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FOOD GRAIN MARKETING IN INDIA

Private Performance and Public Policy

by UMA J. LELE

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Food Grain Marketing in India

Private Performance and Public Policy

UMA J. LELE

This study provides carefully reasoned, documented answers to questions affecting government policy for agricultural development in underdeveloped nations. Among the topics Uma Lele considers are the extent and nature of imperfections in the marketing system and the capacity of the existing system to meet expanded demands.

Focusing on the marketing of paddy, rice, wheat, and jowar, she investigates how storage losses reduce production, the ability of private trade to adapt to rapidly changing supply conditions, the size of margins, and the degree of competition in the marketing and processing of food grains. She provides a detailed and systematic treatment of the problems of new technology, costs, prices, efficiency, transportation, seasonality, and market intelligence.

The book is based on statistical evidence from a large number of markets and on extensive field research, including direct interviews with individuals involved in the marketing process. Although the author concentrates on the performance of India's marketing system, her methodology can be applied to low-income countries in general.

UMA J. LELE is a graduate of Fergusson College in Poona, India, and received the M.S. and Ph.D. degrees from Cornell University. She has been Visiting Assistant Professor of Agricultural Economics at Cornell and is now with the World Bank. She is coauthor (with John W. Mellor, Thomas F. Weaver, and Sheldon R. Simon) of *Developing Rural India: Plan and Practice*

Foreword

Sound government policy for agricultural development requires knowledge of the extent and nature of imperfections in the marketing system. Recently accelerated growth in the food grain production of low-income countries has placed added burdens on marketing systems and raised questions concerning the capacity of existing systems to meet expanded demands. Current questions are concerned with the extent to which storage losses eliminate a major portion of production, the ability of the private trade to adapt to rapidly changing supply conditions, the size of margins, and the degree of competition in the trade. Uma Lele provides carefully reasoned, precisely documented positions on these and other questions which often diverge sharply from current folklore and conventional wisdom.

The availability of new, high-yield crop varieties which require large quantities of purchased imputs lends urgency to governmental decisions concerning the allocation of scarce administrative and financial resources. There is an argument that governments of low-income countries should provide improved marketing conditions by facilitating regulation and services with respect to grades, weights and measures, and market information. There is also pressure upon governments to expand storage facilities and even to displace private trade altogether. Concurrently the rapid progress of technological change in agriculture necessitates the rapid expansion of many factors—education, research, credit, fertilizer production and distribution, irrigation, and

roads. All require large amounts of capital, trained manpower, and an administrative organization. At the same time, efforts to increase taxes, attract trained manpower, and develop an administrative organization encounter great difficulties. A government is therefore concerned with allocating its own scarce resources among the tasks it must perform and with encouraging other sectors to take up tasks they can properly accomplish.

One of the important questions that arises is the extent to which the private food grain trading sector can satisfy the marketing needs of a rapidly developing agricultural sector, thereby leaving the government's resources to be used for other pressing purposes. How competitive is the private trade? What are the costs of performing various functions, such as transporting and storing? What is the structure of the private trade, and how can it be improved? What are the effects of various types of regulations on the mode of operation and the efficiency of the private trade? These questions must be dealt with if a sound, development-oriented public policy is to be formulated. They have, in the past, received little systematic treatment. They are dealt with empirically and in detail by Uma Lele.

This book presents a methodology for analyzing the performance of the marketing system of low-income countries. The methodology is applied to India. The range of problems and questions covering marketing in India is similar to that of most other developing countries. Thus this book is of great value to those concerned with market problems in less developed countries generally. It provides a framework for analysis which should be widely applicable. It also provides a description of market systems and operations and a broadly useful set of policy prescriptions.

Mrs. Lele's work in this important and controversial area commenced several years ago with a detailed study of the structure and intermarket and interseasonal price differentials of the jowar markets in Maharashtra. Results have

been published in a number of places, including the book jointly written by Thomas F. Weaver, Sheldon R. Simon, Mrs. Lele, and myself, *Developing Rural India: Plan and Practice* (Ithaca, N.Y.: Cornell University Press, 1968). In that earlier investigation she studied the markets surrounding Sholapur in particular detail. While she was answering a number of important questions about jowar in Maharashtra, new questions developed concerning the extent to which similar behavior could be expected of other crops and regions.

The study reported in the present book was an attempt to give a higher degree of generalization to the findings of the earlier inquiry and to provide greater detail about the manner of operation of the food grain trade. The investigation was therefore expanded to include the other two important food grain crops, rice and wheat, and the northern, eastern, and southern regions of India, in addition to an expanded examination of jowar marketing in western India.

For the present study, Uma Lele spent over a year traveling in the market areas, collecting data, observing practices, and, most important, establishing close rapport with the traders themselves. In addition, the extensive resources of the Agro-Economic Research Centres, located in New Delhi, Santiniketan, and Madras, facilitated the collection of a very large quantity of statistical data. The result of these efforts is a definitive treatment of the food grain markets in India.

The strength of the work lies in the unusual combination of empirical analysis based on tens of thousands of price observations, collected in the detail which is only possible at the market level itself, and the intuitive knowledge which comes from wide observation and experience in the markets and interviews with hundreds of traders at all market levels. All this results in a sense of variability in the range of conditions, which is necessary for an accurate picture and

the only basis for valid generalization. The breadth and depth of the analysis provide many lessons which are applicable outside India.

Mrs. Lele's investigation of grain marketing in the Indian economy is one of the series of ongoing studies at Cornell University of the processes of agricultural development in low-income countries. Many of these inquiries have been financed by funds from the United States Agency for International Development and The Ford Foundation. The studies cover a wide range of subjects—growth relationships between agricultural and other sectors in development, agricultural price determination and policies for facilitating agricultural growth, and the economics of various resource uses, especially water and fertilizer. A concentration on India has resulted in a detailed and integrated picture of development processes in that country. Uma Lele has made a distinguished contribution to our knowledge of India and of the processes of agricultural development.

JOHN W. MELLOR

Ithaca, New York

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I owe special gratitude to S. C. Chaudhri of the Agricultural Prices Commission and to J. S. Sarma of the Directorate of Economics and Statistics, Ministry of Food and Agriculture, who introduced me to people in the state administrations as well as provided useful data sources and

valuable suggestions for the conduct of the research. The Department of Civil Supplies, the Department of Agriculture, and the Department of Statistics of each of the four states studied provided useful information, as did the Food Corporation of India, the Department of Food, and the National Cooperative Development Corporation. I have benefited immensely from my discussions with numerous officials in these agencies.

Valuable insights and information about the private grain trade were obtained from V. S. Aggarwal and Bhaniram Gupta, of the Federation of the All India Foodgrain Dealers' Associations, and from Devji Ratansi and several of his colleagues, of the Grain, Rice, and Oilseeds Merchants' Association in Bombay. The traders, millers, and market officials in the thirty-odd markets who provided vital information are too numerous to be listed.

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UMA J. LELE

Ithaca, New York

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FOOD GRAIN MARKETING IN INDIA

Private Performance and Public Policy

CHAPTER 1

Introduction

The role of distributional efficiency in the development of the traditional societies has received emphasis only recently in the literature on development. Current literature recognizes the general neglect of the study of distribution in low-income countries and the popular view of trade as an exploitative and antisocial activity.[1] Research on the traditional market structure has been mainly confined to the subject of competitiveness, and even in this area, investigation has been inadequate. The scant literature provides, at best, conflicting evidence regarding the efficiency of the traditional structure.[2] It fails to offer generalizations

[1] "Wide fluctuations in prices are erroneously attributed to the activities of speculators. . . . The data bearing on the prices of foodstuffs . . . suggest empirically what is obvious on general grounds, that these fluctuations are not caused by the activities of traders and speculators, . . . prices for the same product may differ considerably between nearby areas. The discrepancies may persist, because of high cost of transport or imperfect market intelligence" (P. T. Bauer, *West African Trade* [London: Routledge and Kegan Paul, 1963], pp. 388–389). See also Leon Hirsch, *Marketing in an Underdeveloped Economy: The North Indian Sugar Industry* (Englewood Cliffs, N.J.: Prentice Hall, 1961); Uma J. Lele, "Traders of Sholapur," in *Developing Rural India*, by John W. Mellor, Thomas F. Weaver, Uma J. Lele, and Sheldon R. Simon (Ithaca, N.Y.: Cornell University Press, 1968), pp. 237–294; and an excellent survey article by J. C. Abbott, "The Development of Marketing Institutions," in *Agricultural Development and Economic Growth*, ed. Herman Southworth and Bruce F. Johnston (Ithaca, N.Y.: Cornell University Press, 1967), pp. 364–399.

[2] John K. Galbraith and Richard H. Holton, *Marketing Efficiency in*

valid for wide geographic areas. A number of studies neglect altogether such aspects of trade as the number of traders and size distribution of their operations, the role of capital, the extent of free entry, the availability of market intelligence and of transport facilities, and the effect of all these factors on the degree of competitiveness. Above all, they fail to consider the roles, both positive and negative, that a marketing system can play in a developing economy experiencing substantial increases in agricultural production.

In the past there was frequent governmental interference with trade in low-income countries that often originated in political pressure, popular biases, inadequate knowledge, or simply in developmental zeal. The Indian grain trade is no exception. It has a long history of government controls which go back to British times. Compulsory procurement, fixation of ceiling prices, zoning of surplus and deficit regions, fair price distribution, and rationing have all been used singly or simultaneously for at least three decades. The goal of the restrictionist policies during British times was admittedly the maintenance of popular support for colonial rule and not the long-range development of the Indian agriculture.[3]

Puerto Rico (Cambridge, Mass.: Harvard University Press, 1955); P. T. Bauer, *op. cit.;* Leon Hirsch, *op. cit.;* Alice G. Dewey, *Peasant Marketing in Java* (New York: Free Press of Glencoe, 1962); A. P. Kulkarni, "The Behaviour of Prices of Groundnut Pods in Some Regulated Markets in Maharashtra" (Ph.D. dissertation, University of Poona, 1962); Lele, *op. cit.;* Zaibun Jasdanwalla, *Marketing Efficiency in Indian Agriculture* (Bombay: Allied Publishers, 1966); Ralph Cummings, Jr., *Pricing Efficiency in the Indian Wheat Market* (New Delhi: Impex India, 1967). See also J. P. Bhattacharjee's section on West Bengal in Government of India, Ministry of Food and Agriculture, *Report on an Enquiry into the Pace and Pattern of Market Arrivals of Foodgrains (Season 1958–59)*, 1959, and Louis F. Hermann, *Considerations Relating to Agricultural Price Policy in India, with Special Reference to Rice and Other Foodgrains,* Report to the Government of India, Ministry of Food and Agriculture, 1964; and Abbott, *op. cit.*

[3] See Sir Henry Knight, *Food Administration in India* (Stanford, Calif.: Stanford University Press, 1954).

The gradual shift to free trade after the end of the Second World War was brought about by the realization that the "continuing food crisis was likely to perpetuate in an artificial manner as a result of the high commitments undertaken by the government on one hand and the difficulties of procurement on the other," and that "the real solution is not imports or controls on procurement and distribution," but that it is "only a substantial increase of domestic production within the earliest possible time that can solve the Indian food problem."[4] The revival of controls on distribution in the later 1950's and their further intensification in the mid-sixties has, understandably, become a focus for debate in the recent past in India.[5]

Academic interest in distributional arrangements has been aroused, not so much because of claims that one economic

[4] Government of India, *Foodgrains Policy Committee,* Interim Report, 1947, pp. 11–12.

[5] For the debate on the agricultural price policy in India, see Government of India, Ministry of Food and Agriculture, *Report of the Agricultural Prices Commission on Price Policy for Kharif Cereals for 1965–1966 Season,* 1965; Raj Krishna's three articles in *Economic Times,* Oct. 27, 28, 31, 1964; and his "Government Operations in Foodgrains," *Economic and Political Weekly,* II (Sept. 16, 1967), 1695–1706. See also K. N. Raj in *Times of India,* Jan. 20, 1966; M. L. Dantwala, *Times of India,* Feb. 10, 1966; K. N. Raj, *Times of India,* Feb. 16, 1966; M. L. Dantwala, *Times of India,* Feb. 19, 1966; M. L. Dantwala, "Incentives and Disincentives in Indian Agriculture," *Indian Journal of Agricultural Economics,* XXII (April–June, 1967), 1–25; V. M. Dandekar, "Agricultural Price Policy: A Critique of Dantwala," and M. L. Dantwala, "Agricultural Price Policy: Reply," *Economic and Political Weekly,* III (March 16, 1968), 454–459; Edward Mason, *Economic Development in India and Pakistan,* Occasional Papers in International Affairs, No. 13 (Cambridge: Harvard University, Center for International Affairs, 1966); T. W. Schultz, *Economic Crisis in World Agriculture* (Ann Arbor: University of Michigan Press, 1967); John W. Mellor, "Functions of Agricultural Prices in Economic Development," *Indian Journal of Agricultural Economics,* XXIII (Jan.–March, 1968); 23–27; and Raj Krishna, "Agricultural Price Policy and Economic Development," in Southworth and Johnston, *op. cit.,* pp. 497–540. For a review of the food price policy see Appendix I.

system is superior to another, but because choice of a marketing system has become an integral part of agricultural price policy in India. One must, however, not disregard the fact that the whole question of food procurement, distribution, and price policy has had serious political overtones in India. This has been reflected in the various pronouncements that have tended to blame price rises and food shortages on the profiteering and antisocial activities of grain traders. Because of their relatively small number, traders exercise little power at the ballot boxes. There has, however, been a strong tendency among grain traders themselves to act as a pressure group to slow down what they consider to be a trend toward the socialization of the grain trade. The political exploitation of the food issue has unfortunately not been restricted to policy pronouncements and pressure groups. Political leaders both of states with a surplus, and states with a deficit, of agricultural commodities have shown a vested interest in maintaining single-state zones, not so much with a long-range view of agricultural development, but with an immediate interest in keeping prices and supplies under their control. The result is that in poor crop years surplus states refuse to part with their surpluses, even for purchase on government account, and deficit states overstate their requirements in order to acquire the maximum share of the existing food supply through excessive claims on the central government. However, in good years when low prices threaten political action by the cultivators, the surplus states press for price support operations and procurement at prices higher than would be dictated by market prices. Although political aspects of food policy have been pointed out in order to place the issue in its proper perspective, this study is confined only to the examination of the economic features of the marketing system.

From an economic viewpoint, distributional arrangements are of interest for several reasons. In their most neutral form they perform the function of signaling prices to consumers and producers, thus bringing about the allocation of

available supplies among consumers and of resources among producers. The popular view in low-income countries is that markets for agricultural commodities do not operate efficiently in price-signaling and that there are great differences between prices paid by consumers and those received by producers, both over time and space, that are caused by monopolistic elements. It is essential to examine the available evidence, to ascertain if the markets do in fact show a great deal of inefficiency, and if they do, whether this phenomenon can be explained in terms of economic factors.

However, even if the market is highly efficient, it may have certain unacceptable features: e.g., it may operate in a manner that causes a great deal of year-to-year instability in the price level.[6] Or the market may provide a price level which adversely affects the growth of the industrial or the agricultural sector. In that case it may be necessary to improve the existing distributional arrangements or to replace the present system with a new one. However, any such change needs careful consideration because of its possible impact on several important factors affecting long-run economic development. Among the more important are the mobilization of market supplies for urban consumption, the stability of prices, long-run distributional efficiency, optimum utilization of financial resources—private and public—and the balance between the prices of food and non-food crops and between the prices of agricultural and nonagricultural commodities.

Only some of these factors have received careful consideration in the recent food policy debate. The policy of compulsory partial or complete procurement of marketed surplus, at prices which disregarded market forces, has been a failure in India. The government failed to procure more than 10 percent of the total production—even with maxi-

[6] This may simply be due to fluctuations in supplies but, nevertheless, may necessitate interference.

mum gearing of its administration to procurement—increased its commitments by introducing statutory rationing across the board in all large urban centers, depended heavily on imported food for distribution, and caused an extensive illegal market in food grains. Private trade handled, legally and illegally, approximately two-thirds of the marketed surplus during 1965–1968. The literature on the food policy debate amply shows the concern of many prominent economists over the reliance of the Indian nation on imported supplies for feeding its urban masses.[7]

Following the failure in procurement has been the failure to give stability to the domestic grain market. Governments have not succeeded in reducing regional price differences even for those portions of the marketed surplus procured by the government. Nor have they succeeded in reducing the costs of distribution universally, even for government-procured grains. This is because in some cases market margins have been low to begin with and hence there has been no scope for further reduction. But in other cases it is also because political pressures and administrative inefficiencies in the public sector have proved to be a barrier to the reduction in market margins. In fact, in some instances market margins have been higher in the public distribution process. The Agricultural Prices Commission has been attempting to equalize procurement prices of paddy and rice in various states, without much success. With as little success it has emphasized the desirability of having a standard set of margins for the distribution of food grains.

The data analysed by the Commission on the costs of public distribution during 1965–1966 and 1966–1967 show that there is a wide variation in the margins charged for the different items by the different state governments. For example, in 1966–1967, the

[7] Although concern was expressed in the context of food shortages in the 1960's, the problem will remain as long as there are substantial year-to-year fluctuations in production and consequent shortages due to vagaries of the weather.

total cost of distribution of rice converted from paddy procured within the same state was as low as Rs. 7.49 per quintal for some parts of Andhra Pradesh, while as high as Rs. 22.34 in other parts of Andhra Pradesh and Rs. 29.05 in West Bengal. For wheat supplied from the Union Government's stocks, the total cost of distribution varied from Rs. 4.59 per quintal in Orissa to Rs. 14.00 in Andhra Pradesh; the cost of distribution for bajra obtained from other states ranged from Rs. 9.38 in Gujarat to Rs. 15.20 in Maharashtra.[8]

The government has had even less control over regional differences in prices of that portion of the domestic marketed surplus which changes hands at prices other than those fixed by the government. Critics of the policy have argued that prices of domestic food grains show a great deal of regional and seasonal variation which is caused not only by movement and stocking restrictions imposed by the government but also by the covert nature of the market that does not follow the rules of the open-market game.

However, what has escaped the opponents of the present policy is the effect of such restrictions on the distribution efficiency both in the short and long run. The development of the black market has, in the short run, resulted in the dispersal of quantities that would be mass-handled in open trade and increased the costs of marketing by small-scale handling as well as by adding illegitimate charges to regular market costs. It has also resulted in an emergence of a class of profiteering intermediaries who receive a major share of the consumer's rupee and has distorted price signals, thus further affecting resource allocation.

The continuation of such a policy also has dangerous

[8] In 1967–1968 procurement prices of rice fixed by various state governments were as follows: Rs70.00 per quintal in Mysore, Rs72.80 in Tamil Nadu, Rs72.69 in Andhra Pradesh, Rs85.00 in Punjab, Rs 90.00 in Uttar Pradesh, Rs93.75 in West Bengal, Rs95.25 in Bihar, and Rs107.77 in Assam. See Government of India, Ministry of Food and Agriculture, *Report of the Agricultural Prices Commission on Price Policy for Kharif Cereals for the 1968–1969 Season*, Sept. 1968, p. 16.

long-run effects, which in India have never received the attention they deserve. The aim of the distribution system in a developing economy such as India, in the long run, should be not only to bring about more efficient processing of food where at present antiquated methods result in heavy losses, as in rice milling, but also to encourage processing and packaging of food where no food industry exists currently. A labor surplus economy such as India has a great deal of scope for increasing employment and income through the development of such an industry. The presence of a black market or even a chronic fear of its existence will only discourage such modernization of the distributional system. Even with the present distributional arrangements a great deal needs to be done to bring about better organization for crop-forecasting and the dissemination of stock and crop information to the existing market structure, which will not be done while the very existence of the market structure is constantly threatened.

Another problem which has received little attention in policy debates is that of the alternative allocation of the scarce capital available to the public and the private sectors. Two distinct but related issues need careful consideration. The first is whether the replacement of the traditional market structure with a governmental organization will bring about a more efficient distributional system. In this case the cooperative sector should be treated as part of the governmental organization, since it is usually superimposed at least in food marketing, by a governmental policy. To resolve this question it is essential to examine available evidence for ascertaining the extent of inefficiency in the existing market structure.

The second issue that needs consideration is whether private capital can be reallocated in a desirable manner or whether public resources (financial and administrative) should be reserved for investment in fields to which private capital will not flow very easily. Here we should include financial as well as human capital, since trading involves considerable skill—a realization that dawned on the co-

operative marketing agencies after much hard competition from the private sector. It is necessary to weigh the benefits that accrue to reallocation at both ends (private capital out of trading and public capital into trading) before introducing any hasty policy measures. However, if the existing market structure, which consists mainly of the private sector, seems sufficiently competitive to begin with, such an evaluation may not be necessary.

An additional feature of the food policy had escaped the attention of its critics. Governmental interference through such policies as zoning, distribution, procurement, ceiling prices, and so forth, had been directed mainly toward keeping cereal prices low and not toward prices of other crops such as pulses, oilseeds, cotton, and jute, with the result that prices of these crops oscillated more or less with the free market forces, whereas those of cereals continued to be controlled.[9] Thus in the early sixties, food prices were controlled at levels lower than would have existed in the free market, given the series of successive poor crops. However, in the late sixties, despite considerable increases in production, prices remained higher than would have existed in the free market. There is sufficient evidence that individual crops show an elastic supply response to changing prices in India.[10] There is also considerable evidence that commercial crops such as cotton and jute show a higher elasticity of supply when compared to subsistence crops.[11]

[9] Some may challenge the effectiveness of the policy. However, even they will not dispute the contention that cereal prices have been at least somewhat lower than they would have been in the absence of governmental intervention, if not because of controls on prices, at least because of market inefficiencies resulting from governmental actions discussed earlier.

[10] See Raj Krishna's excellent article, "Agricultural Price Policy and Economic Development," in Southworth and Johnston, *op. cit.*, pp. 497–547, for a review of literature on this subject.

[11] This is partly because of greater use of purchased inputs, partly because of the market-oriented attitude of the cultivators who grow them, and partly because of the fact that individually the crops occupy small

Under these circumstances, it is necessary to arrive at a balance between prices of food crops and commercial crops so as to reach a proper balance in their supply.

Additional factors which may lead to a shift between crops are (1) uncertainty regarding prices and (2) the relative ease of marketing some crops. In the past, price policy was not only aimed at lowering prices of food crops, but the nature of the controls changed so frequently that the future course of the policy was unpredictable. It is, therefore, necessary to define the goals of the agricultural price policy. A policy of controlled prices for some crops and a free market for other crops may considerably distort allocation of land and other inputs and hence may cause long-run supply imbalances.

The last but not the least important issue concerns the terms of trade between agriculture and industry. The historical evidence from developed countries is overbearingly in favor of making the terms of trade less favorable to the agricultural sector.[12] Even in India the question of using high agricultural prices for increasing agricultural production was dismissed as unimportant by the British administrators.[13] Although little work has been done on the

portions of the total cultivated land and, therefore, can make proportionately greater inroads onto the rest of the cultivated land, as compared to food grains, which occupy a major portion of the cultivated land. "It is conceivable that a crop taking up 10 percent of the total acreage in an area could have a much more elastic supply response than the aggregate, but it is not conceivable for a crop taking up 95 percent of the acreage. The lesser crop after all can double in acreage at the expense of the major one, but the major one cannot similarly double at the expense of the minor one" (John W. Mellor, "The Functions of Agricultural Prices in Economic Development," *Indian Journal of Agricultural Economics*, XXIII [Jan.–March, 1968], 24).

[12] Raj Krishna terms this a "negative price policy." See his article in Johnston and Southworth, *op. cit.*, for a review of the evidence.

[13] Regarding the demand for higher procurement prices from the provincial governments in 1946, Sir Henry Knight states, "The real question in India was not whether the black market prices were higher, but whether higher procurement prices would cause more grain to be grown

aggregate supply response to relative changes in sectoral prices, the available evidence on the response of individual crops, of marketed surplus, and of input use suggests that though terms of trade may not, in themselves, be sufficient to bring about an agricultural revolution, they may accelerate or retard the growth rate initiated by a technological change.[14] Agricultural price policy must thus consist of much more than a program oriented toward influencing the producer's and the consumer's prices mainly through market margins, which often may not even provide scope for improvement except through a major technological change in marketing processes.

It is further necessary to consider whether the existing market structure is capable of handling rapid increases in agricultural production prompted by the new technological advances in agriculture, or whether alternative distributional arrangements would have to be pursued in the long run. The choice of a distributional process is therefore of immense interest, not only because of its relative efficiency in itself, but because of its role as a broadcaster of appropriate signals for substantial increases in agricultural production. It is in this light that one must evaluate the performance of the traditional trading sector with regard to (1) the degree of efficiency of the structure and (2) causes of inefficiencies, if any, in order to develop an appropriate price policy.

This book proposes to examine the following specific hypotheses in the context of the Indian food grain market:

1. The traditional market structure is basically competitive and to a considerable extent fulfills the textbook conditions of competitiveness.

2. All markets of individual cereals are closely interre-

in the country, and there is no reason to believe that this would have happened" (*op. cit.*, p. 216).

[14] Krishna, in Southworth and Johnston, *op. cit.*; V. M. Dandekar, *op. cit.*

lated: i.e., the price of a specific crop in one market is related to the prices of the same crop in other markets. This interrelationship between price movements in two markets is called market integration.

3. Because of the competitive nature of wholesale trade, intermarket price differences do not tend to be greater than transport costs.

4. Seasonal fluctuations in prices are consistent with storage costs.

5. Milling margins are commensurate with milling costs and milling outturns.

Choice of Products and Areas

These hypotheses are examined in relation to three major cereals: rice, wheat, and jowar.[15] Rice occupies the largest area among all the principal crops in India. On an average, the area under rice is 36 percent of the total area under cereals, 28 percent of the total area under food grains, and 21 percent of the total cropped area. The total production of rice in the country is roughly 48 percent of the total production of cereals and 40 percent of the total production of food grains.[16] The production, processing, and sale of rice thus constitute the single largest industry in India, contributing roughly a fifth of India's national income. Rice, wheat, and jowar together constitute two-thirds of India's food grain production and a third of India's gross national product.

The evidence presented here relates to the rice trade in West Bengal and Tamil Nadu, the wheat trade in Punjab, and the jowar trade in Maharashtra (Figure 1). West Bengal and Tamil Nadu are both predominantly rice-producing and consuming areas. Together they produce a fourth of the total Indian rice production, which was 38

[15] In India, cereals include rice, wheat, jowar, bajra, maize, barley, and ragi. Food grains are cereals and pulses, including gram.

[16] Ministry of Food and Agriculture, Government of India, *The Rice Economy of India*, 1961, p. 3.

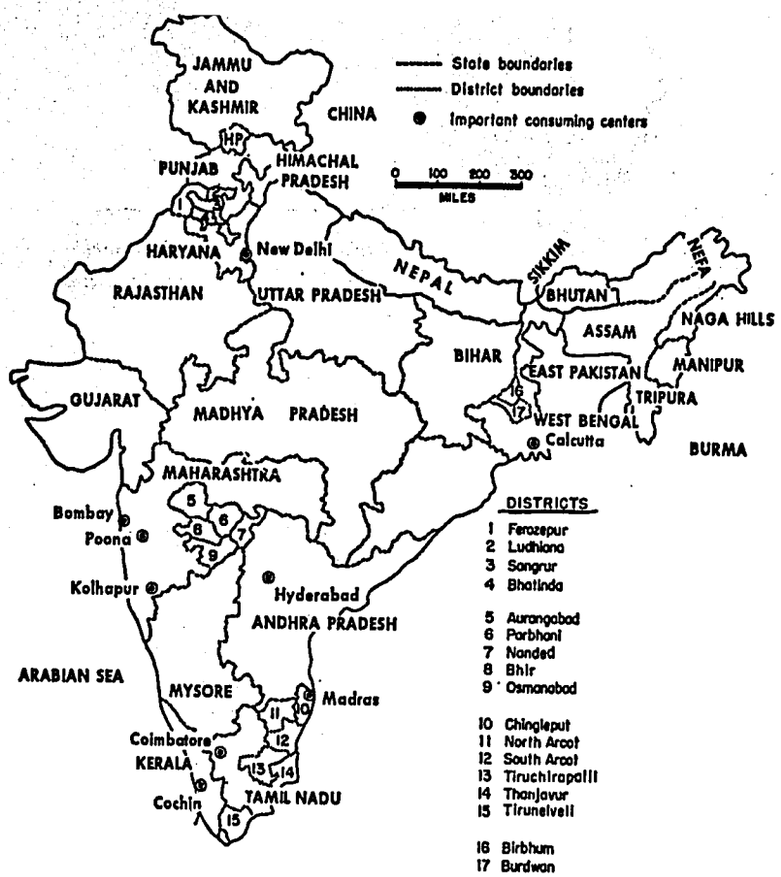

Figure 1. Relative positions of the states and the areas of study, India
Source: Adapted from Government of India, Ministry of Food and Agriculture, Directorate of Economics and Statistics, *Indian Agricultural Atlas* (New Delhi, 1958).

million tons in 1964–1965 (Figures 2 and 3). Punjab is not only a major producer and consumer of wheat but is also a major exporter of wheat to a number of states in the Indian union (Figures 2 and 4). Punjab produced a fourth of India's 9-million-ton wheat production in 1955–1956. By 1964–1965 its share had increased to approximately a third of the 12 million tons produced in India. Maharashtra

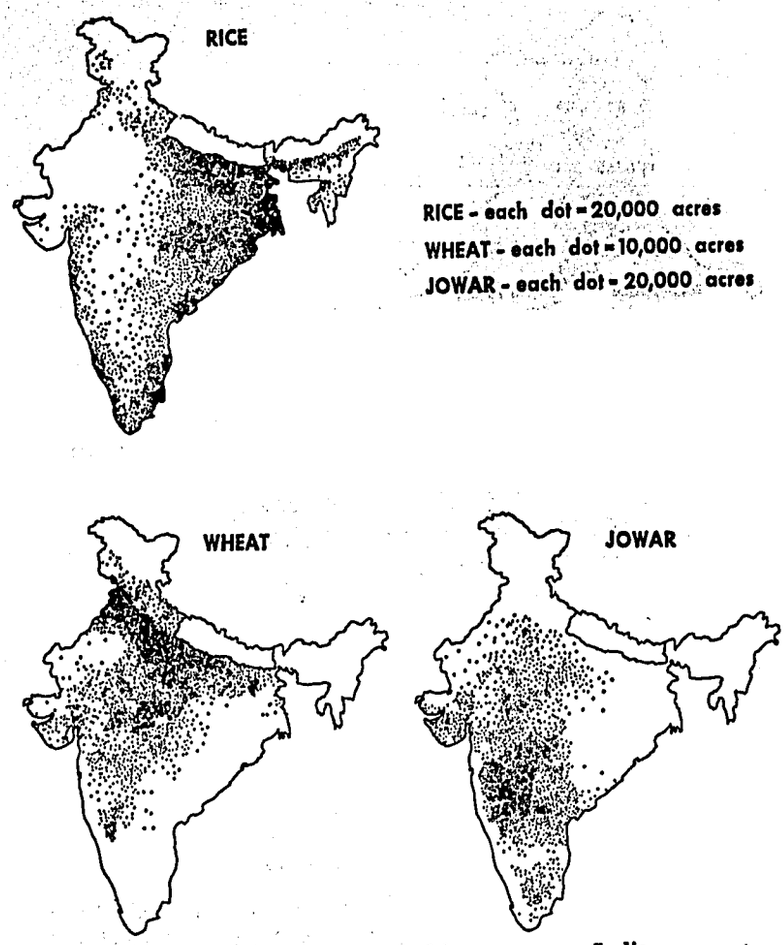

Figure 2. Extent of rice, wheat, and jowar acreage, India
Source: Adapted from Government of India, Ministry of Food and Agriculture, Directorate of Economics and Statistics, *Indian Agricultural Atlas* (New Delhi, 1958).

is the largest jowar-producing state in India, contributing a little over a third of the total jowar production (Figures 2 and 5). It is a major consumer and exporter of jowar.

Although the present book uses a case-study method, the work provides observations that apply to major areas and

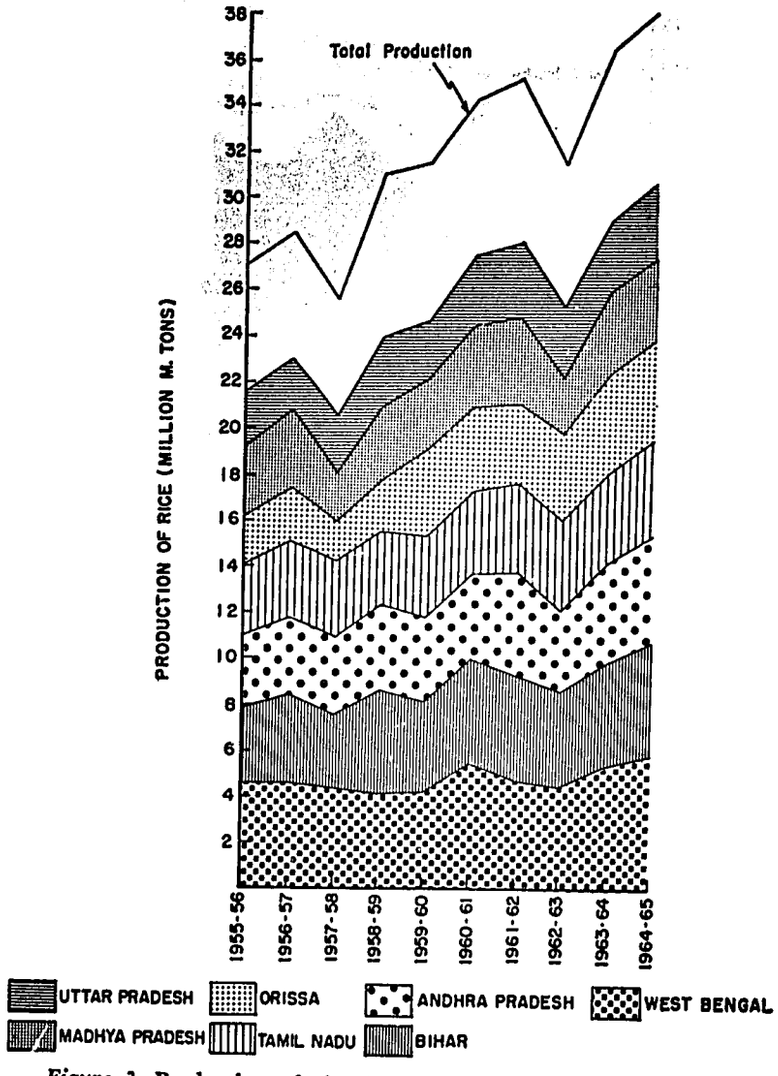

Figure 3. Production of rice in major rice-producing states, India, 1955–1956 to 1964–1965

Sources: Government of India, Ministry of Food and Agriculture, *Rice Economy of India* (New Delhi, 1961), and *Bulletin on Food Statistics* (New Delhi, 1955 to 1967).

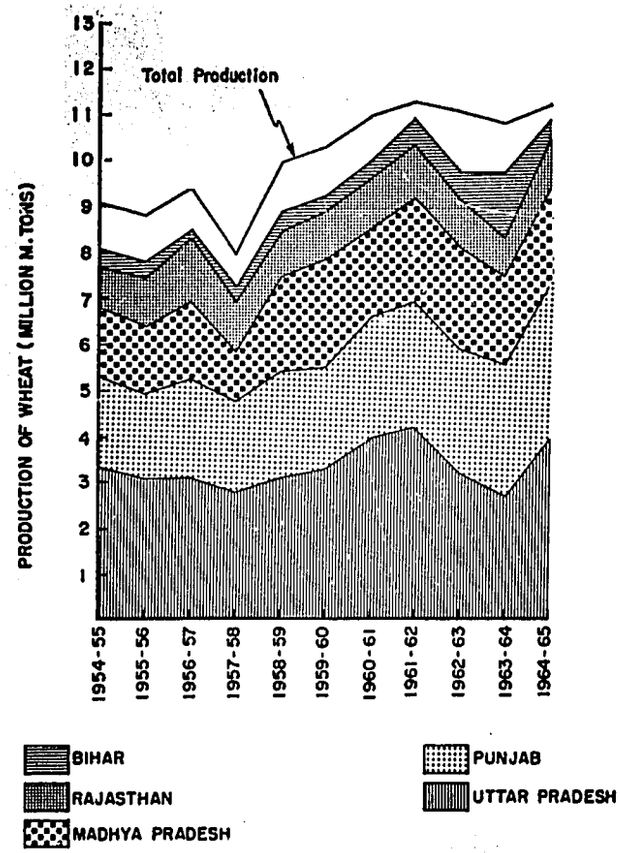

Figure 4. Production of wheat in major wheat-producing states, India, 1954–1955 to 1964–1965

Source: Government of India, Ministry of Food and Agriculture, *Bulletin on Food Statistics* (New Delhi, 1954 to 1967).

food grains of the country. The marketing patterns of the three food grains are sufficiently similar to give a study of this nature general applicability. However, the differences in the regions as well as in the marketing problems of the three cereals are substantial enough to make a comparative study such as this useful for understanding policy problems of specific regions and individual cereals.

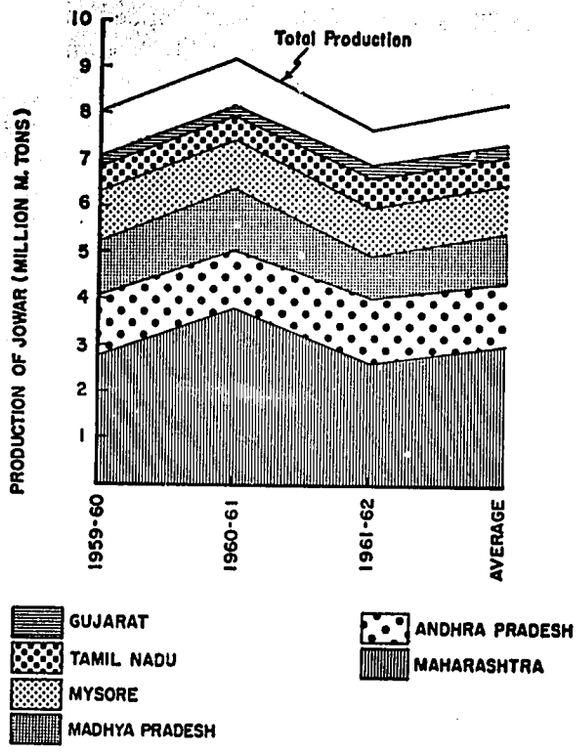

Figure 5. Production of jowar in major jowar-producing states, India, 1959–1960 to 1961–1962

Sources: Government of India, Ministry of Food and Agriculture, *Agricultural Situation in India* (New Delhi, 1959–1960 to 1963–1964), and *Bulletin on Food Statistics* (New Delhi, 1959 to 1963).

Relative Positions of the Regions

Although all four states selected for this study are major producing regions of the respective cereals, they show a great deal of diversity in physical conditions, cultivation practices, crop yields, and consequently, diversity in the size of the surplus.

West Bengal is the largest rice-producing state in India, contributing approximately 15 percent to the all-India rice production. Paddy is the most important crop in the state.

Approximately 70 percent of the gross cropped area in the state is under paddy. West Bengal also has the highest percentage of land under cultivation in India.[17]

Rice is the staple food of the people of West Bengal. It accounts for about 89 percent of the total cereal consumption. Despite superior fertility, favorable natural conditions, and extensive cultivation, the state does not produce enough rice to meet its own requirements. Except for an occasional bumper crop, West Bengal has consistently been deficient in food supplies in general. The heavy pressure of population and backward methods of cultivation result in poor crop yields. The average per acre yield of rice between 1949–1950 and 1957–1958 in West Bengal was 900 pounds, compared to 1,000 pounds in Tamil Nadu.

Only 16 percent of the area in West Bengal was double cropped in the 1950's as compared to 30 percent in Punjab and Tamil Nadu.[18] A little over a fifth of the net area sown was irrigated in 1956–1957. The irrigation facilities in the state, however, do not lend themselves to double cropping, as they fail to offset the water scarcity in winter months when lands lie fallow.[19] In 1956–1957 only 25 percent of the area under paddy was irrigated in West Bengal, in contrast to 90 percent in Tamil Nadu and 94 percent in Andhra Pradesh.

Tamil Nadu is also a major rice-producing state of India. It produces approximately a tenth of the total production, ranking fourth in the amount of rice produced. As a net exporter Tamil Nadu has been less important than Orissa, Andhra Pradesh, and Madhya Pradesh. However, unlike

[17] Approximately 60 percent of the geographical area of the state is cultivated. This is 15 percent higher than the all-India average (National Council of Applied Economic Research, *Techno-Economic Survey of West Bengal* [New Delhi, 1962], p. 35).

[18] *Ibid.*

[19] The precipitation is concentrated in the four summer months (June to September) in West Bengal.

West Bengal, it has been increasing its exports in the last two decades, owing to the remarkable increase in rice production in the state. From 1949–1950 to 1965–1966 rice production has slightly more than doubled, with an increase of approximately a third in the acreage under paddy in that period. This production increase has converted the state from a net importer of rice in 1949–1950 to a marginal exporter in the sixties. Average yields in Tamil Nadu have been uniformly higher than the all-India average for nearly every crop, and in the case of several crops such as paddy, groundnut, jowar, and tobacco the average yield in Tamil Nadu is higher than in any other state.[20]

Punjab is a major wheat-producing state of India, followed by Uttar Pradesh and Madhya Pradesh in the amount of acreage.[21] However, in production Punjab ranks second only to Uttar Pradesh, producing approximately a third of the all-India wheat production. Punjab has the highest per acre yield of wheat in India. Although yields have been increasing in all major wheat regions, Punjab has remained at the top for a considerable period of time.[22] This is mainly because the proportion of irrigated wheat and improved strains in this state is higher than in any other state (50 percent of the area under wheat was irrigated in Punjab, compared with 44 percent in Uttar Pradesh during the triennium 1955–1956 to 1957–1958.[23] The application of fertilizer is also higher in amount in Punjab as compared to other states.[24] The state has,

[20] National Council of Applied Economic Research, *Techno-Economic Survey of Madras,* (Madras: Department of Industries, Labour, and Cooperation, 1960), p. 70.

[21] Uttar Pradesh accounts for 31 percent of the total area under wheat, Madhya Pradesh for 22 percent, and Punjab for 16 percent.

[22] The average yield of wheat from 1962–1963 to 1964–1965 was 1,057 pounds per acre in Punjab, as against 750 in Uttar Pradesh and Rajasthan, 550 in Madhya Pradesh, and 400 in Maharashtra.

[23] See Government of India, Ministry of Food and Agriculture, *Report on the Marketing of Wheat in India,* 1963, Appendix 5, p. 231.

[24] *Ibid.,* p. 14.

therefore, been of considerable importance as a "surplus" state in a markedly food-deficient country.[25]

Maharashtra is the largest jowar-producing state in India. It occupies a third of the total jowar acreage of India and produces a little over a third of the all-India jowar production. Jowar is a major crop of the state. Poor soil, low rainfall, and scanty irrigation in Maharashtra are conducive only to the production of millets. Over half the area under cultivation is under millets and pulses. Jowar constitutes two-thirds of this acreage. A relatively high proportion of the area is under commercial crops, mostly cotton and oilseeds, for which the Deccan soils are well suited. But neither of them yield high returns. Consequently agricultural incomes are low and millets constitute the main food of a large section of the population living in rural and semiurban areas.

[25] It is difficult to estimate actual exports of wheat from Punjab to the rest of India during the period of this study. No statistics are available on the amount moved by road, which constitutes an important component of the total exports. Exports on government account during the period of wheat zones are not a good indicator of the actual surplus in the state, because there is always a tendency on the part of a state government to spare as small a quantity as possible for consumption in other states. The only other way to estimate wheat exports would be to deduct domestic utilization in the state (namely, human consumption, feed, and seed) and the net change in private and government stocks from the total state production. However, almost all the figures except those for production required for this estimation elude a researcher. If per capita production is any indication of the extent of surplus, Punjab produced as much as 295 pounds of wheat per capita in 1961–1962, compared to 135 in Madhya Pradesh, 115 in Uttar Pradesh, 35 in Gujarat, and 25 in Maharashtra, all of which are major wheat-consuming states. Although per capita consumption of wheat is much higher in Punjab than in the rest of India, where other grains such as rice, jowar, and bajra are consumed in supplementary forms, this still left a great deal of surplus which could be exported to other states.

Analytical Procedure

At least five primary markets located in the heart of eacl of the four major grain surplus areas have been selected fo study. A primary market, for the purposes of this study, i defined as one in which most of the transactions at thi wholesale level take place directly between the cultivato and the wholesaler. One terminal market, a major urbai consuming center in the region which receives a significan portion of its supplies from these primary markets, is se lected for a study of price relations over time and space. A terminal market is defined as one in which most of th arrivals come from traders rather than from producers Most of the grain imported from surplus regions is usec directly for local consumption.

