0	0.00	0	0.00	3000	1.81
Other	109	0.09	53	0.04	205	0.28	14409	6.51	121	0.04	1051	0.46	96	0.06
World	126048	100	147207	100	72295	100	221451	100	296069	100	226241	100	165410	100

Source: US Department of Commerce, Bureau of the Census

Case Study Methodology

The US rice industry is fairly concentrated, with a number of the major firms being closely held or privately/family-owned enterprises. Competition is often fierce within this group of firms. Adding to this competitiveness is the presence of a few large multinational agricultural conglomerates that are heavy participants in rice exporting, typically in the bulk rice trade.

While the historic trade data presented in the previous section suggest certain trends, answers to the underlying questions related to why these trends are occurring and what future trade directions may be, are left begging. We assert this is a result of the changes being linked to firm-specific behavior and the firms' strategic responses to country, regional, and global structural and economic changes. To get a better notion of what has driven these responses and what future responses might be, a series of interviews with millers, processors and exporters, as well as rice industry officials and agricultural attachés, was conducted in late summer and early fall of 1994. Much of the information gained in the interviews was given under the premise that it would be held confidential or at the least be aggregated such that the identity of the firm could not be ascertained.

The case study methodology yielded information from which four scenarios are sculpted. These scenarios illustrate four different firm-based responses to the choices they face in the free-entry,

chain-of-value game introduced earlier with the hypothetical US-Arrozia example. A general representation of this US CRP rice export game is shown in figures 3 and 4. Figure 3 characterizes the linkage of "game" decisions to the various stages of rice technology and to rice products themselves. Essentially, all firms which choose to export will either follow a simple product export pattern or a more complex vertically-linked export pattern. This second pattern involves either subsidiaries, joint ventures or institutional arrangements which are unclear and vary from case to case dependent upon the firms and the countries involved.

Figure 3. US CRP Rice Export Characterizations Linked in Rice Technology

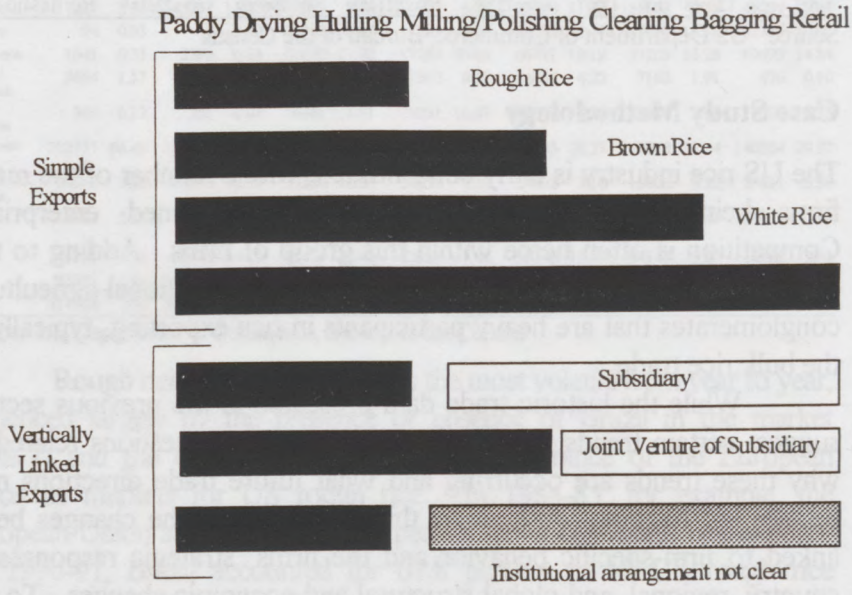
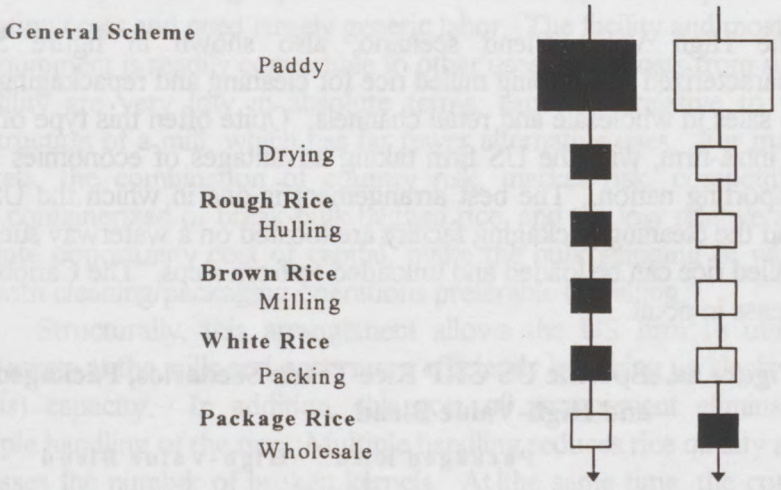


