

DETERMINANTS OF RICE TRADE IN THE WORLD MARKET

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Structurally, the world rice market is thin because it has always been a residual market. The thin market refers to the low ratio of trade (imports and exports) to production. The proportion of world rice production traded internationally is very small and stayed below 5 per cent per annum for the last four decades. The ratio of trade to production is small because “the bulk of rice production occurs in the monsoon lands of Asia, which stretch from Pakistan to Japan, and these countries are also major consumers” (Siamwalla and Haykin, 1983: 11). The coincidence of consumption and production is high in world’s major rice producing countries such as China, India, Bangladesh, Indonesia and Myanmar. Technological changes of mid-1960s and the trade policies pursued by various countries further accentuated the thinning process.

This residual nature of the world rice market failed to provide proper price signals for countries in respect of their export and import decisions. Instead, these decisions are based more on domestic market compulsions. Though importing countries tend to pursue productivity-enhancing policies somewhat more rigorously than exporting countries both these groups of traders do not find the thin world rice market as a reliable source to import rice during the periods of scarcity or to export during the periods of bumper harvest. This lack of confidence on trade forces the countries to form trade blocs, bilateral agreements, and preferential trade agreements.

This Paper examines the various determinants of rice exports and imports of the major rice trading countries. However, two sets of problems are involved in estimating these relationships.

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They are:

- (i) It is impractical to list all policy measures, particularly the non-tariff trade barriers that are so important in world rice trade, it is not possible to separate government policy from actually observed trade data.
- (ii) Even if we could specify all the policy variables unambiguously, these variables are not truly exogenous because they are not independent of the error terms: for instance, in the supply equation, Governments do vary their policies in response to production fluctuations. Keeping these two limitations in view this Paper examines the rice trading patterns in Section I and in Section II analysis of various determinants of rice exports and imports of various countries has been carried out.

SECTION - I

Rice Trading Patterns

Differential growth rates in rice production and consumption across regions have led to changing patterns in the regional distribution of world rice trade. Southeast Asian countries, such as Myanmar, Vietnam and Thailand, emerged as major rice exporters in the later part of the 19th century and maintained their position of dominance until the Second World War by meeting the import requirements of the European countries. Contrary to the expectation of a similar role of these countries even in the postwar period, Myanmar and Vietnam lost their positions and Vietnam became a net importer of rice till late 1980s. Myanmar, though having dominated the international rice trade until the late 1960s, lost its position to China. Thailand alone could succeed in retaining its position throughout this period. World rice exports on an average increased from 4.65 million tones during 1950-54 to 19.4 million tones in 1995-96. Asian countries' exports increased from 3.3 million tones per annum in 1950-54 to 14.0 million tones in 1993-94. During the same period, South America and Europe exported more than one million tones, North America more than two million tones and Africa 0.5 million tones (Table - 1.1).

Table - 1.1
Annual Average Rice Exports By Continent (Million Tones)

Year	World	Asia	South America	North America	Africa	Europe
1950-54	4.65	3.33	0.20	0.62	0.14	0.32
1955-59	6.35	4.71	0.15	0.71	0.26	0.40
1960-64	7.34	5.31	0.19	1.10	0.37	0.29
1965-69	8.00	4.88	0.42	1.74	0.55	0.32
1970-74	8.47	5.22	0.32	1.74	0.47	0.52
1975-79	9.73	5.69	0.59	2.27	0.19	0.75
1980-84	12.49	7.83	0.50	2.68	0.07	0.97
1985-89	12.95	7.62	0.53	2.43	0.08	1.11
1990	12.48	5.74	0.58	2.47	0.13	1.09
1993	16.36	10.73	1.06	2.68	0.15	1.19
1995	19.38	14.00	1.00	2.90	0.27	1.20

Source: *Trade Yearbook*, Food and Agriculture Organization Rome, Various Issues. *World Rice Statistics*, International Rice Research Institute, Philippines, Various Issues.