Village-Level Price Formation

It is generally believed that village-level prices often dc not reflect the market forces of supply and demand anc that when the produce is marketed at the village site, cul tivators receive prices that are much lower than those pre vailing in market places. Various factors are believed to be responsible for the phenomenon of underpricing in the vil lage markets. Heavy indebtedness of the cultivator to the village trader-moneylender, lack of knowledge about mar ket prices, a need for cash for paying taxes and debts, poor transport facilities linking villages with markets, and an inadequate number of wholesale markets are some of the familiar explanations for the weak bargaining power of the cultivator.

In a competitive market, the price difference between the village-level market and the wholesale market will generally be equal to or less than transport costs between the two. A difference greater than shipping costs would result in an increased flow between the two markets and thus cause an increase in village prices and a decline in the wholesale market price.

In order to determine whether village-level prices are in parity with prices in the nearby market it is necessary to compare wholesale market prices with prices of comparable varieties of grain in a nearby village market in relation to the costs for handling shipments between the two points. Unfortunately no systematic data are available on prices prevailing in the village markets.[26] Wherever possible, farm harvest prices collected by the state departments of agriculture are, therefore, compared with primary wholesale market prices.

Market Integration

The analytical approach to regional price analysis is in conformity with my earlier work on jowar markets.[27] It is hypothesized, first, that markets for agricultural commodities in underdeveloped countries are closely interrelated, i.e., that the price formation in one market is related to the prices in other markets.[28] This interrelation between price movements in two markets is defined as market integration. The second hypothesis is that, because of the competitive nature of the wholesale trade, price differences between markets do not tend to be greater than transport costs.

Price Formation in a Wholesale Market. The degree to which price formation in an individual market is influenced by prices in another market is estimated by obtaining correlation coefficients between weekly wholesale prices in these markets. The degree of correlation is taken

[26] For a detailed exposition of data problems see Appendix 2.

[27] Lele, *op. cit.*

[28] W. W. Cochrane describes farm product markets as "typically atomistic in their behavior with the result that rivalry is impersonal, prices administered by private parties are uncommon and profits tend to be competitive. In this view, the single market does not stand alone as a determiner of either price or quantity. . . . The actions of buyers and sellers in a particular market are always influenced to some degree by the price signals and substitutional possibilities in other related markets" ("Markets as A Unit of Enquiry in Agricultural Economics Research," *Journal of Farm Economics,* XXXIX [Feb. 1957], 34).

as an indicator of the extent to which the two markets are integrated.

The correlation between price movements of a commodity in any two markets will be perfect—i.e., 1.00—under conditions of perfect competition. The degree of correlation will, however, be less than perfect in any real-world situation. For even though an individual trader may be unable to influence prices, the conditions of perfect mobility, perfect knowledge, and perfect homogeneity of product are not satisfied in actual market transactions.

Perfect mobility is not achieved in the real world because of transport costs. As a result of costs of shipment, prices in any terminal market can move within the range of plus or minus transport costs in relation to a primary market without there being any movement of goods between these two markets. The larger the transportation cost, the larger the range within which prices can move in relation to the other market without there being any shipment of goods. This will mean a larger "residual term" and a lower correlation between prices in the two markets. It must be added, however, that high costs of transport may not necessarily be a result of an inefficient transport system. They may be due merely to long distances between markets. This is the kind of imperfection over which traders have very little control. It cannot be corrected by increasing shipments to the terminal markets.

A low correlation may also result from a different kind of immobility, caused by transport bottlenecks. In underdeveloped countries, unavailability of transport facilities over long periods of time is a common phenomenon. Consequent bottlenecks obstruct the free flow of goods between surplus and deficit regions and result in excessively depressed prices in the surplus region, excessively high prices in the deficit region, or both.

A factor closely related to transport bottlenecks is the uncertainty about how long a favorable price difference between markets can be expected to persist. Risks in es-

tablishing business connections on a sporadic basis tend to be greater than normal, as there is always fear of a loss of margin if the movement of goods between markets is delayed by transport bottlenecks. It is this risk, apart from the actual shortage of transport, which discourages the free movement of goods between markets. Immobility may cause price differences that are greater than transport costs. These differences can be reduced by improving the flow of goods between markets.

A low correlation between price movements in different markets may also result from the lack of scientific grading of the produce. Price differences due to differences in varieties often tend to be rather large in low-income countries where grain is generally marketed without grading. Data collected by the governmental agencies do not relate to comparable varieties of grain and sometimes do not even specify the variety. This leads to apparent regional differences which originate in a lack of homogeneity in the commodity. There is often a tendency in underdeveloped countries to attribute all price differences to speculative elements in trade. For the present analysis, a special effort was made to acquire prices of uniform varieties for the markets studied. Despite this effort, the price data have some obvious limitations due to the lack of scientific grading. It can, however, be said that the condition of homogeneity of product is, generally, satisfied.[29]

Excessive price differences may also occur as a result of deficient and poorly disseminated knowledge regarding market conditions. This means that the trader is not aware of the opportunities for making profits by exploiting price differences by means of the movement of goods. Incomplete knowledge may thus result in an inadequate flow of goods and hence in price differences that are greater than costs of shipment. This factor is not of much signifi-

[29] See Appendix 2, the section "Problems of Varieties," for a discussion of varietal differences.

cance in the areas studied, because the traders were found to be highly knowledgeable about price movements in various market centers.[30]

In the present study, correlations between prices in different markets are expected to be less than perfect because of three factors: basic transport costs, temporary transport bottlenecks, and the resulting uncertainty arising from time taken for transport. If the correlations are less than perfect, it is necessary to determine whether price differences are greater or smaller than transport costs. This can be done by examining price differences after deducting transport costs.

If price differences are greater than transport costs, it is an indication that the flow of shipments was not adequate to wipe out price differences. It is then necessary to determine whether this condition resulted from factors beyond the control of the trader, such as transport bottlenecks, or from speculative and monopolistic actions of traders.

Seasonality of Price Movements

Two issues are examined in the analysis of seasonality. The first is the relatively simple question of whether an off-seasonal rise in the prices of agricultural commodities is excessive in relation to storage costs and, therefore, provides opportunities to traders to earn abnormal profits. The second and more basic question relates to the factors that determine the seasonal pattern of prices.

In tackling the issue of the profitability of storage, the following procedure is used. First, the price rise from the harvest season until the postharvest off-season is considered in relation to the cost of purchasing grain in the harvest season and storing it until the off-season. Profits that could be earned by such a storage policy are estimated by comparing the actual off-seasonal price with the cost of storage.

[30] The sources and nature of market information available to traders are discussed in Chapter 2.

However, this approach assumes a rigid storage policy—namely, that all of the purchases are made in the harvest season and that all of the sales are made in the off-season—which is far from realistic.

In actual practice the peak period of purchases lasts for several weeks, often for two or three months. In addition, purchases are made on a minor scale all year round. Nor are sales restricted to the week of the highest off-seasonal prices. Seasonal lows and highs, though generally concentrated in specific time spans, move from week to week and month to month in different years and are, therefore, difficult to predict. Not all traders are skillful in judging the periods of the two extremes accurately. Besides, the nature of the trade itself does not permit the restriction of purchases and sales to these two times. In fact there are a constant turnover and a continuous flow of supplies to the consumer all year round. Traders buy and sell at prices other than the low and the high of the season. The hypothetical estimates, therefore, only show the return from a constant purchase and sale policy.

To bear this out, wherever possible, profit estimates obtained from actual profit and loss statements of the traders have been presented and compared with the corresponding hypothetical estimates. Profit rates, volume of operations, and purchase and sale records of various traders have also been analyzed with a view to examining year-to-year and trader-to-trader uniformity, if any, in storage operations.

As in the case of regional price differences, in a perfectly competitive market, the price in the off-season will be equal to the harvest price plus the cost of storing grain until the off-season. Under ideal conditions where there is no uncertainty about the future, knowledge of an excessive price rise would result in an increase in stocks and thus keep prices competitive. In such a market, the price pattern will be determined by the costs of storage, so that the off-seasonal price will be equal to the harvest price plus storage costs. However, a major difficulty in applying the

methods of regional price analysis to seasonality of prices is that the information available to traders about future prices is nowhere as perfect as that about regional price differences. Distance in time itself creates difficulties in anticipating accurately various forces which would affect demand and supply in the off-season.

It is, therefore, hypothesized that an off-seasonal price rise that exceeds or falls short of storage costs is a function of a misestimation of supplies. This error in the estimation of the supplies is considered to be a result of one or a combination of the following factors: (1) the inadequate direct intelligence available to traders about the actual size of the crop at the time of the harvest when a major portion of the crop is marketed; (2) the inadequacy of the market arrival magnitude as an index of the crop size, due to (a) the destabilizing behavior of cultivators and (b) intermarket flows; and (3) inadequate knowledge about the storage operations of other traders.

As an indirect support for the hypothesis of misestimation, crop size in one year is related to the post harvest price rise in the following year to determine any significant relationship between the size of the crop and the off-seasonal price rise. During the period of this study the seasonal price pattern was not left completely to the free play of market forces but was considerably influenced by various official policies such as movement restrictions, regulation of the import and distribution of food, price fixation, and so forth. Wherever such factors seem important, they have been taken into account in analyzing seasonal variations in prices.

Milling Margins

The analysis of milling efficiency consists of two elements. First, it hypothesizes that in a perfect market, price movements of paddy and rice would show a perfect correlation. We have discussed in the section on market integration factors which would reduce correlation in the real-world

situation. The analysis of milling efficiency is analogous to that of market integration. It is assumed that correlations may be less than perfect, owing to milling costs. Because of milling costs, the prices of rice in any primary market may move within the range of plus or minus milling costs in relation to the prices of its paddy equivalent, without there being any conversion from paddy to rice. The greater the milling costs, the larger the range within which the prices of rice can move in relation to their paddy equivalents without there being any conversion of paddy. This will mean a larger "residual term" and a lower correlation between rice and paddy prices. High milling costs may be a result of a variety of factors. They may result from a technologically inefficient milling system. They may also be caused by underutilization of a milling capacity that may be technologically efficient or inefficient. In other words, high milling costs may be due to an economically inefficient milling sector. In addition to the technological and economic causes, high milling costs may also result from such factors as government controls, which may influence margins in at least two ways. They may legitimize payments such as bribes, and they may lead to untimely milling and diversification of stocks, thus causing higher storage losses and hence higher margins. It is expected that the correlation between paddy and rice prices in the primary markets will be less than perfect, because of a combination of these various factors. The case of milling efficiency is thus somewhat different from that of transportation, in the sense that while the trading sector has no direct control over improving either the economic or technological efficiency of the transport system, it must play a major role in the efficient working of the milling sector. The analysis of milling efficiency proposes to deal with the policy implications of this aspect.

The second feature of the analysis is the examination of the actual size of the margin between paddy and rice prices. In a perfectly competitive market, margins between

rice and paddy prices will be determined by milling costs and the outturn of rice and by-products from paddy. An analysis of milling margins may provide special problems in a real-world situation, because of the existence of a range of technologically different processing systems with different capital and labor requirements and different quantitative and qualitative outturns of rice and by-products. These elements are discussed in the analysis. It inquires whether the margins between rice prices and their paddy equivalents are in fact competitive or whether they are higher than they would be in a competitive system. The analysis attempts to provide some possible explanations for the phenomena that may exist.

CHAPTER 2

Geographical Setting and Market Structure

Location of Markets and Patterns of Intermarket Flows

Wheat Markets in Punjab

The districts in which the wheat markets selected for this study are located—Ferozepur, Sangrur, Bhatinda, and Ludhiana—are major wheat-producing areas. The first three are the largest wheat-producing districts, in that order. In yields, the districts surpass the average per acre yield of wheat for the state. Together they occupy a little over a third of the wheat acreage in the state and produce approximately 40 percent of the total wheat production.

Jagraon and Khanna markets are located in Ludhiana district, Moga in Ferozepur, Kot Kapura in Bhatinda, and Barnala in Sangrur (Figures 6 and 7). All five markets are major assembling centers for wheat; Moga is known as the biggest wheat market in Punjab. All of the markets are regulated under the Punjab Agricultural Produce Act and are among the oldest regulated markets in India.[1]

[1] Each market regulated under the Agricultural Produce Act has a market committee on which growers, traders, and local bodies are represented. The committees, in their bylaws, define market practices and fix market charges payable by various parties. Among the important functions of the committees are settlement of disputes, licensing of market functionaries, and correct weighing of the produce. An attempt is being made to centralize wholesale transactions in market yards by popularizing these markets, in order to exercise supervision over transactions. Regulation has generally curbed malpractices of traders, brought

Delhi					
180	Khanna				
215	50	Barnala			
215	50	40	Jagraon		
247	68	42	19	Moga	
275	96	45	48	28	Kot Kapura

Figure 6. Approximate distances between wheat markets, Punjab (in miles)

Flows of Wheat. During the period of free trade the Punjab markets sent wheat to Delhi, Bombay, Gujarat, Madhya Pradesh, eastern Uttar Pradesh, Jammu and Kashmir, and Himachal Pralesh. The importance of shipments to particular centers varied from market to market. Barnala sent wheat mainly to the surrounding regions, such as eastern Uttar Pradesh, Jammu and Kashmir, Himachal Pradesh, and Delhi. It sent very little to Bombay and Gujarat. Kot Kapura, Jagraon, and Moga sent wheat mostly to Bombay and Delhi. Kot Kapura also sent substantial quantities to Bhopal (Madhya Pradesh). Khanna sent most of its wheat to Bombay and Ahmadabad (Gujarat), and some to Bangalore (Mysore State). Delhi was not a significant market for Khanna. The hinterland of Khanna produces mostly a fine variety of wheat, known as the "golden variety," which attracted a large number of purchasers from distant markets.[2]

about open auctioning of produce, and resulted in fair returns to cultivators.

[2] The data on percentages of arrivals of certain grades in 1963 and 1964 in the Khanna market for approximately three weeks indicate that the top-quality wheat does predominate in Khanna. Two-thirds of the arrivals graded were of first grade during the period April 15–30 in 1963 and 1964, about a fourth of second grade, and none of fourth grade. See Cummings, *op. cit.*, p. 69.

Wheat was usually sent to an important market within a region, for example, to Bombay City, in Maharashtra, or to Ahmadabad, in Gujarat. Most of it was consumed locally in the terminal markets, but substantial quantities would find their way to the smaller centers in the hinterlands. This is apparent from the popularity of the Sharbati wheat and Basmati rice of Punjab in the countryside of Maharashtra and Gujarat.

Transport Facilities. All five primary markets of wheat are located on main lines of the Northern Railway and are relatively close to important junctions (Figure 7). Barnala is on the Dhuri-Bhatinda line, Kot Kapura on the Bhatinda-Ferozepur line, Moga and Jagraon on the Ferozepur-Ludhiana line, and Khanna on the Ludhiana-Delhi line; all are major railway junctions. As all the markets are on broad-gauge lines, there is no problem of transshipment of goods when shipments are sent to major terminal markets like Delhi and Bombay. Despite these good railway connections, occasional bottlenecks result from the unavailability of freight cars.

All the Punjab markets are equally well connected by roads (Figure 7). Roads run parallel to the railway lines of all the primary markets, except Barnala, providing an excellent alternative mode of transport. The Grand Trunk Road, a major national highway, runs between Delhi and Ludhiana. Khanna lies on this road. Moga, Jagraon, and Kot Kapura are well linked with the Grand Trunk Road by good feeder roads and can, therefore, utilize the highway for the export of goods to terminal markets in Himachal Pradesh and eastern Uttar Pradesh and to Delhi. Barnala is the only market that is relatively at a disadvantage in road transport because of the lack of a good feeder road.

A good deal of traffic moves by road in Punjab. The utilization of roads is much more intensive in this state than in many other states. Roads are preferred for short hauls.

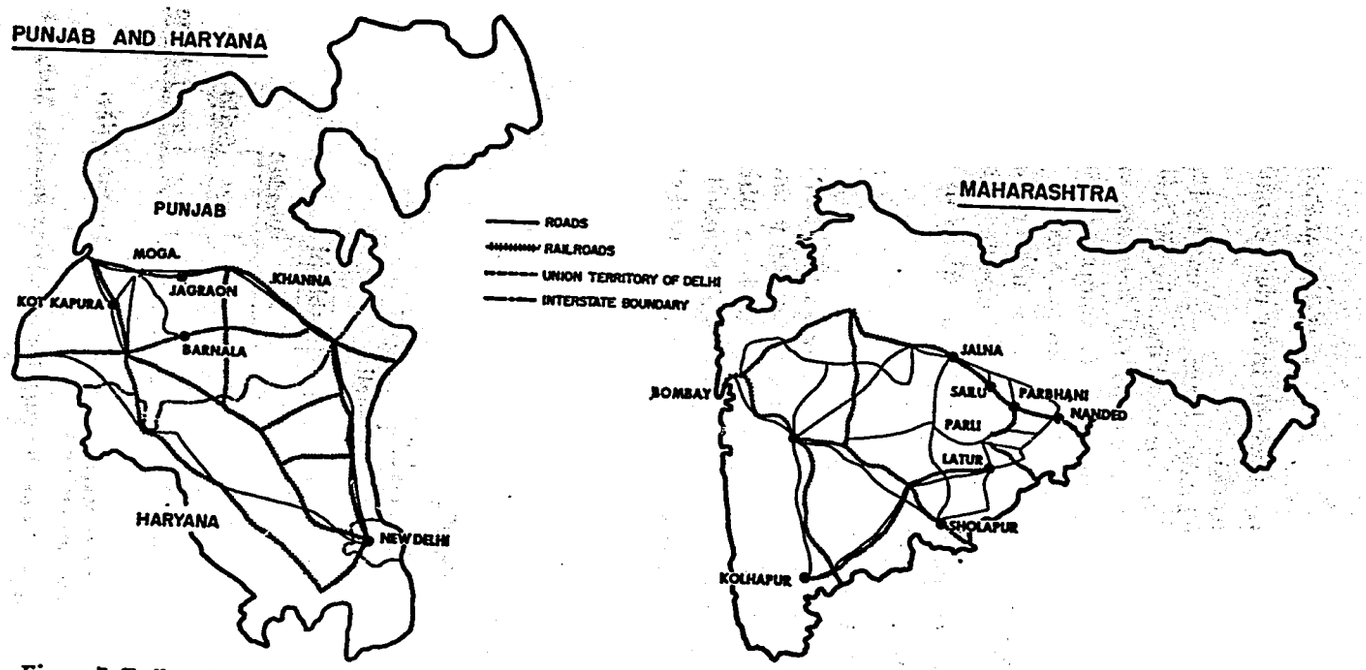

Figure 7. Rail and road connections between markets, Punjab and Maharashtra
Sources: Adapted from National Council of Applied Economic Research, *Techno-Economic Survey of Punjab* (New Delhi, 1962), and *Techno-Economic Survey of Maharashtra* (New Delhi, 1963).

Most of the shipments of wheat from the primary markets to Delhi are made by trucks.

For long-distance haulage, there is a marked preference for railways, for various reasons. First, the difference in the cost of shipment by road and by rail becomes much more substantial for a long-distance as compared to a short-distance haul (i.e., less than 300 miles). Second, because of various legal restrictions on interstate movement by road, the task of shipping by road is formidable when a number of state boundaries have to be crossed, as in the case of a shipment from Punjab to Bombay.

Jowar Markets in Maharashtra

The six primary markets selected from Maharashtra lie in a major jowar region of the state. Sailu and Parbhani are in Parbhani district, Parli-Vaijanath in Bhir, Latur in Osmanabad, Jalna in Aurangabad, and Nanded in Nanded district (See Figures 7 and 8). All six markets are regu-

Bombay								
120	Poona							
370	150	Kolhapur						
280	160	200	Latur					
615	665	200*	63	Parli				
551	601	– *	170	64	Parbhani			
610	659	300	95	122	58	Nanded		
508	558	– *	314	107	43	101	Sailu	
437	486	300	242	179	115	173	72	Jalna

*No direct railway connections. Distances are in road miles.
– Circuitous road connections.

Figure 8. Approximate distances between jowar markets, Maharashtra (in miles)

lated under the Hyderabad Agricultural Market Act No. 2, of 1930. They are also among the earliest regulated markets in India.[8] The five districts are situated in central Maharashtra, traditionally known as the Marathwada region. The jowar acreage of the region is a little less than a third of the state acreage under jowar, and the region produces a little over a third of the state's total jowar production.

The Marathwada region lies to the east of the so-called scarcity tract, traditionally known as western Maharashtra. Rainfall increases as we move from western Maharashtra to Marathwada and becomes more dependable. This region annually receives between 30 and 45 inches of precipitation. Throughout the tract there has been very little development of irrigation. The proportion of irrigated area was only 3 percent in Marathwada in 1956–1957. Less than 5 percent of the jowar acreage is irrigated in this region.

Flows of Jowar. During the period of free trade, jowar was shipped from the primary markets to a number of consuming centers in Maharashtra. All six markets sent jowar to such cities as Poona, Bombay, Kolhapur, and Sangli, in Maharashtra, and to various centers in Andhra Pradesh. Latur and Nanded sent large quantities to assembling centers in Sholapur district. Jalna sent substantial amounts to Gujarat. Jowar was also occasionally sent to Punjab, Uttar Pradesh, and Mysore from these markets.

Transport Facilities. The state of Maharashtra, compared to the rest of India, is in general poorly served by transport. The length of railway lines and roads relative to the area, population, and industrial output of the state is lower than the all-India average. The state is further plagued with a multiplicity of gauges. This necessitates transshipment at the break of gauge points, causing serious han-

[8] Parli was regulated in 1940, Parbhani in 1942, and Latur as early as 1931. These markets lie in a region which formed part of the erstwhile Hyderabad State, which was well known for its regulation of grain markets.

dling problems and delays in shipments. The effectiveness of transport facilities depends not only on the availability of railway lines and roads but on the number of vehicles. Even here Maharashtra lags behind the rest of India. The state has 15.7 vehicles per 100 square miles, as against 32 vehicles in India as a whole. Maharashtra has 47.3 vehicles per 100,000 inhabitants, compared to the all-India average of 100 vehicles.[4]

The four jowar markets selected for this study are connected to major terminal markets in central and southern India. Nanded, Sailu, Parbhani, and Jalna lie on the Manmad-Sikandarabad line of the Central Railway. Grain is sent via Manmad to Bombay, via Dound to Poona, and via Kurduwadi to Kolhapur in western Maharashtra. At each of these junctions grain is transshipped onto a broad-gauge line. The line running to Sikandarabad connects these markets to Hyderabad in Andhra Pradesh and, farther south, to Madras. Until recently there was no rail line connecting these markets directly with Madhya Pradesh and Vidharbha. It was only in 1964 that a new line was constructed between Hingoli and Khandwa.

Recently, surfaced roads were constructed connecting the four markets with each other and joining them to the main roads going toward Poona and Bombay in the west and to

[4] Maharashtra has 2.25 miles of railways per 100 square miles, as compared with 2.98 miles in India as a whole. With 9 percent of the population of the country and a 22.23 percent share in industrial output, the state has 7.6 percent of India's railway mileage. In 1958 the state had 0.17 miles of road per square mile of area, as compared with 0.26 miles for all India (National Council of Applied Economic Research, *The Techno-Economic Survey of Maharashtra,* 1963, pp. 130–145). Partly because of the low density of population in relation to geographical area, and the high concentration of the industrial output of the state in the two cities of Bombay and Poona the railway mileage appears relatively low. However, the fact remains that transport facilities are poorly developed, except in the Poona division and the northern half of the Bombay division, the heart of the industrial activity of the state.

Hyderabad in the south. During the period of this study (i.e., 1955–1956 to 1963–1964) Parbhani was not connected with any of the six primary markets by a direct all-weather road. All the roads were of poor quality and without any overbridges, and they usually were closed in monsoons. Even the distance of 50 miles between Sailu and Parbhani was not traversed by a direct road. There was a road via Jintur which increased the distance to 120 miles. The case of Jalna was similar. All-weather roads have been constructed between Parbhani and Nanded since 1964. Figure 7 shows the circuitous nature of the rail and road connections between these markets and the rest of the state. Jalna was the only market where truck traffic played an important role during the period of this study.

Parli, the major market in Bhir, is a junction of a meter-gauge and a broad-gauge line. The meter-gauge line runs up to Parbhani. The broad gauge-line runs down via the Latur road to Hyderabad. The meter-gauge line connecting Parli with Parbhani makes Parli accessible to all the centers to which Parbhani is connected by rail and road (Figure 7). While Parli is connected to Latur and Nanded by a motorable road, it is not connected to any other center by a good road. The small roads from Parli are closed in monsoons. The meter-gauge railway, therefore, is the main means of communication with the rest of Maharashtra.

The sixth market, Latur, is the major market center of Osmanabad district. It has been a major assembly center of jowar, cotton, groundnut, gur, and pulses. It is the last station on the Latur-Kurduwadi-Miraj narrow-gauge railway line (Figure 7). It is thus connected to Sholapur district and the rest of western Maharashtra. A considerable amount of kharif jowar is exported from Latur to the assembly centers in Sholapur to take advantage of the high prices in those markets. A broad-gauge line going to Hyderabad is 20 miles from Latur. Produce to be shipped to Andhra Pradesh has to be transferred by truck to this broad-gauge line.

Rice Markets in West Bengal

The five markets selected from West Bengal lie in Burdwan and Birbhum districts, which together produce a fifth of the state's rice production, and in which over 80 percent of the cropped area is under paddy. Burdwan and Guskara markets are situated in Burdwan district, while Bolpur, Ahmadpur, and Sainthia are in Birbhum district. Calcutta is their major terminal market. Some rice is also shipped to the coal fields of Bengal and Bihar in the northeast.

Transport Facilities. All five markets in West Bengal are on a loop line of the Eastern Railway and are well connected with Calcutta by rail (Figures 9 and 10). Burdwan lies on the Grand Trunk Road and, therefore, has also been well connected with Calcutta by road for a considerable period of time. All the remaining markets except Bolpur, though not on major highways, have been connected with major centers in the area by all-weather roads. Because of the unbridged river Ajoy on its western side, Bolpur was at a disadvantage in road connections and remained more or less isolated until 1961. Since the opening of a bridge in 1961 it has been linked with the western side of the river. From Burdwan, shipments are made both by rail and road. Ahmadpur, Guskara, and Sainthia sent rice to the coal fields of Bengal and Bihar by rail and road and to Calcutta by rail. Until 1961, however, Bolpur sent its shipments almost exclusively by rail to Calcutta.

Rice Markets in Tamil Nadu

Thanjavur, South Arcot, Chingleput, North Arcot, and parts of Tiruchirapalli constitute the rice tract of Tamil Nadu. Together they occupy approximately two-thirds of the state acreage and produce approximately two-thirds of the production. Thanjavur has the highest proportion of land under rice (89.1 percent).

Almost all of the alluvial soils of the state are con-

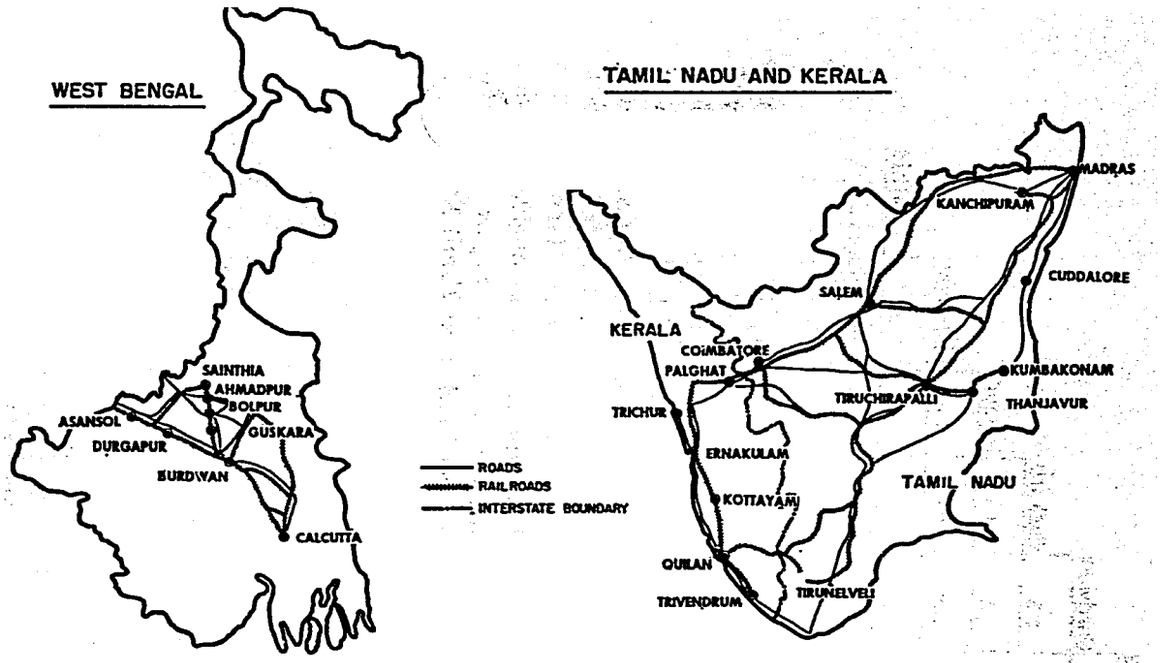

Figure 9. Rail and road connections between markets, West Bengal and Tamil Nadu

Sources: Adapted from National Council of Applied Economic Research, *Techno-Economic Survey of Madras* (Madras: Department of Industries, Labour, and Cooperation, 1960), and National Council of Applied Economic Research, *Techno-Economic Survey of West Bengal* (New Delhi, 1962).

Calcutta					
67	Burdwan				
90	23	Guskara			
100	38	10	Bolpur		
111	44	21	11	Ahmadpur	
119	52	29	19	8	Sainthia

Figure 10. Approximate distances between rice markets, West Bengal (in miles)

centrated in the delta of the Cauvery in Thanjavur and in a belt along its bank in Tiruchirapalli. Deltaic alluvial is the most fertile soil of the state. All the primary markets selected from Tamil Nadu, with the exception of Tirunelveli, are located in this rice tract. Kanchipuram is in Chingleput district, Kumbakonam in Thanjavur, Cuddalore in South Arcot, Tiruchirapalli and Mannachanallur in Tiruchirapalli, and Tirunelveli in Tirunelveli district, which lies at the southern tip of India (Figure 9). Figure 11 shows the distance between markets in Tamil Nadu.

Madras									
50	Kanchipuram								
119	92	Cuddalore							
181	160	65	Kumbakonam						
250	192	95	35	Mannergudi					
160	200	65	40	26	Tiruvarur				
204	168	83	25	24	35	Thanjavur			
198	160	100	60	55	65	30	Tiruchirapalli		
372	350	275	220	215	233	198	175	Tirunelveli	
300	280	215	200	190	200	165	136	230	Coimbatore

Figure 11. Approximate distances between rice markets, Tamil Nadu (in miles)

Flows of Rice and Paddy. Unlike the three other states which serve one or two major terminal markets, flows of rice are much more dispersed in Tamil Nadu. Markets from Chingleput district send a major part of their arrivals to Madras. During the period of free trade, however, Madras received a major portion of its supplies from the adjoining districts of West Godavari, Krishna, and Nellore, in Andhra Pradesh. In fact, Nellore rice is the most popular variety in Madras. Cuddalore, a market located in South Arcot, does not export much rice. It supplies rice mainly to the local population.

All markets selected from Thanjavur district supply rice to Coimbatore district, a major industrial center of Tamil Nadu, and to markets in Kerala, Trivendrum, Palghat, Calicut, Trichur, Ernakulam, and Kottayam are the main centers that receive rice from Tamil Nadu.

Direct shipments of paddy and rice are made by rail and road from Thanjavur to Coimbatore and Kerala. Tiruchirapalli is a major assembly market. It acquires paddy locally and from Thanjavur and ships it to Coimbatore and Kerala in the form both of paddy and rice.[5] Mannachanallur is only seven miles from Tiruchirapalli. It also assembles surplus paddy locally and from Thanjavur and sends it to Coimbatore and Kerala.

Tirunelveli is not a major rice-producing district. It adjoins the state of Kerala and the district of Kanyakumari.

[5] This pattern of trade, namely importing from Andhra Pradesh and exporting to Kerala, evolved long before the Madras State (now known as Tamil Nadu) was formed in 1956. Before the reorganization of the states, a rice tract in Andhra Pradesh comprising districts of East Godavari, West Godavari, Krishna, Nellore, and Guntur was in Madras Province. Malabar, a rice-consuming region of Kerala, was also in the province. Northern districts of the present Tamil Nadu State received fine rice from the rice tract of the present state of Andhra Pradesh, and eastern districts of Tamil Nadu exported coarse rice to Kerala. The deficit of the province was met mostly through imports from Burma and other eastern countries, but hardly ever through imports from other provinces within the country.

It sends rice to Nagercoil, in Kanyakumari, and to Trivendrum and Kottayam, in Kerala. Rice coming to Nagercoil from Tirunelveli is also shipped to Kerala in large quantities.

Thus, except for Madras and its satellite primary markets in Chingleput district, price relations between various primary and secondary markets are more indirect in Tamil Nadu as compared to other states. Price movements in Thanjavur and Tirunelveli may coincide because both are influenced and affected by the same sort of demand conditions, not because there is any direct trade between the two centers.

Transport Facilities. The primary markets in Tamil Nadu are in the eastern and southern parts of the state, which is predominantly served by meter-gauge railway (Figure 9). Tiruchirapalli is the only market besides Madras City which is served both by broad-gauge and meter-gauge railways and is a major railway junction located on a main line. This location, however, creates a lesser problem for the transshipment of goods in Tamil Nadu than in other states, because the two gauges are not intermixed as they are in other states. Transshipments, therefore, do not have to be repeated.

In the period of free trade, paddy and rice going from Thanjavur district to Coimbatore and Kerala move mostly by railway via Tiruchirapalli. They are transferred from meter-gauge railways to broad-gauge lines. From Tiruchirpalli the produce moves both by rail and road. Trucks coming from Kerala and Coimbatore carry rice and paddy on their way back. Often paddy is moved up to Coimbatore by truck and then sent to Kerala by railway. Rice can be hauled from Tiruchirpalli to Kerala in two days by truck. It takes almost a week or ten days to ship it by rail. Rail shipments are particularly difficult at the time of the Kuruwai harvest (in September and October). Freight cars are difficult to acquire in the rainy season.

Paddy is frequently hauled to Kerala in a relatively wet condition and often develops a musty odor.

Tamil Nadu is better served by roads than most other states. The quality of feeder roads in Tamil Nadu is also much superior to that in most other states. Road transport, therefore, plays a good compensatory role in agricultural export from Tiruchirpalli and Thanjavur. Problems occur mainly because of the interstate nature of the rice trade. Most of the trucks that ply between Kerala and Tiruchirpalli are from Kerala. Few trucks from Tiruchirpalli operate between the two states. When freight cars are not available, traders are, for the most part, at the mercy of incoming vehicles for shipments by road.

Market Structure

In India a predominantly large proportion of the food produced never leaves the farm but is retained for domestic consumption, for seed, for feed, and for payments to agricultural laborers, still usually made in kind. The proportion of the marketed surplus in the total food production is difficult to estimate accurately, as the quantity retained for use on each farm depends on a variety of factors, such as the size of the farm and the family, the proportion of food grains in the total farm production, and the amount of hired labor.[6] Nor is the absolute quantity retained for home use constant from one year to another. Even if one takes into account population changes which affect rural food requirements, year-to-year changes in the crop size affect marketed surplus in a complex manner. It is often noted that a poor crop with a consequent high price may bring only a small absolute amount to the market if the cultivator tends to keep his cash income stable, whereas a

[6] See Dharm Narain, *Distribution of the Marketed Surplus of Agricultural Produce by Size-Level of Holding in India, 1950–51,* Institute of Economic Growth (Delhi) Occasional Paper (Bombay: Asia Publishing House, 1951).

large crop and a resulting low market price may lead to the marketing of a larger absolute quantity. The response of the cultivators, however, seems to vary according to the size of their holdings. There has recently been sufficient evidence to suggest that large farmers market little when prices are low and hold stocks in anticipation of future higher prices.[7] The size of the marketed surplus thus depends upon the relative share of small and large cultivators in the marketing, and may thus vary considerably from one year to another.[8] The various empirical studies of the Directorate of Marketing and Inspection of the Ministry of Food and Agriculture suggest that the total marketed surplus of various food grains may be between a third and a half of the total food production in India.[9] Thus from 1955–1956 to 1964–1965 between 20 and 40 million tons of food grains passed through the market channels each year.

The marketed surplus that leaves the farms moves from small markets to large urban centers through a multiplicity of intermediaries, chiefly in an unprocessed form. There is not much standardization of the produce, of the nomenclature, or of the various weights and measures used. Literally thousands of varieties of rice, wheat, and other cereals are sold every day that have their prices quoted in a bewildering number of units of measurement. Despite the similarities in the marketing of grain throughout India, there are differences not only from one region to another but from one grain to another that are both complex and interesting.

A striking feature of the marketing of rice as compared to that of wheat and jowar is the relatively unorganized and local nature of the trade. Despite its importance in consumption over a wide region in India, there are no rice

[7] *Report on the Pace and Pattern of Market Arrivals.*

[8] For a detailed discussion of implications of these various factors see Raj Krishna, "Agricultural Price Policy and Economic Development," in Southworth and Johnston, *op. cit.*, pp. 509–512.

[9] See the marketing series of the Directorate.

markets that are comparable to wheat markets like Moga and Hapur in size and in influence on other, distant markets. When there is free trade, the Keralites consume coarse rice imported from eastern and southern Tamil Nadu, and the Tamilians in the northern part of Tamil Nadu import rice from Andhra Pradesh, across the border. Most of West Bengal's production is consumed locally, and some is imported from neighboring Orissa.[10] Traditional trade linkages have, therefore, been limited to neighboring areas: e.g., between Kerala, Tamil Nadu, and Andhra Pradesh; between West Bengal, Orissa, and Assam; and between Andhra Pradesh, Maharashtra, and Madhya Pradesh. It is only when rice prices are at a record high that there is a large-scale movement of rice across several states (e.g., in 1957, from Andhra Pradesh to Calcutta). Most of the trade names of rice are only of local significance. There are only a few fine varieties, such as Basmati grown in Uttar Pradesh and Punjab, Kamod grown in Madhya Pradesh and Maharashtra, Nellore of Andhra Pradesh, and Patna of West Bengal, that enter the channels of interstate trade. However, the demand for most of these high-priced varieties is confined to discriminating and comparatively well-to-do consumers. The turnover tends to be relatively small, indicating little linking of markets located at long distances from each other. Of the total rice production, only 10 percent of the crop is of fine variety and about 30 percent of medium variety; some 60 percent of the crop is coarse in quality, low-priced, and commonly consumed by the masses.[11]

These characteristics of the rice trade may have evolved

[10] Some rice is smuggled into West Bengal from East Pakistan. However, there is also considerable movement in the opposite direction. The volume of net imports through such channels, therefore, cannot be estimated. Some fine rice (e.g., Basmati) is also imported from Uttar Pradesh and Punjab. However, most of this is eaten by high-income urban consumers.

[11] *Rice Economy of India*, p. 9.

as a result of strong preferences for local varieties in most of the areas. However, the dispersal of paddy trade is by no means universal. In Andhra Pradesh and Punjab, rice markets constitute important assembling centers, whereas in West Bengal and to a greater extent in Tamil Nadu, a large portion of the paddy surplus is sold directly at the paddy fields. Nor are variations in marketing patterns restricted to the paddy trade.

The marketing patterns of wheat and jowar also show a great deal of regional variation. How complex and varied the marketing patterns of the three cereals are is illustrated in Figures 12–15. In all the cases, the process of concentra-

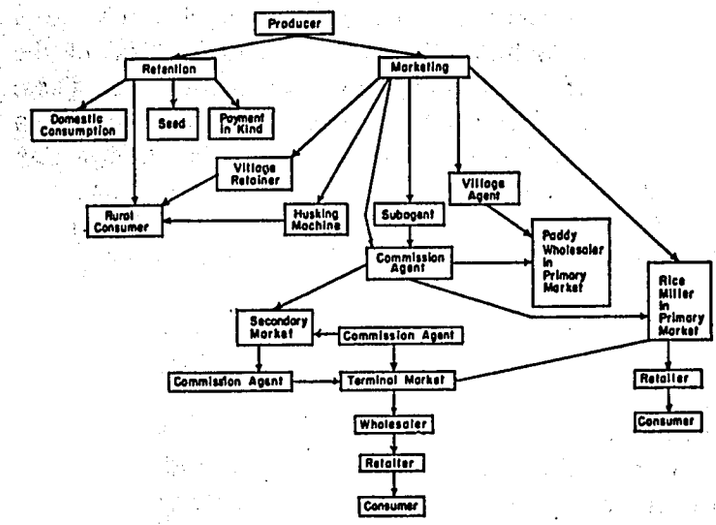

Figure 12. Traditional channels of rice marketing, Tamil Nadu

tion begins with the collection of surpluses from millions of small cultivators. The producer either sells his produce at the village site to one of the several types of intermediaries or brings it directly to a wholesale market. The produce is then moved to secondary and terminal markets in a variety of fashions, depending on the network of inter-

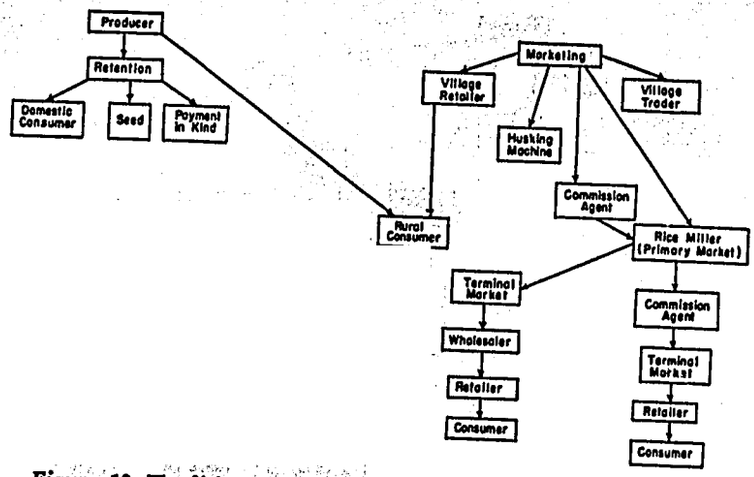

Figure 13. Traditional channels of rice marketing, West Bengal

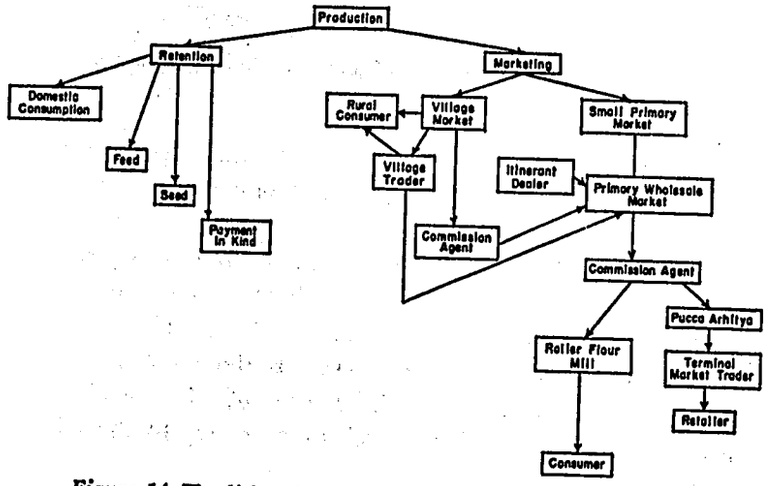

Figure 14. Traditional channels of wheat marketing, Punjab

mediaries available, the extent of processing needed, and the institutional setup in a specific area.

Village Markets

Each village or cluster of small villages has a market, and a large number of these small village markets assemble

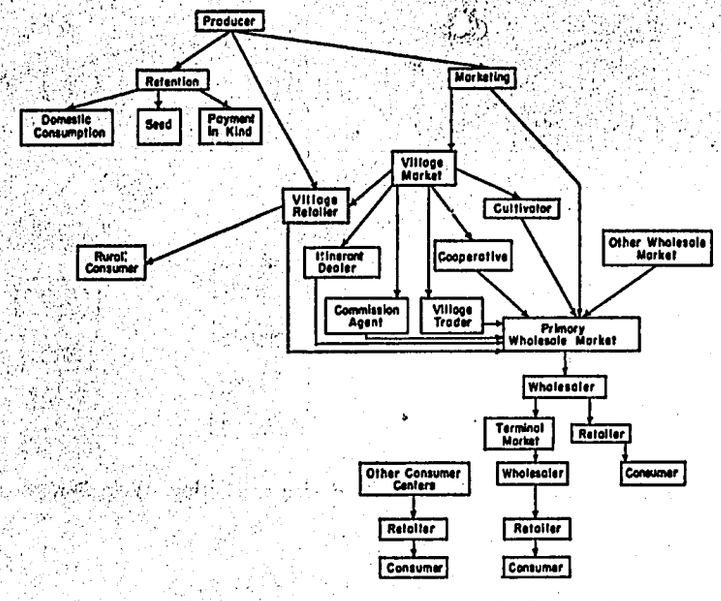

Figure 15. Traditional channels of jowar marketing, Maharashtra

once or twice a week. The days on which these markets meet are fixed, so that itinerant traders can visit the area. Most of the transactions in these markets involve small quantities; producers sell their surpluses and purchase supplies for their daily requirements. Part of the produce is purchased by small retailers who, in turn, sell it to the nonfarm rural population or, later in the season, back to the cultivators themselves. The rest of the produce is purchased by intermediaries and finds its way to the wholesale market.