Figure 4 is a general schematic of US CRP rice trade behavior to rice importing countries, and will be used as a framework for four scenarios which we have identified as: 1) Packaged Rice; 2) High-Value Blends; 3) Brown Rice - EU Tariff; and 4) Rough Rice. Rice trade behaviors which are intermittent or which are just emerging (Japan) have not been included in this initial research work. By no means are these scenarios limited in practice or in potential application to the nations for which examples are given. Rather, they represent broader conditions which are typified by these examples and conditions

in the nations discussed therein. The scenarios are discussed in decreasing order of value-added.

Figure 4. General Schematic of US CRP Rice Trade to Importing Counties



Packaged Rice

The case of packaged rice represents the simplest and most frequent but lowest volume scenario in the US rice export trade. Simply put, a shelf-ready rice product is exported from the US to wholesale or retail distributors for immediate movement to the consumers' purchase points. This arrangement is most predominant in countries having no domestic rice production, small required volumes and low price sensitivity. Sweden is a typical example. Frequently, however, "deals" on US shelf-ready rice are precipitated by Market Promotion Programs such as the Export Enhancement Program. This periodically arises in nations such as Turkey or other relatively high-income, high-consumption nations. Figure 5a illustrates this scenario, whereby packaged rice moves into the importing nation and often to the retail stores in palletized form.

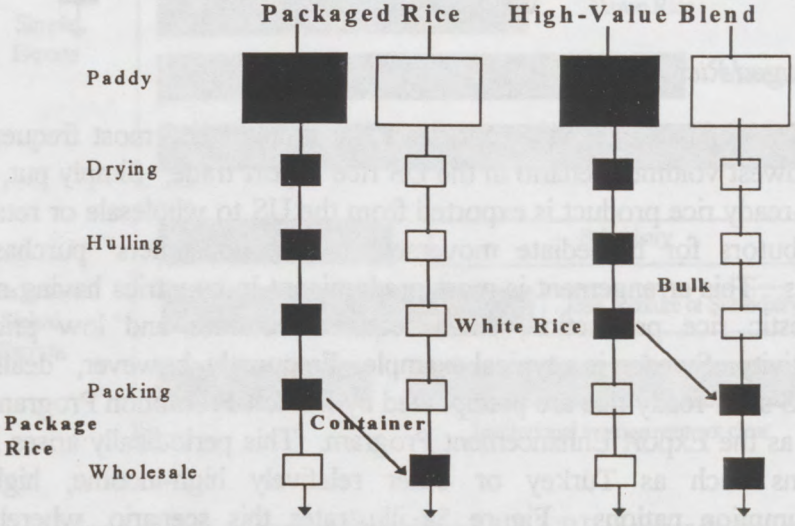
There is a small but steady US export trade in retail-ready palletized rice. Through toll-packing, store or brand labels and custom packages for the foreign distributor are produced and packed in the US. The only value added in the importing country is achieved in off-loading containers from the ship, taking the pallets out of the container, and arranging the packages on the shelf for final sale. From the packer's point of view, the only difference between a pallet of product

bound for domestic distribution and one bound for export is the latter probably has labels in Swedish or Arabic rather than English and Spanish. This kind of trade is the height of value-added rice exports; this is as high as the α-value can go for rice.

High Value Blend

The High Value Blend scenario, also shown in figure 5a, is characterized by shipping milled rice for cleaning and repackaging prior to sales in wholesale and retail channels. Quite often this type of trade is intra-firm, with the US firm taking advantages of economies in the importing nation. The best arrangement is one in which the US mill and the cleaning/packaging facility are located on a waterway such that milled rice can be loaded and unloaded to/from ships. The Caribbean is a case in point.