Though Asia's exports are increasing in absolute terms, its share in the total world rice exports has come down from 72 per cent in 1950-54 to 66 per cent in 1993-94 and, for some years even to less than 50 per cent. This might be because of the exit of Myanmar, the largest supplier of rice to the world market till the mid-1960s. On the other hand, the shares of North America, South America and Europe have increased. Myanmar and Vietnam were the two major rice-exporting countries before the Second World War. The exports of Myanmar, though having continued to dominate the export market till 1966, declined abruptly in 1967 and stayed below one Million tones thereafter. Until 1963, myanmar was the large supplier of rice in the world marketwith a share of more than 25 percent. Its share declined from 16 percent in 1965-66 to 7 percent in 1976-77 and to less than 1 percent in 1993. This is because rice production in myanmar suffered a setback during 1965 - 1990. Declining production growth rates and social and political problems in the country resulting from ethilic division of labour and colonial intervention could be the important resons for Myanmar's failure to maintain its dominant position in later years(Table-1.2)

Table 1.2:

Annual Average Rice Exports of Major Rice Exporting Countries: (Million Tones)

Year	Myanmar	China	Pakistan	Thailand	Vietnam	USA	India
1950-53	1.17	0.23	0.08	1.45	0.00	0.61	
1954-58	1.63	0.89	0.09	1.24	0.12	0.67	
1959-63	1.69	1.10	0.16	1.31	0.25	0.96	
1964-65	1.41	1.32	0.26	1.90	0.06	1.33	
1965-66	1.34	1.19	0.20	1.90	0.02	1.55	
1966-67	1.13	1.67	0.43	1.51	0.02	1.35	
1967-70	0.52	1.66	0.29	1.16	0.01	1.85	
1971-73	0.66	1.52	0.19	1.85	0.00	1.76	
1973-76	0.21	2.38	0.62	0.95	0.01	1.83	
1976-77	0.63	1.44	0.78	1.93	0.01	2.11	
1977-78	0.67	1.18	0.96	2.93	0.00	2.29	
1978-79	0.35	1.67	0.78	1.61	0.00	2.28	
1980-84	0.72	1.06	1.09	3.54	0.02	2.65	
1985-89	0.38	0.84	1.07	4.92	0.36	2.43	
1990	0.21	0.66	1.21	4.33	1.00	2.24	0.51
1991	0.17	0.95	1.51	5.15	1.95	2.17	0.68
1993	0.21	1.42	1.03	4.99	1.77	2.68	0.63
1994	-	1.60	1.40	4.70	2.20	2.80	0.81
1995	-	0.10	1.10	5.50	2.00	2.90	3.38

Source: *Trade Year Book*, Food & Agriculture Organization, Rome, and various Issues.
World Rice Statistics, International Rice Research Institute, Philippines, Various Issues.

Among the pre-war exporters, only Thailand could retain its significant share in the world rice trade. Its exports increased from 1.4 million tones per annum to 5.5 million tones during 1950-51 to 1995-96. Thailand alone contributed 28 per cent of world exports in 1993-94. The year 1958 witnessed a change in trading patterns

when China began to play a dominant role by replacing Myanmar, the then largest exporter, in the world rice market. However, China could retain this position only until 1984. Though it lost its position during the 1980s, it could regain its strength in 1993. A major development in the rice market in 1989 was the emergence of Vietnam as the third largest exporter. Vietnam's rice production and exports expanded in 1989 in response to changes in agricultural policies, including provisions to allow families to lease land for 10-20 years, to allow private ownership of equipment and draft animals. In addition, distribution of inputs was decentralized, and private marketing of grain was allowed. Exports have increased from 0.02 million tones in 1980-84 to 2.0 million tones in 1995. Korea and Taiwan, the former colonies of Japan, used to export large quantities mostly to Japan before the war. However, Taiwan is now exporting very small quantities and the Republic of Korea has become a net importer. Pakistan became one of the important rice exporters in 1980 by replacing China and Myanmar. In 1995-96, it exported more than one million ton. It is gradually improving its position in the world market by exporting Basmati rice. The United States is the second largest rice exporter with more than a 20 per cent of share in world rice exports. It exported more than two million tones during 1995-96. The growth of US exports significantly reduced Asia's share in general and Thailand's share in particular. In 1995, India replaced US as the second largest rice exporter in the world by exporting more than three Million tones of both Basmati and non-Basmati rice to different parts of the world. Though India has been the largest producer of rice in the world, she was nowhere in the international market as an exporter of rice. It could export only less than one per cent of world exports until 1977 and less than 3 per cent in 1993. This is because domestic policies in India have always been directed toward self-sufficiency (for domestic consumption) in foodgrains as a whole.