Village markets are very poorly equipped; most of them are uncovered and without storage, stallage, or drainage facilities. In addition, the roads linking most of these markets to towns and wholesale markets are so poor that often only a bullock cart can travel on them, and even then only with considerable difficulty. Some markets lack roads completely. Hardly any of these markets have telephones or

telegraphic or even postal facilities. Producers from within a radius of five or ten miles gather in these markets to sell their small surpluses. Farmers who have relatively large surpluses go to larger wholesale markets, but farmers with small surpluses do not find that the price difference makes going to the wholesale market worthwhile.

Primary Wholesale Markets

Wholesale markets are held in a fixed place and daily transact a large volume of business emanating from the village markets. Some wholesale markets also serve as assembly points for distant producing centers. Most of these wholesale markets are situated in district or taluka headquarters or important business centers. These markets are much better equipped than are the village markets. They are generally connected to distant consuming and terminal markets by roads and have such other facilities as post and telegraph offices and, in some cases, telephones. Many of the markets are situated on railway lines.

Terminal Markets

Terminal markets are generally situated in large urban centers where part of the produce is sold for local consumption and the rest is forwarded to other consuming centers. In terminal markets transactions take place mainly among traders, instead of between cultivators and traders.

Share of Village Markets

The importance of village markets in the assembly of produce varies significantly from region to region. Because of the easy accessibility of primary markets in Punjab, very little marketed surplus goes to the village markets. It is estimated that in the districts of Ferozepur, Ludhiana, Jullundur, and Bhatinda over 80 percent of the wheat surplus is sold by cultivators directly in wholesale markets. In certain areas like Kot Kapura, as much as 95 percent of the wheat surplus is marketed in a wholesale market directly

by the grower, as against the 56 percent average for all India.[12] Similarly, as much as three-quarters of the total paddy arrivals in wholesale markets in Punjab are estimated to be brought by cultivators. In Andhra Pradesh the estimate is as high as 82.5 percent. In contrast, in Madras, Orissa, and Uttar Pradesh most of the paddy surplus is disposed of by cultivators in small village markets, and then moved to larger markets by various middlemen. The estimates indicate that only 10 percent of the paddy arrivals in wholesale markets in Tamil Nadu, 20 percent in Orissa, and 30 percent in Uttar Pradesh are brought by cultivators. The rest come through middlemen. Maharashtra is somewhere between the two extremes. Approximately half the paddy arrivals in wholesale markets are believed to be brought by cultivators.[13] The percentage of the marketed surplus of jowar sold in the wholesale markets appears to be somewhat higher in Maharashtra.[14]

The importance of village markets varies as much with the type of grain as it does with the area. A cereal such as paddy which calls for considerable processing is more apt to be marketed directly in villages if processing agencies exist in the immediate vicinity. In West Bengal, for example, until recently a large proportion of the paddy was hand-pounded[15] and was therefore sold in local village markets. In Tamil Nadu, however, despite the fact that hand-pounding has been almost nonexistent, village sales are predominant, and contrary to general expectations, are believed to have increased in the recent past.

The relatively high levels of primary market sales in

[12] *Report on the Marketing of Wheat*, pp. 95–96.

[13] *Rice Economy of India*, p. 19.

[14] This is based on my own observations. See Lele, *op. cit.*, p. 245.

[15] According to the estimates of the Rice Milling Committee, as much as 84 percent of the total paddy production of the state was hand-pounded before World War II, and the percentage had declined to 70 percent in 1953–1954. My conversations with millers suggest that it is approximately 30 to 40 percent presently.

Punjab, Andhra Pradesh, and Maharashtra are usually believed to be due to the spread of market regulation in these states. In 1958, 33 paddy markets were regulated in Andhra Pradesh, 62 in Punjab, and 114 in Bombay, whereas in predominantly rice-producing states such as West Bengal and Tamil Nadu, no paddy markets were regulated. Market regulation acts have banned village sales in several of these states. However, the decline in village sales is due not so much to the nominal abolition of village sales by law, as to the more favorable marketing conditions created in the regulated market yards through the standardization of weights and measures, the fixing of market fees, open auctions, and other market reforms. In all the markets, officials indicated the difficulties of enforcing the market act to prevent village sales.

By 1966, seventy-nine markets were regulated in Tamil Nadu, most of these for paddy. Nevertheless, paddy arrivals in these markets have been negligible. Of fifteen regulated markets in South Arcot district, the proportion of paddy arrivals, in relation to marketable surplus, was 0 percent in three markets, very low in three other markets, less than 5 percent in four other markets, and over 20 percent in only three markets. Such figures are characteristic of all of the districts in Tamil Nadu.[16] The prevalence of village sales in Tamil Nadu seems to be due to the presence of a relatively highly developed network of intermediaries at the village level, in comparison with many other states.

Intermediaries at the Village Level

A variety of agents operate in the assembly of grain surplus. There are village traders, itinerant dealers, and commission agents, who usually purchase grain in small village markets. Their share in the operation is almost negligible in Punjab and only slightly greater in Maharashtra. In West Bengal, most of the purchases of paddy in villages

[16] From an unpublished document of the Government of Tamil Nadu, Department of Agriculture.

are made by commission agents of the rice millers located in a nearby area, who usually receive a fixed commission for their delivery. The remaining paddy is sold by cultivators directly to village retailers or to millers at the mill sites. In Tamil Nadu, however, many different kinds of village agents, brokers, commission agents, and their subagents purchase paddy for rice millers in villages. There are also village retailers, paddy wholesalers, and professional dehuskers who purchase paddy from cultivators in varying amounts. Of all these numerous intermediaries, village agents constitute the most important assembling agency throughout Tamil Nadu. They purchase paddy in villages and then move it to major assembling centers, where they sell it either to a local rice miller, to a paddy wholesaler, or to an agent of a rice miller in a distant terminal market. Village traders are kept informed of market conditions and prices through their frequent visits to nearby wholesale markets.

In Madras, unlike West Bengal, paddy wholesalers are active in surplus areas, where they purchase paddy on their own or through commission agents and send it to millers in secondary and terminal markets. Some traders deal only in paddy, while others convert paddy into rice by paying fixed milling charges in addition to selling rice locally or in terminal markets.

In Maharashtra, jowar that is not brought to the primary markets by cultivators is sold to one of the several intermediaries given in Figure 15.

Intermediaries in Primary Markets

The major assembly of grain takes place at the primary market level in three of the four states; Tamil Nadu is the exception. Two types of traders operate in wheat and jowar in primary markets, commission agents and wholesalers. In paddy markets rice millers are the major purchasers.

Commission Agents. Commission agents operate as middle-

men between the producer and the buyer.[17] A cultivator usually brings his produce to the shop of the commission agent, who grades all the produce that comes to his shop in various lots, according to such criteria as the size of the grain, moisture content, and foreign matter. In regulated markets, sales are held in open auction. Buyers move from shop to shop to participate in bidding. In the markets which are not regulated, sales usually take place by means of private bargaining between interested parties. The method of bargaining varies considerably. Traders sometimes use sign language and undercover methods to arrive at a price.

The commission agent receives a commission for his services. The manner of payment varies substantially from one region to another and also depends upon the nature of the transaction. In the regulated markets, the individual who pays the marketing charges is determined by the bylaws of the market committees. In the regulated markets of Maharashtra a cultivator whose interests a commission agent supposedly represents in the sale of his produce is required by law to pay a fixed commission to the commission agent, whereas in the primary markets of Punjab a purchaser is required to pay commission. It may be fair to state that in intermarket transactions a commission agent receives a commission from either the purchaser or the seller, depending on whose interests he represents in the transaction. In the paddy markets of Tamil Nadu and West Bengal, agents who purchase paddy in villages for rice millers and wholesalers of large market centers usually receive commissions from the buyers. The commission, though not fixed by law, usually is remarkably uniform within a region. In cases of primary-terminal transactions, a commission agent who purchases grain in a primary market on behalf of a trader in

[17] A commission agent is known as a *Kachha adatya* (*arhitya* or *adatdar*) in the north. He is simply called an *adatya* in Maharashtra.

the terminal market receives a commission from the buyer, whereas a commission agent who sells grain in the terminal market for his principal in the primary market gets paid by his principal. However, each case is not always so clear-cut, and in some cases, a commission agent may receive a commission from the buyer as well as the seller.

A producer receives an advance from his commission agent when the produce is brought to the market, and the balance after the final disposal of the grain. Regulated markets usually have a provision in their bylaws to assure prompt payment to the producer. In some markets of Maharashtra, market committees have made it obligatory for the purchaser or the commission agent to pay the cultivator's expenses for staying in the market town in case of a delay in payment.

In addition to acting as a middleman, a commission agent performs various other functions for the cultivator. He usually holds the produce in his warehouse for the cultivator if the latter does not find the going market price satisfactory. He also lends money to the cultivator for the latter's consumption and investment needs. The interest rate charged on such loans varies considerably from one area to another. Some traders in West Bengal claimed that they engaged in moneylending simply as a form of nonprice competition and did not charge any interest on the loans; they considered this to be a good way of binding cultivators. Since moneylending is often an integral part of marketing, interest is usually recovered through the proceeds of the sale. This practice makes it difficult to determine the interest rate charged on loans. In West Bengal, the amount per year recovered as interest seems to range between 12 and 18 percent of the value of the loan. Moneylending seems to have been on the decline in recent years wherever private trade has been suspended. This is partly because the suspension of private trade has severed the traditional relationship between the *adatya* and the cultivator. The recovery of loans has been more difficult when the

cultivator does not sell his produce through the commission agent. Besides, although traders charged interest, moneylending did take the form of nonprice competition. The abolition of private trade has made this competition meaningless. Despite these factors, commission agents claim that their advances to cultivators have declined because of the increased "intrusion" of governmental and cooperative agencies into the moneylending business. Many traders in Maharashtra claim that even before the procurement scheme came into existence, loans were of much smaller magnitude, usually ranging between Rs50 and Rs100, and were merely used to induce the producer to retain the same commission agent.

In Punjab, the relationship between a cultivator and his commission agent resembles relationships in the medieval banking system. It has been customary for a Punjabi cultivator to deposit the returns from the sale of his produce with the commission agent. This is usually done as a safety measure and as a matter of convenience. The cultivator withdraws money from the *Kachha arhitya* when he needs it.[18] Over a long period of time, commission agents have discovered that a cultivator rarely withdraws all the deposits. The agent, therefore, lends money from these funds to his customers. Advances are made both for consumption and investment purposes. It was learned that a cultivator does not receive any interest on deposits. He pays about 12 to 18 percent interest on short-term loans.[19]

The nonprice competition between commission agents

[18] This widespread custom of depositing money with *arhityas* comes as a surprise, in view of the generally accepted picture of over-all poverty of the agricultural sector. However, the practice indicates the relative prosperity of the Punjabi cultivator, who is not as hard-pressed for money as his counterpart elsewhere and who often has enough surplus income to deposit with a commission agent.

[19] This is somewhat in conflict with Ralph Cummings' observation. In his study of the Khanna market (*op. cit.*), Cummings indicates that such advances are made interest-free. He argues that it is only in cases of high-risk loans that any interest is charged.

thus takes various forms. The *adatyas* inform their customers of the prevailing market prices. They provide living and dining facilities to cultivators visiting their market places. They store produce for the grower if he does not find the going market rate satisfactory. In some cases, they protect savings and lend money to cultivators.

Wholesalers. There is little specialization among the functionaries of the grain trade. Besides acting as intermediaries, commission agents also purchase grain on their own account. The small-scale operators usually sell their stocks to the large wholesalers in the market or to local consumers later in the season. In some areas, the difference between a commission agent and a wholesaler is somewhat more clear-cut than in others. In Punjab, for example, commission agents purchase only small quantities on their own account. Many wholesalers engage in commission agency only on a limited scale. Most of them undertake commission agency only if the produce is brought to them. They do not solicit customers.

In Maharashtra, however, many commission agents are also major wholesalers who purchase grain on their own account or on the account of their principals in the terminal markets. Many big wholesalers, who are responsible for a major share of the intermarket purchases, are also the major commission agents in the market. This mixing of two functions has caused considerable concern among some observers of the grain trade, who contend that the function of a commission agency is in conflict with that of a wholesaler, since the former is supposed to represent the interest of the seller (i.e., the cultivator) and the latter that of the buyer.[20]

[20] The Shirname Committee appointed by the Government of Bombay State in 1955 recommended that joint licenses should not be given to traders. However, most of the regulated markets in Maharashtra still continue to issue joint licenses.

Role of Intermediaries in Intermarket Flows

In addition to receiving arrivals from cultivators, primary markets also receive their arrivals from smaller primary markets in the nearby regions. Kot Kapura, in Punjab, receives arrivals from Jaito, Bariwala, Pharidkot, and Baga Purana; Jagraon from Raikot; Khanna from Khamaro, Nabha, Machiwara, Sirhind, and Samrala. Khanna also receives produce from much larger and more distant markets like Amritsar, Jullundur, and Ludhiana. In Maharashtra, markets in rabi areas such as Sholapur district receive kharif jowar from various important primary markets in the nearby kharif areas. Being major exporters, these markets generally offer slightly higher prices than those prevailing in small markets that cater chiefly to local demand.

In most cases the price difference between a small primary market and a major exporting market may remain between Rs2 and Rs3 per quintal. This is usually slightly higher than the actual cost of shipment between the two markets, which would amount to approximately Rs1.00 to Rs1.50 per quintal, depending on the distance. Price differences which tend to be somewhat greater than transport costs can be explained by the working of intermarket transactions. The big assembly markets such as Moga, Khanna, and Barsi enjoy the privilege of attracting customers from major consuming centers, a situation which has evolved over a long period of time. Purchases are made by these consuming market traders in three different ways:

1. Many traders visit major export *mandis* in the market season because of their reputation as the big assembling markets. Such a visit itself usually causes a bullish tendency in the market.

2. The assembling markets receive orders from importing centers for large-scale purchases. Traders in these importing centers make a careful survey of various price quotations received from different assembling markets. There is usually keen competition among assembly markets for

orders. This keeps prices in various assembly markets on a par. If a price quotation from the next assembly market is slightly lower, an importer usually shifts to that market. However, importers usually do not have contacts with smaller primary markets. The price level in small markets is determined mainly by the prices prevailing in nearby assembly markets. Both cultivators and itinerant traders would take their produce to the big assembly markets if the price in that market were significantly higher than the price in the nearby small primary market.

3. Traders in importing centers advise their agents in assembling markets to purchase grain on their account, to be shipped to them later in the season. This type of purchase requires that there be mutual understanding and faith between the trader and his agent. For instance, when a trader directs his counterpart in the assembly market to purchase wheat on his behalf, he has to rely on the primary market agent to make sure that the quality and grade specifications are met. Owing particularly to the lack of standardization of grades in India, the understanding of the buyer plays an important role. An importer or exporter develops confidence in his agent only through personal knowledge and experience in dealing with him over a period of time. When a terminal market trader purchases wheat from his agent in the primary market he usually pays part of the value down. The balance is usually paid within a month after receiving the shipment. Such credit is extended by the primary market trader only when he is confident of the honesty and the financial integrity of his customer. When purchases are made for future delivery, a buyer in the terminal market has to be assured that he will not be outsmarted by someone who will overbid him later when prices soar. The very nature of intermarket transactions, therefore, requires that there be mutual understanding and trust between the transacting individuals.

In addition to the intermarket flows between small and large primary markets and between primary and terminal

markets, there are direct flows of grain from village markets to secondary and terminal markets. In Tamil Nadu, traders in secondary and terminal markets appear to make their purchases directly from villages through numerous commission agents, village merchants, and brokers, to whom they usually pay a fixed commission per bag of paddy purchased. Concomitant with this elaborate network of agents and subagents is the dispersal of milling among a number of terminal markets located in deficit areas. Terminal markets receive a great deal of paddy that is then converted into rice and sold to local customers. There are a large number of rice mills in Kerala and Coimbatore that purchase paddy from Thanjavur. In addition, there are numerous centers such as Tiruchirapalli that may be termed secondary markets. Traders in these centers purchase paddy from a surplus region such as Thanjavur district, convert it into rice in local mills, and send it to Kerala for sale on their own account. In Birbhum (West Bengal) most of the paddy is assembled locally in primary markets and converted into rice before shipment to terminal markets, whereas in Burdwan a large proportion of the exports are in the form of paddy.

The primary market traders and rice millers thus purchase both on behalf of their principals in terminal markets and on their own account. After a careful survey of prices in various markets, traders and millers send rice to their own agents in terminal markets with specific instructions about when and how much to sell. In the case of rice, stocks are usually held in the form of paddy and processed just before the shipment is sent to the terminal market. Although this is a general pattern when there is free trade, whenever there are shortages and hence an increase in governmental restrictions, there is a tendency for the millers to move their rice stocks to the terminal markets in the early part of the season to avoid seizure.[21]

[21] See *Report on the Pace and Pattern of Market Arrivals*, West Bengal section.

Market Intelligence

Very few organized agencies exist for the dissemination of market intelligence to the trading community in India. The foremost traditional channel of market intelligence is personal contact. Although crop conditions and prices are reported in newspapers and broadcast on the radio, heaviest reliance is placed on information gathered through personal contacts. A trader in a primary market acquires information about crop conditions in his region by talking to cultivators from nearby villages, who frequently visit his shop.

In order to establish trading contacts, traders in primary and terminal markets send their agents to various major markets. This also enables them to acquire firsthand reports on crop outlook and on demand conditions in important centers. This has been an age-old practice in the grain trade. Once such contacts are established, there is a mutual understanding about the free exchange of market intelligence. Traders in primary and terminal markets maintain continuous contact through postcards, telegrams, and telephone calls. Many traders use printed postcards of a standard format with adequate blanks for filling in price and quality specifications. A trader in Khanna stated that he sent hundreds of cards a day to various traders in the peak season of marketing. In addition to a trader's own agents there are brokers in primary and terminal markets who specialize in the collection and dissemination of market intelligence. Reliance on brokers for market intelligence is much more extensive in Tamil Nadu than in the three other states, where brokers are almost nonexistent. Brokers make a careful survey of price and quality differences in various shops. Agents visiting market places usually get in touch with these brokers to place orders. Brokers earn a commission on the volume of sale.

A trader in a primary market is also on the lookout for any orders that his fellow traders may receive from con-

suming areas. If he notices heavy orders from a particular terminal market, he usually gets in touch with his own counterpart in that terminal market in an effort to receive orders.[22] Personal contacts, therefore, appear to be the most important means of acquiring market information, although traders usually mentioned newspapers as the second most important source for obtaining an over-all view of the crop outlook, governmental policies, imports, and general market conditions. It is difficult to evaluate the importance of radio broadcasts in disseminating market information. Traders occasionally mentioned that they listened to radio broadcasts. However, most of them stressed the importance of personal contacts and newspapers, in that order.

Significantly, traders appear to acquire market information about areas where they have had traditional trading links. Traders in West Bengal usually were knowledgeable about conditions in Orissa, Bihar, and to a lesser extent in Uttar Pradesh. They did not, however, have any trading contacts with, or any market information about, any other part of India. Similarly, traders and millers in Madras collected market information about conditions only in Kerala and Andhra Pradesh. Because the wheat market is much more extensive, traders in Punjab collected market information from a number of states, such as Uttar Pradesh, Bihar, Himachal Pradesh, Jammu and Kashmir, Madhya Pradesh, Maharashtra, Gujarat, Mysore, and Andhra Pradesh.

The information that can be collected by an individual trader is limited by the resources available to him and by the good will he has in the business. Despite a wide network of traders' associations, it is noteworthy that no private

[22] An interesting account was given by some Khanna traders about Uttar Pradesh being flooded with Punjab wheat in 1965 when movement restrictions between the two states were removed, until supplies to Jammu, Kashmir, and Himachal Pradesh were affected. Prices in Uttar Pradesh fell, and supplies had to be diverted from Uttar Pradesh to Jammu, Kashmir, and Himachal Pradesh. Many Punjabi traders lost heavily in this mad rush of shipments to Uttar Pradesh.

agency has emerged to collect and disseminate market information on a systematic basis. This is mainly because traders refuse to share their information with others and have no confidence in the information they might receive from such an organization.

Almost all traders seem to be willing to exploit new sources of supplies or new markets for their own stocks. A trader in Sholapur explained that he was the first in the district to import corn from Andhra Pradesh after the jowar trade was monopolized by the state government at the end of 1964. Corn was in demand from villagers who found jowar too expensive to buy. The trader, however, found that within a week after his deal was known to other traders, there was an influx of corn into Sholapur, causing a sharp decline in his margin.

Because of the very personal nature of the contacts between trading individuals, traders occasionally send their own agents to reside in other areas for trading purposes. Although this practice is not very widespread, one encounters Tamilian traders residing in Maharashtra who purchase a variety of pulses for shipment to Tamil Nadu or a handful of Punjabi traders in Tamil Nadu who import pulses from northern India into Tamil Nadu.

The preceding discussion indicates that the traditional market structure provides a complex set of alternative channels at each stage of marketing. The analytical parts of this study examine the extent of the interrelationship between the various stages of marketing and its effect on competitiveness. First, however, it is necessary to examine the number and size distributions of trading agencies and their effect on competitiveness.

CHAPTER 3

Competitiveness of Markets: A Hypothesis

In the present chapter, we specify the conditions under which oligopolistic elements may operate and investigate whether such conditions are likely to be present in the Indian grain trade.

Characteristics of Oligopoly

As is generally known, in oligopoly small numbers of buyers or sellers handle a large share of the total supply and, therefore, enjoy some degree of monopolistic power. The oligopolist consequently is in a position to influence prices through his actions. As prices are likely to be manipulated by the oligopolist for his own benefit and the manipulations may result in harm to various sections of the society, some resentment against oligopolistic elements is natural.

Another feature of oligopoly is awareness on the part of the oligopolist that his profits depend upon the actions of his rivals. This may lead to two types of situations. It may result in open oligopoly, a condition in which firms actively compete with one another. Or it may encourage the operators to cooperate and to pursue a common policy which will increase the profits of all of the participants in the market. In this case oligopoly resembles monopoly to a considerable extent, in that the consumer encounters only one price and has no alternatives, and prices tend to be higher than they would be in the presence of competition. Collusion need not be explicit and formal. If there

are only a few large firms, they realize that the policies of one affect those of the others, and may develop a common policy without express collaboration. Yet collusion is by no means inevitable in oligopoly and is limited by at least two factors. First, the number of the firms involved may impose a limitation on the success of a collusive policy. As the number gets larger, firms may find it impossible to develop a common policy, owing to the difficulties in resolving conflicts of interests or simply of opinions. The second barrier to collusion is the uncertainty that may exist concerning the most profitable policy for the industry to pursue. This is likely to be of considerable importance in cases where the knowledge of market conditions available to various members differs substantially. In such a situation there may be reluctance among the more knowledgeable traders to divulge information which can be of exclusive benefit to them.

The capacity of the oligopolist to influence prices in a manner that is beneficial to him and to maintain such prices for a specific length of time depends upon the extent to which obstacles prevent new firms from entering the market and also upon the extent to which alternative outlets are unavailable to the producer. There can be various types of barriers to entry. Economies of scale may enable only a few firms to exist in the market. Superior entrepreneurs may eliminate rivals through their policies and discourage newcomers from entering the industry. Control by a few of the entire supply of a productive resource or technical skill is another possible barrier to entry. Certain official policies, such as licensing and the granting of an exclusive franchise, constitute an additional type of barrier. A heavy capital requirement is also an important factor limiting entry into an industry. Although the advantages which derive from the control of scarce resources are cumulative up to a point, they nevertheless do not often confer permanent power to secure substantial monopoly profits or abnormally high returns unless they are reinforced by institutional hin-

drances to entry,[1] or by economies of scale. For "if entry on a small scale is feasible, the number of potential rivals is great and price warfare would have to be so widespread and continuous as to be unprofitable."[2] In a traditional society there are such institutional factors as caste structure or family background which may create barriers to entry. In the following pages we examine the prevalence of these oligopolistic elements in the grain market in India.

Number of Traders

Village Markets

Little systematic information is available on the number of traders in village markets in India. Most of these markets are not regulated, and in some cases, despite the various licensing acts that are enforced by regulated wholesale markets in the vicinity, a large number of traders operate in village markets without licenses. The number of village traders is not of much interest in Punjab, where most of the marketable surplus is sold in the primary markets. Even in Maharashtra, traders indicate that there is an increasing trend in the quantities sold in primary markets that is greater than can be explained simply by increases in production. This increase is believed to be due to the increased popularity of regulated markets. It is mainly in West Bengal and Madras that the number of commission agents and wholesale traders purchasing grain in village markets is of interest. However, hardly any information is available on their number. This is not only because there are no records of the subject, but also because of the difficulty of making estimates, since numerous commission agents from nearby primary markets and milling centers (as well as from secondary and terminal markets, in the case of

[1] Bauer, *op. cit.*, p. 96

[2] George J. Stigler, *The Theory of Price* (New York: Macmillan, 1952), p. 228. The existing small firms, therefore, pose as great a threat to the oligopolist through the possibility of expansion as does the entry of new rivals.

Madras) visit these small village markets. The number thus varies considerably from one season to another. Given the nature of assembly in these areas, where a great deal of marketed surplus is collected directly from paddy fields, one would expect there to be a large number of small traders to perform the task. This is supported by the data collected by the Agro-Economic Research Centre on the number of licensed paddy traders in 1959.[3] Granting that quite a few of these traders were concentrated in several milling centers, the number still indicates the overcrowded nature of the grain trade. No such information is available on markets in Tamil Nadu. Since most of the purchases are made directly in the villages by a relatively complex network of intermediaries, the number is likely to be even larger in Tamil Nadu than in West Bengal.

Primary Markets

Since the pattern of marketing varies from area to area and from cereal to cereal and since the data available for various regions lack uniformity, the number of traders cannot be considered in isolation at different levels of marketing. In the final analysis an over-all judgment has to be made by consolidating information available on the number of traders at different levels. Much more systematic information is available on the number of traders operating in the primary markets than in the village markets, and it illustrates more clearly the overcrowded nature of the grain trade.

Table 1 shows the number of wholesalers and commission agents in the primary markets of Maharashtra. In the regulated markets of Maharashtra, traders are generally classified in three categories. "A" type traders can purchase produce in any amount. They usually purchase locally and export to terminal markets. "B" and "C" type traders are small operators. There is usually a limit specified by the

[3] *Report on the Pace and Pattern of Market Arrivals*, p. 143.

Table 1. Number of traders in primary markets, Maharashtra, 1967

Market	"A" type traders		Total "A" type traders	"B" and "C" type traders
	Wholesalers	Wholesalers–commission agents		
Latur	—	281*	281	281
Parli	28	65	93	65
Parbhani	31	40	71	108
Nanded	—	111*	111	193
Sailu	—	71*	71	35
Jalna	72	115	187	176

* No breakdown available into wholesalers and wholesalers–commission agents.

Source: Information collected by a research investigator from market committees, 1967.

market committee on the size of their operations. The limit varies from one market to another. Type "A" traders are either commission agents or wholesalers, or both. As there is not much specialization of function in the grain trade, many market committees, in issuing a license, do not make a distinction between a commission agent and a wholesaler. A breakdown of traders by the type of operation is, therefore, available for only three of the six markets studied. Even for these, the figures cannot be presumed to be very exact. Most of the traders operate both as wholesalers and commission agents, although they are registered either as wholesalers only or as commission agents only.

Table 1 should therefore be viewed as showing only the number of traders who operate in a primary market. The total number of traders indicates the number of potential competitors present in a market, since both wholesalers and commission agents purchase grain on their own account, though in varying quantities.

A similar phenomenon is observed in the markets of Punjab. All the markets except Moga had between 72 and 82 registered traders. Moga had as many as 129. However,

of these only 5 were registered as wholesalers in Barnala, 6 in Kot Kapura, 7 in Khanna, 12 in Jagraon, and 25 in Moga. All the others were registered as commission agents.

It is noteworthy that though the number of traders in each of these 11 wholesale markets in Punjab and Maharashtra was so great as to make them overcrowded, it was by no means fixed. In fact there is a great deal of year-to-year variation in the number of licensed traders in the grain markets. Table 2 shows the number of licensed traders in Parli and Latur over a period of four years.

Table 2. Changes in number of licensed traders in primary markets, Maharashtra

Market	Type of trader	1959–60	1960–61	1961–62	1962–63	1963–64
Parli	Commission agents and wholesalers	106	109	116	n.a.	n.a.
	"B"	51	62	78	n.a.	n.a.
	"C"	32	15	15	n.a.	n.a.
	Total	189	186	209	n.a.	n.a.
Latur	Commission agents and wholesalers	n.a.	298	314	308	301
	"B"	n.a.	135	143	161	156
	Total	n.a.	433	457	469	457

n.a.: not available.

Source: Annual reports of the Agricultural Produce Market Committees of Parli and Latur.

Similar observations have been made by the Agro-Economic Research Centre in West Bengal regarding the number of licensed dealers in paddy in Birbhum district. The number of dealers in Bolpur market, which is served by a radius of twenty miles, increased from 76 in 1957–1958 to 87 in 1958–1959. During the same period the number in the nearby Saktigarh market in Burdwan district in-

creased from 62 to 72.[4] This was attributed to the increased profitability of the paddy trade.

The available evidence on the number of traders in grain markets thus overwhelmingly indicates the crowded nature of the grain trade. It further indicates that the numbers increase even more when returns in the trade seem more attractive.

Rice Mills: Number and Capacity

Comparable data on the number of rice mills and husking machines are poor for several reasons. First, there is a problem of coverage of mills located in remote areas, partly due to the inaccessibility of the areas but also due to licensing and reporting methods. A rice miller is required to obtain a license to operate a mill prior to the installation of the mill. Millers often install mills without obtaining licenses or proceed with installation while their applications for licenses are pending. The growth of such unlicensed mills, mainly of single hullers, has been particularly significant in the recent past, due to the procurement policies of the government. Their effect on milling capacity is discussed later. There is thus often a delay of a year or two before newly installed mills get licenses and are accounted for in the government statistics. Finally, there are the usual delays in reporting after a mill receives a license.

In addition to the problems of coverage, there is the problem of defining a rice mill. This definition is of interest, not only from the viewpoint of the number of rice mills, but also of milling capacity. It will, therefore, be worthwhile to digress at this stage to the subject of definitions. Two types of power-driven rice mills operate in India: hullers and shellers.

In the huller which is called the husking machine in some states, the machinery consists of a small sized huller, driven on electric or diesel oil motor of 5 to 20 horsepower. . . . The huller con-

[4] *Ibid.*

sists of two grooved horizontal cylinders set side by side in an outer casing. These cylinders revolve at a high speed up to one thousand revolutions per minute. One of the cylinders receives the paddy while the other discharges it after the husk has been removed. The actual husking is effected by a steel blade set in the outer casing against which the cylinder revolves. The blade is adjustable according to the size of the paddy and the degree of hulling required. The product may be passed again through the same or another huller for polishing. In the rural areas such single huller machines are generally used. . . . There are rice mills of the huller type each containing a number of hullers. When paddy is converted into rice in a single huller there is a greater percentage of broken rice than may be economical and to avoid this the paddy is hulled in one huller and the resultant husked rice containing a good proportion of paddy grains is passed through other hullers which are so adjusted as to mill rice with least breakage. For this reason some mills are equipped with two or four hullers each.[5]

"In the sheller type of rice mill the dehusking is done by grinding the paddy between two stone discs . . . the polishing of the husked rice is done by automatic cone polishers; the cleaning, dehusking, winnowing, polishing and sieving are automatically performed one after another in a continuous process and the various products, rice, husk, bran, etc. are separately delivered."[6] The cone-polisher sheller mills yield a higher outturn than traditional hullers with considerably less broken rice.[7]

Modern sheller mills are equipped with rubber roll shellers instead of underrunner disc shellers. These mills yield a slightly higher percentage of rice than is obtained in a cone-polisher sheller mill. Modern rice mills did not exist in India until early in 1966.

The governmental statistics on the number of rice mills frequently include single hullers in addition to multiple-

[5] Government of India, Ministry of Food and Agriculture, *Report of the Rice Milling Committee*, 1955, p. 11.

[6] *Ibid.*

[7] See pp. 197–199 below for some factual evidence.

huller establishments, sheller mills, and huller-sheller combinations. Records on the number of single hullers are often incomplete, as hullers have spread to remote rural areas. Data on the number of rice mills are, therefore, often incomplete and not comparable among areas, as the extent of underreporting is not uniform in all areas. The data maintained by rice millers' associations sometimes do not include single hullers in the number of rice mills. The reasons why millers do not consider single hullers as part of the organized milling sector can be traced to the nature of controls and the competition between the two types of establishments. In areas where parboiling is prevalent, a rice mill is distinguished from a husking machine or a single huller as an establishment equipped with parboiling equipment and a drying yard. Only rice mills with parboiling facilities purchase paddy on their own account, whereas single-hulling establishments are used for custom milling of paddy for a fixed charge. Mills purchasing paddy on their own account are required to surrender part of their total rice production to the government at a fixed price during periods of levy. Single hullers have no such restrictions, since in theory they only mill paddy on a custom basis. During periods of control, single hullers have proved to be an alternative channel of marketing for two reasons. First, owners of single hullers often purchase and mill paddy on their account without paying the levy. Second, since prices fixed by the government have often disregarded market forces, cultivators have found it profitable to get paddy converted into rice and sell it in the open market. Hundreds of husking machines, therefore, conduct clandestine business without licenses. Rice millers, consequently, consider single hullers as constituting a rival agency that has been a threat to the milling sector. In addition to these factors which have encouraged the emergence of single hullers, because of the small capital requirements, the single hullers, have been extended to rural areas where the size of the market would not permit the establishment of a

multiple-huller complex or a sheller mill. In Chapter 6, we discuss in detail the effect of changes in the structural composition of the milling industry on the economic and technological efficiency of milling in West Bengal and Tamil Nadu. At present we shall confine ourselves to the broader question of competition within the given structural environment.

The number of licensed rice mills recorded by the Department of Food show that in 1968 there were 43,425 hullers, 2,641 underdisc runner shellers, and 3,762 combined huller-sheller mills.[8]

Estimates of existing milling capacity vary considerably depending on assumptions regarding the sizes of rice mills and the hours and days of running mills. Little reliable data are available on actual sizes of mills, hourly capacity, and the days of operation. The data of the Department of Food show that the 49,838 rice mills existing in 1968 had a milling capacity of 55.53 milling tons of paddy per year.[9] Although no explanations are provided by the Department of how these estimates are obtained, to arrive at an estimate of 55.53 million tons of paddy, it is assumed that the hullers had an average milling capacity of .5 ton of paddy per hour and the sheller mills and sheller-huller mills had an average milling capacity of 2 tons of paddy per hour, and it is further assumed that all the mills operated a single 8-hour shift and ran 200 days a year. It must be pointed out, however, that this estimate actually indicates the lower limit of the existing milling capacity. For the average capacity of single hullers is certainly more than .5 ton of paddy per hour, as there are a large number of huller mills in the organized sector that consist of a battery of hullers.[10]

[8] Government of India, Ministry of Food and Agriculture, "Rice Milling Industry in India: Proposals for the Fourth Five Year Plan," Appendix 1 (unpublished manuscript).

[9] *Ibid.*

[10] Mr. Aggarwal, president of the East India Rice Millers' Association,

It must also be noted that these estimates are based on the number of licensed rice mills. Although estimates vary regarding the number of unlicensed single hullers, they all point to substantial numbers. An extreme case may be that of West Bengal, where the trade contends that in addition to the 6,000 licensed single hullers, there are 6,000 hullers that operate without a license. This estimate is not refuted by the official sources.

Further, if the paddy supplies are indeed high in some year, it should be possible for the mills to operate for more than 200 days per year and/or with a shift of more than 8 hours a day, thus introducing a greater upward flexibility in the existing capacity. Some estimates show that, after allowing for seed, storage losses at the farm level, and hand-pounding, 70 percent of the paddy production is available for machine mills. Even if assumptions are highly conservative, the existing capacity seems to have been more than adequate to take care of the available paddy supplies. If anything, there was a considerable underutilization of capacity in the milling sector. The evidence on the number of rice mills, on the extent of free entry into the milling sector as reflected in the enormous increase in their number, and on the available capacity thus overwhelmingly suggests that there is likely to be little scope for monopolistic returns in rice milling. Rather, the maladies seem to result from the multiplicity of small inefficient milling units. We deal with these matters at greater length in Chapter 6.

Share of Grain Traders in National Income

An altogether different approach to examining monopolistic returns in trade would be to examine the share of

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estimates that of the total number of huller mills in India, 2,000 consisted of a battery of 5 hullers each. The capacity of such mills is more likely to be 2 tons of paddy per hour or more. There may also be many more huller mills larger than single hullers but with fewer than 5 hullers for which no estimates are available.

the grain trade in the national income. Little statistical information is available on the size of the working force in the grain trade or on the income generated by this sector. K. Mukherjee recently attempted to estimate the average income of a grain trader by using two separate methods.[11] First, he divided the income accruing to the workers in unorganized trade, commerce, and transport—the closest approximation to the grain trade—in 1959–1960 and 1962–1963 by the number of the working force in that sector in those two years. He concluded that the average per capita income of the working force associated with the trading sector as a whole was rather low. In fact, it was comparable to that of factory labor, rather than of any other, more highly paid categories.[12]

Since there is no way of determining whether food grain traders earn substantially more than the rest of the trading sector, Mukherjee attempted to make independent estimates of the income accruing to the grain trade by making some rough approximations about the volume of the marketed surplus, the average price received by the producer and that paid by the consumer, and transport and storage costs. He concluded that "unless the working force associated with food grains trade is disproportionately small, it seems quite unlikely that the per capita income in the food grains trade is disproportionately large."[13] His statistical calculations support the general contention in this chapter that net profits earned by grain traders, except for a few in each market, are generally low and reflect the widespread underutilization of the supply of labor in India.

The over-all evidence available thus strongly supports the view that the food grain trade is highly crowded, with a great deal more underutilization both in the trading and

[11] See K. Mukherjee, "The Food Problem in India: Trade Not the Crux of It," *Economic and Political Weekly*, III (April, 1968), 562–564.
[12] *Ibid.*, p. 563.
[13] *Ibid.*

the processing sectors than would be justified by the present technology in the trade. It is, however, not enough to look simply at the number of traders; it is necessary to examine the distribution of their share in the total grain trade, and its effect on competitiveness.

Degree of Concentration in the Grain Trade

Despite the general apprehension about the exercise of oligopolistic forces in grain trade, very little documentation has been available on the concentration of economic power in grain trade. Some rudimentary investigations conducted during the course of this study to examine the degree of concentration of volume in trading operations suggest that in the six markets of Maharashtra approximately 10 percent of the traders handled over half of the total volume of jowar transactions in the markets. In Barnala (Punjab), only 2 traders handled about half of the wheat transactions; in Jagraon, 4 traders; and in Kot Kapura, 5 traders.[14] The size of operations of these traders appears so large in relation to that of others that these figures can be taken as providing at least a rough indication of the concentration of the volume in a few hands. Similar information could not be obtained in West Bengal and Tamil Nadu, as the state governments had introduced monopoly procurement of paddy during the course of this investigation. Since a considerable amount of marketed surplus never reached government hands, millers and traders were most reluctant to disclose their records of purchases and sales. However, C. Mukherjee's study of millers' paddy purchases in Bolpur in 1933–1934 and in 1961–1963 suggests that there probably has been an increase in the degree of concentration of the rice-milling business in West Bengal over the three decades. On the basis of his data and other records (not docu-

[14] In order to arrive at these estimates, we interviewed major traders to acquire information on their volume of business. The information they provided regarding the size of their operations was then verified by interviewing market officials and other traders in the market.

mented) C. Mukherjee contends that "the control of the mills has largely passed on to financially stronger parties, mostly of Calcutta, having a wide interstate network of procurement and storing centers."[15]

It should be noted, however, that if the degree of concentration is indicated by the percentage of traders handling half of the total volume of operations in a market in a year, Mukherjee's estimate for Bolpur indicates much less concentration in rice milling there, as compared to wheat trading in Punjab and jowar trading in Maharashtra.

It may appear at the outset that this apparent concentration of the volume of trade in a few hands must inevitably result in the emergence of oligopolistic elements in grain trade. Various factors seem to discourage such a phenomenon. The three major factors are: relatively free entry into trade, intermarket competition, and lack of cooperation among traders.

Entry into Trade

The factors that may restrict entry into trade in India may be classified into three categories: social, governmental, and financial. Although there is a preponderance of certain trading communities in the grain trade in some parts of India, this phenomenon is by no means very widespread. Table 3 shows the distribution of grain traders among various communities in Maharashtra. In the three primary markets of West Bengal for which data were available, 54 percent of the rice mills were owned by non-Bengalis (including Marwaris) and the rest by Bengalis. Even among Bengalis, neither milling nor husking is restricted to any particular community. Similarly, in Tamil Nadu, persons from various communities, such as Chettiyars, Brahmins, Nadars, and Naidus, are observed to be in the paddy trade.

[15] Chittapriya Mukherjee, "Productivity and Profitability of Rice Milling Industry in Birbhum," *Khadigramodyog*, December 1966, p. 248.

Table 3. Breakdown of "A" type traders by caste or community, primary markets, Maharashtra

Caste or community	Latur	Parli	Parbhani	Nanded	Sailu	Jalna
Marwari	79	35	18	43	30	121
Gujrathi	12	4	6	6	10	38
Vani	60	18	6	0	4	4
Jain	2	0	16	0	4	0
Komti	3	0	0	20	0	0
Musalman	5	3	0	0	0	5
Elam Reddi	14	0	0	0	0	0
Maratha	77	22	15	10	16	19
Rajput	5	0	0	7	0	0
Brahmin	5	5	4	2	3	0
Dhangar	1	0	2	0	0	0
Mali	3	0	0	0	0	0
Teli	1	0	0	0	0	0
Tamilian	1	0	0	0	0	0
Cooperative societies	15	2	0	2	0	0
Other	0	4	4	22	4	0
Total	283	93	71	111	71	187

Source: Agricultural Produce Market Committees.

Some high castes have traditionally looked down upon trade as a menial activity. However, this has not discouraged the entry of other nontrading communities into trade. Although Marwaris and local banias dominate the markets in Punjab, Jats, who are predominantly a community of cultivators, are observed to have entered trade. Both in Tamil Nadu and Maharashtra, some Brahmins are involved in the grain trade, although their numbers are small.

Just as caste has not restricted the number of persons entering the grain trade, neither have governmental policies of licensing effectively curbed the number of traders who deal in food grains. Almost all of the traders who apply for a license are granted one upon payment of a license

fee.[16] The purpose of licensing is not so much to restrict the number of traders as to make possible the regulation and control of the "antisocial" activities of the traders.

Although the availability of a great deal of capital is an asset in trading operations, it is by no means a necessary condition for entering trade. Numerous examples are encountered of persons who borrow small amounts of initial capital from relatives who are traders to start a shop. Employees in grain shops frequently aspire to own their own business eventually. This urge to be one's own master is evident in the large crowds of small traders who operate, along with a few big traders, in each primary market.[17]

The main difference between trading and milling is that milling not only requires working capital for purchasing paddy but also calls for a great deal of capital for investment in the mill. Even this does not restrict milling to large operators. Rice milling is not limited exclusively to owners of rice mills. The leasing of rice mills on an annual basis is a common phenomenon among paddy traders and commission agents. In West Bengal mills are usually run by individual operators. Even so, approximately one-fourth of the mills are run on lease. In Tamil Nadu, joint leasing of mills is much more prevalent. Apart from the custom of leasing, partnerships are widespread in the paddy trade in Tamil Nadu, where a big rice mill may be owned by a number of partners who conduct their business individually and get paddy processed through the jointly owned mill at a scheduled rate.[18] This type of service is also utilized

[16] In Birbhum district, of the 1,751 traders who applied for licenses in 1959, 1,704 were granted licenses (*Report on the Pace and Pattern of Market Arrivals*, p. 143). Both in Punjab and Maharashtra regulated market committees stated that refusal to grant an operating license was very rare.