Figure 5a. Specific US CRP Rice Trade Scenarios, Packaged Rice and High-Value Blend



Until the 1960's, white rice was shipped exclusively as sacked break-bulk cargo. Two innovations changed this. First, containerization drastically reduced time-in-port, damage, and shrinkage; but for rice, this did not reduce the cost of bagging and handling. The second innovation was to ship white rice in bulk just as one would wheat or corn (Allen, 1994). This had not been done in prior years with rice because it had been assumed that the damage to quality would be too great to make bulk shipping economically viable.

All that was required for bulk shipping of rice to succeed was thorough cleaning of the bulk carrier and some innovations in handling. The white rice bulk transport method which now dominates involves loading white rice in a cleaned bulk carrier and unloading, usually with a clamshell-type device, directly into a port-side storage and cleaning facility. Such cleaning operations have relatively low capital and operating costs and need largely generic labor. The facility and most of the equipment is readily convertible to other uses. Exit costs from such a facility are very low in absolute terms, especially relative to the construction of a mill, which has far fewer alternative uses. For many markets, the combination of country risk, market risk, competition from containerized or break-bulk bagged rice, and the low relative and absolute opportunity cost of capital, make the bulk shipping of white rice with cleaning/packaging operations preferable to milling.[11]

Structurally, this arrangement allows the US firm to utilize fixed assets at the mills and ports more efficiently by taking up slack (or excess) capacity. In addition, this sort of arrangement eliminates multiple handling of the rice. Multiple handling reduces rice quality and increases the number of broken kernels. At the same time, the costly and time consuming process of unloading packaged rice at less than modern, low-volume port facilities is avoided, thereby reducing processing and distribution costs and increasing competitiveness with lower priced, lower quality imports from Thailand and Vietnam.

US firms can also play this version of the trade game, with a slight modification (packaging and bulk rice both move), from another country. Such is the case with current expansion of one US firm into Vietnam. A large milling facility in Vietnam has been purchased and is shipping rice into markets where it does not currently participate. The lower quality Vietnamese rice, now owned and distributed by the US firm, is targeted for low-price markets in Africa and certain Latin American countries. Such firm behavior is in response to intense competition from lower-cost producers in Thailand and Vietnam.

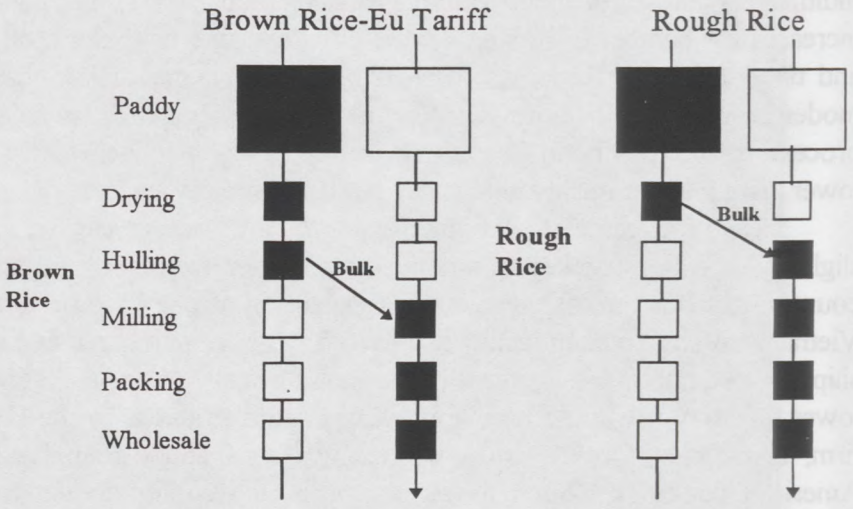
Brown Rice - EU Tariff

The Brown Rice - EU Tariff scenario is a unique situation precipitated by prolonged US - EU policy issues relating to alternative forms of rice

[11] A situation similar to the one in the Caribbean also exists in Saudi Arabia (by virtue of a new US operation there). A facility in Jordan was built and utilized when the Iraqi market was a major factor in US trade; it now sets vacant and under the ownership of the Jordanian government.

imported into the EU. Export of brown rice (largely parboiled) to the EU may be seen by some as an anomaly driven by the desire to protect EU producers in Spain and Italy by setting tariffs up to 150% of the rice value for imports of milled rice. Due to the inefficiencies (and near prohibition) of exporting rough rice versus brown rice and these large tariffs on milled rice, firms have seized what we shall term "brown-rice rents". Such rents accumulate as foreign affiliates receives and mill parboiled brown rice (primarily in the Netherlands), then package and distribute this rice under other US or domestic brands (see figure 5b). The response of US rice milling firms to the high tariffs imposed by the European Community in the early 1960's was to construct polishing operations inside the EU (primarily in or near the Rhine delta). These polishing operations are unique in that they only polish brown rice. The bran is sold for protein feed and the polished rice is sold within the EU free of tariff.