On the import side, there has been a substantial shift in the pattern of world imports. Before World War II, Asia and Europe together accounted for more than 90 per cent of imports and as recently as 1960 accounted for three quarters of imports. During 1995-96, Asia imported 6.2 million tones, Africa 3.8, Europe 2.3 and South America more than one million tones (Table-1.3).

Table - 1.3
Annual Average Rice Imports @ By Continent: Million Tones

Year	World	Asia	South America	Africa	Europe
1950-54	4.59	3.51	0.05	0.21	0.41
1955-59	6.14	3.99	0.05	0.43	0.79
1960-64	6.89	4.68	0.05	0.59	0.87
1965-69	7.93	5.39	0.10	0.75	0.93
1970-74	9.21	6.33	0.05	0.98	0.99
1975-79	9.82	5.46	0.30	1.55	1.51
1980-84	12.39	5.92	0.33	2.88	1.85
1985-89	12.58	4.83	1.16	2.81	1.74
1990	12.20	4.85	0.68	3.00	2.30
1991	12.93	4.07	1.28	3.66	2.50
1993	15.04	6.16	1.07	3.81	2.25

Source: *Trade Year Book*, Food and Agriculture Organization, Rome, Various Issues. *World Rice Statistics*, International Rice Research Institute, Philippines, Various Issues.

Notes@:Rice imports are milled rice imports (See Appendix Table 2.1).

However, there has been a steady and substantial decline in the role of Asian importers except for some countries in West Asia. Asian rice imports as a percentage of world imports sharply declined from 77 percent during 1950-54 to 39 per cent during 1995-96. In contrast to Asia, Europe's share in total imports increased from 9 per cent to 15 per cent, Africa's from 5 per cent to 25 per cent and from 1 per cent to 7 per cent in case of South America. Important rice importers in Asia are Saudi Arabia, Iran, Iraq, Bangladesh, Indonesia, Malaysia, Philippines and Japan. Japan, the largest importer of rice until the late 1960s, has reduced rice imports drastically. Malaysia, Philippines and Sri Lanka are the other group of consistent importers. These countries are either exporting small quantities of rice or cutting their imports drastically.

Although from 1960 to 1987 China was a net exporter of rice, in 1988 it became a

net importer for the first time. During 1995, China was the second largest importing country with imports of two million tones after Indonesia, which imported three million tones during the year. China's emergence as a rice importer was due to the widespread floods and drought in central and southern parts of the country, the major rice growing area. Thus, we can conclude this section by saying that the export side of rice trade is more concentrated than on the import side. Unlike the dominance of a few exporters in the export market there are a large number of importers each is importing a small volume of rice. Because of the concentration of import demand in a few countries, competition among exporters for a share in the world market is strong.

SECTION - 2

Determinants of Rice Exports and Imports:

The quantum or value of exports from any country is influenced by:

- a. Increase in foreign demand is based on the growth in foreign income, foreign income elasticity of demand for the product, changes in tastes and changing supply conditions in competing countries.
- b. Market distribution across countries plays a crucial role in export performance of any country. In other words, export performance depends on export destinations. If most of
- c. One would expect, under perfect market functioning, the demand for exports from two competing to be a function of relative prices, so that variations in export shares would be attributable to changes in relative export prices. If the product is homogeneous a single world price will emerge under these conditions. A particular country's export competitiveness depends on its ability to export at that price, which in turn directly depends on its cost of production.
 - (i) Changes in the cost structure may alter competitiveness of a country in the world market. Cost of production, in turn, is dependent on factor productivity and factor prices.