[17] This has been noted by almost every observer of marketing in low-income countries. See Bauer, *op. cit.;* Galbraith and Holton, *op. cit.;* Hirsch, *op. cit.*, Lele, *op. cit.*

[18] Many mills have been found to maintain two separate accounts, called a milling account and a trading account. The milling account

by paddy wholesalers who get paddy milled on a large scale and pay a scheduled rate to the mill.[19]

One cannot, however, deny the advantages enjoyed by traders who have a great deal of capital at their disposal. Capital plays an important role in an unstable market situation. It provides better staying power in speculative actions. It enables a trader to acquire more information on market conditions than his smaller counterpart. It enables him to provide his own transportation when none is available in the market. Equally important, it enables him to spread his investment and hence his risks on a variety of inventories so as to balance losses with gains. It also enables the trader to work on a much smaller profit margin than is possible for his smaller counterpart. This phenomenon, however, cannot be termed an oligopolistic position.

Intermarket Competition

The second important factor which discourages the formation of oligopolistic elements in trade is the extent of intermarket competition in transactions. The working of the village, primary, and terminal markets led to intermarket competition. Traders in the terminal markets make a careful survey of the terms offered by various traders in various primary markets before they place orders with the wholesalers in the assembly markets.

The relative prices in various neighboring primary markets influence the flow of the market arrivals into a primary

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includes the capital cost of machinery, its maintenance charges, and collections realized for processing undertaken. In the trading account, details of buying and selling and costs of conversion, profit, and loss are recorded. As part of the cost of processing, a scheduled rate for a unit of paddy converted into rice is charged and credited to the milling account.

[19] In Mannachanallur town, in Tiruchirapalli district such partnerships were found to be very common. There are about 500 wholesalers in Tiruchi district and only 120 rice mills. Quite a few mills are operated by partnerships, and those wholesalers who do not run a mill get their paddy milled by paying a fixed rate.

market.[20] This seems to be a result of at least two factors. First, the network of private contacts provides a highly efficient system for the transmission of market intelligence between the main producing centers and their corresponding terminal markets. This enables traders from primary and terminal markets to choose their orders from highly competitive price bids. Second, due to the prevalence of considerable "excess capacity" in trading firms as well as in mills, there is a general tendency among traders and millers to attempt to acquire the maximum share of the business. This was evident in almost all the markets studied.

In West Bengal, there is considerable evidence of a diversion of market flows from one primary market to another on the basis of the price differences.[21] A similar phenomenon has been noticed in the movement of wheat arrivals from small primary markets to major assembly markets in Punjab.[22] For the same reason, markets located in the predominantly rabi Sholapur district receive kharif jowar from the neighboring kharif districts to take advantage of the favorable prices in Sholapur markets. A similar pattern has been observed in Tamil Nadu, where milling centers such as Tiruchirapalli and Mannachanallur operate mostly on the paddy received from the neighboring Thanjavur district as a result of competitive bidding on prices. This competiton, which extends to a number of markets, makes oligopolistic forces unworkable.

Extent of Cooperation

The third major factor which seems to make oligopoly unworkable is the lack of desire on the part of the traders to cooperate for mutual rewards. This is evident from a number of factors.

[20] See *Report on the Pace and Pattern of Market Arrivals*, p. 143, for some evidence of this.

[21] Studies conducted by the Agro-Economic Research Centre, Visva Bharati, Santiniketan, West Bengal (unpublished manuscripts).

[22] See pp. 121–125.

Nature and Extent of Partnerships. A familiar feature of the grain trade in India is the predominance of single-family firms. Some investigations were made of the extent and the nature of partnerships in trade by interviewing traders in various states. In Punjab, the family history was gathered of eighteen major firms that handle most of the terminal market trade in the five primary markets. Of these eighteen firms only six were partnerships involving members of more than one family. All the other firms were partnerships between immediate members of a family (as between brothers or between a father and his sons). Of the six partnerships between different families, three were between a former *munim* (clerk-manager) and his trader. The *munim* provided the know-how and labor, and the trader the finances and good will. It should be noted that partnerships are even less prevalent among smaller traders.

No systematic information of this nature could be collected in Maharashtra, because the jowar and rice trade was taken over by the Maharashtra government during the course of this survey. Many market officials indicated in their interviews that there are a number of spurious partnerships which exist only on paper to take advantage of the basic income-tax deductions allowed to family firms. A predominantly large proportion of rice mills in the primary markets of West Bengal are single-family operations. As was pointed out earlier, even in Tamil Nadu, where joint leasing of mills is prevalent, it is usually only the milling operation which is run jointly, whereas each trader operates on an individual trading account.

Absence of Trading Organizations. This lack of willingness to cooperate has also been evident in the absence of any major traders' organization in India until very recently.[23] The Federation of the All India Foodgrain Deal-

[23] The Grain, Rice, and Oilseeds Merchants' Association in Bombay was formed as early as 1899 and remained fairly active in the cotton and oilseed trade. The production estimates of the association were

ers' Associations has been vocal only as a spokesman for the trading interests and has concentrated on being a pressure group. Even this position it acquired only as late as the fifties, under the leadership of Hasham Premji, who was also a dynamic politician and a social figure. Local traders' and millers' associations in the primary markets function mainly as pressure groups submitting memoranda protesting governmental interference in the grain trade. The occasional meetings of the traders' associations are poorly attended. Neither the local bodies nor their federation has been constructive in bringing about better facilities for the traders (such as improved market intelligence and production estimates) or in initiating new methods or technology in the grain trade.

Another crucial feature of the grain trade is its extreme secretiveness about stock records and profit-loss statements. Such secrecy is restricted not only to outsiders but extends equally, or probably more rigorously, to fellow traders. During the course of this investigation, no president of a traders' organization could persuade other traders to show their stock records to us; the presidents were in fact afraid of making a strong case for doing so, since it might have been thought by their fellow traders to be an intrusion of their privacy. In view of this evidence of the apathy of traders toward each other, it seems inconceivable that organized price maintenance would be very effective in the Indian grain trade. A trader's bargaining power seems to be limited by the competition that he faces from other traders in the same market and from other markets.

To summarize, this survey of the working of the grain trade suggests that the number of trading and processing agencies is indeed very high and results in a great deal of underutilization of capacity. This, in all likelihood, leads to very keen competition for the acquisition of the maximum

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frequently more accurate than the official estimates. It never, however, became an effective organization of grain traders.

share of the total volume of trade. Although the share handled by individual traders is unequally distributed, there is no reason to believe that this is either a cause or a consequence of a lack of competitiveness. This contention is supported by widespread evidence of (1) a good private network of market intelligence which efficiently transmits information about intermarket price differences, (2) free entry into the grain trade, and (3) the extreme self-interest of traders, which generally discourages collusive actions on their part.

The following chapters present statistical evidence regarding interspatial, intertemporal, and interproduct price differences that lend further support to this hypothesis.

CHAPTER 4

Market Integration: A Case of Regional Efficiency

In examining the efficiency of a marketing system, one must inevitably look at the degree to which various village, primary, secondary, and terminal markets are related to each other. A vast body of statistical data exists in India regarding prices of agricultural commodities in hundreds of primary, secondary, and terminal markets. Nevertheless, to using these records for testing the efficiency of the market system requires much painstaking work, owing to the various limitations of the price records, which are discussed in detail in Appendix 2. It is proposed here to utilize these data for examining the interrelationship among prices in several agricultural markets. It is hypothesized that the prices of a cereal in any single market are closely related to the prices of the same cereal in other markets. It is further hypothesized that because of the competitive nature of the wholesale trade, the differences between prices at any two stages of marketing do not tend to be greater than the costs of marketing. In this view, price differences between a village level market and a primary market or between a primary market and a terminal market are not greater than the costs of handling and transport between the two points. The analysis of price differences between regions and between stages of marketing is based on the methodological procedures outlined in the introductory chapter.

Village-Level Price Formation

Data on village-level prices in India are relatively scanty and generally of poor quality. Occasional village-level surveys con-

ducted by departments of agriculture and the agroeconomic research centers provide data for short time spans and, therefore, do not lend themselves to comparisons over long periods of time. The major source of village-level prices is, therefore, the farm (harvest) prices collected by the departments of agriculture or statistics at the state level. Prices at which producers sell their produce at the village site during a specified harvest period are collected from selected villages in each district. A single average district-level price is worked out by taking a simple arithmetic average of the several village-level prices. Average farm prices for a state are worked out for each crop as a weighted average of the district farm (harvest) prices by using district production figures for the current year as weights.

Data on farm harvest prices, as available at present, are not comparable over time and space. This is because most of the state governments have not yet specified varieties and qualities of the commodities for which farm (harvest) prices are collected. As such the varieties and qualities for which farm harvest prices are collected . . . are likely to change from year to year. Besides, prices are collected for a number of varieties and qualities of the same commodity for each of the selected centers in a district. Thus, the district and state farm (harvest) prices are averages of a number of varieties which render them incomparable with prices like wholesale prices which generally relate to one variety.[1]

Besides, the farm prices represent averages for more than one harvest when more than one crop is raised in an agricultural year. The prices also rely heavily on the cultivator's memory, and since units of measurement are fairly arbitrary in rural areas, provide only a rough indication of the general price levels prevailing in villages during harvest times. Despite all these limitations, farm prices are the only available source of information on village-level prices which applies to several regions and several years.

[1] Government of India, Ministry of Food and Agriculture, *Economic Survey of Indian Agriculture, 1959–60*, July 1961, p. 138.

The farm-level prices of rice and paddy in West Bengal and Tamil Nadu and of jowar in Maharashtra are compared here with market prices at harvest time in primary markets located in the same district. Since over 90 percent (and in some cases as much as 95 percent) of the marketed surplus of wheat in Punjab is taken to primary wholesale markets for sale, such comparisons between village and primary market prices are of little significance in Punjab.[2]

The harvest prices of jowar available at the Department of Agriculture in Maharashtra are averages of the prices received during kharif and rabi harvests.[3] In all the markets except Nanded, district farm prices show a close correspondence with the wholesale prices in the primary markets. The lower farm prices in Nanded may be due to the fact that Nanded produces more kharif jowar, the prices of which are usually lower than those of rabi jowar. Although the averages for the districts are not weighted by the amount produced, cultivators may have arbitrarily weighted the average harvest prices by the quantities that they sold in the two harvests.

The wholesale and farm prices of rice in West Bengal show a less precise relationship. The district averages of farm prices were lower than wholesale market prices in Burdwan in 1956 and 1958, and in Birbhum in 1956 and 1957. In Burdwan farm prices and market (wholesale) prices showed a close correspondence in 1955, 1957, 1960, and 1961, and in Birbhum in 1960 and 1961. Farm prices were, however, higher than wholesale market prices in 1959 and 1962 in Burdwan, and in 1958, 1959, and 1962 in Birbhum. It should be noted that in 1957, 1958, and 1959

[2] See pp. 133–134.

[3] See Uma J. Lele, *Working of Grain Markets in Some Selected States, India, 1955–1956 to 1964–1965*, Cornell University—USAID Prices Research Project, Occasional Paper No. 12, Cornell University, Department of Agricultural Economics, Dec. 1968 (hereafter referred to as Occasional Paper 12), pp. 128, 164, 232, and 233, for data on farm harvest prices in Maharashtra, West Bengal, and Tamil Nadu.

there was a restriction on the export of paddy and rice from the surplus districts such as Burdwan and Birbhum. In 1958 and 1959 ceiling prices of paddy and rice were fixed by the government. In 1958 market reporters recorded the open market prices of rice as the actual market prices. In 1959, however, they recorded the statutory maximum prices of rice as the prevailing market prices in the primary markets. In both years, however, the farm harvest prices collected by the Department of Agriculture were recorded as the actual prices received by cultivators. These prices are higher than the ceiling prices of rice fixed by the West Bengal government in Burdwan and Birbhum in 1958–1959. In fact these prices are even higher than the ceiling fixed for fine-quality rice. The harvest prices collected from millers located in all the five primary markets also show that in 1959, millers paid higher prices for paddy in the wholesale markets than the statutory maximum set by the government. The various price quotations thus show that both in 1958 and 1959 open market prices at the village level as well as at the market level were higher than statutory ceiling prices, but that in 1958 farm prices were lower than market prices, whereas in 1959 they were higher. The higher farm-level prices in 1959 may have been due to the increased tendency of millers to purchase in the villages to avoid controls at the market level.[4] As 1959 was the second successive poor crop year in West Bengal, the pressure on supplies had increased and had to be reflected in higher farm prices. In 1959 the farm harvest prices for Burdwan and Birbhum districts showed greater disparity than in any other year for which data were examined. This seems to have been a result of interdistrict movement restrictions, which created varying supply imbalances in the two surplus regions. The higher farm prices in 1962 may also have been due to a poor rice crop and the consequent

[4] See *Report on the Pace and Pattern of Market Arrivals,* West Bengal section, pp. 144–145, for some evidence on this.

pressure on supplies. The available evidence, though confusing at first, suggests that village-level prices in West Bengal are generally determined by competitive bidding and reflect the supply and demand conditions in the market.

Farm prices in Tamil Nadu present an equally confusing picture at the outset. The farm prices almost always seem lower than the wholesale market prices of sort I paddy. They were frequently equal to the wholesale prices of sort II paddy. In a few cases, as in Chingleput in 1957–1958 and in South Arcot in 1959–1960, farm prices seem much lower than the wholesale prices in the primary markets. However, there are a number of instances in which the average district farm price remained higher than wholesale market prices: e.g., Chingleput, South Arcot, and Tirunelveli prices in 1956–1957; South Arcot, Thanjavur, and Tirunelveli prices in 1957–1958.

Several features should be stressed in the comparison of farm prices and wholesale prices in Tamil Nadu. First, since the farm price for a district is not only an average of several prices in a harvest but also of prices of several varieties and of several harvests within an agricultural year, the farm prices are much less homogeneous in Tamil Nadu than in West Bengal and Maharashtra. It is, nevertheless, noteworthy that the farm prices are usually much lower than the wholesale prices of sort I paddy but show a reasonable parity with the wholesale prices of sort II paddy. This seems to be a result of the predominance of second-grade rice in the paddy trade.[5] The higher farm prices in several years could be due to the heavy purchases by millers and traders at the village site.[6] A careful analysis

[5] See Chapter 5, n. 33, below.

[6] There have been several similar cases in which prices in village markets in Thanjavur, a major supplier to Kerala during the period of free trade, remained higher than those in Kerala markets. This was mainly because of speculative buying by Kerala traders in Thanjavur. See University of Madras, Agricultural Economics Research Centre,

of apparently confusing farm and wholesale market prices in these three states shows a rather close relationship between the prices at the two levels of marketing.

Price Formation in Wholesale Markets

A much more rigorous statistical analysis is possible of the relationship among prices in various primary markets and between prices in primary and terminal markets. The degree to which price formation in one market is dependent on prices in other markets is estimated by calculating correlation coefficients between weekly wholesale prices in these markets.

As an example, Table 4 shows a correlation matrix for

Table 4. Correlation (r) matrix for weekly wholesale prices of wheat, Punjab and Delhi, January 1955–December 1965 (n = 569)

Market	Moga	Khanna	Barnala	Kot Kapura	Jagraon	Delhi
Moga	1.00	0.94	0.97	0.97	0.97	0.95
Khanna		1.00	0.92	0.92	0.94	0.90
Barnala			1.00	0.95	0.96	0.94
Kot Kapura				1.00	0.96	0.95
Jagraon					1.00	0.94
Delhi						1.00

wheat prices between various primary markets in Punjab and their terminal market Delhi. Table 5 shows the frequency distribution of correlation coefficients (r) between various primary and terminal markets. The table includes correlation coefficients between primary market prices and terminal market prices of wheat, rice, jowar, and paddy of different varieties and grades. All the correlations are for the period 1955–1956 to 1964–1965. In some cases continu-

"A Decade (1950–1960) of Prices of Rice in the Southern Region," March 1963 (a mimeographed research paper).

Table 5. Frequency and percentage distribution of correlation coefficients between primary-primary and primary-terminal market prices, 1955–1956 to 1964–1965

r	Frequency	Percentage
0.65–0.69	1	1.0
0.70–0.75	7	6.0
0.76–0.80	7	6.0
0.81–0.85	15	13.0
0.86–0.90	20	17.0
0.91–0.95	34	29.0
0.96–1.00	33	28.0
Total	117	100.0

ous data were not available for specific markets over the entire period. Therefore, individual correlations rather than matrices were calculated between pairs of markets. These are also included in the table. The data refer to 22 primary markets and 4 terminal markets of rice, wheat, and jowar. However, since correlations were calculated for prices of rice, wheat, jowar, and paddy of comparable grades and varieties, altogether 44 sets of primary market prices and 7 sets of terminal market prices were considered.

The table shows that well over half the correlations are over 0.90, and nearly 90 percent over 0.80. The high correlation coefficients between prices of individual cereals in various markets strongly support the hypothesis of competitiveness in grain markets. Figure 16 illustrates the point graphically in the case of Punjab. The differences in the degrees of correlation between prices, however, need further elaboration to bring out the nature of price differences in the Indian grain market.

Degree of Competitiveness Within a Market

Correlations were calculated on the basis of records collected directly from prominent millers of the prices they

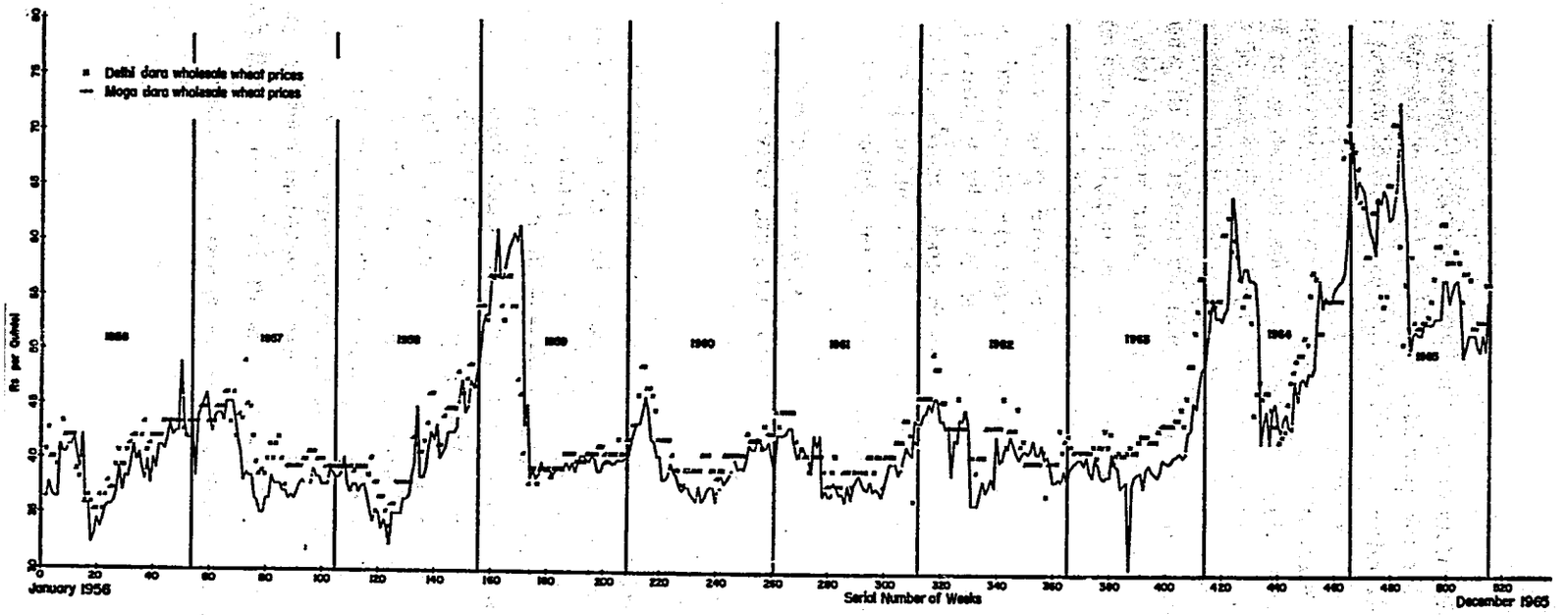

Figure 16. Punjab and Delhi weekly wholesale wheat prices, January 1956–December 1965
Sources: Government of India, Ministry of Food and Agriculture, Bureau of Economics and Statistics; and Agricultural Produce Market Committee, Moga.

paid to cultivators during the harvest months (January and February) for the purchase of paddy. Such records are of considerable value in studying various aspects of market integration. (1) A comparison of prices paid by millers in various primary markets shows the degree of interdependence between these markets in price formation at the miller's level and thus provides further verification of the hypothesis of over-all competitiveness in paddy marketing. (2) A comparison of prices paid by millers with wholesale paddy prices prevailing in the same market tells us something about the presence of monopolistic elements, if any, in the market since such monopolistic forces are bound to be reflected in the effective prices paid by millers. As the millers' price records are maintained only for their own use and are not meant to be submitted to any official agency—in contrast to stock records—there is an element of reliability in these data which is of considerable value in judging the extent of competitiveness in the primary markets.

The correlations between six series of millers' prices were above 0.90 in 13 of the 15 cases, and only slightly below 0.90 in the remaining 2 cases.

Role of Varietal Differences

The importance of variety specification in correlation coefficients is abundantly illustrated by the price relations of the three cereals in all four states. Correlation coefficients in Table 4 are of *dara* prices for all Punjab markets except Khanna, where for lack of *dara* quotations for 1955 and 1956, medium-variety prices are used. Coefficients calculated by using *dara* prices for Khanna and elsewhere for later years show higher correlations than the correlations between medium-variety prices in Khanna and *dara* prices elsewhere (Table 4). Similar comparisons show that farm prices in Moga are slightly better related to medium-grade prices in Khanna.[7] *Dara* prices in Delhi show a slightly

[7] Both farm and medium grades are superior to *dara* wheat.

better correlation with *dara* prices in the primary markets in Punjab than do farm and farm special prices in Delhi. As the correlations between markets are generally very high, the differences in correlation coefficients due to varietal differences are very small. This is because in Punjab and Delhi prices of different varieties of wheat move fairly closely with one another within a market and between various markets. For example, wholesale prices of *dara* wheat in Delhi show a correlation coefficient of 0.96 with farm prices in Delhi, and of 0.93 with farm special prices. Farm prices show a correlation of 0.98 with farm special prices in the same market.

The importance of varieties in the determination of price differences is also shown by rice prices in West Bengal. Prices of the Kalma variety were used in calculating the correlation matrix between primary markets and Calcutta. For the period preceding 1961, Calcutta prices were available only for the Nagra variety, and Sainthia prices only for the Bhasmanik variety. Both of these varieties are of medium grade and are usually valued on a par with Kalma. Correlations between Nagra prices in Calcutta and Kalma prices in Guskara and Burdwan, and between Bhasmanik prices in Sainthia and Kalma prices in Burdwan, Guskara, and Sainthia are slightly lower than those between Kalma prices. In the case of Bhasmanik prices, the difference between coefficients is much more obvious. The correlation coefficients between Sainthia and other markets are much higher when Sainthia prices are of the Kalma variety than when they are of the Bhasmanik variety.

In the cases of both Delhi and Calcutta, the supplies are received predominantly from a single major source, as from the neighboring area of Punjab or Uttar Pradesh to Delhi,[8] and from the neighboring district of Birbhum, Burdwan, Bankura, Midnapore, or 24-Parganas to Calcutta. Vari-

[8] Uttar Pradesh wheat comes mostly from Chandousi, Hapur, and other areas bordering on the district of Ambala in Punjab.

etal differences are, therefore, much less pronounced than those noted for wheat and jowar prices in Bombay and rice prices in Tamil Nadu. We shall consider the effect of these varietal factors on the apparent market integration. The correlation matrix for jowar prices shows a very high degree of correlation between prices in various primary markets. Bombay prices of jowar, however, show a somewhat lower correlation with the primary market prices. It is noteworthy that the correlation coefficients between Bombay and the various primary markets show a remarkable consistency. It is of interest that similar results were obtained in an earlier study of jowar price movements in Bombay and Sholapur district, although the difference between terminal-primary and primary-primary correlations was a little less than that obtained here.[9] In the present case, Bombay prices refer to rabi white jowar, which is a much less specific category than the trade category "Sholapur jowar" used in the earlier analysis. Bombay receives rabi white jowar, not only from the markets in Marathwada, but also from Ahmadnagar, Satara, Sangli, and Sholapur districts in western Maharashtra, and from several other markets in Vidharbha and Madhya Pradesh. There is a great deal of difference in the rabi white varieties grown in different regions, which arises from variations in soil, weather conditions, rainfall, and cultivating practices. In fact, so fine are the distinctions between varieties within this category of jowar that over a period of years an elaborate nomenclature has evolved in the rabi white jowar trade consisting of numerous subcategories of the variety. It classifies the grain according to its color, luster, boldness or size, and even according to the places of its origin. Conceivably therefore, this type of classification results in a somewhat lower correlation between Bombay prices and prices in the primary markets. Just as Bombay has a diverse pattern of imports, the primary markets have a diverse pattern of

[9] Lele, "Traders of Sholapur," p. 261.

exports. These markets in Marathwada export not only to Bombay, but also to Kolhapur, Sangli, Sholapur, Miraj, Poona, and Nagpur in Maharashtra, and in addition, to several places in Andhra Pradesh, Gujarat, and Mysore. The price levels in these markets are, therefore, not determined by price signals in Bombay City to the same extent as are the rice prices in Burdwan and Birbhum districts by those in Calcutta.

Variety specifications for wheat in Bombay are much better articulated and price differences are much more pronounced than for jowar. This results from a lack of homogeneity in wheat varieties as well as from the fact that the wheat market in Bombay, particularly for superior varieties, consists of higher-income consumers, whose varietal preferences exert a much greater influence on demand, and hence on prices of various categories of wheat. In periods of completely free trade Bombay received wheat in considerable quantities from Madhya Pradesh, Uttar Pradesh, and Punjab. There is, however, a considerable difference between the wheat received from Madhya Pradesh and that received from Uttar Pradesh and Punjab. Prices of wheat in Bombay, therefore, apply to less homogeneous types of grains. This is reflected in the correlation coefficients between Bombay and Punjab prices. A correlation coefficient calculated for the period April 1961 to March 1964—a period of free trade between Punjab and Bombay—between prices of the variety in Bombay and Moga shows a correlation of 0.88. This is much lower than correlations obtained between Delhi and Punjab. (See Table 4.) However, the differences between correlations calculated by using prices of two different varieties in Bombay and Moga markets are even greater. Moga *dara* prices show a correlation of 0.80 with Bombay Sharbati prices for the same period, compared to a correlation of 0.92 for the same varieties between Delhi and Moga. This is because varietal differences lead to much greater price differences in Bombay than in either Delhi or the primary markets of what. Prices of the farm and the *dara*

variety in Bombay differed by as much as Rs14.00 per quintal in Bombay, whereas the maximum difference between the prices of the two varieties was Rs9.00 per quintal in Delhi. The price difference between the two varieties ranged between Rs2.00 and Rs4.00 in Moga.

The importance of varietal differences in determining the degree of correlation is further illustrated by a comparison of correlation coefficients for rice in West Bengal and Tamil Nadu. It should be recalled that among the Tamil Nadu markets, Mannergudi and Tiruvarur are located in Thanjavur district and send rice to Kerala and Coimbatore. These markets also ship paddy to Tiruchirapalli, most of which finds its way into the deficit areas in western Tamil Nadu or Kerala, in the form of either paddy or rice. Kanchipuram sends rice to Madras but is relatively unimportant in terms of the total rice supply received by the city. Cuddalore, in South Arcot district, is not an exporter but is important as a local supplier to the South Arcot district. Because patterns of market flow are so diverse, the correlations in Tamil Nadu are slightly lower than those obtained in West Bengal. Similar correlations calculated for rice prices in Kumbakonam and Tiruchirapalli ($n = 100$ from January 1959–December 1960) show a correlation of 0.84. A correlation between Tirunelveli and Tiruchirapalli ($n = 86$ from May 1956–January 1958) shows a correlation of 0.81. Unlike those in West Bengal and Punjab, prices in the markets in Tamil Nadu apply to a great number of varieties, including Sirumani, Kichili *samba,* Vellakar, Vayakondan, Vadan *samba,* Garudan *samba,* Chingleput *samba,* Kudiraival, Nellore *samba,* White Sirumani, and many more. Correlations between Madras and the primary markets are high, although there was little flow of rice to Madras from anywhere but the Chingleput district. One Madras price series for boiled rice applies to the Andhra variety and another to the superfine variety.

A similar analysis examined the relationship of paddy prices in various primary and secondary markets in Tamil

Nadu. Paddy prices were collected for two grades: sort I and sort II. As in the case of rice prices, paddy prices of the same variety were not available for a number of markets and were not always continuous. An attempt was made to collect records for as great a number of weeks for as many markets as possible. Correlations for sort I and sort II paddy in some primary markets for which continuous data were available are also fairly high.

A correlation coefficient was calculated between sort I paddy prices in Tiruchirapalli and Mannachanallur, which is an important market center in Tiruchirapalli district only ten miles from the town of Tiruchirapalli. Weekly prices for a one-year period showed a correlation of 0.95 between the two markets. The case of Tiruchirpalli and Mannachanallur is almost a textbook case of perfect competition. There is perfect flow between the two markets, and perfect knowledge in each about conditions in the other market, mainly because of the short distance between the two, but also because of the fact that these two markets are influenced by almost identical factors, as a result of their pattern of purchasing local and Thanjavur paddy and exporting it to Kerala and Coimbatore. The two markets enjoy identical transport facilities; both use the Tiruchirpalli railway junction and rely on Kerala trucks for exports. But most important, they satisfy the condition of homogeneity of product because of their proximity to each other and their pattern of acquiring paddy supplies.

It should be noted that sort II paddy prices also show a fairly high correlation between markets. Tirunelveli, for many reasons, shows somewhat lower correlations with the rest of the markets. First, the varieties common in Tirunelveli, such as Ponnuruvi and Annaikomban, are not very common in the rest of Tamil Nadu. Second, the crop seasons in Tirunelveli are somewhat different. *Samba* crop, which is harvested in Chingleput, South Arcot, and Thanjavur districts in January–February, is harvested in Tirunelveli in March–April. Third, there is no significant flow of

either rice or paddy between the rest of Tamil Nadu and Tirunelveli. Because Tirunelveli is adjacent to Kerala, a state very deficient in rice, a great deal of paddy and rice flows to Kerala from Tirunelveli.

Movement Restrictions

Apart from varietal differences, lower degrees of correlation may be due to movement restrictions. Correlations were calculated between Moga and Bombay wheat prices for three periods. There was a free flow of wheat between Punjab and Bombay in the first and third periods, i.e., between January 1956 and March 1957, and between April 1961 and March 1964. Because of zonal restrictions, there was no flow of wheat on private account during the second period,[10] i.e., between April 1958 and March 1961.

Although correlations available for all three periods are only between prices of two varieties that are not strictly comparable, the drop in correlation during the period of restrictions on wheat flow is considerable. The correlations between Moga *dara* and Bombay Sharbati wheat prices were 0.69 and 0.80 during the first and third periods, and 0.21 in the second period. Movement restrictions and their effect on absolute price differences are discussed in the following pages.

Transport Costs and Regional Price Differences

Lower degrees of correlation may also result from transport costs. Thus, the higher the transport costs, the greater the range within which price quotations can move without there being a flow of grain between the two trading markets.[11] This would mean a large residual term and a low correlation coefficient. A low correlation may also result if price differences have frequently increased beyond trans-

[10] See Appendix 1, the section "Zoning."

[11] It was pointed out earlier that high transport costs may not be due to inefficiences in the transport sector but simply to long distances, as in the case of Punjab and Bombay.

portation costs and have not been corrected by increased shipments from surplus to deficit regions. If that is the case, it is necessary to examine the factors responsible for such excessive price differences.

Price relations are analyzed between Punjab and Delhi, and Punjab and Bombay wheat prices; between Marathwada and Bombay jowar prices; between Burdwan, Birbhum, and Calcutta rice prices; and between Kanchipuram and Madras rice and paddy prices. The frequency distributions are arrived at simply by deducting from the terminal market price of a cereal for a particular week the primary market price of the same cereal in the same week. Tables 6 and 7 show, as an example, transport costs between Punjab and Delhi and the corresponding frequency distributions of price differences between that pair of markets.[12] The conclusions reached in this chapter are, however, based on data from all four of the states.

In all of the cases except Punjab-Bombay shipments, truck fares instead of railway fares are used. Truck fares are usually slightly higher than railway fares. They therefore represent the ceiling cost of shipment. The use of truck fares, however, does not exaggerate the price difference justifiable between surplus and deficit areas, first because although truck fares are somewhat higher, there are other costs, such as movement to and from a railway station and tips to booking clerks for obtaining freight cars, which are eliminated in road transport. The actual difference between the costs of rail and road shipments is thus not as high as it may appear at the outset.

The use of truck fares is justified on an additional ground, i.e., the increased popularity of truck transport for short-distance hauls. Very few reliable statistics are avail-

[12] Throughout this book the term "transport costs" or "shipment costs" is used to include (1) costs of handling at the place of origin and at the destination of the shipment and (2) other incidental costs incurred in shipment, such as handling charges, local taxes, and postage.

Table 6. Costs of shipping a quintal of wheat from Punjab markets to Delhi

Items	Khanna	Moga	Barnala	Kot Kapura	Jagraon
	Rs per quintal				
I. Mandi expenses					
1. Unloading, cleaning	0.22	0.25	0.22	0.28	0.12
2. Weighment	0.10	0.10	0.10	0.18	0.24
3. Cartage	0.18	0.13	0.15	0.12	0.12
4. Loading	0.08	0.05	0.05	0.05	0.05
5. Filling bags	0.04	0.04	0.06	0.04	0.06
6. Stitching and twine	0.04	0.03	0.02	0.02	0.02
7. *Dara* labor	0.00	0.00	0.16	0.00	0.00
Total of items 1 to 7	0.66	0.60	0.76	0.69	0.61
	Percentage of value of wheat				
II. 8. Commission of commission agent	1.5	1.5	1.5	1.5	1.5
9. Commission of local wholesaler	0.075	0.075	0.075	0.075	0.075
10. Market fee	0.04	0.04	0.04	0.04	0.04
11. Sales tax	1.5	1.5	1.5	1.5	1.5
Total of items 8 to 11	3.115	3.115	3.115	3.115	3.115
	Rs per quintal				
III. 12. Truck charges to Delhi*†	3.00	3.40	3.50	3.20	3.00
or					
12(a). Railway charges to Delhi†	1.00	1.67	1.43	1.57	1.50
12(b). Surcharge	3%	3%	3%	3%	3%
12(c). Illegal gratuities	0.06	0.06	0.06	0.06	0.06
	Rs per quintal				
IV. Expenses in Delhi					
13. Terminal tax			0.10		
14. Labor charges			0.06		

15. Cartage			0.25		
16. Storage costs			0.15		
17. Hundi charges			0.20		
Handling expenses in Delhi			0.76		
Total costs of trucking (in Rs)	4.42	4.96	5.02	4.75	4.37
Shipment‡	+ 3.115%	+ 3.115%	+ 3.115%	+ 3.115%	+ 3.115%

* Includes goods tax.

† Truck and railway charges are for 1967. It was stated by traders that truck charges have increased substantially in the last ten years. The truck charge to Delhi in 1962–1963 was about Rs2.00 to Rs2.50, depending on the distance.

‡ If the wheat price is Rs40 per quintal, the cost of movement from Moga to Delhi will be approximately Rs6.20 per quintal by road, and if the price is Rs55 per quintal, the cost of movement will be approximately Rs6.00 per quintal at 1967 truck charges. When allowance is made for lower trucking costs, Rs5.00 seems a reasonable shipping cost per quintal.

Source: Interviews with traders in Punjab and Delhi.

able on the quantities of grain moved by road in comparison with amounts moved by rail, although trucks are increasingly replacing freight cars for grain shipments wherever producing areas are connected to terminal markets by good feeder roads. The increased popularity of trucks can be attributed mainly to delays in obtaining freight cars and the consequent uncertainty in rail shipment. In the peak periods of marketing, i.e., in the immediate postharvest months, there is a particular rush for railway bookings. Cars are sometimes not available for a week or ten days, and in some cases for several weeks. Even after cars are available, a short-distance shipment of 300 miles, if goods have to be transshipped onto a different line, may take as long as three or four days. Trucks, however, haul grain on the same day.

There are other conveniences in the use of trucks. Goods are loaded directly at the warehouse and delivered to the door of the warehouse at the destination. The stack-

Table 7. Frequency distribution of differences between Delhi and primary market wholesale wheat prices, January 1955–November 1965

Market	Frequency (no. of weeks)	Less than 0	Rs per quintal							Total no. of weeks
			0–2.5	2.5–3.5	3.5–5.0	5.0–7.0	7.0–10.0	10.0–15.0	15 & above	
Moga	Absolute	119	256	91	49	43	8	3	0	569
	Percentage of total weeks	21.0	45.0	16.0	8.6	7.5	1.4	0.5	0.0	100
Khanna	Absolute	367	131	27	24	16	3	1	0	569
	Percentage of total weeks	64.5	23.0	4.7	4.2	2.8	0.5	0.2	0.0	100
Barnala	Absolute	51	189	101	109	75	37	7	0	569
	Percentage of total weeks	9.0	33.2	17.7	19.1	13.2	6.5	1.2	0.0	100
Kot Kapura	Absolute	98	271	89	63	35	11	2	0	569
	Percentage of total weeks	17.2	47.6	16.6	11.1	6.1	1.9	0.3	0.0	100
Jagraon	Absolute	191	232	60	54	23	8	0	1	569
	Percentage of total weeks	33.6	40.8	10.5	9.5	4.0	1.4	0.0	0.2	100

ing of goods in railway sheds and the consequent losses in movement can thus be avoided by road transport. Traders are particularly anxious about such losses in the monsoons. There are, however, several difficulties in using trucks for long-distance (or interstate) movement of goods. First, the costs of road shipment increase proportionately more rapidly than the increasing distance. Second, various official restrictions on truck operations, such as interstate licensing, have made the task of road shipment formidable if several state boundaries have to be crossed. Long-distance grain movements are, therefore, often slow and uncertain.[13]

A Case of Wheat Prices

Price differences between the primary markets and Delhi seem to have remained very low in the eleven-year period studied, 1954–1955 to 1964–1965. In Barnala, 9 percent of the time the price difference was negative, whereas in Khanna, as much as 64 percent of the time the difference was negative. Even when the difference was positive, most of the time it remained below Rs2.5 per quintal—not enough to cover transport and handling costs. When the price difference was above Rs2.5, most of the time it remained between Rs2.5 and Rs3.5 per quintal, barely enough to cover transport and handling costs. For the remaining period it remained between Rs3.5 and Rs5.0, i.e., just enough to cover costs of shipment and normal profits. A price difference above Rs5 per quintal may be termed excessive in that it provides an opportunity for excessive profits for traders. In all the markets the difference was that large only a few times and did not remain consistently large for any significant length of time.[14]

[13] From the day a shipment is loaded on a train in Moga it takes from ten days to two weeks for it to arrive in Bombay.

[14] Similar comparisons between Lyallpur (West Punjab) prices and Calcutta prices made as early as 1935 show similar results. Prices between the two markets occasionally show differences greater than transport costs. However, when a difference arose, it was followed by increased

In comparing relative price differences in various markets, it is seen that in Khanna and Jagraon prices remained below Rs3.5 per quintal more frequently than in other markets. This may be because Khanna and Jagraon are nearer to Delhi than are Moga and Kot Kapura.[15] It is, therefore, plausible that under competitive conditions, in order to make allowances for higher costs of transport, markets located farther away from the terminal centers need to have lower prices than do markets nearer the terminal market. It is quite likely that the prices in these primary markets remained lower because of very keen competition between various primary markets for acquiring a share of the terminal market shipments. Price differences between Khanna and Delhi may also appear to be slightly lower, as Delhi prices apply to the *dara* variety, whereas Khanna prices apply to a medium variety which is slightly superior to *dara*.

The comparison of Punjab and Delhi wheat prices thus strongly supports the hypothesis of high competitiveness in the grain trade and consequent small differences in prices where conditions of free mobility and homogeneity of product are fulfilled.

Unfortunately, prices for comparable varieties were not available for the Bombay market for the entire period studied. "Punjab" wheat prices were available for January 1956–April 1957. They are, however, not comparable to the prices of any specific variety in the markets in Punjab. Farm and *dara* prices were available for the later part of

wheat shipments from Lyallpur to Calcutta. See Government of India, Ministry of Food and Agriculture, *Report on the Marketing of Wheat in India*, 1937.

[15] In terms of road mileage, Jagraon and Barnala are equidistant from Delhi. However, as there is no direct road connection between Barnala and Delhi, the trucking costs from Barnala to Delhi are usually higher than those from Jagraon to Delhi (Table 6). Even railway charges are slightly higher for the Barnala–Delhi as compared to the Jagraon–Delhi run. This may be because Barnala is not located on any main line whereas Jagraon is located on the Ludhiana–Ferozepur line.

the period. Prices for a number of weeks were, however, missing for the farm variety. While *dara* prices were complete for a little over a two-year span, Sharbati prices were available for the longest time. Sharbati prices were recorded from January 1956–July 1964, except for one year (April 1957–April 1958). Differences between *dara* prices in Moga and Bombay were compared with differences between *dara* and Sharbati prices in Moga and Bombay respectively. Differences between *dara* prices in the two markets were available only for the later period.[16]

The magnitude of the price differences is fairly small when prices for the *dara* variety are compared in both the markets. For 80 percent of the time, the difference between Bombay and Moga *dara* prices was less than Rs10.0 per quintal. This difference was just enough to cover costs of shipment from Moga to Bombay.[17] For only 20 percent of the time, Bombay *dara* prices were higher by more than Rs10 per quintal than Moga *dara* prices. Even then, of 30 times when the price difference was above Rs10.0 per quintal, 26 times it was less than Rs15.0 per quintal. Only 4 times in 125 weeks did the price difference become excessive.
when prices for the *dara* variety are compared in both the
pared with *dara* prices in Moga during the same period, the differences are much greater ranging between Rs10 and Rs30 per quintal in most instances. The analysis once again confirms the contention that when prices for the same varieties of grain are compared in markets between which there is a regular flow, the price differences tend to be just enough to cover costs of shipment.

The analysis clearly indicates that the difference between Sharbati wheat prices in Bombay and *dara* prices in Moga was low in the period of free trade (1956–1957), increased significantly during the period of wheat zones

[16] See Occasional Paper 12, pp. 59, 62, 118, 180, and 242.

[17] See Occasional Paper 12, Table 3.6, p. 63, for costs of shipment from Moga to Bombay.

(1957–1961), and then declined significantly in the last period with the abolition of zones in 1961.

Table 8 shows off-seasonal prices in Bombay and Moga before and after the imposition of zones in the later years. The effect of barriers on price differences is self-evident.

Table 8. Off-seasonal wheat prices in Bombay and Moga before and after wheat zones (in Rs per quintal)

	Before zones		After zones			
	1964		1965		1966	
Month	Bombay*	Moga†	Bombay*	Moga†	Bombay*	Moga†
January	65–70	57.50	170–180	65.50	155–160	55.00
February	65–75	59.25	170–175	59.35	120–125	60.00
March	75–85	62.00	95–105	64.50	127–130	57.00
April	80–90	61.00	100–105	66.10	110–120	53.50

* The Bombay price range is for farm and Sharbati wheat.
† Moga prices are for the farm variety.

A Case of Jowar Prices: A Question about Price Records

A comparison of jowar prices in the six primary markets in Maharashtra with Bombay prices indicates that the difference between Maharashtra and Bombay prices remained above transport costs less than 2 percent of the time in the case of all six markets for a nine-year period. This raises a question about the price records.

The Bombay prices of jowar used in the preceding analysis were collected from the records maintained by the Grain, Rice, and Oilseeds Merchants' Association in Bombay. Primary market prices were obtained from the records maintained by the regulated market committees, of the most common prices prevailing in the market. The most common price is supposed to be the price at which the bulk of the produce is marketed. A similar comparison, made earlier, of Bombay jowar prices, collected from the Marketing Research Office of the Government of Maharashtra in Bombay, with the prices in primary markets of

Sholapur district for the same period showed an equally low difference between prices in the Sholapur markets and Bombay.[18] The two different sets of prices used for Bombay show equally small price difference between various primary markets and Bombay. Any doubts about the price data are therefore justifiably directed toward the primary market prices. Is this low level of price difference due to an overstatement of the most common price in the primary market? Kulkarni, in his study of paddy prices in Ghoti market, suggests that there is a likelihood of such an overestimation of primary market prices, because of the method used by the market committee in recording most common prices. In Ghoti market "the most common price as recorded by the Market Committee is neither the price prevailing in the largest number of transactions nor the price at which bulk of the produce is sold. It is simply the price prevailing in a single transaction in which the largest quantity is sold!"[19] Kulkarni further states that the local supply has a significant influence on the price paid for the largest consignment marketed in bulk. However, even with this knowledge, it cannot be established that the bias in the most common prices as recorded by the market secretaries is consistently upward. It is also difficult to conclude anything about the relationship, if any, between the price of the largest consignment and that at which the bulk of the produce is sold. Nor is it known whether market secretaries, who are responsible for the maintenance of price records, follow the same practice in all markets. Finding out would indeed be a tedious task, involving a study of a number of individual transactions in a fairly large number of markets for a sufficiently long period of time.