Figure 5b. Specific US CRP Rice Trade Scenarios, Brown Rice-EU Tariff and Rough Rice



As we have eluded, policy negotiations arising from protectionist posturing have more or less set the stage for this unique and symbiotic relationship. However, as the final details of the GATT unfold, we may indeed see as yet another change in the European rice market. The firms who own these operations have been concerned that tariff concessions made in the Uruguay Round may reduce or eliminate the tariff rents induced in their construction. If, as is proposed, the prohibitive milled-rice tariffs are incrementally lowered 6% per year over a five year period,

several courses of action could evolve. US firms or their affiliates could choose to continue their present pattern of trade if the loss incurred from idle mills exceeds the costs of transportation of the bran portion of rice. Corollary to this, rice could be milled in the US and shipped for cleaning and packaging (high-value blend scenario) thereby partially utilizing the foreign mills.

Both these scenarios assume the US would retain the market share in the European Union. US rice could, however, be displaced in EU markets by relatively high quality parboiled rice from India. Under such a scenario, the Indian rice could be shipped from India as brown (current EU tariff scenario), or it could be shipped as milled rice from European-owned affiliates in India. India, however, has not been known for its ability to deliver a reliable supply of adequate quality rice for export.

Rough Rice

Figure 5b relates the fourth scenario in our set of firm behavior patterns. This scenario will be illustrated by the current behavior in Mexico. Rough rice is shipped directly to Mexico, thereby utilizing excess capacity of Mexican rice mills (this is also occurring in Brazil, a case which will be discussed later in this section). The excess capacity in Mexican rice mills results from reallocation of resources, cut-back of government subsidies for rice production and opening the rice market to private trade in 1989. Since that time, Mexico has become a primary importer of US rice. This phenomenon may accelerate due to provisions in NAFTA which eliminate the import tariff on rice, thus making US rice competitive with lower quality Asian imports.

Until recently, rough rice trade was unusual. Because of the generally low value of rice hulls, most importers have no incentive to pay freight and handling for delivery of a virtual waste product.[12] Recently, however, several Latin-American markets have commenced importing rough rice. There are several reasons for this. Milling rough rice creates value-adding activity and saves scarce foreign exchange. Imported rough rice allows rice mills in the importing country to operate year around. Finally, there are viable uses for rice hulls in the importing markets. The most common use is as poultry litter. As broiler industries expand, the capacity of the importing market to

[12] Hulls greatly increase the volume of rice grains, which , depending on the type of ship employed, can substantially boost transport costs.

absorb hulls increases. Similarly, there is a large and growing demand for protein feed in these markets and rice bran finds a ready market, with the advantages of domestic value added in polishing and foreign exchange savings on fully processed feed supplements.

Corollary to these observations is the reality that, at least in the case of Latin America in general, US firms can either give the importing markets what they want (rough rice) or lose these markets to cheaper Asian rice. US firms are apparently willing to forego rents accumulated from milling in order to move rice into Mexico. This was a particularly important strategy in 1993-94 due to the historically high price of US rice resulting from Japanese rice purchases. It is evident that such a strategy is profitable for both parties or it would not have continued to date. As capital requirements for mill maintenance and operation increases, one might expect the current situation to evolve into a case where foreign affiliates acquire profitable mills (EU scenario) or perhaps one in which milled rice is imported either in bulk for cleaning and packaging (High Value Blend Scenario) or in a shelf-ready form (Packaged Rice Scenario).

Rough rice trade to Brazil has become sizable (400,000+ metric tons in 1994) albeit intermittent. This increase is demand driven by virtue of: (1) a stable government amenable to US rice imports; (2) limitation of government subsidies; (3) shifting of rice acreage to production of other crops; (4) the need for a reliable long-term supply of rice as an input to a large rice-milling sector. Economics of this trade activity have become favorable due largely to the same factors impacting the Mexican trade (use of hulls in feed and for co-generation, etc.).