- (ii) Changes in the level of domestic demand have an important bearing on export performance. Domestic demand pressures may influence domestic absorption of exportable and quantity available for exports.
- (iii) Domestic supply factors also affect the volume available for exports and thereby competitiveness. Among these factors are infrastructural bottlenecks, shortfalls in production due to the vagaries of the weather, and so on.
- (iv) Exchange rate policies also influence export performance. Some countries undertake the policy of devaluation with a view to improving the balance of payments. Such changes in exchange rate affect competitiveness and export earnings.
- (v) Export promotion policies such as export subsidies may result in increases in exports. Domestic market considerations compel some countries to adopt discriminatory policies to discourage exports. For instance, Thailand imposes export taxes such as a premium on rice exports. Whenever the domestic production suffers, the Thai Government increases export premium to stabilise domestic prices.
- (vi) The non-price factors such as quality of the product, preferential trade agreements, commercial policies abroad and trade policies of the competitors also affect the ability of the country to expand exports. In this section rice export and import functions are specified and estimated. In addition to the factors listed above there are some country specific policies with regard to rice exports and imports. Export and import functions are specified separately for major rice exporters and importers. Exporters chosen are Thailand, Myanmar, Pakistan, USA and China and importers are Bangladesh, Indonesia, Iran, Republic of Korea, Malaysia, and Philippines.

The following rice export equation (5.1) and import equation (5.2) are specified:

$$X_i^t = \beta_1 + \beta_2 Q_i^t + \beta_3 WP_t + \beta_4 P_i^t + \beta_5 Z_i^t \dots \dots \dots 5.1$$

$i=1,2,\dots\dots n$

Where

X_i = Quantity of rice exports from country i in million metric tonnes

Q_i = Quantity of rice production in country i in million metric tonnes

P_i = Domestic rice price in country i in US \$ / Tonne

WP = World Rice Price in US \$ / Tonne

Z_i = various explanatory variables relevant for each country

b_1 to b_5 are parameters

$$M_i^t = \alpha_1 + \alpha_2 Q_i^t + \alpha_3 Y_i^t + \alpha_4 WP_t \dots \dots \dots 5.2$$

$i = 1,2,\dots\dots n$

Where,

M_i = Quantum of rice imports from country i in per capita terms

Q_i = Per capita rice production in the i th country

Y_i = Per capita Gross Domestic Product in country i in US Dollars

WP = World Rice Price

t = time

a_1 to a_4 are parameters

Equations 5.1 and 5.2 are estimated using double log functional form. Wherever auto-correlation is present Cochrane-Orchutt generalised least squares estimation is carried out.

Different time periods are chosen for different countries mainly due to the non-availability of data on some of the variables included in the equations. In China and Thailand export equations the country specific variables chosen are international price of wheat and rice export premium respectively. The data on rice exports and imports of the countries under consideration are taken from Trade Year Book of Food and Agricultural Organisation (FAO) for the period 1950-51 to 1990-91. Production figures for these countries are also taken from FAO's production Year Book. Domestic prices are wholesale prices of rice expressed in terms US \$ per tonne. Exports, imports and production are in terms of quantity. FOB price of Thai 5% broken is taken as world price which is expressed in US \$ per tonne. An important source for all these variables is "World Rice Statistics", International Rice Research Institute, and Philippines. Population and Gross domestic product refers to the same time period and are taken from World Tables, various issues.

The hypothesis here is that in addition to production, the decision of how much quantity of rice can be exported depends on the relative prices of rice and wheat in the international market. Similarly, Thai government uses export premium as an instrument to stabilise the domestic prices. Whenever domestic production shortfalls occur Thai government increases export premium to curtail exports and vice versa. So, export premium is expected to play a strongest impact on the export performance of the Thailand. Another important determinant of Thailand's rice exports are the US export price.