The conclusion emerging from this analysis is, therefore,

[18] Lele, "Traders of Sholapur."

[19] A. P. Kulkarni, "Prices of Paddy in the Regulated Market of Ghoti," *Artha Vijnana*, VII (March 1965), 19.

that the price data for comparable varieties of jowar, as recorded by agencies in these primary markets and Bombay, show price differences which are usually not enough to cover the costs of shipment. This may not necessarily imply that there is actually no shipment of the grain between markets when the price difference is less than the costs of shipment, for even within a week when the difference between the most common prices (as recorded in the two markets) is less than transport costs, some transactions can be visualized as occurring at prices other than the most common prices. For example, it is conceivable that some jowar was purchased in the primary market at a price lower than the most common price in that market and sold in Bombay at a price higher than the most common price in Bombay. It must also be emphasized that here the analysis of price differences pertains to weekly quotations. There is sufficient time in a week to ship consignments from the primary markets to Bombay at prices other than the most common price.

One would also have to examine the prices prevailing in various terminal markets to which a single market ships its supplies, and examine price differences between these various terminal markets and the specific primary market, in order to reach a conclusion about the profitability of intermarket shipments. A study of the working of markets indicates that traders in terminal markets constantly keep in touch with price movements in primary markets (and traders in primary markets, with movements in terminal markets) to take advantage of a sudden drop in the price in a primary market (or a rise in the price in the terminal market) before moving supplies.[20] There is also the possibility of a time lag in an intermarket shipment (for

[20] A study of the prices in two terminal markets (Bombay and Kolhapur) made earlier, for example, indicated that shipping to Kolhapur from Sholapur district was much more frequently profitable than shipping to Bombay. See Lele, "Traders of Sholapur," pp. 267–268.

example, a purchase in the season and shipment to the terminal points in the off-season) which needs to be examined to complete the analysis. This possibility will, however, be best examined in the analysis of seasonal price movements.

Despite the limitations of the price data, the analysis of Bombay and Marathwada prices indicates that when there is a free flow of supplies toward a single terminal market from various producing centers, and from a single producing center to various terminal points, the price difference between a producing region and any of its terminal markets is not likely to remain above transport costs for any continuous period of time. An increase in the terminal market price or a decline in the primary market price is corrected through increased shipments from the latter to the former.

Cases of Rice Prices

West Bengal. It will be noted that the price difference between Calcutta and the primary markets was not always positive. In Ahmadpur the difference remained negative about a third of the time, whereas in Burdwan it remained negative about a fourth of the time.

Considering only the positive difference, the price differences between Calcutta and Burdwan, and between Calcutta and Guskara remained lower when compared to the other three markets.[21] This could partly be a result of the fact that Burdwan and Guskara are nearer to Calcutta than the remaining three markets are.[22] It is, therefore, possible that in order to be competitive with Burdwan and Guskara, the price levels in the other three markets had to be slightly lower to make up for the slightly higher transport costs to Calcutta.

The price difference between the remaining three mar-

[21] Similar comparisons of Burdwan and Sainthia prices with Calcutta prices for the period January 1955–December 1958 show that the price difference remained negative 77 percent of the time in Burdwan and 78 percent of the time in Sainthia.

[22] See Figure 10 for distances and location.

kets and Calcutta, however, remained greater than transport costs much more frequently than in the other two markets: e.g., during the same period of time, price difference between Burdwan and Calcutta, and between Guskara and Calcutta remained above Rs4.00 per quintal for only 21 weeks and 31 weeks respectively, whereas the difference remained above Rs4.00, 129 times in Bolpur and 82 times in Sainthia. In the case of Ahmadpur the difference remained above Rs4.00 for 56 weeks of a much shorter period covered in the analysis.

This phenomenon may be partly a result of the relatively poorer transport facilities between Calcutta and the three markets in Birbhum district.[23] Burdwan and Guskara are well linked with Calcutta both by road and rail. The Grand Trunk Road, a major national highway, passes through Burdwan. However, Birbhum district was at a disadvantage during the period of this study because it was poorly connected by roads to the neighboring areas.[24] An overwhelming proportion of the dispatches from the markets in this district were sent by railway.[25]

Tamil Nadu. In comparing prices between Madras and Kanchipuram, two price series had to be used, as one continuous series was not available for Madras. In both cases, prices are of first-sort rice. In both cases, prices in Kanchipuram were frequently higher than or equal to Madras prices. Less than 25 percent of the time the price difference was positive. Only in 36 of 425 weeks did the price difference increase above Rs5.00 per quintal. Even then, the

[23] See Chapter 2, the sections "Rice Markets in West Bengal" and "Rice Markets in Tamil Nadu," for a discussion of transport facilities and location of markets.

[24] It should be noted that a bridge over the Ajoy River, connecting Birbhum district with Calcutta, was built only in 1961.

[25] See *Report on the Pace and Pattern of Market Arrivals,* West Bengal section, p. 135, and "A Brief Report on Arrivals, Stocks, Prices, etc., in the Rice Market at Bolpur, West Bengal," Agro-Economic Research Centre, Visva Bharati, Santiniketan (unpublished manuscript), for discussion of transport problems.

difference did not remain continuously above shipment costs. The fact that Kanchipuram prices were frequently higher than Madras prices may be due to speculative bidding by Madras and local traders in Kanchipuram market—a situation similar to that noted about Thanjavur-Kerala prices earlier. To complete the analysis of price differences, the margin between prices of rice in Madras and of its paddy equivalent in Kanchipuram was calculated. The result indicated that although it was rarely profitable to purchase rice in Kanchipuram for shipment to Madras, it was profitable to purchase paddy locally for sale as rice in Madras.

The difference between prices of rice in Madras and of its paddy equivalent in Kanchipuram was positive much more frequently than the difference between rice prices in Madras and Kanchipuram. Considering milling costs of up to Rs3.00 per quintal of rice, shipment costs of about Rs 2.75 plus commission, and sales tax, the difference of about Rs6.00 to Rs8.00 per quintal must have been just enough to purchase paddy in Kanchipuram and sell rice in Madras.[26] For 17 of the 185 weeks for which prices were studied, price differences remained within such a range. For 22 weeks (i.e., 12 percent of the time) the difference even increased beyond this margin and provided an opportunity for windfall profits. However, even when the margin was above Rs8.00, it remained less than Rs15.00 per quintal. Nor was the margin consistently very high for a long stretch of time. This suggests that when the margin increased, there was an increased flow of shipments and a subsequent decline in the price difference.

Seasonality in Price Differences

The question of whether excessive price differences between the terminal markets and the primary markets show a marked seasonality is of little interest in the case of Punjab-Delhi and Marathwada-Bombay prices, as differ-

[26] See Chapter 6, the section "Actual Milling Costs."

ences were rarely higher than transport costs between the two sets of regions. Prices remained above Rs5.00 per quintal less than 4 percent of the time in Khanna. Even in Barnala, which showed greater price differences from Delhi than did Khanna, they remained above Rs5.00 only 20 percent of the time; for 13 percent of that 20 percent they remained below Rs7.00. The price differences above Rs 5.00 per quintal were fairly well distributed over a market year in Punjab and did not show any marked seasonality.[27] For even during the harvest season when arrivals are heavy, trucks are easily available, though freight cars may be difficult to acquire. Because of the proximity of Delhi to two major wheat regions—Punjab and Uttar Pradesh—Delhi prices do not show rises that are out of line with those in the nearby producing centers.

The question of seasonality is as little exciting in the case of Punjab-Bombay prices, since prices of *dara* varieties did not show great disparities in the 1961–1964 period. Unfortunately, no data are available for *dara* prices during the earlier period of free trade. However, occurrences of excessive price differences are well spread out during the whole of the later period. Prices rose above Rs15 per quintal in Bombay only at the end of 1964, when there were (1) general scarcity, resulting from a poor harvest and off-season, and (2) talk of impending restrictions.

Differences between *dara* and Sharbati prices are of con-

[27] When the price differences increased above Rs5.00 per quintal between these markets, 60 percent of the time the increase in the January–June period, and 40 percent of the time in the July–December period. In contrast, similar comparisons between Lyallpur–Calcutta prices and Lyallpur–Karachi prices for 1930–1936 showed a marked seasonality in differences. Differences increased in the immediate postharvest period when the primary market experienced a sudden dip in prices. Terminal market prices declined only after a lag, when the effect of increased shipments from surplus regions was felt. Differences also increased somewhat at the very end of the off-season, when stocks from the earlier season dwindled and new arrivals had not yet reached the market. See *Report on the Marketing of Wheat in India,* 1937.

siderable interest because of their very great magnitudes. During the first period, i.e., January 1956–April 1957, price differences showed a marked rise. This could have been a result of two factors: (1) January–April is the period when the stocks from the previous harvest are almost exhausted. The new harvest does not come in until March in Maharashtra, and until April in the north. (2) Although the zones were enforced after April 1957, there was a great deal of speculation in the market about new restrictions on the movement of wheat. This created a scramble in Bombay, which is located in the midst of a markedly food-deficient state. Since the shortage was coupled with an off-seasonal period, it must have caused the rise in prices in Bombay.

There is no marked seasonality in the price differences in the later period of free trade. Excessive differences above Rs20 per quintal are rather well spread throughout the year.

In Maharashtra, jowar prices in Nanded showed greater differences from Bombay than did any other market. However, even here, the price difference was excessive (i.e., greater than shipment costs) only 4 percent of the time in a 9-year period. The excessive price differences were spread more or less evenly over the market year in Maharashtra.

The seasonality of price differences is of much greater interest in West Bengal, where disparities were greater than in Punjab and Maharashtra. An analysis of price differences in West Bengal shows that the excessively high price difference (arbitrarily defined as a difference above Rs6 per quintal between the two markets) occurred most frequently between November and February, a peak period of marketing in West Bengal. The excessively high difference was completely restricted to the November–February period in Burdwan, Guskara, and Ahmadpur, and 80 percent of the time it occurred between November and February in the Bolpur and Sainthia markets.

Various explanations for the phenomenon of a concentration of high price differences in the November–February period seem plausible.

1. Prices reach an off-seasonal high in October–November in West Bengal both in the primary and the terminal markets. However, when the harvest of the new crop commences, the prices in the primary markets show a downward tendency a week or ten days before those in the terminal markets. Arrivals of the new crop discourage traders from offering high prices for the old paddy. Prices in the terminal markets follow suit only after a time lag, when the impact of the new crop is felt on the supplies in the terminal markets. Some lag in the prices in terminal markets may also be due to the high demand for old rice by consumers in terminal markets.[28]

2. Even if the two markets are well linked by good transport facilities, there is usually heavy pressure on railway cars and trucks when heavy arrivals start pouring into the primary markets in January and February. Prices thus reach a seasonal low slightly earlier in the primary markets. Terminal market prices follow the trend only when the impact of the new crop is felt on the supplies in the terminal markets. The time lag is even greater when transport bottlenecks prevent a free flow between markets.

There are several additional factors, such as heavier milling losses due to wetness of paddy and a greater drying factor, that result in a great margin in the immediate post-harvest period. Such differences are temporary, however, and correct themselves with the movement of goods between markets.

Excessive price differences, therefore, appear to have been completely restricted to this period in the Burdwan district. In Birbhum, however, excessive price differences, it was noted, occurred occasionally during the rest of the year. Owing to poor road transport facilities between Birbhum and Calcutta movement was limited to rail shipment,

[28] See p. 160.

so that when railway cars were not available and the supplies could not be shipped by trucks, the markets must have experienced depressed prices, which could be corrected only with a free flow of commodities. Although no evidence is available to support this contention, it was advanced as a possible explanation by the traders interviewed.[29]

Rice prices in Madras showed similar seasonality in price disparities. In all three years, disparities occurred between the end of December and the middle of February, i.e., at the time of the *samba* crop. As elsewhere, this pattern in seasonality seems to have been caused by a sudden downward trend in prices in the primary markets with the coming of the new harvest. The drop in prices is followed only in the terminal market by a time lag. The sudden depression in Kanchipuram prices may also have been a result of transport bottlenecks and a lack of trucks and freight cars which resulted from a rush in the shipments.

Trend in Regional Price Disparities

Price differences between regions may be studied over a time period in an effort to determine whether there has been an increasing or a declining trend in regional disparities. Neither trend has been noted in the case of Punjab-Delhi and Marathwada-Bombay prices.

Periods of free flow between Bombay and Punjab have not been long enough at a stretch to indicate any particular trend. Besides, prices have been influenced by rumors of restrictions, crop failures, and various other factors which are difficult to isolate. However, considering the presence of these elements, price differences do not seem to show either a marked increasing or declining trend. Table 9 shows the percentages of times the price differences in West Bengal remained in various classifications in the two

[29] See Chapter 6, the section "Actual Milling Costs."

Table 9. Trend in price differences between terminal and primary markets, West Bengal, 1955–1963 (in Rs per quintal)

Market	Period	Percentage of time price difference between Calcutta and primary market remained less than			
		0	0–4	4–6	6 & above
Burdwan	Dec. 1955–Dec. 1958	78	17	3	2
	Nov. 1959–Dec. 1963	27	63	5	5
Guskara	Dec. 1955–Dec. 1958	77	19	4	0
	Nov. 1959–Dec. 1963	19	61	11	9

time periods studied. The comparison of Kalma prices in Burdwan and Guskara markets with the Calcutta prices of Kalma varieties for the two periods 1955–1958 and 1959–1963 indicates that the price difference remained negative much more frequently in the earlier than in the later period. The price difference remained positive during most of the later period. The frequency of excessive price differences (arbitrarily defined as being above Rs6 per quintal) increased slightly in the later period. Although the price difference remained positive during most of the later period, it remained between Rs0 and Rs4.00 per quintal (i.e., just enough to cover transport and handling costs and a nominal commission) most of the time. Thus, despite a trend of rising price difference between the two primary markets and the terminal market, the price disparities remained commensurate with the rising transport costs and rarely stayed exorbitantly high. It is difficult to determine whether this increase in the price difference in the later portion of the period studied was entirely independent of the rising transport costs. It is plausible that it was a consequence of the steep rise in the costs of trucking, which has increasingly taken the place of rail traffic in these two markets.[30]

[30] Although trucking costs have usually increased more rapidly than railway costs, trucks have been successful in replacing the railroad for

Because of the lack of a continuous long-run price series for comparable varieties, it is difficult to present any systematic analysis of trends in intermarket price differences in Tamil Nadu. However, a rudimentary analysis of the price series for Tiruchirapalli and markets in the Thanjavur district suggests that prices of similar grades of rice and paddy between markets most of the time did not differ by more than Rs4.00 or Rs5.00 per quintal. Nor is there any evidence of an increasing trend in the price difference.

A Concluding Remark

An examination of a vast body of price data for comparable varieties of rice, wheat, and jowar in the four major states over a ten-year period generally reinforces the hypothesis of a high degree of competitiveness in regional trade. The regional price spreads, as estimated from the recorded weekly wholesale price data, are generally commensurate with the costs of movement between the primary and terminal markets. In the few cases in which price differences between markets increase, the disparities are confined to the immediate postharvest period, since prices in producing areas reach the seasonal low sometime before those in the terminal markets and since the time lag between the seasonal low in the primary and terminal markets is accentuated by transport bottlenecks occurring in the postharvest period. There is no widespread evidence of an increasing trend in the price spread between primary and terminal markets. In the single case where it was noted, it seems to have been due to (1) an increase in the costs of road transport and (2) considerable replacement of rail traffic by road traffic.

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short-distance hauls, mainly because of quick delivery of goods, which greatly reduces uncertainty in intermarket transactions.

CHAPTER 5

Cereal Storage and Seasonality of Cereal Prices

The seasonal behavior of price and stock movements constitutes the second most important indicator of the efficiency of a marketing system. The analysis of regional efficiency in Chapter 4 used theoretical concepts based on perfect knowledge and certainty. Seasonal analysis, however, must differ from analysis of regional efficiency, first, because the traders' knowledge of crop size is not as perfect as their knowledge of regional price differences; and second, because there is not as much certainty of the outcome of seasonal decisions as of spatial shipments, owing to the time factor involved, which allows the introduction of several elements that do not exist at the time a decision is reached. Our analysis of seasonal price movements considers the effect of these two factors on efficiency.

This chapter surveys crop seasons and analyzes seasonality of market arrivals, stocks, and prices of rice, wheat, and jowar. The degree of seasonality in the price of each of the cereals is considered in relation to the costs of storing grain between harvests, in order to examine the profitability of storage operations. The resulting estimates are further compared with the profit and loss statements and stock records collected from the stock books of traders, in order to investigate the actual profits that they are likely to have earned. Ultimately, we analyze the degree and pattern of seasonality in the cereal prices in terms of the size and pace of marketings, the level of production,

and various official policies. The analysis is confined to the same primary markets studied in the earlier chapters, and applies to the period between 1955–1956 and 1964–1965.

Crop Seasons

Two well-defined crop seasons exist throughout northern and central India. The autumn, or kharif, crop is sown at the beginning of the rainy season (June–July) and is harvested in autumn (between October and December). A major portion of the annual rice, jowar, and bajra crop is grown in the kharif season. The rabi, or spring, crop is sown in autumn and harvested at the end of the cold weather. Wheat, gram, linseed, rape, mustard, and barley are the major rabi crops. In Maharashtra, jowar is also grown in the rabi season. In southern India, where northeast monsoons bring rain between October and January, there are numerous cropping seasons. The principal harvests in India extend from October to February for rice, from February to April for wheat, and from October–November to February for jowar.

In Punjab, all the wheat is grown in the rabi season and is harvested in April. West Bengal grows over 90 percent of its total rice production in autumn. The crop is harvested between November and January. The remaining 10 percent of the crop is harvested in September. The summer crop, which is sown between November and January and harvested between April and June, is insignificant in this region.

In Tamil Nadu, where a wide range of natural conditions prevail, sowing and harvesting of paddy go on almost all year. At least five harvest seasons have been noted in a year. An early crop, known as *kar-samba,* is harvested in August and September in Kanyakumari and parts of Tirunelveli district. An early *kar,* or *kuruwai,* crop is harvested in September–October in parts of Thanjavur, Madurai, Tiruchirapalli, and Tirunelveli districts and in

Chidambaram taluka of South Arcot district. An early *samba* crop is harvested in December–January. It is raised in Thanjavur district and is a major single crop in Tirunelveli district, where it is irrigated by river-fed channels and rain tanks in all parts of the state. A late *samba* crop is harvested in February–March in Thanjavur, Tiruchirapalli, Madurai, Tirunelveli, South Arcot, North Arcot, and other districts where long-duration paddy is irrigated by tanks, channels, and wells. A hot-weather crop is harvested between April and June. It is raised as a second crop in the portions of Madurai, Ramanathpuram, North Arcot, Chingleput, and South Arcot districts that depend upon the availability of water in wells and tanks. A major portion of the paddy is harvested between October and January in these districts. This period has two major harvests, namely, *kuruwai* in October and early *samba* in November and December. Tirunelveli and Chingleput raise substantial amounts, in proportion to their total production, of late *samba* paddy maturing in February–March, although in absolute terms, the crop size is not comparable to that in Thanjavur.

While there are two major harvests in Thanjavur, Tiruchirapalli, and Tirunelveli (*samba* from November to February, depending on whether maturing is early or late, and *kuruwai* in October), the rest of the districts (Chingleput, South Arcot, and North Arcot) have a single major harvest of early and late *samba* varieties.

Jowar is raised in two seasons in Maharashtra. Rabi jowar is sown in October and harvested in February–March. Three major types of kharif jowar are raised in the Marathwada region. The long-maturing kharif jowar is known as *varadi*. It is sown in July and harvested in November. The inferior early-maturing kinds are known as yellow and *malli* jowar. They are also sown in July but are harvested in October. *Malli* jowar is more prevalent in the hinterlands of Latur market. Its arrivals are quite insignificant in the other five markets.

Seasonality of Arrivals

Wheat in Punjab

The proportion of grain marketed in the immediate postharvest period has frequently been used as an index of the holding power of the cultivator, on the assumption that the higher the holding power of the cultivator, the lower the proportion marketed in the immediate post-harvest months when the market price is low.[1]

Figure 17 shows four-month wheat arrivals as percentages of the total wheat marketings in a year in the five wheat markets in Punjab. These are average percentages for the 1955–1956 to 1965–1966 period. Wheat is harvested in the middle of April. Market arrivals increase in May, remain particularly heavy in June, and taper off in July. In the earlier years, marketings commenced earlier in Khanna and were heaviest in May. In more recent years, however, they have been heavier in June, as in the other four wheat markets.

In these markets 63 to 73 percent of the arrivals were brought to the market between May and July, although there was some year-to-year variation in the proportion of arrivals marketed until July.[2] A study of the lowest and

[1] See, for example, *Report on the Marketing of Wheat in India*, 1963, p. 22. The report studies five markets in Punjab (Ambala, Jullundur, Abhor, Bhatinda, and Hissar) for seasonality of arrivals. On the basis of a three-year average (1954–1955 to 1956–1957), the report concludes that only a little over a third of the arrivals are brought to the market during May, June, and July. The report then compares these figures with similar prewar estimates for two other markets in West Punjab (Lyallpur and Gojra) for which data were available. After similar comparisons of prewar and postwar arrivals for a few markets in each major wheat-producing state, the report concludes that there has been a definite improvement in the holding capacity of the cultivator in Bihar, Madhya Pradesh, Punjab, Gujarat, and Maharashtra over that of the prewar years.

[2] These proportions are much higher than the Ministry's figures for other Punjab markets. However, even for the period 1954–1955 to 1956–

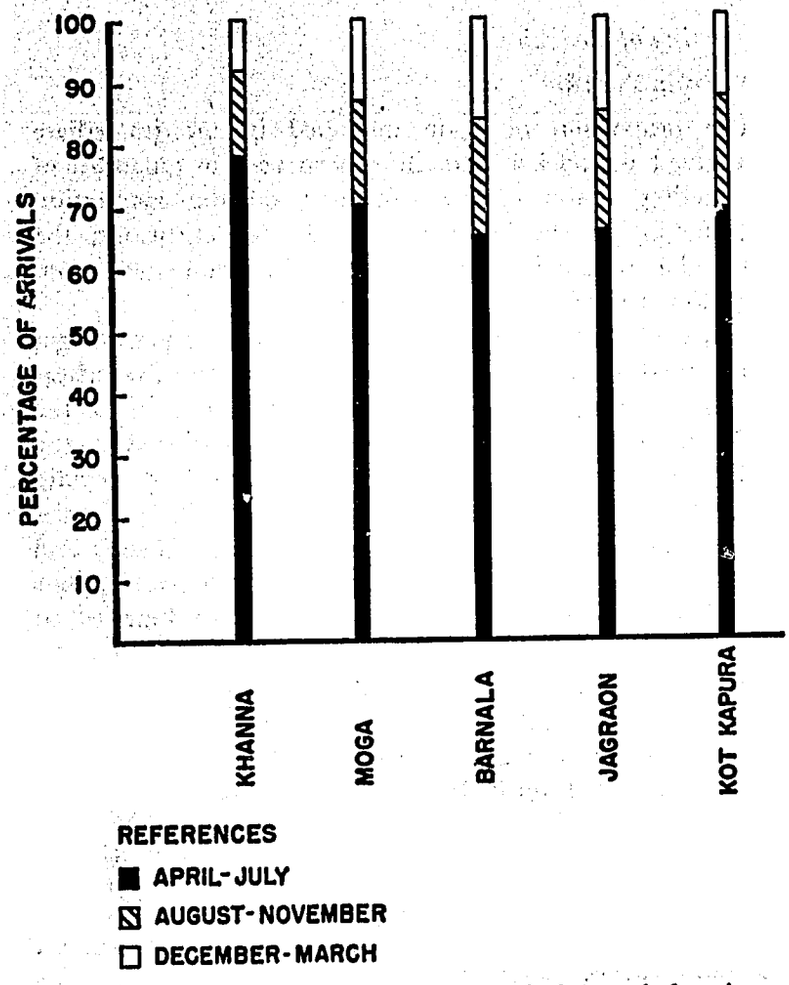

Figure 17. Average four-month percentages of wheat arrivals, primary markets, Punjab, 1955–1956 to 1965–1966

Source: Data from Agricultural Produce Market Committees, Punjab.

the highest proportions marketed during the ten-year period indicates that, even in the years when cultivators withheld their supplies in anticipation of better prices later in

1957, the years to which the Ministry's figures refer, percentages marketed are much higher in these markets.

the year, over half of the annual arrivals were marketed by the end of July. The lowest proportion marketed until July varied from 54 percent in Barnala in 1957–1958 to 67 percent in Khanna in 1955–1956. The highest proportion marketed ranged between 71 percent in Barnala and 84 percent in Khanna. Among the five markets, Barnala seems to experience the lowest degree of seasonality in arrivals, and Khanna the greatest.[3]

In spite of this variability among markets, all five markets show much greater seasonality in marketing than is generally thought to be characteristic of Punjab.[4] Nor is there any declining trend in the proportion marketed through July in the last eleven years for which arrival data are available.[5]

A comparison of the arrival data for these five important wheat markets with the data for various other markets in Punjab suggests that the proportion marketed varies greatly from one market to another. Therefore, it is difficult to generalize about an over-all decline in the seasonality of marketings.

The high seasonality of the arrivals also suggests that an improved holding capacity may not necessarily result in a decline in the marketings in the immediate postharvest period. Rather, the high seasonality may be due to various other factors. (1) Risks in stocking for the off-season may be too great from the viewpoint of a cultivator. He may, therefore, choose to sell the produce soon after the harvest. (2) Storage losses on farms may be significantly greater than

[3] The markets chosen by the Ministry for its report are at one end of a scale showing minimal seasonality, whereas Cummings' data for Khanna give an impression of excessively high seasonality, as Khanna experiences greater seasonality than most other markets (Cummings, *op. cit.*, p. 54).

[4] In fact, average proportions for these two markets are comparable to prewar estimates for the Lyallpur and Gojra markets in Punjab. See *Report on the Marketing of Wheat in India*, 1937.

[5] Regression equations fitted to the proportions marketed over the period do not indicate either an increasing or a decreasing trend.

those incurred by traders.[6] If this is the case, the off-seasonal price rise has to be sufficiently large to cover storage costs. The high loss factor, when coupled with high risks in predicting the off-seasonal price rise, would further reduce the desire to hold produce for the off-season. The statement that cultivators sell their produce soon after the harvest because their economic conditions force them to do so may not be altogether true, except for small cultivators. Their marketings, however, are generally a quite insignificant part of the total marketed surplus. The seasonality of the marketing may have been pronounced because cultivators chose to market their produce early.

A cultivator will, however, choose to market a smaller quantity if he finds that the harvest price is too low or that a high price rise is expected later in the year. His actions will be circumscribed by his knowledge of the market conditions. It is likely that, owing to a very restricted view of the grain market, a cultivator's decision to withhold supplies may not always be determined by rational factors. For example, cultivators are known to have withheld supplies when they found current harvest prices lower than in previous years, and therefore unjust.[7] The decision in this case was not based on the current years' market conditions. Under such circumstances, the behavior of cultivators and the quantities they market may be more erratic and less amenable to logical analysis.

It would, therefore, be interesting to find out whether arrivals have been more erratic in recent years.[8] Here, again, one faces the problem of generalization, as there is no uniform

[6] Cummings, in his study of Khanna market, suggests this to be the case, although he does not present any systematic data to support his contention (*op. cit.*, p. 77). The *Report on the Marketing of Wheat in India* (1963 edition) also states that losses due to vermin and weevil attacks and to dampness are higher in villages than with traders (pp. 145–153).

[7] See *Report on the Pace and Pattern of Market Arrivals.*

[8] In order to study fluctuations in the quantities marketed, it is necessary to examine arrival data for a sufficiently long period for the same markets. However, such data are not easily available.

pattern of year-to-year variation in marketing, either absolute or proportional, in these markets. In 1958–1959, the proportion marketed was substantially lower compared to the previous year in all the markets except Khanna, and in 1959–1960, in all five markets. However, in later years there was no such uniformity. The proportion was low in 1964–1965 in Khanna, Moga, and Jagraon. It was low in 1963–1964 and 1964–1965 in Barnala, and low in 1964–1965 and 1965–1966 in Kot Kapura.

This lack of uniformity may be due to the fact that the response of cultivators to a changing price structure is not the same everywhere. In some areas cultivators may withhold more for the off-season than in others. However, this is not the only factor. Lack of uniformity in the pattern may even have been due to intermarket flows about which we know very little.

On the basis of its arrival data, the *Report on the Marketing of Wheat in India* states that there has been a definite improvement in the holding capacity of the cultivator in Punjab in comparison to the prewar years. The evidence presented in this chapter suggests that there has not been an overall decline in the proportion of marketings in the immediate postharvest period in all the major markets. The proportion marketed in the immediate postharvest period is, however, by no means an indicator of the holding capacity of the cultivator.

Jowar in Maharashtra

In Maharashtra, rabi jowar arrivals are generally heavy between the end of February and the beginning of May (Figure 18). Arrivals of yellow jowar begin in October and are usually heavy in November. Arrivals of late-maturing *varadi* jowar begin in November and continue to be heavy in December and January. Jowar is usually stocked for three to six months between April and October (i.e., between the two harvest seasons).

It will be noted from Figure 18 that the average proportion

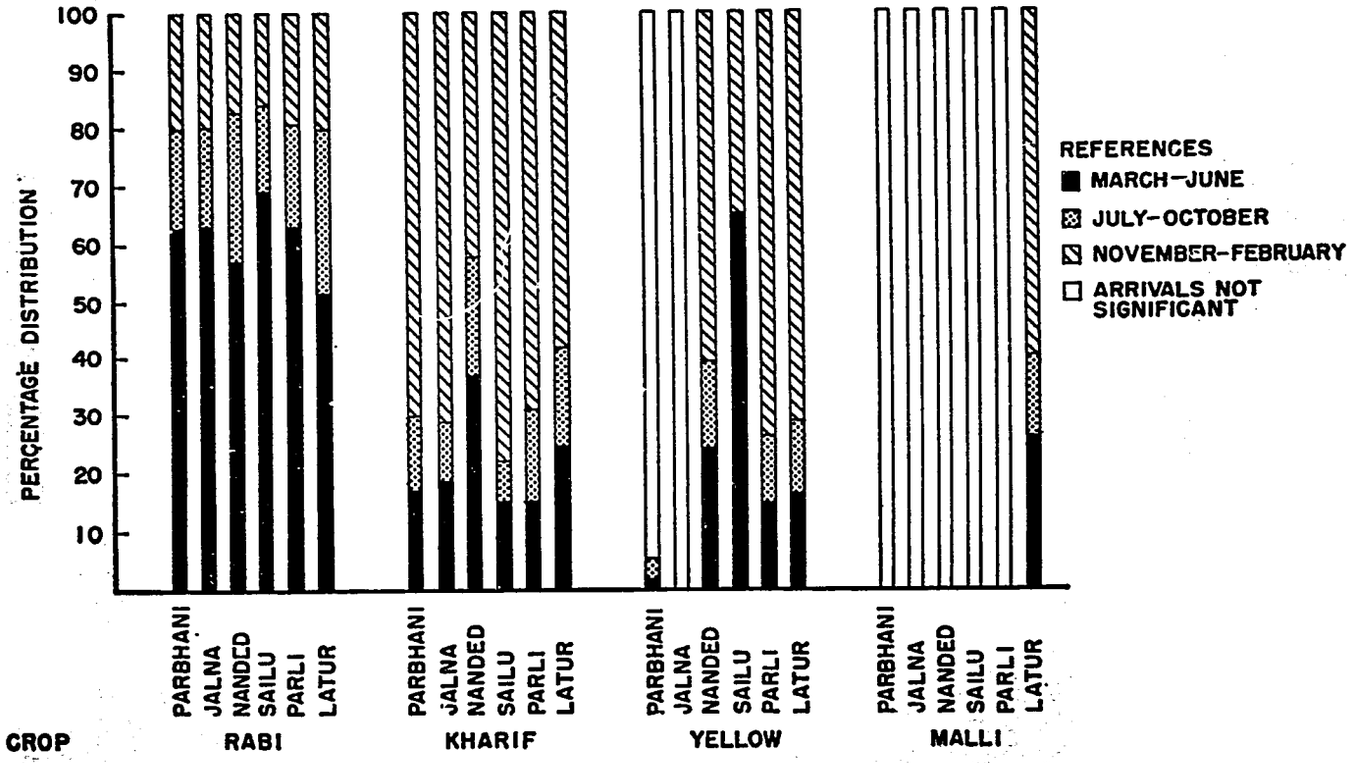

Figure 18. Average four-month percentages of jowar arrivals, primary markets, Maharashtra, 1955–1956 to 1965–1966
Source: Data from Agricultural Produce Market Committees, Maharashtra.

of both rabi and kharif jowar marketed in the peak marketing period is lower in Latur and Nanded than in the rest of the markets. This may be due to the fact that, compared to other districts, a very large proportion of the area under cultivation is allotted to cash crops in this region.[9] The cultivators may therefore have a somewhat greater holding capacity than those in the surrounding districts. The phenomenon in Latur, however, is mainly due to a substantial diversion of jowar to the nearby markets in the adjoining Sholapur district. Osmanabad district had been sending considerable amounts of jowar to Sholapur, where the prices are usually attractive. The district is connected to Sholapur by rail and road. Consuming centers like Kolhapur, Bombay, and Poona purchase a great deal of jowar from Sholapur, owing to good rail and road connections. In fact, the exports from Osmanabad to Sholapur are so large that although Sholapur is only a rabi district, the Barsi market in Sholapur attains a second peak of arrivals in November–December because of the flow of kharif jowar from Osmanabad.[10] The flow from Latur to Sholapur district is an indicator of two factors: (1) the intelligence available to traders regarding intermarket price differences and (2) their willingness to exploit such price differences through the movement of goods. All the markets show pronounced seasonality in the arrivals of yellow and *malli* jowar (Figure 18).[11]

[9] In 1956–1957, 55 percent of the total area cropped was under cotton and groundnut in Nanded district, as compared to 22 percent in Aurangabad, 10 percent in Bhir and Osmanabad, and 27 percent in Parbhani.

[10] The rabi and kharif arrivals show greater seasonality in the Marathwada markets than in those in Sholapur. However, this is because the arrival figures are reported according to crops in these markets whereas rabi, kharif, and yellow arrivals are all lumped together in the Sholapur district. See Lele, "Traders of Sholapur."

[11] Only the Sailu market shows a high proportion of yellow jowar arrivals in the March–June period. Very small quantities of yellow jowar are reported in the Sailu market, and in some years, arrivals are reported only in the March–June period. This results in excessive weighting of

Paddy in West Bengal

No reliable information is available on paddy arrivals in the primary markets in West Bengal. As most of the marketed surplus passes through rice mills, quantities purchased by the milling sector in the primary markets should give some idea about the seasonality of the market arrivals. Such data, however, could not be collected because of (1) a lack of comprehensive records in most of the mills[12] and (2) the unwillingness of the millers to part with milling records.[13] Whatever is discerned about seasonality is therefore based only on secondary data.

The amount of rail and river-borne traffic in rice and paddy during the postharvest months as a proportion of the annual traffic is most commonly used as the index of seasonality in paddy marketing. Data for six years of the prewar period for three major areas trading with Calcutta indicate that 50 percent of the total annual arrivals of paddy and rice moved to Calcutta during the January–April period. Paddy arrivals in Calcutta were heaviest in January and February (28 percent of the annual total), while the rice movement was heaviest in February and March (also 28 percent). Arrivals diminished gradually after March, the months of the least activity being July and August in the case of paddy, and September to No-

those months and thus distorts the seasonal pattern. It cannot be said whether this seasonal pattern is a result of arrivals not being reported very carefully or whether there really is such an unusual pattern. It is likely that data have not been recorded with great care because the quantities are so insignificant.

[12] This is partly a result of the frequently changing ownership and/or management of most of the rice mills.

[13] Concealment of records is an old phenomenon. Even the Agro-Economic Research Centre at Santiniketan found it impossible to collect reliable market arrival data from traders and millers for their survey in 1958–1959 (*Report on the Pace and Pattern of Market Arrivals*). This attitude is more pronounced in periods of severe government restrictions. A very prominent rice miller in Bolpur was put in jail during my visit to the market in March 1967 for having supplied false records to the Civil Supplies Department.

vember in the case of rice. The degree of seasonality was slightly more pronounced for paddy than for rice.[14]

Data for more recent years assembled by the Agro-Economic Research Centre at Santiniketan indicate several interesting aspects of marketing in West Bengal. The data collected in 1957–1958 and in 1958–1959 from six hinterland villages around Bolpur and Saktigarh show that the heaviest proportion of the arrivals is marketed in the first two quarters (i.e., between November and April). The proportion marketed in the two years in Bolpur was 67 percent and 74 percent of the annual arrivals. It was 71 percent and 74 percent in Burdwan.[15] Estimates of total arrivals during the following year are not available from the center's follow-up study of 1959–1960. However, the data for the first quarter (December–February) confirm the high seasonality in mill arrivals.[16] The investigation also suggests that (1) the poorer the crop, the higher the proportion marketed in the early part of the market year, and (2) there is a distinctly different pattern of marketing between a small and a large cultivator. Small cultivators were observed to have marketed their surplus earlier in the season, probably because of relatively low staying power. The data also indicated that in recent years, larger landowners have been further delaying the disposal of their surplus to the latter part of the year.[17] This behavior of medium and large cultivators, because of its unpredictable nature, has had a considerable destabilizing effect on supplies and prices. The study also shows that a high proportion of the postharvest arrivals between December and February was converted into rice and shipped to Calcutta in those three months. In 1959–1960, the dispatches constituted 69 percent

[14] Government of India, Ministry of Food and Agriculture, *Report on the Marketing of Rice in India*, 1955, pp. 23–24.

[15] *Report on the Pace and Pattern of Market Arrivals*, p. 134.

[16] "A Brief Report."

[17] *Report on the Pace and Pattern of Market Arrivals*, p. 134. E.g., the proportion marketed in the fourth quarter increased at the cost of the proportion marketed in the third quarter.

of the arrivals in mills.[18] These estimates corroborate other data which show that the utilization of milling capacity in West Bengal is highly seasonal.

Paddy in Tamil Nadu

In Tamil Nadu, marketing seasons vary from region to region according to the harvest seasons in the areas. Markets in South Arcot, North Arcot, and Chingleput usually experience a peak period of marketing between January and March. The lean season is usually between June and August. Markets in Thanjavur and Tiruchirapalli have two marketing seasons: January to March, when *samba* paddy is marketed; and October, when *kuruwai* is marketed. The marketing season commences somewhat later in Tirunelveli. The first season is between March and April, and the second between October and November.

Figure 19 shows quarterly arrivals of paddy and rice in Cuddalore, Kumbakonam, Tirunelveli, and Mannachanallur as percentages of the total annual arrivals in 1961. The available data do not show a marked seasonality in the marketing of paddy and rice. This may be for various reasons. Since a number of rice crops are grown and are spread throughout the year, it is likely that there is a more steady flow of arrivals than is generally noted for wheat and jowar or rice in other parts of India. An important explanation is also derived from the organization of rice and paddy marketing in Tamil Nadu. As was discussed earlier, a large proportion of the marketed surplus is assembled by the village agents directly at the paddy fields, whereas the arrival data record only the arrivals coming to a primary market. The data, therefore, exclude a substantial amount of paddy that is directly purchased by millers from the villages.[19] It is likely that sales by cultivators show a much greater seasonality than is indicated by the primary market data.[20]

[18] *Ibid.*

[19] See *Report on the Pace and Pattern of Market Arrivals*, pp. 248–290, for evidence.

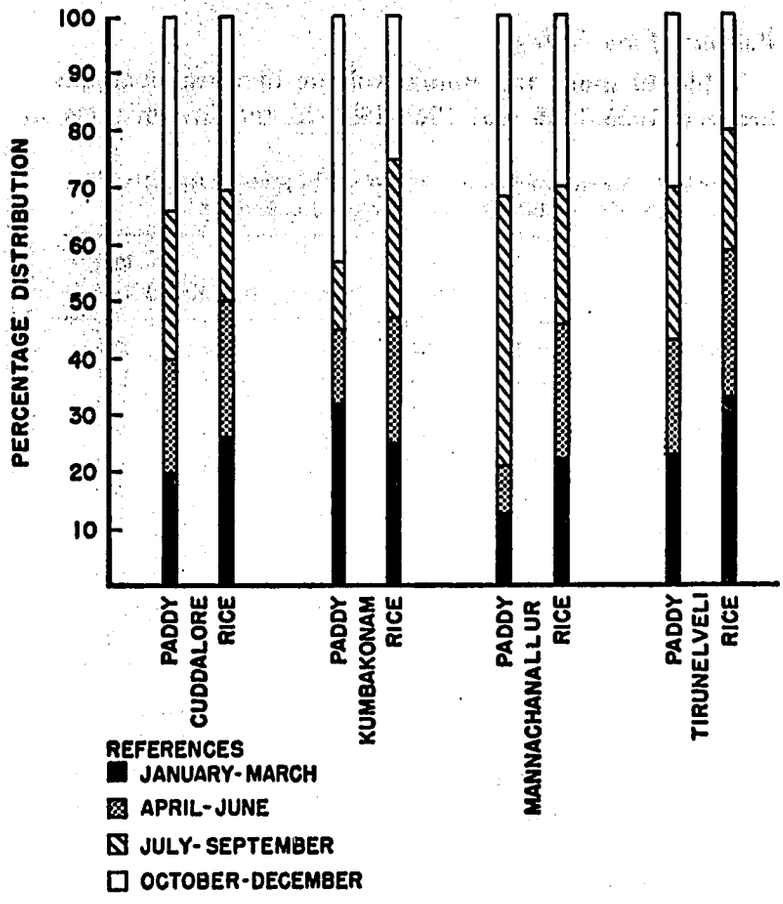

Figure 19. Average quarterly percentages of rice and paddy arrivals, primary markets, Tamil Nadu, 1961

Source: Data from Government of Tamil Nadu, Department of Statistics.

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[20] *Ibid.*, pp. 291–328. Another study, made by the Agricultural Economics Research Centre in Madras, however, contends that there is no pronounced seasonality in the marketing of paddy in Tamil Nadu State, as there is in other states. Their conclusions seem to be based on the same kind of data that is presented here. These data seem too inadequate in themselves to arrive at conclusions ("A Decade of Prices of Rice in the Southern Region").

Volume of Marketings

Table 10 shows the annual volume of wheat marketings between 1955–1956 and 1965–1966 in the five markets in

Table 10. Annual volume of wheat arrivals, primary markets, Punjab, 1955–1956 to 1965–1966 (in thousand quintals)*

Year	Khanna	Moga	Jagraon	Barnala	Kot Kapura
1955–56	165	284	81	120	144
1956–57	149	330	76	127	157
1957–58	206	354	121	192	189
1958–59	176	323	113	155	209
1959–60	117	297	91	169	153
1960–61	132	393	149	181	200
1961–62	292	412	423	228	225
1962–63	350	422	417	249	314
1963–64	315	450	460	209	292
1964–65	286	346	349	205	255
1965–66	306	468	448	320	253

* Rounded to the nearest thousand.

Source: Records of the regulated market committees, Punjab.

Punjab. Arrivals show substantial fluctuations from one year to another. However, there is no consistency in the year-to-year movement of arrivals between markets; i.e., arrivals do not decline or increase in comparison to the previous year simultaneously in all the markets. While arrivals in some markets increase over those of the previous year, in other markets they decline. This may be owing to shifts in the outlets preferred by shippers in the nearby smaller primary markets. The rates of increase were calculated for market arrivals and wheat production in the districts in which the markets are located.

The trend lines in all of the cases show a good fit and highly significant *b* coefficients. Except for Jagraon, all the markets show a rate of increase of between 9 percent and 21 percent. Jagraon shows an increase of 61 percent per year.

And also with the exception of Jagraon, all the markets show rates of increase in arrivals that are more or less commensurate with those in the production in the surrounding district.

Arrivals in a market year also show a statistically significant relationship with preceding wheat production in the district.[21] It therefore seems that an increasing trend in the arrivals is due mainly to an increase in wheat production. It should, however, be noted that during the period studied, there was probably some shift in the marketing from village markets and small primary markets to major assembly centers. It is also likely that some increase in the volume of arrivals is due simply to better coverage of market arrivals, although this is not so important in Punjab as elsewhere.