Participation in the Brazil market has been taken up by multinational agricultural conglomerated, such as Cargill and Dreyfus, who often export soybeans, orange juice concentrate, and other commodities in exchange for rice. Creative joint-venture opportunities have also cropped up in Brazil. One such case is the import of rough rice from the US into Brazil with repayment made in terms of bicycles which are monetized on-shore in the US. This acts as a hedge for exchange risk. Capital shortages in Brazil have to date been more severe than those in Mexico, especially throughout the 1980's. As a result, plants are in a lower state of maintenance than in Mexico. We may expect a similar pattern of evolution as in Mexico for these mills; it may be accelerated by the "shake-out" of inefficient Brazilian rice producers. Competition for this huge rice market will be intense, with Asian rice again posing the major threat to US rice.

Allen, Oliver, E. "The Man Who Put Boxes on Ships." *Audacity* 2 (3) (1994) 13-23.

Caves, R.E. and R.M. Bradburd. "The Empirical Determinants of Vertical Integration." *Journal of Economic Behavior and Organization* 9 (1988): 265-79.

Chandler, A.D. *The Invisible Hand: The Managerial Revolution in American Business*, Cambridge MA: Harvard University Press (1977).

Gray, H. Peter. "Intra-Industry Trade: An 'Untidy' Phenomena." *Weltwirtschaftliches Archiv* Vol. 124 (1988): 211-229.

Henderson, D.R. and S.D. Frank. "Industrial Organization and Export Competitiveness of US Food Manufacturers." NC194 research project *Organization and Performance of World Food Systems* report OP4 (March 1990).

Jordan, Thomas. "Intra-Industry Trade: An In-Depth Study of Swedish Liquid Pump Trade." *Weltwirtschaftliches Archiv* Vol. 129 (1993) 752-776.

Klein, B., R. Crawford and A.A. Alchian. "Vertical Integration, Appropriable Rents, and the Competitive Contracting Process." *Journal of Law and Economics* 27 (1978): 403-18.

Krugman, Paul R. *Geography and Trade*, Cambridge MA: MIT Press (1991).

Krugman, Paul R. "Competitiveness: A Dangerous Obsession." *Foreign Affairs* (March/April 1994a): 28-44.

Krugman, Paul R. *Peddling Prosperity: Economic Sense and Nonsense in the Age of Diminished Expectations*, New York: W.W. Norton (1994b).

Setia, P., N. Childs, E.Wailes, and J. Livezey. *The US Rice Industry.* Economic Research Service, USDA, Agricultural Economic Report No. AER-700. Washington DC (1994).

Siamwalla, A. and S. Haykin. *The World Rice Market: Structure, Conduct, and Performance*, IFPRI Research Report 39 (1983).

United Nations *Classification by Broad Categories*, Series M, No. 53, New York (1971).

US Department of Commerce. US Commodity Exports and Imports as Related to Output: 1991 and 1990. Bureau of the Census, Washington DC (May 1994).

Vaughan, O., M. Malanoski, D. West, and C. Handy. "Firm Strategies for Accessing Foreign Market and The Role of Government Policy." unpublished paper presented to the NE-165/WRCC-72 Research Conference on *Interactions Between Public Policies and Private Strategies in the Food Industries*, Montreal (June 26-28,1994).

Vernon, R. "International Investment and International Trade in the Product Cycle." *Quarterly Journal of Economics* 80 (1966): 190-207.

Vocke, G. "Investments to Transfer Poultry Production to Developing Countries." *American Journal of Agricultural Economics* 73 (3) (August 1991): 951-954.

Wailes, E.J. and S.H.Holder Jr. *Cost Models and Analysis of Modern Rice Mills*. Bulletin 907, Arkansas Agricultural Experiment Stations, University of Arkansas, Fayetteville, AR (1987).

Williamson, O.E. "Transaction-cost economics: The Governance of Contractual Relations." *Journal of Law and Economics* 22 (1979): 233-262.

Williamson, O.E. *The Economic Institutions of Capitalism*, New York: The Free Press (1985).

Williamson, O.E. "Transaction Cost Economics." *Handbook of Industrial Organization,* ed. R. Schmalensee and R.D. Willig. Amsterdam: North-Holland. Vol I (1989): 135-182.