Results are given in Tables 2.1 and 2.2. Results on export equation show that rice production has significant impact only on exports of Pakistan and USA. The elasticity of exports to production is found to be greater than unity in these two countries. This variable failed to have significant impact on exports of Myanmar, Thailand and China. This might be because these countries have adopted stock building operations to buffer against the future production uncertainties. Instead of exporting during the periods of production increase, this increase in production is used for stock accumulation. This is the reason why production in these countries could not have significant impact on exports. Contrary to this, exports are highly elastic with respect to production in Pakistan and USA mainly because rice is not a staple

food for consumption in these two countries. With the exception of Myanmar and Thailand, world prices, as expected, have little impact on exports. The coefficient of this variable has turned out to be negative in these two countries, which is expected to be positive. The negative world price coefficient in Thailand's price equation is justified because fob price of Thai 5% broken is considered as world price so we expect a negative relationship between Thai exports and world price. When rice export premium is included in the equation the impact of world price on Thai rice exports is found to have reduced. Domestic prices are found to be most important determinants of rice exports in Myanmar with the elasticity close to unity. None of the variables are found to be significant in China's export equation. World price does not affect the export competitiveness of any exporting country. The same results hold good when we take export shares rather than absolute quantity of exports as dependent variable.

Due to the highly erratic nature of rice imports import function suffered from poorer explanatory power than the export functions. In Bangladesh and Indonesia production variations are found to have important bearing on the quantum of imports. On the other hand, in countries like Saudi Arabia and Iran gross domestic product has a significant impact on the quantities imported. The results, thus, show that with the exception of a few countries, there is no sufficient degree of price responsiveness in the world rice market. Production variable is found to be an important determinant of rice exports of Pakistan and USA with an elasticity of greater than unity.

Table - 2.1
Parameter Estimates of Rice Export Equation
Cochrane Orchutt Generalised Least Squares Estimation#

Country	Intercept	Production	Coefficient of World Price	Domestic Price	Z _i	R ²
Myanmar	2.73	0.336 (0.76)	-0.586 (-2.73)	-0.906 (-5.75)		0.90
China	0.18	-0.241 (-0.42)	0.048 (0.11)		0.126 0.20	0.10
Thailand	-0.06	0.091 (0.33)	-1.253 (-4.24)	-1.493 (4.46)		0.77
0.48	-0.554	-0.660 (-1.16)	1.158 (-1.40)	-0.376 (2.49)	0.77 (-2.38)	
Pakistan	-2.91	1.754 (4.77)	0.487 (1.11)	0.221 (0.35)		0.75
USA	-0.39	1.222 (8.42)	-0.076 (-0.52)			0.82

Notes: Figures in the parentheses are t values

wherever auto-correlation is present Cochrane-Orchutt generalised least squares estimation is carried out to solve the problem

Z_i for China = International wheat price, Hard Winter No.2, USA, US \$/tonne.

for Thailand= Rice Export Premium

Table 2.2
Parameter Estimates of Rice Import Equation
Cochrane-Orchutt Generalised Least Squares Estimation

Country	Production	Coefficient of Gross Domestic Product	World Price	R ²
Bangladesh	-0.172 (-1.10)	-0.734 (-2.067)	-0.389 (-1.039)	0.42
Indonesia	-4.436 (-3.73)	-0.086 (-0.306)	1.561 (2.556)	0.43
Iran		-	1.335	-0.072 0.56
Philippines	7.271 (0.77)	-3.775 (-1.68)	0.099 (0.04)	0.15
Malaysia	-1.139 (-2.22)	-0.042 (0.10)	0.187 (0.67)	0.20
Saudi Arabia		0.284 (2.432)	-0.580 (-2.29)	0.74

Note: Figures in the parentheses are the t-values.

Conclusion

Since the late 1980s a reinvigorated regionalism has emerged in many parts of the world. Economic ties among countries today include, increasingly, economic relations between countries of differing levels of economic development. Most important in this context is the increasing importance of North-South relations. Integration within Europe intensified in the early 1990s when EC countries removed many of the obstacles to the movements of goods and services within the region. Global market failures, as a result of trade distortions and regionalism, in providing signals to producers and consumers are not only true for agricultural commodities but also for industrial goods, though the degree may differ.

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