Year-to-year fluctuations in market arrivals are also evident in the case of jowar. Jalna and Sailu are the two largest rabi jowar markets in the area. Nanded receives the highest amount of kharif jowar, followed by Sailu, Latur, and Jalna. Nanded, Parli, and Latur also receive significant amounts of yellow jowar. Arrivals of yellow jowar in the other three markets are insignificant. Only Latur receives *malli* jowar.

In all six markets, arrivals show a tremendous year-to-year variability in volume. The highest volume of arrivals during a year is as much as six times greater than the lowest volume of arrivals in the same market (of rabi in Sailu). Although the variability is less pronounced in other markets, there is still considerable fluctuation in arrivals from year to year. Fluctuations in arrivals are more than proportionate to the fluctuations in production. There is, however, no statistically significant relationship between the movement of arrivals and that of production; i.e., increases and declines in production in a district are not always followed by a corresponding movement in arrivals. It is likely that the recording of arriv-

[21] Thus production in the 1955–1956 crop year (July–June) is regressed with market arrivals in the corresponding market year (i.e., April 1956–March 1957). Except for Moga, where the *b* coefficient is significant at the 90 percent level, the *b* coefficient is significant at the 95 percent level for the other four markets.

als varies considerably from year to year, so that in the years of poor crops and poor arrivals most of what comes to the market is reported, whereas in the years of heavy arrivals only a proportion is recorded.

Despite fluctuations, market arrival data show some upward trend between 1955–1956 and 1963–1964.[22] This can be interpreted in various ways. The upward trend may be due to an increase in the marketings by cultivators and/or to a shift in the marketings from the village markets to the primary markets, as was suggested by the traders in these markets. In these cases, there is not a real increase in the quantities marketed but only a change in the marketing pattern. The apparent upward trend may also be due to better recording of the market arrival data by the market committees. The available data on market arrivals do not make it possible to explain which of these factors, singly or in combination, are responsible for such a trend.

The market arrival data for Tamil Nadu have several gaps and are, therefore, not of much use for estimating either the trend or the fluctuations in arrivals. Arrival data are completely lacking for the West Bengal markets.

The market arrival data indicate that where only one or two crops are raised in a year, there is considerable seasonality in the marketings of cereals. The data also indicate that both the volume and the pace of market arrivals vary considerably from one year to another but that changes in neither can always be explained in terms of changes in production in the market area. Intermarket flows and changing coverage of marketings over a period of years make the data incomparable over time and space.

We shall now examine the degree of seasonality in the prices of the three cereals in these same markets for the same period (1) to determine whether the price rise was adequate to cover storage costs, (2) to investigate the actual storage

[22] A trend line fitted to the arrival data, however, does not show a good fit or a significant *b* coefficient except in the cases of Jalna and Latur.

policies of the traders, and (3) to inquire into the relationship, if any, between seasonal price movements, arrivals, and production.

Seasonal Price Movements and Storage Costs[23]

In a competitive market, the off-seasonal rise in the price of a crop will be just enough to cover storage costs and "normal" profits of the stocking operation. The concept of normal profits in economic theory is vague and the estimation of such profits in practice, difficult and imprecise. The traditional concept has essentially two theories of profit: (1) that which regards profit as a residual (the excess of price over cost) and (2) that which regards profit as a reward for a factor of production. The basic difficulty in the second approach is in defining exactly the entrepreneurial function as distinguished from that of management, and consequently, in allocating the return between the managerial and the entrepreneurial functions. There is also the problem of estimating the return for uncertainty. Here one may have to consider traders according to the risk premium they place on various stocking operations or according to their ability to bear uncertainty, which in turn will depend upon their own capital and their capacity to raise additional funds in case of need. Various approaches may yield diverse estimates of profits, depending on the assumptions, not completely devoid of value judgments, made in calculating the return. It has, therefore, been decided to use the residual approach, in which only likely rates of return are computed by deducting storage costs from off-seasonal prices.

Period of Storage

In estimating storage costs, it is assumed that a trader usually buys his stocks during the peak period of marketing, i.e., in the immediate postharvest period when prices are low,

[23] For the methodology used in the analysis, see Chapter 1, the section "Seasonality of Price Movements."

and sells the produce in the period preceding a new harvest —a period hereafter referred to as the off-season—when prices generally reach a seasonal peak. The storage period, thus defined, varies considerably in the four regions studied. In Punjab, since wheat is harvested only once a year, around the middle or end of April, and marketed in May and June, the storage period for wheat is assumed to extend from May–June until January–March of the following year.

In Maharashtra, rabi arrivals are heavy beginning in March and taper off by June. The second harvest of early varieties of kharif jowar commences in mid-October and is followed by the harvests of late varieties in November and December. The kharif crop comes to the market in December–January. Arrivals remain heavy until March. There is thus an overlapping of kharif and rabi marketings in March. The traders in Maharashtra indicated that they usually store between the two major harvests and get rid of most of their rabi stocks before kharif arrivals reach the market, in order to take advantage of the high prices prevailing in the market. The storage period for jowar is, therefore, assumed to begin in March and end in September, October, or November.

The major crop of paddy is harvested in West Bengal in November–December, and arrivals begin in January. The storage period for rice and paddy is, therefore, assumed to be from January to September–December in West Bengal. Owing to the numerous crops grown in Tamil Nadu, the length of storage varies considerably for various grades. Coarse grades of paddy, which constitute the major part of the production, are not stocked for more than three or four months, because of the numerous short crops that are harvested almost all year round in Tamil Nadu. There is not much off-seasonal price rise for coarse paddy and rice.[24] Unfortunately, there is not much systematic data available on prices of coarse varieties. The early and late varieties of *samba* crop come to the market between January and April.

[24] Short-duration crops generally produce only coarse grades of paddy.

The early *kuruwai* crop comes to the market sometime in September–October. This short crop has considerable impact on prices of coarse varieties. Coarse varieties are, therefore, stored between March–April and August. The late varieties of the *kuruwai* crop come to the market between October and November. Prices of sort I and sort II rice and paddy, therefore, show an off-seasonal peak in November and decline with the coming of the new harvest. *Kuruwai,* as it matures about the time of the northeast monsoon, is more perishable than the *samba* crop and is therefore not stocked. Because *kuruwai* rice is of inferior variety, it is more in demand in Kerala and is quickly shipped to the terminal markets there. Also, it has a much shorter marketing season, as it is rushed to the market before cultivators are occupied with the sowing of the *samba* crop. Most of it, therefore, is wet when it arrives in the market and quickly develops a musty odor. For all these reasons, only the *samba* crop is stored for a significant length of time. In order to compare the off-seasonal price rise with storage costs, it is assumed that first- and second-grade rice and paddy are purchased in March and stored until November.

Components of Storage Costs

In the case of all three cereals, the average price of the month (or the months) in which storage is assumed to commence is taken as the purchase price of the stocks. To this, storage costs are added to arrive at the costs of holding a quintal of the cereal from harvest until the off-season. Storage costs consist of (1) items that vary directly from the volume of stocks, such as costs of borrowing funds, costs of the material used in storage, loss in weight due to drying and to pests, and (2) items that are independent of the volume of business, at least in the short run, such as costs of maintenance of the shop, salaries of permanent employees, the cost of obtaining market intelligence, rent of the shop, and taxes. Certain items, such as the rent of warehouse space, are fixed costs in some cases and variable in others.

Even a rough judgment about the fixed-cost component poses serious problems, for the fixed costs assignable to the storage of a quintal of grain vary even more considerably from one trader to another than do variable costs. The variation is due to (1) variations in the absolute size of operations of different traders, (2) variations in the proportion of different crops in the total volume of business of an individual trader, and (3) year-to-year variations in the proportion of different commodities in the total volume of business of an individual trader.[25] It has, therefore, been decided to use only the variable costs of storage in calculating the hypothetical margins in storage operations. In order to arrive at the next margin to the trader, it would be necessary to allow for fixed costs from the gross margins. Since the cost items that vary with the volume of business vary for individual cereals, the cost components of the three cereals are discussed individually below.

Storage Costs of Wheat

The warehouse rent is estimated to be Rs0.10 per quintal per month. Depreciation of the bag was stated to be between Rs0.30 and Rs0.50, depending on the length of storage. It is, therefore, taken to be between Rs0.35 and Rs0.45 from May–June until January–March. It is assumed that if the produce is bulk-stored instead of bag-stored, the same cost would account for the labor and materials for bulk storage. The approximation is not very inaccurate, since the greatest depreciation of the bag occcurs at the very beginning of the storage period (i.e., when a new bag becomes a used bag) and increases only slightly with the length of storage. The cost of labor and material used in bulk storage is also incurred initially. The loss in weight was stated to be anywhere between 2 percent and 10 percent, depending on such factors as weevil attacks, moisture content in storage, and the type of storage facilities used. These figures are much higher than those ob-

[25] See Table 13 for some evidence on this.

tained for jowar storage in Maharashtra and for paddy and rice storage in West Bengal and Tamil Nadu. Wheat, however, is thought to be more susceptible to insect and weevil attack than the other cereals. The average loss in weight was, therefore, taken to be 4 percent for eight months of storage. Loss due to drying was not included, as this loss in weight before the beginning of monsoons was stated to be regained during monsoons when the humidity increased. The interest rate was assumed to be 9 percent per annum.

Storage Costs of Jowar

In jowar operations, warehouse rent is assumed to be Rs0.06 per month. Traders stated that rents have increased in recent years and have gone up to as high as Rs0.10 to Rs0.12 per month. Loss in weight due to pest, insect, and rodent attacks was stated to be between 2 percent and 3 percent during the period of storage. It is, therefore, assumed to be 3 percent for eight months. Jowar is stored mostly in gunny bags. Depreciation of a bag in a period of storage was stated to be approximately Rs0.40 for eight months. The interest rate was 9 percent.

Storage Costs of Paddy and Rice

West Bengal. On the basis of the data collected in West Bengal, loss in weight of paddy or rice due to drying is assumed to be 2 percent until July. It is assumed that after July there is a gain in weight of up to 0.25 percent per month until November. Loss due to weevils or rodents is assumed to be 0.6 percent. These estimates of losses are in close agreement with the estimates made by various governmental agencies[26] and also with estimates in several recent investigations of

[26] *Report on the Marketing of Rice in India,* pp. 244–249; Government of West Bengal, Directorate of Agriculture, *District Handbook on Agricultural Marketing for the District of Birbhum,* 1963, p. 21; *Brochure on the Marketing of Rice in West Bengal,* Government of West Bengal, Directorate of Agriculture, 1955, pp. 16–17; *Rice Economy of India,* p. 79.

physical losses during storage conducted by traders in regulated markets.[27] Dorris Brown, however, on the basis of his investigations, contends that losses in storage are much higher.[28] According to his observations, loss in weight caused by rodents, weevils, and drying is usually as much as 5 percent by July and may be as high as 10 percent to 15 percent by November.

The rate of interest on borrowed funds is assumed to have been 9 percent per year during the period studied. Warehouse rent is not included in storage costs, because maintenance of the warehouses of rice mills constitutes an overhead cost to the millers. This does not vary according to the volume of stocks and, therefore, is difficult to assign to an individual quintal of paddy or rice. These difficulties, however, emphasize the need to allow for establishment costs in making a judgment about the net residual margin likely to be earned by a rice miller in stocking operations.

Paddy is usually stored in bulk by rice millers. Rice straw is used for lining the walls and floors. This has no commercial value and, therefore, is not included in storage costs.

Tamil Nadu. The depreciation in weight was the most difficult item to estimate for Tamil Nadu. Traders' figures of losses in weight due to drying ranged from 2 percent to 10 percent. The condition in which paddy is brought to the market varies considerably from one lot to another and consequently poses a serious difficulty for traders in making a uniform estimate of drying. Loss in weight due to rodents, pests, and insects was, however, quite low and ranged between 0.5 percent and 2 percent in four months. It should be noted that this estimate of loss is in close conformity with the estimates given by the West Bengal millers. The interviews with the traders in the two states indicated that, contrary to the general impression that storage losses are heavy, they seem

[27] S. C. Jain and Rajvir Singh, "Storage Losses of Foodgrains: A Case Study in U.P.," *Economic and Political Weekly,* III (October 19, 1968), 1627–1628.

[28] In personal exchange of views.

fairly low, at least in the trading sector. It should be pointed out, however, that Dorris Brown, on the basis of his observations, rejects such low estimates of loss in weight also in the case of Tamil Nadu and argues in favor of a range of 2 percent to 10 percent. In the present analysis, the average loss in weight due to drying is assumed to be 4 percent, and the loss due to pests and insects 1.25 percent, in a period of eight months.

In all the cases the gross rate of margin per quintal of grain is calculated as follows:

$$\frac{\text{off-seasonal price} - (\text{purchase price} + \text{variable costs of storing, harvest to off-season})}{\text{purchase price} + \text{storage costs}} \times 100.$$

As an example, Table 11 shows absolute as well as percent-

Table 11. Estimated gross rate of margin from wheat storage, Moga, 1955–1956 to 1965–1966

Year	Gross margin per quintal (Rs)*	Gross rate of margin on investment (%)†
1955–56	8.45	27.79
1956–57	4.34	11.10
1957–58	−5.40	−11.54
1958–59	17.86	44.95
1959–60	−1.79	−4.02
1960–61	−0.58	−1.35
1961–62	1.63	3.89
1962–63	1.83	4.34
1963–64	14.35	33.32
1964–65	13.52	27.17
1965–66	−3.94	−6.65
Average	4.75	11.7

* Average for January–March period. The gross margin per quintal is the difference between the actual price and estimated variable costs of storing a quintal of wheat until the off-season.

† Average for January–March period; estimated by taking the gross margin per quintal as a percentage of the cost of storage including the initial price of the grain.

age gross margins in wheat operations in a single market in Punjab.[29] Figures 20 and 21 graphically illustrate the various features of wheat and jowar storage operations. These features are discussed below.

Table 11 clearly brings out the year-to-year variability in the margin in storage operations. When it is assumed that a Moga trader purchased wheat at an average May–June price and sold at an average January–March price in four of the eleven market years for which wheat prices are examined, the price rise does not seem to have been enough to cover even the variable costs of storage. Another two years seem only marginally profitable. If one allows for overhead costs of the business, the net margin is likely to have been near zero or negative. However, in four of the eleven years the estimated rate of profit seems exorbitantly high. This variation is equally noticeable in the case of the jowar prices. Gross margins must have been negative in 1957–1958, 1961–1962, and 1963–1964 if the trader purchased in March and sold between September and November. The gross return seems only marginally positive in 1958–1959 and 1960–1961 but seems excessively high in 1955–1956, 1956–1957, 1959–1960, 1962–1963, and 1964–1965. Despite the year-to-year variability in the returns, the average[30] margin over a period of ten years in Maharashtra and eleven years in Punjab seems fairly reasonable.

It is noteworthy that the average returns for jowar compare well with those for wheat. In West Bengal, 1955, 1960, and 1961 were years of poor returns for both paddy and rice storage. The price rise in 1960 was not enough even to cover variable costs of storage. It just barely covered variable costs in 1955 and 1961. After allowing for overhead costs, the net return seems to have been negative even in 1955 and 1961. In contrast, 1959 appears to have been a year of excessive

[29] For similar data on jowar and rice operations see Occasional Paper, pp. 122, 125, 188, 189, 190, 261, and 263.

[30] The average is not weighted by volumes but is only a simple average.

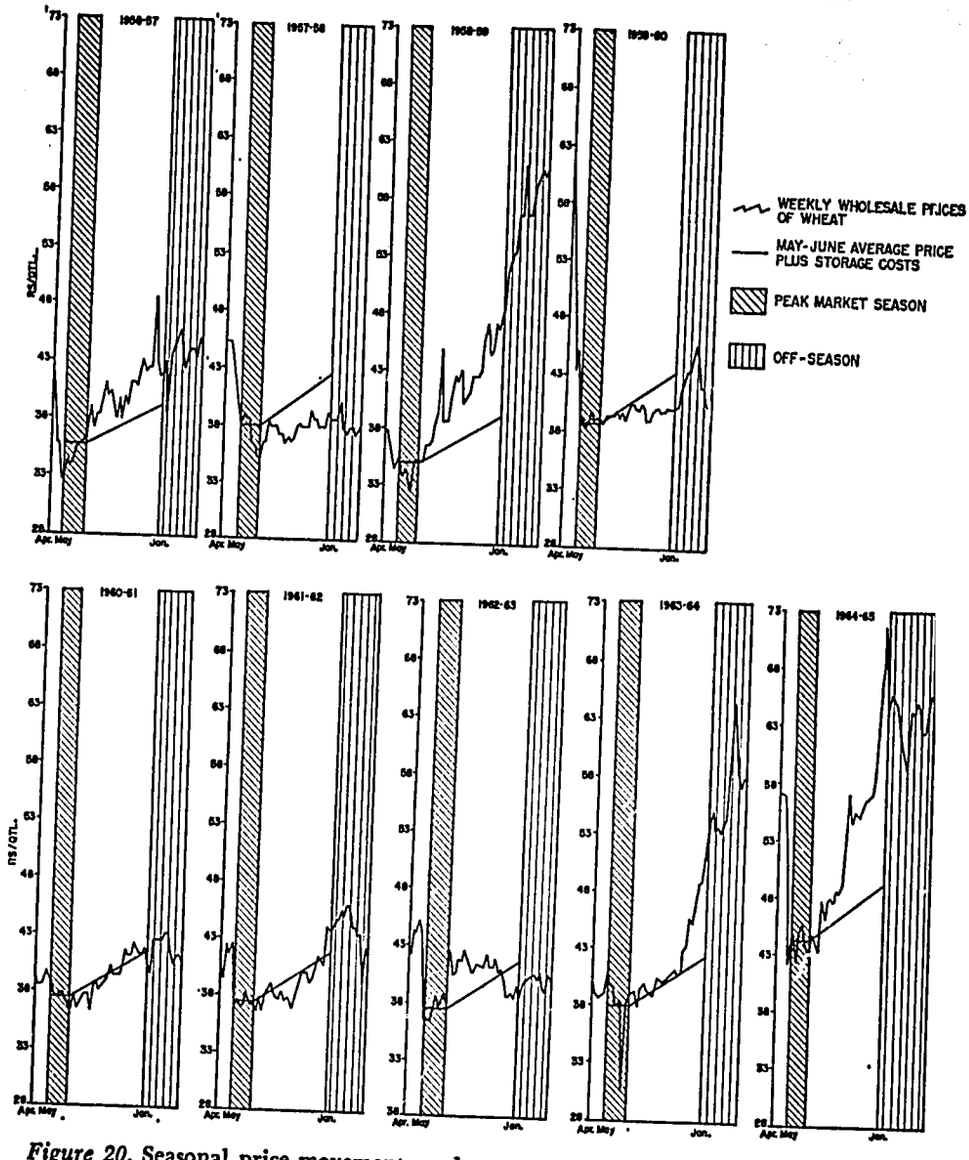

Figure 20. Seasonal price movements and storage costs of wheat, Moga, 1956–1957 to 1964–1965

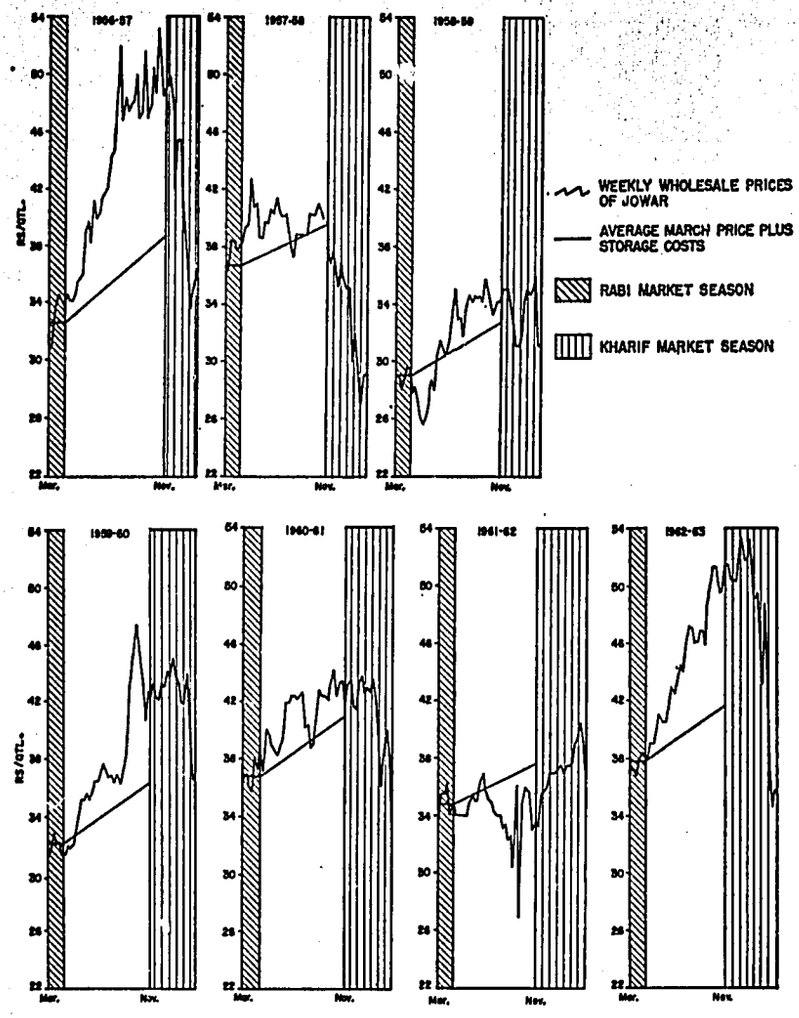

Figure 21. Seasonal price movements and storage costs of jowar, Jalna, 1956–1957 to 1962–1963

returns. It should be noted, however, that the enormous price increase in 1959 was due to the fixing of maximum prices by the state government. Most of the purchases were, however, made at prices higher than the statutory maximum. The records of wholesale market prices show only the fixed prices

for this period. However, the harvest prices collected from millers show that in Bolpur a miller paid Rs29.70 per quintal of paddy when the statutory maximum price was Rs27.00, and that in Guskara the prevailing price was Rs31.00 per quintal of paddy. The farm harvest prices collected by the Department of Agriculture show that the open market price of rice was Rs56.70 per quintal in Burdwan district and Rs63.46 in Birbhum when the statutory maximum was set at Rs47.93. The actual margins, therefore, must have been much lower in 1959.[81]

The years 1956, 1957, 1958, 1962, and 1963 show moderately high returns. The average return over a period of nine years seems somewhat higher in paddy operations than in rice operations. The over-all gross return over the nine-year period is, however, exaggerated both in the case of rice and of paddy, owing to the use of the statutory maximum price as the purchase price for 1959.

It should also be recalled that the estimates of loss in weight due to drying as well as to weevils, rodents, and pests, assumed in storage costs, are much smaller than estimates made by some other investigators. If the higher estimates are used, the resulting net margin would, indeed, be very low.

In the case of prices in Tamil Nadu, apart from year-to-year variation, the margin varies from one grade to another. The average gross margin appeared to be very high in stocking sort I rice, and somewhat less in paddy, whereas it appeared to be fairly low in sort II paddy.[82] It should be recalled that sort II grade is commercially the most important, as the majority of urban and semiurban consumers eat medium-grade rice. It is only the high-income consumers who eat fine

[81] See also pp. 176–177 for further explanation of price movements in 1959.

[82] See Occasional Paper 12, pp. 261 and 263, for estimates of returns in Tamil Nadu. No price data were collected for sort II rice. However, monthly price series of sort II rice collected by the Agro-Economic Research Centre of Madras show that sort II rice prices did not show greater seasonality than sort II paddy prices. See "A Decade of Prices of Rice in the Southern Region."

rice. The proportion of local fine rice in the rice trade in Tamil Nadu is, therefore, not very significant.[33] The relatively high seasonality in the prices of first-grade rice and paddy seems to be due to the fact that most of it is harvested only once a year, during the *samba* crop season, while numerous crops of second-grade paddy are harvested every year. It is to be expected that prices of coarse grades of rice will show even less seasonality than those of medium-grade rice.

A comparison of intermarket margins also indicated that there is considerable uniformity among markets in the estimated gross margins in any year. This is to be expected when the markets are closely integrated. The following section discusses the monthly variations in the margin.

Estimated Returns and Actual Profit-Loss and Stock Statements

In the preceding analysis the average price for a period extending from four to eight weeks in the immediate post-harvest period was assumed to be the purchase price. It was also assumed that a trader usually sold his stocks when prices reached a seasonal high. There is thus a built-in downward bias in the estimated storage costs and a consequent overstatement of the rate of gross profit. For although the seasonal

[33] The prewar estimates for the former Madras Province (which included the districts of East and West Godavari, Vishakhapatanam, Krishna, and Guntur, all of which are now in Andhra Pradesh) indicate that of the total production in the province, 18 percent consisted of fine, 29 percent of medium, and 53 percent of bold rice. Most of the fine rice was grown in the districts of West Godavari and Vishakhapatanam and to a lesser extent in East Godavari, Krishna, and Guntur districts. Except for South Arcot, almost all the other districts in the present Tamil Nadu were predominantly medium-grade producing areas, whereas Malabar Coast (now in Kerala) produced almost entirely coarse rice. The prewar estimates also show that as much as 97 percent of the fine, 85 percent of the medium, and only 48 percent of the coarse rice were marketed in Tamil Nadu. The statistics thus indicate that in the present state of Tamil Nadu the storage of locally produced paddy and rice consists mostly of medium grades. See *Report on the Marketing of Rice in India*, pp. 34–41.

low generally occurs during a period of four to eight weeks, purchases for the off-season are not necessarily restricted to these few weeks. In fact, arrivals usually remain heavy for several weeks. Traders start their purchasing at the beginning of new arrivals and continue stocking for several weeks. Many jowar, wheat, and rice traders indicated that although the lowest price is usually reached within a couple of weeks of the commencement of heavy arrivals, they often made their pipeline purchase early in the season but preferred to wait to make further purchasing decisions until they got a feeling about the market situation. This is supported by the stock data collected from major traders in these markets. Figure 22 shows purchases and sales of wheat by three prominent traders in Moga during the period 1964–1965 to 1966–1967.

The analysis in the preceding section also implies that there is a pattern of year-to-year fluctuations in the margins earned that is consistent for all the traders in a market dealing in a particular cereal. In other words, the years of high off-seasonal price rises usually result in high margins for most of the traders. The profit-loss statements of the traders and millers, however, do not show any such consistent pattern. As an example, Table 12 shows the gross margins per quintal estimated from the actual profit-loss statements for wheat in Punjab.[34] Table 13 shows the volume of wheat handled by

[34] Gross margins in Table 12 are not directly comparable with those in Table 11, since the former do not account for variable costs of storage, as do the latter. The gross margins simply show the difference between the value of sale and of purchase. Estimating variable costs is even more difficult in the case of revolving stocks than in the case of the hypothetical estimates made earlier, for costs vary from one lot to another, depending on the length and the time of storage, the condition of the lot when it was purchased, and the purchase price of the lot. Any approximations are, therefore, likely to introduce an element of error which can be avoided by not making assumptions about variable costs. It should, therefore, be emphasized that the profit rates comparable to those in Table 11 will be smaller than those in Table 12. See Occasional Paper 12 for similar data on jowar operations in Maharashtra and paddy operations in Tamil Nadu.

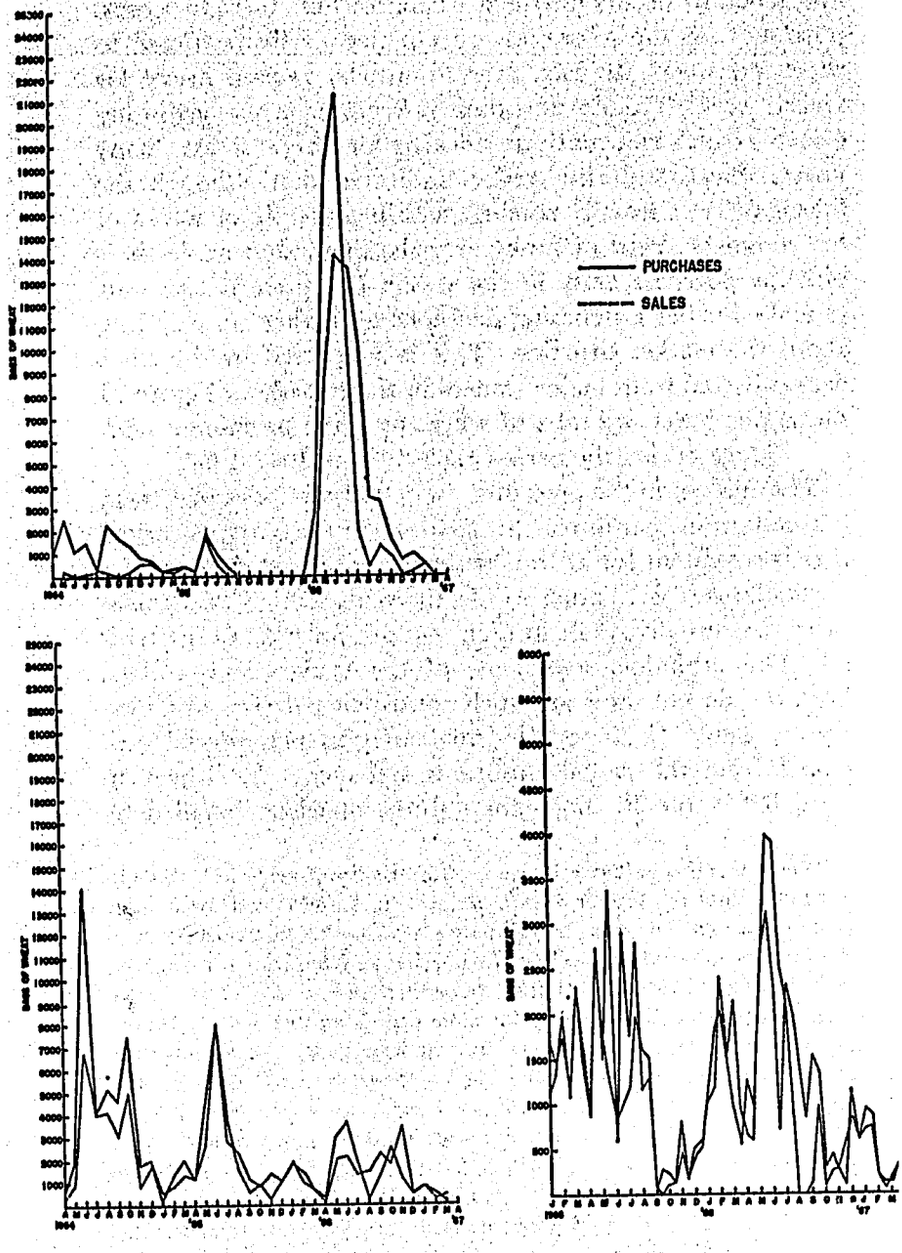

Figure 22. Purchases and sales of wheat by three Moga traders

Table 12. Actual gross margin from wheat storage, Moga, 1963–1964 to 1966–1967

Year	*Gross margin (Rs per quintal)**						*Gross rate of margin on investment (%)†*					
	Traders						Traders					
	1	2	3	4	5	6	1	2	3	4	5	6
1963–64	0.67	1.50	n.a.	1.59	0.94	2.25	1.4	3.3	n.a.	3.9	2.1	5.0
1964–65	1.99	2.16	3.54	4.78	2.00	0.35	4.0	4.2	7.4	9.5	3.6	0.6
1965–66	1.19	2.24	6.85	3.41	1.22	−3.03	2.2	4.0	12.9	6.5	2.1	−5.0
1966–67	n.a.	n.a.	8.31	16.75	1.72	3.05	n.a.	n.a.	12.6	28.4	2.4	3.8

* Average sale price minus average purchase price equals gross margin.
† Gross margin per quintal divided by purchase price per quintal.
n.a. data not available.
Source: Calculated from profit-loss statements of Moga traders.

Table 73. Quantities of wheat purchased by six Moga traders on their own account, 1963–1964 to 1966–1967 (in quintals) *

Year	Traders 1	2	3	4	5	6
1963–64	32,383	10,480	n.a.	3,102	23,400	10,540
1964–65	3,823	14,755	1,607	2,950	5,955	17,893
1965–66	2,047	6,088	2,828	4,282	2,974	4,106
1966–67	n.a.	n.a.	1,314	3,546	37,244	7,225

* Quantities purchased are almost always equal to quantities sold in a year.
n.a.: data not available.
Source: Stock books of Moga traders.

major traders in these selected markets. The available evidence on stocking operations in West Bengal is examined separately.

Several interesting features are brought out by the comparison of hypothetical and actual margins earned in storage operations by food grain traders. The margins obtained from profit-loss statements seem to be completely unrelated to the corresponding earlier hypothetical estimates of the gross margins per quintal. Actual gross margins are generally lower than the hypothetical estimates. There is no relationship between the year-to-year variation in the actual and the hypothetical gross profits, e.g., 1965–1966 seems to have been a year of losses in wheat operations in Punjab according to the hypothetical estimates, whereas in actual practice, 1965–1966 turned out to be a relatively profitable year for most of the wheat traders.[35]

It has also been assumed in the preceding analysis that the trader stocks the produce for a period of seven to nine months before selling it in the market. Figure 22 clearly illustrates the rather close correspondence between the quantities purchased and sold in each month. Stock statements for other

[35] This was said to be a result of the unexpected opening of Uttar Pradesh markets to Punjab wheat under a new zonal arrangement in May 1965. Traders shipped considerable quantities of their stocks to the consuming centers in Uttar Pradesh.

markets show a similar pattern in Punjab. Unfortunately, no such data were available for any other state. This evidently high turnover of stocks is quite in contrast to the rigid stock policy assumed in the preceding analysis. This appears to be a result of the fact that the timing of the off-seasonal peak is not accurately predicted by all the traders. Too many traders, therefore, end up storing too small amounts or selling their stocks too soon or too late.[36] Besides, the assumption made in estimating gross margins, i.e., that the traders withhold all their stocks until the off-season, is slightly unrealistic, for although it is conceivable that an individual trader might follow such a policy, it would be impossible for the market as a whole to operate if all traders did so.

The purchase and sale records of wheat traders thus rather uniformly suggest a quick turnover of stocks. This raises a vital question about the identity of holders who must store the grain from harvest until off-season. The statistics available on this subject are scanty and for the most part of poor quality. The existing evidence can provide some basis for making a judgment regarding the physical movement of stocks. Since no comprehensive data indicate on exactly whose behalf purchases are made of the arrivals coming to the primary markets, the available data are not useful for discerning who does the stocking.

The records maintained by the regulated market committees in Punjab on arrivals, stocks, and dispatches provide further support to the evidence of the stock records of traders discussed earlier. The data are assembled from returns submitted by individual traders. These data are not always consistent with the arrival data gathered by market committees directly through auctions and are sometimes also inconsistent with the data on rail shipments collected directly from

[36] To some extent this is because of the varying amounts of market information available to different traders at different times and their unwillingness to share it with others. The varying rates of profit are also a result of the varying entrepreneurial skills which explain the different decisions made by different traders under similar market conditions.

railway offices. Despite these drawbacks, they are of interest, since these estimates are the only index of total dispatches, including rail shipments, for which there are no independent estimates available at all. Such data collected by Cummings for Khanna market for the period 1959–1960 to 1963–1964 show that there is only a very short time lag between the movements in arrivals and those in stocks.[87] Stocks reach a peak only a few weeks after wheat arrivals reach a peak and then decline steadily, rather closely following the decline in arrivals. His data on rail shipments, obtained independently from the northern railways, show a steady volume of exports from May through November, and indicate that 95 percent of the total rail shipments are dispatched between May and November and only 5 percent between November and April, the off-seasonal period.[88]

Since considerable quantities of wheat are shipped to Delhi and to other consuming markets in the vicinity of Punjab by road, truck dispatches are particularly heavy in the immediate postharvest period, when there is a great deal of strain on the freight car supply. This is much truer of other markets in Punjab than of Khanna, which generally caters to distant markets in Madhya Pradesh and Maharashtra, where shipments are sent by rail. Jagraon, Barnala, Kot Kapura, and Moga ship considerable quantities to Delhi by road, not only for local consumption, but also for dispatches to other consuming centers. It therefore seems plausible that a major portion of the pastharvest arrivals is dispatched to terminal markets within a few months after the harvest, as in fact is indicated by our stock records of the large traders in these markets. These records, however, show the physical movement of stocks and still offer two possibilities regarding holding: (1) that most of the primary market purchases are made by local wholesalers on behalf of the terminal market traders, or (2) that most of the primary market purchases are made by local wholesalers who transfer their stocks to the

[87] *Op. cit.*, p. 65.
[88] *Ibid.*, p. 66.

terminal markets on their own behalf. In either case the physical movement of goods does not necessarily imply a transfer of ownership. The stock records of traders as they exist now do not tell us anything about the extent of these two types of intermarket transactions.[89] As has been already discussed at length earlier, both types of transactions are equally widespread in grain trading. Several studies conducted by the Ministry of Food and Agriculture suggest that in periods of shortages and impending restrictions, there is a greater tendency to diversify stocks by traders in order to avoid seizure. In that case, physical movement does not necessarily suggest a transfer of ownership. This is, however, not generally true of normal times, when there appears to be a great deal of turnover of stocks.

The explanation of who holds the stocks between the harvest and the off-season *during normal times* therefore seems to lie in the rather simplistic but not always obvious fact that storage is done at all stages of marketing for relatively short periods of a few months. Even in Punjab, where wheat markets are highly seasonal, 65 percent to 75 percent of the arrivals reach the market by the end of July, a major portion of which is dispatched to the terminal markets by the end of August or the middle of September. Retailers in terminal markets purchase their supplies from these stocks. That part of the early arrivals in primary markets which is not dispatched in the early postharvest period is stored at the local level and finds its way into terminal markets later in the season. As much as a fourth or a third of the total arrivals remain with cultivators for as long as three or four months after the harvest, even during normal times, and find their way into the market system only later in the off-season. All evidence suggests that storage by cultivators is more substantial in years when they consider harvest prices unremunerative and/or expect a high off-seasonal price rise.

It seems, therefore, highly plausible that there is a fairly

[89] See pp. 249–252 for a discussion of stock data.

even flow of supplies from the producer to the consumer during much of the year through storage that is shared by a large number of functionaries, including the producer and the consumer. An additional factor to be considered is the likelihood of some seasonality in the consumption of different grains, at least where substitution is possible. It is thus likely that low-income and/or rural consumers in the north increase their consumption of maize following the kharif season when maize prices are low and wheat supplies low and prices high, thereby relieving some pressure on the supplies. Where there is no such seasonal substitution in consumption—probably where there are high-income consumers—this must be reflected in the higher prices consumers must pay at the end of a crop year to acquire scarce supplies.

Another feature of seasonal price movements is, of course, that even in years of relatively steady price levels, there are some weeks when prices are low and others when they are high. For an intelligent or a fortunate trader it is possible to purchase and sell in these weeks and make a large profit. All the traders, therefore, may not necessarily purchase at the lowest price and sell at the highest, and hence, despite an enormous price rise, may not reap the maximum profit from storage operations.

It is also noteworthy that the realized rate of margin calculated from the profit and loss statements of the traders generally shows less variability between years than the hypothetical estimates which are based on an assumption of a rigid policy of harvest to off-season storage. Rather, a great deal of the variability appears in the volume of operations (Table 13). This variability is also noticeable in the account of a single trader (Table 13). Although the data are much too inadequate to make any firm generalization, Table 13 shows rather heavy purchases of wheat by two wheat traders (Trader 1 and Trader 5) in 1963–1964, a year of a high off-seasonal price rise.[40] These traders show a relatively high vol-

[40] A similar pattern is noted from the profit and loss statements of traders in the remaining four markets of Punjab. It must be emphasized,

ume of gross profits in wheat operations in that year as compared to the remaining years.

Although our stock data for wheat do not go back to 1963–1964 to enable us to examine the timing of purchase and sale operations of these traders, it is obvious from Tables 12 and 13 that the high volume of gross margin of these traders is by no means due to a high unit margin. In fact, their unit margin is lower in 1963–1964 than in the remaining years. It seems to be due, instead, to the large volume; the implication is that even in the years of high price rises, traders who have large stocks may not withhold them until the off-season. This suggests that an excessive price rise may result from an adequate stock build-up by major traders and/or from early disposal of stocks by those who possess them.

It is likely that in order to avoid losing heavily one year and flourishing the next, and thus averaging the rate of profit over a number of years, which is what would result from the rigid policy, traders undertake a quicker turnover of their volume and try to stabilize the rate of profit within certain limits.[41] Thus, either with a flexible policy, as actually followed by traders, or with a rigid policy regarding the period of stocking, as hypothesized in the above analysis, there appears to be considerable year-to-year variation in the volume of profit. The average return to a trader over a length of time, therefore, does not appear to be exorbitantly high.

Another interesting feature brought out by the examination of profit-loss and stock statements is the unique nature of the individual trader's operations, not only in volume of operations, but also in the timing of purchase and sale of stocks. This uniqueness is a result of (1) the individualistic nature of the operations and (2) the great amount of flexibility in the stock operations. The interviews with the traders also emphasized their essentially short-term view of the market, as illustrated by their stock operations. Traders are constantly

nevertheless, that of five traders in each market, only a couple show a large turnover in 1963–1964.

[41] This is shown in the stock records of traders.

on the lookout for the best price for their stocks under current circumstances and may decide to postpone a transaction for a week or ten days, but they invariably formulate their policies in terms of weeks rather than months. The idea of following a policy of storing from the harvest to the off-season seems absurd to them basically, because of the large number of uncertain elements entering into such an operation. The uncertainty prompts them to undertake a quick turnover although it may result in a lower margin. The analysis of the actual market operations therefore suggests that the high off-seasonal price rise is not necessarily accompanied by a high rate or volume of profit for all the traders.[42]

Profit-loss statements of rice traders and millers are of a slightly different nature in Tamil Nadu. In all five markets except Kumbakonam, the profit and loss statements showed the volume and value of the paddy purchased and the volume and value of the rice sold. In most cases, the total quantity of rice sold in a year was in close correspondence with the rice equivalent obtainable from the volume of paddy purchases, using a yield rate of 66 percent. The gross margins show the difference between the average purchase price of a quintal of paddy and the average sale price of its rice equivalent. In order for these figures to be comparable with the hypothetical estimates of gross margins, it was necessary to deduct from the gross margins the variable costs of storage and the costs of milling a quintal of paddy. In the case of Kumbakonam, the gross margins were obtainable for the purchase and sale of paddy. These gross margins could, therefore, be compared with hypothetical gross margins only by deducting the variable costs of storage. If allowance is made for milling costs,

[42] The great variability in profit rates and the consequent high risks in storage may at least partially explain the heavy market arrivals in the immediate postharvest season (see the section "Seasonality of Arrivals," above). The contention made earlier that cultivators may market heavily soon after the harvest more because of choice than compulsion appears convincing, in view of the great variation in profits.

returns for milling paddy seem to be somewhat higher than for simply purchasing and selling paddy.

The margins of various traders in individual markets in Tamil Nadu seem fairly uniform, with a few exceptions in which a consistently higher absolute and percentage rate of return was noted as compared to the rest of the traders. There also appears to be some variation in the profit rate of a single trader from one year to another. However, since the variability between years is not much more significant than the variability among traders, it is difficult to establish any relationship between patterns of seasonal prices and the profit rates earned by traders. These profit and loss statements thus confirm the observation, made on the basis of Punjab and Maharashtra records, that there is no consistency in the profit rate earned by traders from year to year. That is, all the traders do not earn a high rate of profit in one year and a low rate in another.

An examination of the quantities of paddy purchased by traders in different markets in Tamil Nadu also shows that there is no consistency in the volume handled by various traders in a single market from year to year.[43] For example, the data for the five traders studied in Cuddalore show that the amount of paddy handled by three traders increased in 1962 in comparison to the previous year, whereas that handled by one trader declined. In 1963, the paddy purchases of one trader declined whereas those of the remaining four traders increased in comparison to the previous year. A similar inconsistency was apparent in all of the remaining four markets. The data on Tamil Nadu thus further support the observations made in the cases of Punjab and Maharashtra.

Although no direct evidence could be obtained in West Bengal either on the profits earned by traders in storage operations or on the volumes handled by individual traders, the available evidence on rice millers' purchases of paddy lends

[43] See Occasional Paper, p. 267, for statistical evidence.

further support to the observations made in the cases of the other three states.

Data available on the distribution of total paddy purchases by rice mills in Bolpur in 1960 and 1961 in different quarters of the years indicate that only a little over a third of the total supplies are purchased between January and March. In 1960 the paddy purchases were higher between October and December than in the January to March period. In 1961 a significantly high proportion of the purchases were made between April and June and, later, between October and December.[44]

If purchases are considered in terms of a rice year, in 1960–1961 approximately 70 percent of the year's paddy was purchased over a six-month period, between November 1960 and April 1961.[45] The lowest price of the season, however, was not reached until the second week of March. This spread of purchases is also supported by the arrival data collected by the Food and Civil Supplies Department. In 1957–1958 in Bolpur, 75.7 percent of the annual arrivals came to the market between November and April. In Saktigarh market (Burdwan district), 68.5 percent of the annual arrivals came to the market between November and April.[46] The data collected directly from villages near Bolpur on cultivators' sales indicate that 66.8 percent of the annual sales took place between November and April in 1957–1958, and 74.0 percent in 1958–1959. The report, however, states "that this has happened in an area where in average to good crop years a much smaller proportion of the total produce comes to the market during these two quarters as has been observed by us in our continuous village surveys."[47] It should be noted that the proportion of paddy marketed in this region over a six-month period (November to April) is comparable to the propor-

[44] C. Mukherjee, *op. cit.*, p. 251.

[45] *Ibid.*

[46] *Report on the Pace and Pattern of Market Arrivals*, p. 203, Table w. 7.

[47] *Ibid.*, p. 134.

tion of wheat marketed in the Punjab markets in the first three months after harvest (i.e., between May and July).[48]

Another interesting feature of stocking by the millers is indicated by the milling pattern in a year. It was pointed out by the millers in their conversations that they usually mill paddy only when they receive orders for rice from the consuming centers. It was also indicated that a major portion of the dispatches to the terminal markets is in the form of rice.[49] The evidence indicates that a major part of the paddy purchased is milled during the first two quarters. In 1960–1961, when 70 percent of the paddy purchases were made between November 1960 and April 1961, 64 percent of the total paddy processed during the year was milled in these two quarters.[50] There is also evidence that an overwhelming proportion of this milled rice was shipped to Calcutta during this time. In 1958–1959 railway dispatches of paddy from Bolpur during December and February constituted 86 percent of the local paddy arrivals. In 1959–1960 the percentage was 69.[51]

The Department of Food in West Bengal also has data on monthly milling of paddy by rice mills during 1960 and 1967. Unfortunately, the data on monthly purchases of paddy by rice mills are available only from 1965 on. It is, therefore, difficult to discern the stocking pattern of rice mills for the years 1960–1964, when there was free trade. The data on quantities milled, however, show a very pronounced seasonality. Between 50 percent and 55 percent of the total paddy milled in a year was milled between Janu-

[48] See pp. 121–125 for the seasonality of wheat marketing.

[49] Similar observations have been made by the investigators of the Agro-Economic Research Centre at Santiniketan. See "A Brief Report."

[50] C. Mukherjee, *op. cit.*, p. 251.

[51] "A Brief Report." Most of the dispatches to Calcutta are made by railway. Even if allowance is made for underreporting of purchases by millers in 1958–1959 because of various official controls, the Centre believes that the ratio of dispatches to purchases must have been of the magnitude of 70 to 75 percent.

ary and April during the period 1960–1964. The data for later years show a very close correspondence between the quantities of paddy purchased and milled but with a higher degree of seasonality than is noticeable in the earlier years. The increase in the seasonality was due to the procurement of rice by the state government at fixed prices through a levy on rice millers. The levy was sometimes partial, sometimes complete. It was, however, a disincentive to rice millers to hold stocks, since they received the same fixed price for rice throughout the year. There also was a great deal of pressure from government officials on rice millers to surrender stocks. The data thus lend further support to the argument that there is a rather highly seasonal purchasing and milling pattern in a period of free trade, which is reinforced by government policies.

The available evidence on patterns of purchases, milling, and dispatches suggests a high turnover of stocks. It is not known who does the stocking in Calcutta. Millers declare that they sell most of their rice stock outright to wholesalers in Calcutta, who in turn sell it to retailers. There is no doubt, however, that they send part of their stock to Calcutta on their own account, to be sold by their agents (hopefully) at some profitable price in the future. The available evidence suggests that storage is not restricted to any specific level of marketing but that short-period storage is undertaken at all levels. Millers store paddy for several weeks and then ship it to the terminal market, where it is stored either for the miller or a wholesale trader. It is also conceivable that in periods of free trade middle- and high-income consumers purchase what they need in bulk and store it over the season. It is well known that in India there is a high value placed by consumers on old rice.

In either case—i.e., whether the stocks are sold to wholesalers or held by millers on their own account for speculative transactions—profits accruing to the wholesaler or the miller will not be as high as those implied by the rigid policy if the turnover is high. Only if the stocks are held

well into the off-season will the maximum estimated profits be earned. Very little factual information is available on the actual length of storage. Mukherjee's study and the studies by the Agro-Economic Research Centre observe that there is an increasing trend toward an immediate transfer of rice from mills to the stores in Calcutta.[52] This suggests that although the dispatch figures may give an impression of a high turnover, they indicate the movement but not necessarily the sale of stocks. The investigations of the Agro-Economic Research Centre show that the tendency to disperse stocks away from the primary markets was a result of strict government controls on trade, popular hostility toward millers, and a general shortage of rice in the market. Data on retail distribution are so scanty that very little can be said about the size of the flow from the wholesaler to the retailer during a year. Until this is known it cannot be said that a major portion of the stocks are held until as late as October–November.

However, even if it is assumed to be true, the average profit over a period of nine years—assuming that stocks are sold between September and December—is not very high when allowance is made for fixed costs of business. The highest average profit (for 1955–1963) for both rice and paddy was earned in October. However, there is such an enormous variability between years in the rate of profit that could be earned in October, that a trader was very unlikely to follow a rigid policy of selling in October even when it involved losing in one year in the hope of making a high profit in the following year, to balance the rate of profit over the years. It seems improbable, therefore, that a trader would follow a rigid policy of purchasing in January and selling in October.[53] There appears to be a tendency among

[52] See *Report on the Pace and Pattern of Market Arrivals*, pp. 140–141; C. Mukherjee, *op. cit.*, p. 251.

[53] In fact, the year-to-year variability in the October price relative to the previous January price is so great that an inclusion of a few earlier years, such as 1953–1954 and 1954–1955, would depress the October

the millers to aim at stabilizing their profit rate within a year rather than accept variation from year to year. In any case, the prices in these nine years do not suggest an over-all high rate of profit for the millers.

Although the data suggest a high profit rate in the purchase and milling of paddy, it should be recalled that the estimates are based on the assumption that the milling cost is Rs5.36 per quintal of paddy. This estimate, though higher than those for milling costs in several other provinces, appears reasonable for West Bengal.

That the over-all profit rate is not likely to be high in the rice trade is also supported by the increase in the elimination of middlemen from the trade in West Bengal, noted by millers in their interviews. It was indicated that in the recent past a major portion of the paddy was acquired by millers directly from cultivators. Large cultivators with large surpluses brought their paddy to the rice mills. Those who had small quantities to sell sold to the agents of millers. Small traders and paddy dealers who collected paddy on their own account for sale to mills had almost completely disappeared from the trading scene in the later years of free trade. This was said to be a result of low margins, consequent to a small volume of operations, which had to be shared by a large number of intermediaries. Similar observations are made by the Agro-Economic Research Centre in its survey of market arrivals.[54]

The above discussion of traders' storage practices is based upon an implicit assumption that the supply of storage facilities is highly elastic and, therefore, does not affect storage costs either through an increase in the opportunity cost of owned storage space, through an increase in the rents of hired warehouses, or through the extension of storage to less suitable areas where storage losses would be increased. Little scientifically constructed warehouse space existed in India

profit rate considerably, since prices did not rise in the off-season in those years.

[54] *Report on the Pace and Pattern of Market Arrivals*, p. 144.

until recently. Traders and millers in primary and terminal markets stored stocks in private warehouses, known as "godowns," usually attached to their shops and mills. These warehouses were usually constructed of brick and mud or brick and mortar. The warehouses, though usually built to minimize storage losses, may never pass scientific tests for aeration, moisture-proofing, and insect-proofing. Apart from the fact that no information exists on the extent of such warehouse space in markets, the determination of the availability of space is made more difficult by the fact that traders dealing in numerous agricultural commodities frequently use space for one crop, then another. The availability of storage space in a market in any one year is thus contingent upon the size of the marketings of a particular crop as well as upon the size of the marketings of all the other crops coming to the market. When arrivals are particularly heavy, traders often use their houses for storage, and if storage space still proves inadequate, they may stock gunny bags in sheds with sheet-metal roofing and no walls. Interviews with traders indicated that usually storage space was not adequate and that a maximum effort was made by them to rotate stocks from inferior to better storage areas in the course of their purchase and sale operations, in order to minimize storage losses. Although year-to-year fluctuations in production did not warrant increases in storage space in the past, this by no means will hold true in the future, since substantial increases in production are already being realized through technological advances. The increases in wheat production in Punjab and in rice production in Thanjavur district in Tamil Nadu in recent years have resulted in the inadequacy of facilities for long-run storage as well as for transit storage when increases in marketings are sizable.[55] The situation in Thanjavur brought home the need for transitory village-level facilities for holding paddy

[55] See K. S. Gill, *Wheat Market Behaviour in Punjab, Post Harvest Period, 1968–1969* (Ludhiana: Department of Economics and Sociology, Punjab Agricultural University, n.d.).

until it is dried, before moving it to the mills for long-run storage. The increased production of wheat in Punjab emphasized the need for storage facilities near railheads to avoid storage losses due to transport bottlenecks.[56]

The construction of new warehouses has been mainly confined to the public sector in India.[57] Despite an increase in the construction of warehouses by central and state warehousing corporations, the Food Corporation of India, and on a small scale by cooperatives, the total storage capacity of the Union Food Department, the Food Corporation, and state governments together constituted a meager 4.6 percent of the total food grain production in 1967–1968.[58] Considerable discussion has recently occurred in India on types and sizes of storage facilities. Concern has been expressed about the costs and benefits of flat versus silo storages. The debate was prompted by the rather high costs of construction for some recently built silos in India. Further investigation into the merits and costs of the two types of storage indicates several facts. (1) Costs of flat storage of equivalent capacity are not as low as the initial estimates of construction costs generally indicated. A great deal of evidence on actual costs of construction for some public and cooperative flat warehouses in several states rather consistently indicates that the actual construction costs of high-quality warehouses are much higher than is generally believed. (2) The initial high costs of construction for silos were a result of at least two factors. First, a sellers' market originally existed in silo construction, which resulted in monopoly profits for the

[56] It must be emphasized that transport bottlenecks were exaggerated in Punjab in 1968–1969, because of the government's exclusive reliance on rail transport for the movement of wheat. This shows the administrative rigidity of the public sector in handling emergency situations.

[57] The public sector is defined here as consisting of the state and central governments, the Food Corporation of India, and cooperative societies which receive large financial sums from the government at low interest rates for storage construction.

[58] *Report of the Agricultural Prices Commission on Price Policy for Kharif Cereals for the 1968–1969 Season*, p. 73.

few who were initially in the construction business. A great deal of competition now goes on among contractors for obtaining bids and has helped bring the costs down. Second, more research on the construction of silos has brought out the possibility of using a variety of designs (affecting gradients and the location of hopper bins) and materials (such as a combination of steel and concrete, instead of concrete alone). This has brought construction costs down substantially.[59] Both of these facts suggest that the differences in the capital costs of flat and silo storage are not as great as was initially believed. Recurring expenses of storage are more difficult to determine, as handling charges and storage losses vary according to the rate of turnover. However, some preliminary estimates of recurring expenses indicate that storage in flat warehouses may be more expensive, owing to (1) greater handling costs, (2) higher maintenance costs of the flat warehouses themselves, (3) the high cost of gunnies whenever storage is done in bags, and (4) somewhat greater physical losses of grain. On balance, strictly from a comparison of the economics of the two systems, silo storage thus appears to be more efficient.

However, various other considerations must enter into investment decisions regarding different types of storage. A major objection generally raised to silos is that, given the level of technology prevailing in the Indian marketing system, silos may not always be the most practical form of storage. Implicit in this objection is concern about the lack of bulk handling, transportation, and processing facilities that tends to make silos a less effective form of storage under Indian conditions. However, there are certain other factors which also must be considered. The Indian grain trade is characterized by a large number of varieties which must often be kept separate in order to cater to consumer

[59] I am grateful to James E. Wimberly and G. V. K. Moorthy for some very stimulating discussions and illuminating facts about the storage problem.

preferences. Flat storage is much more suitable for this function than silos. Flat storage is also multipurpose, permitting a combination of different items to be stored simultaneously, thus making for more effective use of capacity as compared to silos, which must be used for storing a single type of grain at a time. Also important is the possibility of a great deal of flexibility in the size of flat storage places, whereas silos may have to be of a certain size if they are to be built for minimum capital costs. Our investigations through interviews with engineers suggest that in the case of silos, there is a rather clear indication that unit costs of construction decline up to a certain point, after which they rise rapidly. No such relationship between the size of flat storage facilities and the unit costs of construction has been established.

The economics of storage types must evaluate all these factors in determining an economically efficient investment. Neither of the two types of storage is probably always superior to the other under Indian conditions; superiority is determined by the function and the length of storage and by the agency which may use a storage method. It is likely that silos have a great deal to recommend them to the public sector, where a minimum size of storage space for specific grains may make sense from the point of view of capacity utilization, where the length of storage may call for minimizing long-term storage losses, and where handling facilities may prove more effective for bulk vertical storage. Flat storage may, however, make considerable sense in the private trading sectors where the scale of the operation is likely to be small, turnover high, and multipurpose storage facilities necessary. There is also an additional factor which may be of significance in the case of flat storage. Its divisible construction, and hence small capital requirements, may bring forth considerable capital from the private sector which is unlikely to flow into the construction of silos.

It is now generally recognized at the higher levels of decision-making that a much more flexible policy is re-

quired for new storage construction. What is not recognized, however, is that by not providing a positive incentive to the private sector for the construction of new storage space and by maintaining a great deal of uncertainty regarding the trade's future existence, the government has throttled a major source of storage capacity expansion. This is inevitably going to affect the increase in the storage capacity available to handle future increases in marketings. In the final analysis, whether the private sector is allowed to play a role in the construction of storage facilities will have to depend on decisions about the over-all control of the marketing system. However, the expansion of storage facilities is an area in which the private sector could play a vital role in the modernization of the marketing system.

Predictability of Seasonal Price Movements

The analysis of the hypothetical and actual stock operations of grain traders has emphasized the year-to-year variability in the seasonal price patterns of all three major cereals. Table 14 summarizes the percentage rise in the prices of wheat, jowar, and rice between 1955–1956 and 1966–1967 in the four states.

The table illustrates the great variability in the seasonal price patterns (1) of an individual cereal between years, (2) of an individual cereal compared to other cereals, (3) of an individual cereal between two states, and (4) between grades of a single cereal within an individual state. The second and the third phenomenon can be explained as being due mainly to variations in the production of different cereals; zonal restrictions which prevented interregional trade and consequently led to disintegration of the market;[60] differences in the distributional policies adopted for different cereals, which had varied impacts on various cereals; and regional variations in other price policies, such as the fixation of floor and ceiling prices, procurement poli-

[60] The term *disintegration* is used in the sense defined in Chapter 4.

Table 14. Off-seasonal rise in cereal prices in four major states, India, 1955-1956 to 1966–1967 (in percentages)

Year	Wheat, Punjab*	Jowar, Maharashtra†	Rice, West Bengal‡	Rice and paddy, Tamil Nadu§		
				Sort I rice	Sort I paddy	Sort II paddy
1955–56	35	46	14	n.a.	n.a.	n.a.
1956–57	23	41	17	50	42	29
1957–58	5	9	26	17	11	14
1958–59	62	16	16	53	43	36
1959–60	15	32	46‖	18	19	13
1960–61	15	12	2	48	30	13
1961–62	22	−2	12	20	23	11
1962–63	7	30	34	23	12	−1
1963–64	63	3	27	42	43	30
1964–65	38	68	m.p.	m.p.	m.p.	m.p.
1965–66	8	m.p.	m.p.	m.p.	m.p.	m.p.
1966–67	47	m.p.	m.p.	m.p.	m.p.	m.p.

* From June to February in Jagraon.

† From March to November in Parbhani. Prices are for rabi jowar.

‡ From January to November in Burdwan.

§ From March to November in Tiruchirapalli.

‖ If the open market price for January is used as the real market price, the price rise is only 23 percent.

n.a.: data not available for the complete year.

m.p.: monopoly procurement; no open market prices available.

cies, and credit availability. The causes of variations in the degree of seasonality between various grades of the same cereal have been discussed earlier.

In this section, we are concerned with the phenomenon of year-to-year variations in the seasonal pattern of a single cereal in the same market. A very rudimentary analysis of the off-seasonal price rise should involve an examination of the interrelationships between cereal prices and the cereal's arrivals and production. It should be recalled at this stage that in Punjab when regressing between arrivals of wheat from April to March and the preceding rabi wheat

crop in the district were fitted, in four of the five markets changes in arrivals showed a significant relationship with changes in production at the 95 percent level, and in the remaining market at the 90 percent level.[61] In Maharashtra, however, no such significant relationship was observed between market arrivals and production in the surrounding region. Arrival data for markets in Tamil Nadu and West Bengal are much too inadequate for the discernment of any relationship between arrivals and production. However, paddy assembly in both these states has been so dispersed in the past that any data on arrivals at wholesale market yards would in all likelihood not adequately indicate the marketed surplus. Besides, the increasing trend, noted earlier in the West Bengal markets, toward the concentration of arrivals at the mill sites is likely to distort any fluctuations in arrival data resulting from changes in production. Market arrival records, therefore, constitute a rather poor explanatory variable in seasonality patterns. The high degree of integration between prices in various producing and consuming markets suggests that the factors that cause a specific seasonal pattern are common to a group of markets having trading relationships with one another. It also suggests that an increase or a decline in arrivals in an individual market does not, by itself, greatly influence prices in that market unless it is accompanied by a similar movement in other markets, for prices in a single market are to a considerable extent influenced by conditions in the various markets with which it has trading relations.

It was, therefore, only in Punjab that the May–June wholesale market price (i.e., the harvest market price) was regressed with market arrivals in the following market year, an underlying assumption being that traders can predict the size of the annual arrivals on the basis of their knowledge of the crop size. In all four states, the harvest prices of the respective cereals, the off-seasonal prices, and

[61] See the section "Volume of Marketings," above.

the percentage of increase in prices from harvest until the off-season were all regressed with each of the following variables: (1) district-level production, (2) state-level production, and (3) all-India production of the particular cereal in the production year immediately preceding the market year under consideration. The correlations between prices and production, and between prices and arrivals were a priori expected to be negative, as an increase in the crop size and arrivals would, *ceteris paribus,* result in lower harvest prices. The correlations obtained varied considerably from one cereal to another.

For wheat, in the case of all the regressions, the *b* coefficient, as well as the correlation coefficient, was positive. The high positive correlation between the May–June price and the wheat production seems to have been due to the trend factor. Both the May–June price and the district, state, and all-India wheat production showed an increasing trend between 1954–1955 and 1964–1965. No significant causal relationship could, therefore, be obtained. Neither the postharvest price nor the percentage increase in price in the postharvest time showed any statistically significant relationship with the size of the wheat crop in the preceding year at any level. The regression analysis of various variables thus did not explain either the level of the harvest price, the level of the off-seasonal price, or the price rise from the harvest until the off-season. All of the variables showed an increasing trend between 1954–1955 and 1964–1965.[62] Seasonality in wheat prices thus does not seem to be

[62] Arrivals showed an annual rate of increase ranging from 9.4 percent in Moga to 61 percent in Jagraon. Production increased 6 percent per year in Ferozepur, 14 percent in Sangrur, 16 percent in Ludhiana, and 19 percent in Bhatinda. Punjab State showed a rate of increase of 13 percent per year, as compared to 7 percent for all India. The average May–June price in the primary markets showed a rate of increase of 9 percent per year, and the average January–March price 8.2 percent per year.

determined entirely or even mainly by wheat production and by wheat arrivals.

In Maharashtra, only the percentage rise in the price of jowar from the harvest until the off-season showed any significant relationship with jowar production in Maharashtra. Neither the level of the harvest price nor of the off-seasonal price is explained by arrivals and/or production.

$$y = 85.33 - \underset{(0.09)}{0.20}x$$
$$r = -0.64 \text{ (significant at 90 percent level)}$$
$$n = 8 \text{ (1955–1956 to 1962–1963)}$$

where

y = percentage rise in price from March to November
x = Maharashtra production in the preceding crop year.

In Tamil Nadu both the sort I rice prices and the sort II paddy prices were used in regression analysis. As elsewhere, the March price, the November price, and the percentage rise in price from March to November of sort I rice and of sort II paddy were each regressed with each of the following variables: (1) Tamil Nadu rice production, (2) rice production in the southern zone, and (3) all-India rice production. The purpose of using both the first- and second-grade prices was to examine the importance of grades in obtaining statistical relationships. Since medium-grade varieties constitute a major portion of the trade in the area, they were expected to show a closer relationship with rice production than the first-grade rice, which constitutes a small portion of the total rice production and trade and which is produced predominantly in one of the several crop seasons in the state, thus causing higher seasonality in prices. Production in the southern zone was used as an additional variable in the case of Tamil Nadu, as the

state remained within the southern zone during most of the period studied.[63]

Neither the sort I rice prices nor the sort II paddy prices showed any statistically significant relationships with production. This was true both of the harvest and the off-seasonal prices. Table 15 contains two sets of equations showing the relationship of the percentage rise in the price of first-grade rice and second-grade paddy to rice production at three levels of aggregation.

In the case of West Bengal, the January price of rice, the November price of rice, and the percentage rise in price from January to November in Burdwan between 1955–1956 and 1963–1964 were each regressed with rice production in the preceding year in each of the following: (1) Burdwan district, (2) West Bengal State, (3) the eastern zone,[64] and (4) the Indian union. No statistically significant relationship was obtained.

Arrivals and crop size thus generally serve as poor explanations of the year-to-year variability in the pattern or extent of seasonality in the prices of the three major cereals. Rather, seasonal price movements seem to have been influenced by a complex set of factors, such as zonal restrictions, procurement, imports, public distribution of cereals, credit control, and ceiling prices, all of which not only varied from one cereal to another but, even in the case of the same cereal, from one state to another. In addition to all of these factors which influenced prices of individual cereals in a set of trading markets, the prices and supplies of other cereals influenced price levels of particular cereals whenever there was a substitution of one cereal for another in consumption. All of these factors are too complex and too varied, statistical information too inadequate, and the time series too short to be explained by a rather simple set of statistical equations. The sections below, however, illus-

[63] See Appendix 1, the section "Zoning," for a review of zonal restrictions.

[64] I.e., in West Bengal and Orissa.

Table 15. Relationships between off-seasonal price increases in Tamil Nadu and rice production, 1955–1956 to 1962–1963

First-grade rice	Second-grade paddy
$y_1 = 0.21 - 0.05x_1$ (0.23) $r = 0.55$	$y_2 = 59 - 0.126x_1$ (0.13) $r = 0.36$
$y_1 = 0.56 - 0.016x_2$ (0.85) $r = 0.46$	$y_2 = 89 - 0.766x_2$ (0.43) $r = 0.58$
$y_1 = 2.84 - 0.11x_3$ (2.5) $r = 0.65$	$y_2 = 101 - 0.0276x_3$ (0.009) $r = 0.78$*

y_1: percentage rise in price of sort I rice from March to November.

y_2: percentage rise in price of sort II paddy from March to November.

x_1: rice production in Tamil Nadu in the crop year ending in June of the market year.

x_2: rice production in the southern zone in the crop year ending in June of the market year.

x_3: all-India rice production in the crop year ending in June of the market year.

* Significant at the 95 percent level. Only the second-grade paddy prices show significant regression coefficients. The relation between production and prices also improves with the level of aggregation in the case of sort II paddy prices. The correlation coefficient becomes significant in the case of the relationship between second-grade paddy and all-Indian production.

trate the importance of some of these factors in influencing seasonal patterns.

Seasonality and Movement Restrictions

Table 14 shows the year-to-year variability in wheat price increases. It should be noted that there was free trade of wheat between Punjab and the rest of India in 1955–1957 and in 1961–1964. There were zonal restrictions on move-

ments of wheat between 1957 and 1961 and between 1964 and 1967. In most cases, the periods of free trade and zones generally correspond with market years of wheat. Despite relatively short periods of free movement and zonal restrictions, the table suggests that years of zonal restrictions were not accompanied by low seasonality. On the contrary, off-seasonal price rises have been about the same in periods of zones as in the periods of free trade. This contention is usually countered by the argument that zones were imposed as a result of poor crops and consequent price rises, and that it is, therefore, not enough to examine the actual price rise during a period of zones but that it is necessary to analyze the price rise which would have occurred in the absence of zonal restrictions. The only way to examine this is to consider, if possible, the price increase in a year of equivalent crop size when there were no zonal restrictions. In the 1956–1957 market year, for example, with an all-India wheat crop of 8.7 million tons and free trade between regions, prices showed a rise of 23 percent in Jagraon, whereas in 1958–1959, with a crop of 8 million tons and much greater wheat distribution, the off-seasonal price rose over the harvest price by 62 percent.[65] The price of Sharbati wheat in Bombay showed a 44 percent increase in March 1957 over the previous harvest price in 1956, as against 55 percent in 1958–1959 when Punjab wheat was cut off.

In contrast, in 1963–1964, when there was free movement of wheat, prices in Jagraon rose by as much as 63 percent as a result of a crop failure, whereas in the following year, with zonal restrictions on exports from Punjab, prices increased by only 38 percent although there was an even smaller wheat crop. It is noteworthy, however, that Sharbati

[65] In 1956–1957, 1.55 million tons of wheat were distributed, as against 3.47 million tons in 1958–1959, most of which was imported. The availability thus increased from 9.25 million tons in 1956–1957 to 11.47 million tons in 1958–1959. The difference of 2.5 million tons during the two-year period was certainly adequate to take care of the increase in population and income.

wheat prices in Bombay increased by about 60 percent in 1963–1964, whereas they increased by about 90 to 100 percent in 1964–1965.

It is, therefore, apparent that with similar wheat supplies, prices of domestic wheat in deficit regions showed a much greater off-seasonal price rise in periods of movement restrictions than in periods of free trade. The evidence regarding the effect of zonal restrictions on off-seasonal price increases in the surplus regions is at best conflicting. There is no clear evidence that restrictions on movements reduced the extent of the off-seasonal price rise. The effects of zonal restrictions are probably combined with other factors, such as procurement, distribution, and credit availability.

Apart from the influence of the actual zones, the frequent introduction and withdrawal of zones and numerous changes in existing zonal arrangements created a degree of uncertainty in the market which affected the purchase and sale operations of traders and must have had an effect on the seasonal price pattern. Traders, in their interviews, invariably complained about the effect of a sudden withdrawal of zonal arrangements on prices through the pressure of demand from deficit areas, and about the opposite, depressing effect on prices of the unexpected imposition of zones.

Seasonality and Governmental Policy

No single factor seems to have been dominant in the seasonal price movements of rice in West Bengal. Factors affecting annual price movements are so numerous and varied that a year-to-year survey is undertaken in the following paragraphs to illustrate the importance of these factors in the seasonal price movements of rice and paddy.

Despite a drop in the production of rice in West Bengal, Orissa, and India in general, prices did not show a very great off-seasonal increase in 1955. The state government had undertaken a liberal policy of distributing cereals through relief work and fair-price shops. In 1955, over 100,000 tons of rice were distributed in this manner. Prices,

therefore, did not show a steep rise. The year 1956 experienced a higher price level as well as a greater off-seasonal rise than 1955 (Table 14). This seems to have been a reresult of an influx of rice-eating refugees, a terrible cyclone in May, and a devastating flood in September, all of which were accompanied by an absence of credit squeeze which resulted in a speculative build-up of stocks. The price rise was arrested only by the introduction of "modified rationing" in Calcutta and elsewhere.

Both absolute and relative prices went up still further in 1957 over the previous year. Increased investment under the Second Five Year Plan, coupled with deficit financing, had increased the money supply in circulation. The increase in rice production was much too inadequate to meet the increased demand resulting from an increase in population and income. Later in 1957, the export of Orissa rice on private account was banned, which resulted in a widespread shortage in Calcutta and surrounding areas.

The seasonal low and high in 1958 were still higher than the corresponding prices in the previous year. The price rise in November was nevertheless both relatively and absolutely lower in 1958 as compared to 1957. This was despite a drop in production over the previous year. Market arrivals were low in 1958 because of the withholding of stocks by larger cultivators in anticipation of high prices.[66] Licensing and the submission of fortnightly returns of stocks and transactions were demanded by the state government from traders in order to check speculation. A ban on the movement of rice and paddy outside of the state borders was continued. A 25 percent levy was imposed on rice mills located in surplus districts, and maximum rice and paddy prices were fixed. Over 980,000 tons of cereals were distributed through ration shops.

The excessively high price rise noted in 1959 was due to

[66] See *Report on the Pace and Pattern of Market Arrivals*, West Bengal section.

the fixation of a maximum rice price by the state government in early 1959, which was later abandoned in July because of difficulties in administering prices. Open market prices, therefore, once again reached a high level consequent to a poor crop in the state. Although the price rise in 1959 seems steep, it is more apparent than real.

The year 1960 did not show any rise in price, and 1961 experienced only a slight price rise. This may have been because of a good harvest in West Bengal and the formation of an eastern zone in December 1959 which allowed a free flow of Orissa rice into West Bengal in the following two years.

Prices, however, showed a steep rise in 1962, when the seasonal high reached an unprecedented level of Rs75.00 per quintal. This was owing to a poor crop in West Bengal and Orissa. Local production and imports from Orissa and the central government fell short of the state requirements. In the year 1963 there were once again high absolute and relative prices in the off-season. This was because of a poor crop for the second year in succession in West Bengal and Orissa, which was followed by frequent restrictions on exports of rice by the Orissa government. The central government's increased shipments were not adequate to meet the deficit.

The size of the harvest was thus not the only or even the most important factor in the determination of the seasonal pattern. The seasonal pattern was as much determined by various policies followed by state and central governments. The off-seasonal price rise depended upon the size of market arrivals, the actual imports and prospects of imports from Orissa, the supplies made available by the central government, the extent of retail distribution, and the prices fixed by the state government at various times.

Not only was there year-to-year variation in policies, but their enforcement also varied considerably from year to year. If traders usually use their past experience with crop size to forecast off-seasonal price rise, the seasonal pattern in

West Bengal could hardly be anticipated on the basis of the rice crop during the preceding nine years. Apart from actual official intervention in trade (which took such varied forms as the imposition of ceiling prices, compulsory procurement, interdistrict and interstate restrictions on movement, imports on governmental account, retail distribution of imported and procured stocks, and frequent credit squeezes), the probable nature of impending restrictions created a great deal of uncertainty among millers and traders about future needs and the availability of supplies. The official measures influenced the availability as well as the area of trading operations by imposing restrictions on export and import on private account and by procuring and distributing on governmental account. A sudden imposition of movement restrictions resulted in excessive stocks with the millers, whereas a sudden imposition of controls on exports from Orissa cut off a major source of paddy supply for the millers in Birbhum and Burdwan. Apart from the official policies, the farmers' market behavior created additional uncertainty in West Bengal regarding farm-level stocks and their release during the period under study.

The rice trade in Tamil Nadu and the jowar trade in Maharashtra were controlled less frequently and less vigorously during the period studied than the rice trade in West Bengal and the wheat trade in Punjab.[67] The off-seasonal price rise in these regions showed a somewhat closer relationship with the size of the crop than in Punjab and West Bengal, although it was also influenced by occasional movement restrictions, the distribution of cereals, and credit availability.

[67] See Appendix 1 for a review of control policies.

CHAPTER 6

The Rice-Milling Industry

The efficiency of the rice-milling system depends upon the degree of competitiveness within the system, the state of technology, and capacity utilization. These three factors interact. Thus, milling technology may determine the size of milling units, the structure of the milling industry, and hence the degree of competitiveness. Similarly, government policies such as licensing may influence the number of milling units and hence indirectly affect the choice of milling technology. Capacity utilization may be influenced both by the degree of competition and milling technology.

In a perfectly competitive market, given full-capacity utilization, the maximum margin between paddy and rice prices is determined by milling technology through its effect on the cost of milling and on the quantity and quality of rice and by-products derived from paddy. Rice and paddy prices may fluctuate within the margin determined by milling technology. Thus, given the competitive environment, the larger the margin, the greater the fluctuations possible between the limits set by technology. This will mean a higher residual term and a lower correlation between rice and paddy prices.

Margins may be higher than those determined by milling technology in a system not perfectly competitive. It is generally believed that rice milling in low-income countries is imperfectly competitive with margins much higher than costs. Margins may also be higher because of incomplete utilization of capacity and its effect on costs. In this

chapter, we first review the structure and competitiveness of the rice-milling industry and its effect on milling costs. We then examine the degree of interdependence and size of the rice-paddy margin. This will provide a basis for ascertaining the relationship between market structure and milling technology. The implications of such an interrelationship are of immense interest in formulating policies for the modernization of the rice-milling industry.

Structure of the Rice-Milling Industry

There has been an enormous increase in the number of milling units during the last two decades. The effect of this expansion on competition depends upon many factors, including growth in demand for milling services, technology, the size of new and old units, and the initial extent of capacity utilization.

It is clear that the milling industry has been technologically antiquated. Of nearly 50,000 licensed milling units at the end of the 1960's, 87 percent were of the huller type, and an additional 8 percent of the huller-sheller type. Barely 5 percent of the milling units were of the sheller type. The data also show that, owing to lower milling costs, single hullers have largely replaced hand-pounding in the last two decades after independence.[1] Not clear, however, is the extent to which single hullers have provided competition to the larger rice mills which processed the bulk of the marketed surplus of paddy. It is likely that most of the expansion in the number of rice mills simply resulted in displacement of the old technology. Thus competition did

[1] In 1953–1954, 70 percent of the paddy production in West Bengal was officially estimated to have been hand-pounded. In 1967, rice millers indicated that the proportion had gone down to 30 to 40 percent. The number of licensed single hullers in the state had increased from almost none to 6,000. Millers claimed that there were an additional 6,000 hullers operating in 1967 without licenses. See *Report of the Rice Milling Committee,* for costs of hand-pounding and milling rice.

not increase as much as is suggested by a cursory glance at the numbers.

There is, however, little direct evidence available on this question. Study of the data for West Bengal and Tamil Nadu permits a detailed examination of indirect evidence for two areas which are broadly representative of the institutional and physical environment within which the milling industry operates in India.

Number of Rice Mills and Capacity Utilization in the Organized Rice Mills, West Bengal

The rice-milling industry is comprised of two sectors: the organized sector, in which the millers purchase paddy on their own account; and the unorganized sector, in which milling is done on a custom basis. Although there is an overlapping of functions in the two sectors, mills in the unorganized sector are generally single hullers. Thus it is possible and convenient to maintain a distinction between the two sectors.

The published official statistics on the number of licensed rice mills in West Bengal (excluding single hullers) suggest a considerable increase in their numbers despite the restriction imposed by the 1958 Rice Milling Industries Act.[2] The statistical abstract of the government of West Bengal for the year 1962 indicates that there were 293 licensed rice mills in 1953 and that the number increased to 494 in 1960 and to 515 in 1962. The records of the Food Department for later years show 729 licensed rice mills in 1967 and 741 in 1969.

This increase is confirmed by the estimates of the *Annual Survey of Industries* published by the Central Statistical Organization. Due to changes in the definition of a factory, these are not comparable over a long period of time. However, data for the 1960–1964 period show that

[2] See Appendix 1, the section "Rice Milling," for effects of the 1958 act on the number of rice mills.

rice mills employing 50 or more workers working with the aid of power increased from 135 in 1960 to 185 in 1962 and to 212 in 1964.[3] However, there is some question about the interpretation of these data, since inquiries made to the Department of Food of the government of West Bengal indicate that as a result of the 1958 act, not many new rice mills are likely to have come up in the private sector in West Bengal since the mid-1950's.

No information is available on the actual capacity of rice mills or their capacity utilization. Data collected by the Food Department show the total quantity of paddy milled by rice mills in the state between 1960 and 1969. From these data, it should be possible to estimate capacity utilization of rice mills over time if some assumptions are made about their actual capacity. However, these data have several limitations. The quantities of paddy milled were estimated from the weekly returns that millers, under the 1958 Rice Milling Act, were required to submit of their purchase, milling, and stock operations. Since the purpose of the returns was to make it possible to estimate the stocks of paddy held by traders, so that a procurement and distribution policy could be formulated, millers almost always understated the quantities of paddy purchased and milled in order to avoid the seizure of stocks. Understatement became even more pronounced after 1965 when the government imposed a levy on millers which often amounted to 100 percent of the quantities milled.

An alternative estimate of capacity utilization can be derived from assumptions about the average size of mills and the percentage of the marketed surplus milled in the organized rice mills. Such estimates were made on the basis of the information collected from the Food Department, interviews with rice millers, and the East India Rice Millers' Association.

[3] Government of India, Central Statistical Organization, Department of Statistics, Cabinet Secretariat, *Annual Survey of Industries*, 1960–1964.

Table 16 shows the estimates, based on official data, of quantities of paddy milled and estimates based on hypothetical assumptions outlined above. The hypothetical estimates show a higher rate of capacity utilization than those obtained from the official data. Both estimates of capacity utilization show a declining trend which began in 1965. This seems to be due to various causes. First, a considerable drop in production resulted in a smaller marketed surplus, even assuming a fixed percentage of production. Second, a further decline in supplies to the organized sector

Table 16. Number of licensed rice mills in the organized sector and estimates of effective capacity utilization, West Bengal, 1955–1969

Year	No. of mills (1)	Estimated effective capacity of mills (metric tons)* (2)	Our estimates: Quantities milled (metric tons)† (3)	Our estimates: Utilization of effective capacity (%) (4 = 3 ÷ 2)	Official estimates: Quantities milled (metric tons) (5)	Official estimates: Utilization of effective capacity (%) (6 = 5 ÷ 2)
1955	360	900,000	765,000	85	n.a.	n.a.
1956	391	977,000	836,000	86	n.a.	n.a.
1957	425	1,062,000	940,000	88	n.a.	n.a.
1958	446	1,115,000	860,000	77	n.a.	n.a.
1959	467	1,167,000	851,000	73	n.a.	n.a.
1960	494	1,235,000	857,000	69	650,000	53
1961	497	1,243,000	1,067,000	86	810,000	65
1962	515	1,288,000	963,000	75	790,000	61
1963	n.a.	n.a.	899,000	n.a.	710,000	n.a.
1964	n.a.	n.a.	1,088,000	n.a.	700,000	n.a.
1965	711	1,778,000	1,126,000	63	510,000	29
1966	n.a.	n.a.	990,000	n.a.	450,000	n.a.
1967	729	1,823,000	980,000	53	150,000	8
1968	741	1,853,000	1,005,000	54	310,000	17
1969	742	1,855,000	n.a.	n.a.	350,000	19

* Based on an official estimate of 10 metric tons of milled rice in a single shift of 8 hours and 250 days of running in a year.

† Calculated at 20 percent of the state's production.

n.a.: data not available.

was caused by low procurement prices, fixed by the government, which diverted market supplies from the regular market channels to single hullers.[4] The cultivators found it profitable to sell rice in the open market rather than to sell paddy to rice millers at procurement prices. Operators of single hullers also indulged in clandestine trade. Third, there was considerable underreporting by rice millers of quantities milled. The second and third factors explain the much sharper decline in the estimates based on official records of milled rice. During the relatively normal period 1955–1962, capacity utilization seems to have been much higher than is generally believed to be characteristic of organized rice mills in India. Even in that period there was considerable year-to-year variation in capacity utilization.

Number of Rice Mills and Capacity Utilization in the Organized Sector, Tamil Nadu

Data from the Office of the Labour Commissioner, Tamil Nadu, show the number of rice mills with ten or more workers working with the aid of power or twenty or more workers working without the aid of power. Table 17 shows the statistics on these mills in Tamil Nadu from 1955 to 1966. Data for subsequent years are not comparable because of changes in the definition of rice mills recorded as factories and in fact show a considerable decline in numbers in 1967. The Civil Supplies Department provides data on the number of wholesale mills only for 1968. Wholesale mills are equivalent to organized rice mills that purchase paddy on their own account. The records show the number of mills to be 1,768. The data in Table 17 apply to the organized sector and show a considerable increase in their numbers.

It is noteworthy that the increase in the number of workers is proportionately much smaller than that in the num-

[4] Data for years beginning with 1965 correspond with data for the official procurement of rice by the state government from millers.

Table 17. Number of rice mills with 10 or more workers working with the aid of power, Tamil Nadu, 1955–1966

Year	No. of rice mills	No. of workers
1955	645	10,176
1956	799	11,288
1957	846	12,525
1958	887	13,086
1959	942	12,727
1960	1,011	13,810
1961	997	12,185
1962	1,533	13,702
1963	1,483	14,367
1964	1,463	15,123
1965	1,429	13,428
1966	1,412	12,457

Source: Office of the Labour Commissioner, Tamil Nadu.

ber of rice mills. The smaller increase in the number of workers is by no means due to an increasing trend toward automation, for most of the new rice mills installed were of the traditional huller type. There were only 15 sheller mills and 110 huller-sheller combination type of rice mills in Tamil Nadu in 1964, and the number did not show any significant increase in the subsequent period.[5] Possible explanations for the decline in the average labor force per mill may lie in the overstaffing of labor in the earlier years and the streamlining of employment in the subsequent period. However, the employment pattern is more likely indicative of a trend toward smaller-sized rice mills even in the organized milling sector.

Comprehensive data show that in 1960 there were 7,411 rice mills in Tamil Nadu, including small rice mills and single hullers. For the period 1964–1968, the number of rice

[5] Our investigations show that several mills recorded as combined huller-shellers are, in fact, only huller mills.

mills shows a substantial increase, most of which is due to a significant increase in single hullers (Table 18). Discus-

Table 18. Number of rice mills, effective installed capacity, and production of paddy, Tamil Nadu, 1964–1968

	Type of rice mill						
Year*	Huller	Sheller	Huller-sheller	Total	Installed capacity†	Paddy production	Utilization of capacity (%)
					(million metric tons)		
1964	8,636	15	110	8,761	6.97	6.00	86
1965	8,818	16	110	8,944	7.26	5.28	72
1966	8,972	14	111	9,097	6.73	5.70	85
1967	9,310	19	113	9,432	7.01	6.17	88
1968	10,000	69	100	10,169	8.89	5.84	66

* Installed capacity refers to calendar years, and production year to the July 1 crop year.

† Installed capacity is estimated on the basis of a single 8-hour shift and 250 days of work.

Source: Department of Civil Supplies.

sions with the Food and Civil Supplies Commissioner corroborate this evidence. New licenses have been issued on the basis of a "need" for more milling capacity in the area. The traditional flow of paddy involved considerable movement from the surplus areas of South Arcot, North Arcot, and Chingleput to Madras, and from Thanjavur to the deficit districts in the western part of Tamil Nadu. There was, therefore, a considerable spread of large rice mills into the deficit districts. Data from the Office of the Labour Commissioner indicate that only a third of the rice mills classified as wholesale mills were located in the four surplus districts of Tamil Nadu. A major portion of the marketed surplus of paddy was processed outside the surplus districts by such large rice mills.

Unfortunately, even less information on the average capacity of the large organized rice mills is available for Tamil Nadu than for West Bengal. Besides, because of a consider-

able outflow of paddy into Kerala, the assumption that quantities milled are equivalent to the total marketed surplus may be less appropriate in the case of Tamil Nadu. Thus the data for Tamil Nadu provide only a rough comparison of the total installed milling capacity for the production of paddy for the 1964–1968 period (Table 18). The available data are comprehensive for all mills and show no breakdown between organized and unorganized sectors. There is such a breakdown for 1968 from the Civil Supplies Department's estimate of the effective capacity of wholesale mills. If we assume the marketed surplus to be 20 percent of the state's production, then capacity utilization for 1968 in the wholesale mills is in remarkable agreement with the over-all estimates for 1968 in Table 18. In periods of free trade, there probably was some outflow of paddy to Kerala, and hence capacity utilization may have been somewhat lower than is indicated in Table 18. The evidence nevertheless indicates that effective capacity was used fairly in Tamil Nadu.

Although little can be said about relative capacity utilization in the organized and the unorganized sectors, if the trend has in fact been toward smaller rice mills in the organized sector, as is suggested by data in Table 17, the increase in capacity could not have been as fast as the increase in the number of organized mills. The milling capacity during the period of free trade was probably used relatively more heavily in the organized sector than in the unorganized sector. The data for the 1964–1968 period also emphasize the year-to-year variability in capacity utilization.

To recapitulate, evidence from West Bengal and Tamil Nadu strongly suggests that, even with a considerable increase in the number of milling units, there was no significant decline in the capacity utilization of organized rice mills during the period of free trade. Thus there was no increased pressure on the mills to compete more vigorously and thereby to reduce market margins. It also indicates that lower utilization in the subsequent period was mainly due to

governmental policies which diverted market surplus from the organized milling channels, rather than due to the inherent competitiveness of single hullers. There thus was an obvious imbalance in the milling structure as it expanded in size without becoming more competitive.

Types of Milling Capacity

The preceding discussion assumes a specific definition of rice-milling capacity. An effective policy to increase capacity utilization recognizes a wide range of factors that affect capacity utilization. In this context it is useful to distinguish three types of capacity.

Engineering capacity is defined as the highest number of working hours that can be maintained in a year purely on the basis of mechanical feasibility. Although it is hard to specify exactly what this is, customary practice in India suggests that modern rice mills can be run for 300 days a year at approximately 20 to 22 hours of running time a day with the remaining time reserved for the maintenance and repair of the machinery.

Effective capacity is defined as the maximum of working hours that can be maintained in a year within the confines of technological, social, and other physical and environmental restraints. Thus, given the family-operated mills traditional in the rice-milling sector in India, it is reasonable to assume that only a single eight-hour shift will be operated in a day.[6] More important, given the nature of the traditional parboiling process, which involves 1 to 3 days to steep the paddy in boiling water and to sun-dry it in open yards, it is more or less impossible to operate rice mills during monsoons in areas where parboiling is prevalent. It is therefore customary to assume 250 days of running time instead of the 300 days possible with modern drying equipment. The

[6] The resources of small family-operated mills may be much too small to permit the hiring of managerial staff. It may also be a result of a lack of managerial talent or of a strong desire to keep a firm within a family.

effective capacity of a rice mill in India is thus slightly less than a third of the engineering capacity of the milling machinery. Effective capacity was used in the preceding discussion of the utilization of mill capacity.

Optimum capacity is defined as that level of use at which the difference between total revenue and total costs is maximized. Optimum capacity may be much smaller than effective capacity if unit variable costs increase with increases in output, without a corresponding increase in unit revenue. This depends on a variety of factors which we shall examine in detail. The extent to which the full engineering capacity of the plant is utilized constitutes one of the important factors in industrial efficiency.

Some Hypotheses Regarding Pattern and Extent of Capacity Utilization

The available evidence suggests that in both Tamil Nadu and West Bengal, effective milling capacity in the organized sector was utilized much more heavily than in the unorganized sector. There was considerable variation in the year-to-year utilization of effective capacity, depending on crop size and on the proportion marketed through regulated trade channels.

The most important factor reducing optimum capacity below effective capacity is the cost of providing supplies for the period from one harvest to another. The larger the interharvest period and the greater the uncertainty with respect to supply-demand balances, the greater will be the cost and the greater the year-to-year variation in the percentage of effective capacity utilized.[7]

[7] We have already examined the evidence on seasonal price patterns, the pace of market arrivals, and purchases by millers in West Bengal in Chapter 5. V. K. Gupta provides some direct statistical evidence on the size of operation and costs of raw material in Rajpur which clearly indicates that "raw material costs increased as the utilization of capacity increased and this formed the major chunk of the total cost." (V. K. Gupta, T. P. Gopalaswamy, and D. P. Mathur, *Studies on Moderniza-*

In years of a small crop, it will be necessary to operate mills at only partial capacity. Where there is only a single major harvest of paddy, the cost of raw material increases considerably, owing to the need for at least partial purchases in the off-season. Such costs are particularly high in periods of sharp seasonal increases. If purchases are restricted to the immediate postharvest period, stocks required for the full capacity utilization of a rice mill are indeed high and involve considerable working capital. When there is a generally heavy build-up of stocks by the milling sector immediately after the harvest, prices in the off-season do not rise as sharply as otherwise, even if production is low.

The evidence on grain trade operations cited earlier shows that traders and millers avoid building up heavy stocks of grain in the immediate postharvest period and depend largely on a quick turnover of stocks for profits. This is partly because they depend to a considerable extent on their own resources for working capital. Even when millers desire to borrow funds for the purchase of paddy, there are often restrictions on the availability of bank credit. When credit is available, millers have less flexibility in their operations, as it is tied to the stocks of paddy.

Perhaps most important in discouraging a heavy build-up of stocks by mills in the immediate postharvest period is the uncertainty of seasonal price movements, which often result in excessively high seasonal margins in some years and low margins in others. Although average profit margins over a period of 8 to 10 years may not seem to be low ex post, the year-to-year variability in the margins emphasizes the high element of uncertainty implicit in storage operations. A large build-up of stocks greatly raises the loss function in a situation of high uncertainty and discourages millers from a commitment. Capacity utilization is even further discouraged by the government's policies, which generally aim at curbing

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tion in Paddy Rice System, [Ahmadabad: Indian Institute of Management, 1969], p. 165).

stocks as an antihoarding measure. The seasonally low utilization of milling capacity is further reinforced in areas where technical restraints on parboiling during monsoons raise the costs of carrying stocks beyond the monsoons and further reduce effective capacity utilization.

The data from modern and traditional rice mills show that even when less than 50 percent of the capacity is utilized, variable costs constitute as much as 96 percent of the total operating costs, with the cost of raw material and interest itself being slightly over 90 percent of the total. Variable costs would constitute even a higher percentage of the total costs if there were an increase in the capacity utilization. Where variable costs form such a large portion of the total costs, declines in average costs as a result of increases in capacity utilization are insignificant and, therefore, do not provide an incentive for extending capacity utilization.

This argument is supported by the actual behavior of millers, as evidenced by data collected from private rice mills of various sizes in Birbhum and Burdwan districts of West Bengal. It is evident that a close relationship exists between effective milling capacity and storage capacity. The data further show that storage capacity in these private mills never exceeded 60 percent of the annual effective capacity.

Further evidence of the highly seasonal utilization of capacity is provided by estimates of the monthly production of rice by organized rice mills in West Bengal during 1960 and 1967. It is noteworthy that data for the 8 years including both free trade and government procurement show a remarkable uniformity in the milling pattern, except for a gradual increase in the seasonality of milling in the later years, when open trade and, hence, seasonal fluctuations in rice prices were abolished.

An examination of the nature of variable costs of rice mills emphasizes the fact that milling is predominantly a trading operation which involves mainly storage and that only a small value is added in actual processing. It thus seems highly plausible that the level of utilization at which

optimization of profits occurs may change significantly from one year to another, depending on market conditions. The evidence on capacity utilization, when considered in relation to optimization, thus seems generally consistent both in terms of absolute level and of year-to-year fluctuations in the level.

This examination brings out an interesting distinction between the technical capacity, effective capacity, and economic capacity of rice mills and emphasizes the need for policies to move the economic optimum as close to the engineering capacity as possible. An investment pattern which reaches the optimum at low levels of engineering capacity, though profitable from an individual miller's point of view, is obviously inefficient for the society as a whole. Such a pattern may result in excessive allocation of the society's scarce capital to the milling sector, and several intermediaries may have to share the function of storage in an uncoordinated manner. In the long run, the total milling capacity will expand beyond what would be justified under full utilization of engineering capacity.

This divergence of private and social returns is a result of the manner in which market forces are structured. The forces result from a lack of facilitative public policy as well as from misguided policies, which not only raise the variable costs of operation, but frequently make it almost impossible to predict returns on operations with any degree of certainty. The divergence of private and social return is also a function of environmental restraints built into the traditional technology of drying and parboiling. There is obviously considerable scope for public policy with respect to prices, stocks, and credit on the one hand, and technology on the other, to change this state of affairs.

Utilization does not have much impact on milling costs in the traditional rice mills, as fixed costs constitute a small proportion of total milling costs. Underutilization of capacity does have a significant impact on costs in modern rice mills, for which fixed costs are much larger.

The data collected from two modern rice mills of 2 and 4 tons per hour capacity clearly show that within a single mill considerable variation in average fixed costs will occur, depending on variation in capacity utilization.[8] They also show considerable variation in average fixed costs between the two modern mills for milling the same quantities of paddy, even when capital costs are adjusted for excessively high constructions costs.

The evidence further suggests that, if anything, per unit direct processing costs are likely to be higher in a larger rice mill than in a smaller one. Thus, given the larger capital costs of modern rice mills as compared to those of the traditional mills, the saving in interest on working capital derived from partial utilization of a large rice mill may not necessarily compensate for the larger unit fixed costs. These costs may be even more significant because differing levels of capitalization are likely in rice mills of different sizes.

An additional aspect which is often overlooked in cost accounting for different-sized mills is the natural inclination toward vertical integration in a larger-sized mill due to the availability of by-products as raw materials. Such additional capacity created by the vertical integration may also be underutilized if adequate raw materials are not available to feed it. Underutilization of capacity due to environmental restraints will, of course, be eliminated in the process of modernization by the use of modern parboiling and drying equipment. However, underutilization that is due to market forces and inappropriate governmental policy may remain, substantially increasing costs for the highly capital-intensive modern mills, perhaps to the point at which they are not competitive with the traditional mills. Even if the modern mills remain competitive under these conditions,

[8] See Uma J. Lele, *An Analysis of Modernization of the Rice Milling Industry in India,* USAID Research Project, Occasional Paper No. 37 (Ithaca, N.Y.: Cornell University, June 3, 1970), for statistical evidence on modern rice mills.

there will be much greater waste of capital in unused capacity than now, because of their higher capital requirements.

Factors Affecting Milling Structure

We have already seen how utilization of milling capacity in the organized sector during the period of free trade seemed consistent with the optimization of returns in milling operations. It is now necessary to examine the phenomenon of a rapid increase in the number of single hullers in the unorganized sector and a trend away from large rice mills.

In several areas, such as West Bengal, husking machines have clearly replaced hand-pounding, which was prevalent in the domestic consumption of rice in the rural sector. Official estimates indicate that prior to the Second World War as much as 84 percent of the total paddy production of the state was hand-pounded.[9] The extent of hand-pounding had declined to 70 percent in 1953–1954.[10] A few rice millers in West Bengal estimated, during my conversations with them, that the extent of hand-pounding at about 30 percent to 40 percent in 1967, with husking machines processing more than two-thirds of the balance.

The increase in the number of husking machines is also partly attributable to governmental policies that have directly and indirectly encouraged their establishment in a variety of ways. We have already explained how in areas such as West Bengal single hullers have clearly proved to be an alternative channel of marketing during periods of price controls and statutory levies.

Government policies indirectly encouraged the development of an unorganized rice milling sector by discouraging the growth of the organized milling industry. The 1958 Rice Milling Act, although it did not directly control expansion of the organized milling sector, created a great deal of uncertainty in the private sector regarding its future and

[9] *Report on the Marketing of Rice in India*, p. 38.
[10] *Report of the Rice Milling Committee*, p. 11.

hence discouraged investment in large-scale mills involving considerable capital. The 1958 resolution by Congress leading to nationalization of the grain trade further discouraged modernization in the private sector, since the threat seemed more real to a modern, efficient sector than to an outmoded and inefficient one. The substantial fluctuations in marketed surplus resulting from the official procurement policies further discouraged the expansion or the modernization of the organized private milling sector.

A factor which has until recently been no less inhibiting in the modernization process is the lack of technical knowledge on the part of millers regarding the establishment and operation of modern rice mills. Until the Ford Foundation team of experts looked into the question of modernization,[11] the government neglected the matter completely, while emphasizing the merits of hand-pounding, if not in deeds at least in words. It neither provided millers with a knowledge of modernization—which is as necessary as the extension of new varieties of crops to cultivators—nor with financial assistance for initiating the modernization process. Rice milling, along with oil and dal milling, was classified as a "traditional industry" and, therefore, did not qualify for financial support for modernization.[12] A further problem in modernizing was the difficulty of marketing pure bran which resulted from the lack of development of a bran-extraction industry.

Finally, widespread use of the traditional single hullers was also an indicator of the lack of alternative opportunities for investment by persons in small towns with little capital and some knowledge of the working of the paddy-rice trade. The development of small- and medium-scale industries

[11] Modernization is defined here as the establishment of rubber-roll sheller mills and a mechanical parboiling and drying system in which parboiling is prevalent.

[12] It was only in October 1969 that the Reserve Bank formulated a policy of extending financial assistance to private millers for modernization.

in the rural areas of the rice-growing states was conspicuous by its absence during the two decades of stagnant agriculture. The dynamism of agriculture and the consequent spurt in small industries in rural Punjab in recent years are examples of the effects of profitability on the channelization of small savings.

The examination of the rice-milling industry suggests that the number of mills in the organized sector increased sufficiently to maintain a fairly high degree of competition. However, there probably was not enough underutilization of capacity to make possible rigorous competition among millers—not so much as one might believe from examining the over-all increase in the number of milling units. The large number of new single hullers mostly took over the paddy that had been hand-pounded before and did not take over the processing of the marketed surplus to a significant extent, except in periods when government policies restricted and impeded the organized rice-milling sector. This development in the rice-milling industry thus did not positively foster competition, as one might expect, as a compensation for overcrowdedness and consequent underutilization of capacity. Hence, it did not exert pressure for reducing milling margins.

Apart from competitiveness, the structure of the milling industry had a significant effect on milling costs through technological factors. We discuss these below.

Milling Technology

If markets operate competitively, paddy and rice prices in a market should have the following relationship: Price of rice per quintal = price of paddy equivalent of one quintal rice + milling costs − value of by-products from paddy ± value of quality differential resulting from processing technologies.

A majority of the 58 million tons of paddy currently produced is processed by traditional hullers. Several drawbacks exist in the traditional huller type of rice mill. In these

mills, paddy is not effectively cleaned before dehusking and there are considerable breakage and loss of rice. In the process of hulling, the mills provide no control over the degree of polish, nor do they have a facility for separating bran from husk. Paddy milled in hullers thus produces less rice than that milled in a traditional sheller mill, and still less than that milled in a modern rubber-roll sheller mill. There is a much higher proportion of brokens, refraction, and unhulled paddy in hullers. The by-products are mixed with each other, are of poor quality, and hence are usable only as animal feed or as fuel in the rice mills. Thus, there is considerable wastage in the present rice-milling industry.

Although estimates vary, it is believed that approximately 4 percent to 10 percent more rice of superior quality could be recovered if there were complete modernization of the existing industry.[13] The loss of rice resulting from antiquated processing has been estimated by the Rice Milling Committee as 0.5 million tons, valued at Rs350 million.[14] It is estimated by the Department of Food to be as high as 2.5 million tons, valued at Rs2,250 million.[15] The bran recovered in its pure form in the modern milling process could be used for oil extraction for edible purposes, and the remaining by-product could be used as poultry feed. It is estimated that at least 1.2 million tons of bran, valued at approximately Rs400 million, is lost in the traditional process of rice milling.[16] Another estimate puts the loss of bran

[13] Government of India, Ministry of Food and Agriculture, Department of Food, "Rice Milling Industry in India: Proposals for the Fourth Five Year Plan," p. 6 (unpublished).

[14] Food Corporation of India, *Report of the Rice Milling Committee*, n.d., p. 11.

[15] *Rice Milling Industry in India: Proposals for the Fourth Five Year Plan*, p. 7.

[16] H. A. B. Parpia and H. S. R. Desikachar, "Modern Process for Parboiling of Rice," *Modernization of Rice Industry* (Ahmedbad: Indian Institute of Management, Aug. 1969), p. 87.

oil at as high as 2 million tons, valued at Rs500 million.[17] Whatever the differences in the various estimates, they all emphasize the substantial losses involved in the continuation of the existing processing system, which inevitably must affect market margins.

Recovery of Rice from Paddy

The earlier data from the Ministry of Food and Agriculture on rates of recovery were overwhelmingly in favor of hand-pounding. The Ministry's estimates suggested that the percentage of recovery of rice, including broken rice, ranged from 70 to 73 percent for hand-pounding, 68 to 69 percent for hullers or huller-type mills, and 69 to 70 percent for sheller mills.[18] However, these rates were not corroborated by tests conducted by Dorris Brown, who maintained that yields were much lower in hand-pounding and that there were much greater differences between huller and sheller milling rates.[19]

Since the inception of a modernization program in the rice-milling industry, much more scientific evidence on recovery rates has been available in India. The investigations conducted by the Central Food Technological Research Institute in Mysore generally show a great deal of variation in milling outturn, depending on the variety of paddy, the extent of polish, the type of equipment, and the condition of the paddy before milling (whether it is raw or parboiled). The data for West Bengal show a recovery rate of 68 percent for parboiled paddy in traditional hullers. Similar estimates for the ADT 27 variety in Tamil Nadu range

[17] Gupta, Gopalaswamy, and Mathur, *op. cit.*, p. 12.

[18] *Rice Economy of India*, p. 36.

[19] Dorris Brown's unpublished data. Brown contends that the recovery rates range from 66 to 68 percent in traditional huller and sheller mills and that they are as high as 72 to 74 percent in modern rice mills when 4 percent bran is removed. See Dorris Brown, "Recent Trends in the Milling and Processing of Rice," *Indian Farming*, Sept. 1966, p. 77.

between 67.2 and 67.9 percent.[20] Outturns of raw paddy are much lower, with a much higher percentage of brokens.

Modern mills gave an over-all increase in total rice outturn averaging 2.5% over (traditional) sheller type mills and 6.6% over huller units. The actual increases varied from 0.8–4.2% for the sheller unit and 1.8–12.5% for the huller units respectively. For parboiled paddy the corresponding increases in total rice yields for the modern mills averaged 0.8% over the sheller mills and 1.6% over huller units. The actual figures varied from 0.0–1.3% for sheller mills and 0.3–2.3% for huller mills.[21]

Recovery of By-Products from Paddy

When the degree of polish is relatively high, as in machine milling, the proportion of bran removed increases with a corresponding reduction in the proportion of rice.[22] The recovery and the utility of the by-products also vary with the method of processing. As was noted earlier, in huller-type mills bran is mixed with finely powdered husk and is therefore not usable as cattle feed or fuel. Some millers try to separate bran from husk to sell as cattle feed. However, since only the coarse husk can be separated from bran, and not the powdered husk, this so-called bran from the traditional hullers fetches a very low price in the market, compared to the bran produced in sheller mills. In the sheller-type mills, bran comes out in unadulterated form. The yield of bran is also much greater.

For a typical mill owner in Bolpur, the following breakdown of rice and by-products is given as normal for multiple-huller equipment: from 150 kilograms of paddy, 96 kilograms rice, 5 kilograms broken, 40 kilograms husk, 5 kilograms bran, and 4 kilograms wastage.

Pure rice bran is of great potential value as a source of

[20] Central Food Technological Research Institute, Mysore, *Report on Evaluation of Modern Rice Mills in Comparison with the Existing Mills*, n.d., Tables 2 and 6.

[21] *Ibid.*, p. 7.

[22] *Rice Economy of India*, p. 36.

oil. The industry is, however, still in its infancy in India and, therefore, not of great importance at present. Most of the millers interviewed in West Bengal and Tamil Nadu did not sell their bran for processing but used it mainly as fuel in the mills. Some sold it as cattle feed. The market price of husk-mixed bran has varied from Rs2.00 to Rs3.00 per quintal, and that of pure bran from Rs20.00 to Rs45.00 during the period of this study.

Milling Costs

Milling costs may differ according to whether the paddy is milled raw or parboiled, the type of mechanical equipment used, the type of power used, and the size of the plant. There is an even more difficult conceptual problem in assigning fixed costs to the milling expenses. The existing huller mills range in age from five to forty years. For the older mills, by any method of calculation, depreciation charges must be nil or very small. The newer rice mills, of course, have larger fixed costs. It must be remembered that unit fixed costs depend upon the volume of paddy milled in a year and hence will vary from one year to another. But most important of all is the question of how to assign fixed costs to milling and storage. Milling may well involve the storage of paddy over a period of several months. Does one assign interest on working capital to the costs of storage or of milling? Such considerations substantially affect the estimation of milling costs.

Milling costs in traditional hullers and modern rubber-roll sheller mills also differ, owing to varying labor-capital ratios in the two technologies, the former being much more labor intensive and the latter more capital intensive. Most elements of labor cost vary directly with the volume of operations in traditional mills. Labor costs are, however, more likely to be of an overhead nature, because of the greater managerial requirements of modern mills. Capital costs and part of the labor costs, being fixed, will affect milling costs according to the degree of capacity utilization,

as well as according to the method of accounting used in allocating costs. An additional factor which is likely to introduce considerable real variation in milling costs, even between modern rice mills, is the degree of capital intensity. A much greater variation in capital-labor ratios is possible between mills using modern technology than between traditional hullers. Since costs of borrowing capital may be significantly different for public and private sectors, this may further add to variability in milling costs.

Quality of Rice Produced

The establishment of modern rice mills in India has emphasized the differences in outturn itself and in the quality of the outturn that may result from differences in milling equipment. The Central Food Technological Research Institute's evaluation indicates that the raw paddy increases in head rice yields (defined as all grain of three-fourths size or larger) in modern mills over sheller mills varied from 1.0 percent to 12.4 percent, with an average increase of 6.1 percent. As compared to huller mills, the corresponding increases varied from 6.5 percent to 27.7 percent, with an average of 15.1 percent. For parboiled paddy, the corresponding increases over sheller units varied from 0.0 percent to 2.5 percent, with an average of 1.3 percent. The increases over huller mills varied from 1.0 to 8.5 percent, with an average of 4.1 percent.[23] Rubber-roll sheller mills are thus obviously much superior in quality of processing to traditional hullers and even to traditional sheller mills.

Considerable difference of opinion exists in India and other rice-consuming countries in Asia as to whether quality differences would ensure price differentials adequate to justify a heavy capital investment in modern rice mills. The underlying contention is that consumers in Asia do not show a marked preference for higher head rice content and that, in fact, in some cases, there is a special demand for

[23] Central Food Technological Research Institute, *op. cit.*, p. 7.

broken rice to be used in traditional preparations. Because of the absence of a free market in rice in India since the establishment of modern rice mills, little can be said about what price differences would follow from quality differences in rice. Price differences due to quality would be distinguished from those due to varieties, for which we have abundant evidence from the past.[24] An interesting study of the domestic rice market in the Philippines indicates that price differences due to quality are much smaller in that market as compared to those in the international market.[25]

The excessive emphasis on the improved physical characteristics of rice produced in modern mills has been mainly due to the importance given by American consultants in the initial stages in India and elsewhere in Asia to the appallingly poor quality of domestic processing in comparison to the standards of the international market. The point, no doubt, is particularly relevant to countries such as Pakistan that have been unable to compete in the international market because of poor processing methods. In the domestic markets in Asia, however, investment in modern mills seems much more justifiable on grounds of increased outturn and improved by-products, each of which in itself provides enough economic justification for investment.[26]

Efficiency of the Existing Paddy-Rice System

The preceding discussion emphasizes how different components of the milling margin would be differently affected

[24] Quality differences apply to various characteristics of the appearance of the rice, as distinguished from varietal differences, which are partly inherent and affect cooking quality and flavor, for which consumer preferences are highly marked in India.

[25] Roger A. Aspiras, "The Relationship between Quality and Price in Philippine Wholesale Rice," International Rice Research Institute, Los Baños, Philippines (mimeographed).

[26] This is proved in abundant evaluation reports on modern mills in India by official and nonofficial agencies that do not allow for an increase in return due to the improved quality of the rice processed in modern mills.

under different milling technologies. Where different milling technologies exist simultaneously, the price of rice may be determined by the technology of the marginal producer. The producers using more efficient technology will earn profits larger than "normal," much in the nature of "rent," thereby encouraging a shift toward a more efficient milling technology. When considerable expansion of low-cost technologies takes place, any excess capacity that may exist in the milling sector may result in the undercutting of prices, so that the process of elimination of inefficient milling technologies is accelerated, not so much because of the profit incentive, but because of the loss involved in not shifting to a more efficient milling technology. The shift from hand-pounding to hulling is an excellent example of such an economic force at work in the processing system in the past. This, however, did not affect the processing of the marketed surplus, most of which was milled in the traditional organized rice mills during the period of free trade. We shall now compare the spread between the market prices of rice and paddy that existed during the free trade period with the technologically determined market margins to examine if the industry operated efficiently. In the traditional milling technology, neither by-products nor variations in quality due to processing had a significant impact on market margins. In determining the actual market margins that probably existed in the traditional industry, we shall, therefore, only consider the recovery of rice and milling costs.

Actual Recovery of Rice from Paddy

On the basis of the widespread evidence on milling outturns in hullers discussed earlier and in accordance with the usual practice in India, a ratio of 2 to 3 is used in this analysis for the milling outturn of rice from parboiled paddy. Since all the paddy is parboiled in West Bengal and all except the rather fine-quality paddy is parboiled in Tamil Nadu, milling outturn is considered only for parboiled paddy.

Actual Milling Costs

Data on costs of milling in traditional rice mills available from secondary sources have two major drawbacks. They are often outdated. For example, most data in publications of the Ministry of Food and Agriculture and of the various state governments apply to the prewar period or to the early fifties. Second, when available for later years, like data from the marketing surveys of the Department of Statistics, Tamil Nadu, or from the rice millers' association in West Bengal, they show considerable diversity. It is not always clear what components these costs include. More interesting, the data show considerably higher costs for West Bengal than for Tamil Nadu. We therefore collected data from selected traditional rice mills in Tamil Nadu and West Bengal.

Our investigations show a remarkable degree of uniformity in the variable costs of milling in Tamil Nadu. The direct milling costs that consist of costs for labor and for oil and fuel range between Rs1.00 and Rs2.00 per quintal of rice. Fixed costs vary somewhat more, only because of a variation in the depreciation component. Our data for Tamil Nadu show the unit direct total cost of milling to be approximately Rs5.50 to Rs6.00 per quintal of rice in 1969.[27] Millers, however, indicated that since the early 1960's milling costs have nearly doubled, owing to higher interest rates, higher prices of spare parts and repairs, higher taxes and licensing fees, and somewhat higher labor costs. Data collected by the Department of Agriculture in Tamil Nadu in surveys in 1963 show the cost of milling in Alandur market to be Rs3.15 per quintal of rice when rice was boiled once. When there was double boiling, costs were slightly higher and amounted to Rs3.90 per quintal of rice at Erode, Rs3.60 at Tirrupur, and

[27] It must be noted that these costs do not include the purchase of paddy, which constitutes the highest cost component in milling. Since we propose to compare rice prices with those of paddy, we are concerned only with the value-added component.

Rs3.45 at Karaikudi.[28] At Mannachanallur, one of the largest milling centers in the south, the cost was Rs3.15 per quintal of rice in 1963.[29] These data seem to be in remarkable agreement with what our estimates for 1969 would indicate if we extrapolated costs for earlier years on the basis of our interviews.

In order to determine whether actual milling costs were in fact higher in West Bengal than in Tamil Nadu or whether other elements caused the costs to seem so much higher, we collected data on milling costs directly from selected rice mills of various sizes in West Bengal. The data for eight traditional huller mills in West Bengal show that the direct costs of milling, which include oil, fuel, electricity, and salaries of temporary workers, range between Rs1.50 andRs4.00 per quintal of rice in 1968. If it is assumed that all of the effective capacity was utilized by the rice mills in a year, the fixed costs of operation—defined to include depreciation, interest on block capital, insurance, maintenance, and salaries of permanent employees—range between Rs1.00 and Rs2.75 per quintal of rice.[30] The average total milling costs per quintal of rice for 1968 show a range of Rs2.70 to

[28] The higher costs in these markets may also be due to the fact that the mills may be smaller in size since they are situated in deficit regions.

[29] From an unpublished document of the Government of Tamil Nadu, Department of Agriculture. The costs are quoted per quintal of paddy, and here are converted into costs for a quintal of rice for the sake of comparison.

[30] Depreciation is calculated as 10 percent of the value of machinery and 5 percent of the value of buildings. Any overstatement of depreciation resulting from the use of the standard accounting method rather than the replacement method is probably somewhat counterbalanced by the fact that the effective capacity was generally not used fully, and hence the unit fixed costs were slightly higher than those assumed here. There are additional reasons why costs may have been somewhat overstated. Interest rates were much lower in the fifties. It is also likely that salaries of both skilled and unskilled laborers have risen somewhat above the levels of the fifties, though not very significantly. It is thus highly possible that milling costs were lower in the fifties than those in the data collected from the mills in 1969.

Rs5.10.[31] The costs show no consistent variation according to the size of the plant.

The total per unit milling costs in West Bengal thus do not seem much higher than those in Tamil Nadu. However, this is because the fixed cost component of West Bengal mills is much smaller than that of Tamil Nadu, owing to the fact that most mills have already depreciated in the accounting sense. The variable costs, however, are much higher in West Bengal than in Tamil Nadu and seem consistent with the higher milling charge paid by the West Bengal government under its procurement scheme, as compared to other states. In 1967, West Bengal allowed Rs5.36 per quintal of rice milled, in comparison to Rs2.25 in Tamil Nadu. The charge was subsequently reduced to Rs4.50 but was still higher than that in other states.[32]

It is also noteworthy that the variation in costs from one mill to another is due not so much to differences in fixed costs as to differences in direct costs of milling. Several reasons for the differences seem plausible. It should be recalled that in 1968–1969, mills were milling paddy for the West Bengal government. Records of some mills show operations much below capacity. If the low level of operation was unexpected, this must have affected the millers' hiring of labor and hence affected costs. However, a less generous view of the situation suggests that some millers, in fact, milled more paddy than their records indicate but assigned their variable costs only to the stocks submitted to the government. As data presented earlier show, there was a substantial decline in the reported

[31] These are not equal to the sum of variable and fixed costs given above, because the firms with the lowest variable costs did not always have the lowest fixed costs.

[32] The official explanation is that millers in West Bengal are required to surrender by-products, whereas they are not required to do so in the other states. Our inquiries indicate that, in fact, no by-products were ever recovered from millers. Nor is the difference justified by the temporary storage undertaken by millers subsequent to milling in West Bengal, as was explained by officials. There is not a significant difference in the duration of storage in West Bengal, as compared to other states.

quantities of paddy milled by rice millers in West Bengal during periods of control, while the supplies in fact found their way to the consuming markets.

Another explanation for such a great variation in variable costs may be that some mills are simply more inefficient in their operations than others and do not really have to attempt to reduce their costs, owing to the high milling rate allowed by the West Bengal government as compared to any other state in India. On the contrary, pressure from the millers for maintaining such a high milling rate may be the result of inefficiencies on the part of some millers while efficient millers reap profits from high milling rates. Another explanation may be that, as a result of controls, other components such as bribes to government officials and heavy storage losses due to clandestine storage, which normally do not enter into economic calculations, raise milling costs for some millers.

Whatever the reasons, our data for Tamil Nadu mills as well as for some mills in West Bengal suggest that millers in West Bengal are probably being paid a higher milling charge than would be justified, on economic grounds, in an open or competitive situation. A large percentage of the mills are old and hence have no depreciation or interest on the fixed capital components of their fixed costs. On the contrary, the Tamil Nadu government obviously paid too little to its millers for milling. Either policy is likely to encourage inefficiency. The case of high milling charges needs no further laboring. When milling rates are as low as they were in Tamil Nadu, there is also likely to be considerable pressure on millers to recover costs through devious means. The price per quintal of rice in the markets of Tamil Nadu and West Bengal should thus have been in the neighborhood of 1.5 times the per quintal price of paddy plus milling costs of 1.5 quintals of paddy.

Actual Differences between Paddy and Rice Prices

Figures 23 and 24 show the percentage distributions of the actual spread between the price of rice and that of its paddy

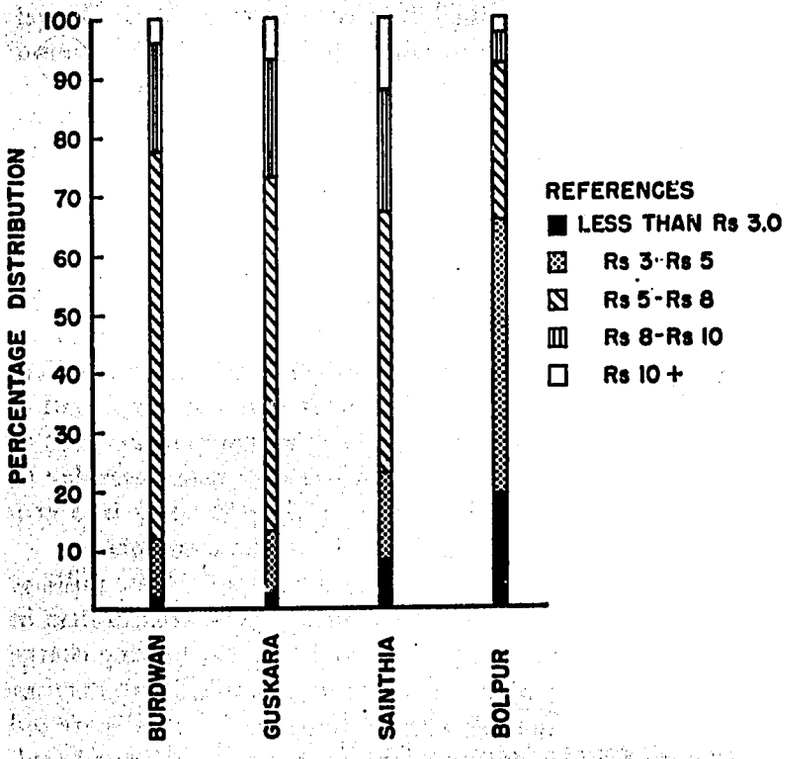

Figure 23. Percentage distribution of differences between prices of 1 quintal of rice and 1.5 quintals of paddy, primary markets, West Bengal, 1955–1963

equivalent in the markets of West Bengal and Tamil Nadu. For example, in the 459 weeks for which weekly wholesale prices of rice and paddy were compared in the Burdwan market, the price spread between a quintal of rice and 1.5 quintals of paddy remained less than Rs3.00 for 2 percent of the time (Figure 23).

Figure 24 indicates that in Kanchipuram, during the period 1955–1963, out of 484 weeks, a little less than half the time the price difference was above Rs5.00 per quintal of rice. In Tirunelveli, the price difference was above Rs5.00 for 31 percent of the time; in Cuddalore, 21 percent; in

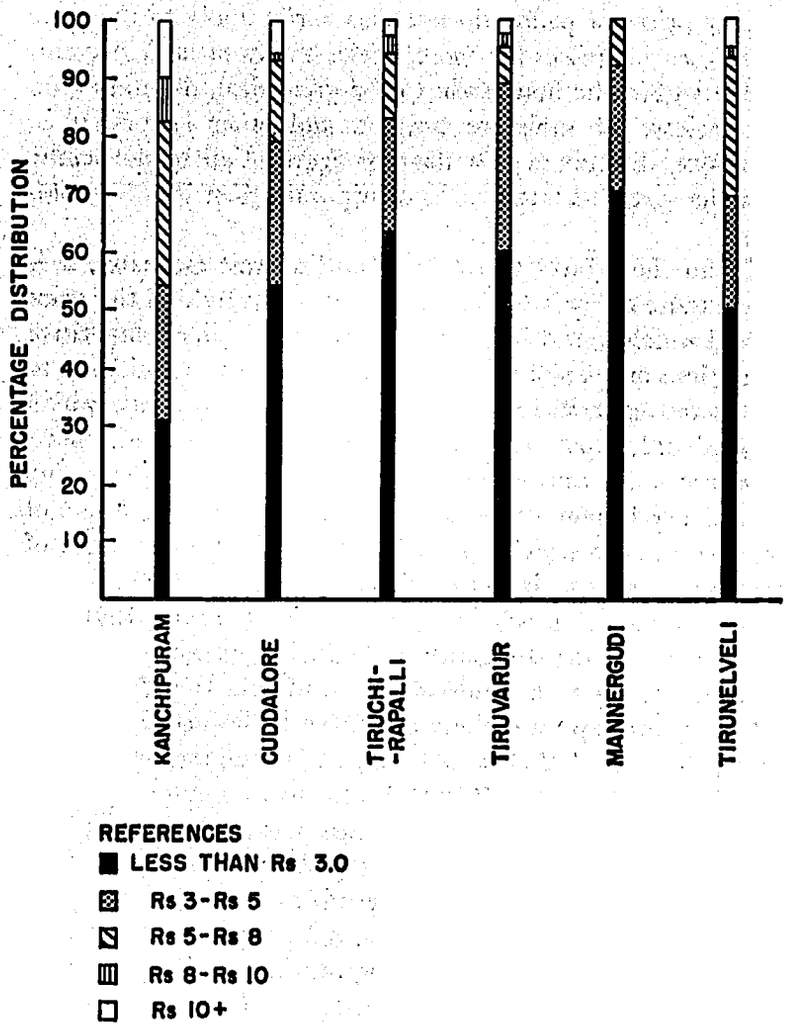

Figure 24. Percentage distribution of differences between prices of 1 quintal of rice and 1.5 quintals of paddy, primary markets, Tamil Nadu, 1955–1963

Tiruchirapalli, 17 percent; in Tiruvarur, 11 percent; and in Mannergudi, 8 percent.

It is necessary at this stage to point out that, although both rice and paddy prices apply to sort I rice in all markets,

weekly prices of paddy do not necessarily apply to the same variety as rice prices for those weeks. Prices of both rice and paddy within the first grade vary a great deal, depending on the variety, the moisture content, and other factors. It is, therefore, difficult at this stage of aggregation to determine why the spread is larger in Kanchipuram than in other markets.

Given the arbitrary nature of milling cost estimates, it is much more difficult to determine the magnitude of the price spread which would be justified in milling under competitive conditions and beyond which markets could be considered to be operating inefficiently. For unlike shipping costs, which depend only upon the mode of transportation and, therefore, are fairly uniform between any two points, processing costs depend upon a complex set of factors. In using a rate of 66 percent of rice yield, precision is sacrificed for the sake of large-scale analysis. It should also be recalled that the data on milling costs are much less precise than those on transport costs, owing to the difficulties of assigning variable and fixed costs accurately to an individual lot of milled paddy. Some arbitrary assumptions, therefore, have to be made to arrive at a price spread that would be justified under competitive conditions. Using the Tamil Nadu government's figure of Rs2.25 per quintal of rice as the direct variable milling cost, and of Rs1.50 per quintal as the commission on procurement (which could be treated as the return to the miller per quintal of rice milled and sold), it would be necessary to allow for amortization of building and equipment and other establishment costs, such as taxes and interest. If Rs1.25 is allowed for such costs,[33] it would seem that a spread of up to Rs5.00

[33] This does not seem too unrealistic in view of the following calculation: A modern 2-tons-per-hour rice mill costs Rs150,000; the annual milling capacity of such a rice mill = 2 TPH × 24 hours × 300 days × 80% = 11,500 tons of paddy; the annual rice yield from such a mill = 11,500 tons of paddy × 72.112% = 8,294 tons of rice. If the cost of the rice-milling equipment is to be amortized in 18 years at an interest rate of 6 percent per year with an annual production of 8,294 tons of rice,

per quintal of rice and its paddy equivalent is a liberal allowance for milling costs. It should be noted that this is in agreement with the highest per unit total cost of milling 1.5 quintals of paddy cited above for West Bengal.

Figures 23 and 24 show that the spread in the West Bengal markets was much greater than in Tamil Nadu. In Burdwan, it remained above Rs5.00 for 88 percent of the time; in Guskara, 87 percent; in Sainthia, 77 percent; and in Bolpur, 34 percent. It is not known whether the lower percentage in Bolpur was due to the shorter period covered. It may also have been due to the poor transport facilities in Bolpur, which probably kept rice prices depressed as compared to those in other nearby markets. The generally larger spread in West Bengal may also have been due to the fact that paddy brought to the market usually has a much higher rate of refraction (i.e., dust and foreign matter) than that in other states, where cultivators clean paddy before marketing it. This fact was consistently noted in discussions with procurement officials in West Bengal and Tamil Nadu. The generally larger spread in West Bengal is, however, commensurate with the higher milling costs claimed to prevail in West Bengal.

Concluding Remarks

The preceding analysis of the spread between paddy and rice prices suggests that the traditional rice-milling industry is not only technically inefficient but also economically inefficient within the confines of the given technology. The cases of West Bengal and Tamil Nadu clearly show the negative effects of government regulation on the structure and effi-

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each quintal of rice will have to be assigned approximately 43 paisas as the amortization cost. Given the underutilization of capacity in the milling industry, this cost will be greater than 43 paisas. There are several other costs, such as taxes, amortization of the buildings, and other establishment costs (including telephone, electricity, purchase of storing and bagging materials and insecticides), which would add to amortization costs.

ciency of the milling industry. Controls encouraged wasteful allocation of resources to single hullers, which are competitive with hand-pounding in rural areas but which are more costly than rice mills in the organized sector in periods of open trade. Governmental policies that disregarded economic and technical efficiency also influenced margins by maintaining an antiquated milling technology and, hence, a lower and poorer quality of outturn of rice and by-products.

Government policy also resulted in a negation of economic efficiency in various ways. First, by positively interfering with market supplies, it encouraged the diversion of supplies from regular market channels, thus causing increased handling and storage losses. Further, excessive controls influenced milling costs through the legitimization of unjustified charges. Also, by setting milling charges too low in some areas, the government encouraged circuitous methods of recovering profits, while it encouraged gross inefficiencies in others by setting milling charges too high.

A great scope obviously exists for a positive, facilitative governmental policy in the future. There seem to be at least four ways in which this can be brought about. (1) A favorable atmosphere needs to be created which would encourage private investment in technologically superior milling equipment. (2) A need for an extension of technical knowledge ought to be recognized and a positive program adopted for making millers in the private sector aware of modern milling technology. (3) Credit should be made available to millers for modernizing existing rice mills in order to foster competition between those who could raise their own capital and those who, for lack of capital, would fail to modernize. (4) A price policy is needed which would stabilize off-seasonal price movements and market supplies from year to year, thereby reducing uncertainty in trading operations and increasing the utilization of effective capacity.

A complete elimination of private milling is as unworkable for rice as it is for the grain trade, since milling is more a trading activity than it is a processing activity. Efficiency

could be enhanced in the industry in the future by pursuing policies that will create a balance between the private, public, and cooperative sectors instead of using the public and cooperative sector mills as barometers of inefficiency for a small private sector, as has been done in several other industries in India.

CHAPTER 7

Performance and Policies

The Basic Theme

This work examines the widespread contentions that the private marketing systems in India and elsewhere in underdeveloped countries are not highly competitive and that there are regional and temporal disparities in agricultural prices which are largely a result of monopolistic and speculative elements in the trade. The work was prompted by the general neglect of the problems of distribution and the tendency among responsible persons to accept these views as established facts. These stereotypes have important implications in terms of the policy measures suggested and adopted in underdeveloped countries. A proper understanding of the distribution process is important, for any change in the process, for either better or worse, has considerable impact on the development of the agricultural sector through its effect on the allocation of resources within the agricultural sector and between agriculture and the rest of the economy.

Direct Observation of Market Structure

A firsthand observation of market structure preceded the statistical analysis of price variations over time and space in this study. Statistical information is often not adequate to arrive at specific conclusions unless it is coupled with direct observation; it may even tend to be misleading. Traders and market officials were, therefore, interviewed extensively through informal discussions of trading practices, factors in-

fluencing storage decisions, market intelligence available to traders, the degree of free entry into the agricultural commodity trade, capital as a factor leading to monopoly, problems of cooperatives, transport facilities, the role of easy entry, the extent of partnerships, and a number of other matters. These discussions proved useful for a number of reasons. It was possible to make judgments about trade that were independent of textbooks or official reports on marketing in India. Second, the informal discussions helped in the generating of hypotheses for statistical testing and in the interpreting of results obtained from the statistical study where data proved inadequate. Interviewing primary reporting agencies was also essential, in order to be able to use the existing data effectively.

The information collected through such informal interviews provides evidence quite the opposite of the prevailing views on marketing. First, the number of intermediaries seems much too large to permit monopolistic practices in trade. Intramarket and intermarket competition among a large number of intermediaries greatly limits the profits that can be earned in the grain trade despite the relatively strong bargaining positions enjoyed by some traders vis-à-vis producers and fellow traders. There is reason to believe that by and large collusion, either tacit or overt, is uncommon in the Indian grain trade. High profits earned by a few traders are not monopolistic returns but can be attributed to the large volume of operations resulting from their command of capital, a scarce resource in Indian trade. The high profits of the few large traders can also be explained by the skill of these traders in correctly judging market trends and by their speculation in short-term inventories. The unstable market conditions in India provide a number of opportunities for a skillful trader to make profits. Traders on the whole appear to be relatively well informed about prices and demand conditions. Market intelligence is available to them mostly through private agencies and through their contacts in various market centers. Owing to the lack of a well-organized

system of disseminating market information, the traders' knowledge of stocks and the over-all supply position is, of necessity, poor.

Regional Price Variations

For the purpose of examining regional price variations, prices of comparable varieties of jowar, wheat, and rice were compared in a number of producing and consuming market centers. The degree of relationship between prices in various market centers was taken as an indicator of market integration. Price differences were considered in relation to the costs of transportation. Where differences were found to be greater than transport costs, an attempt was made to examine factors underlying such excessive price differences.

An examination of regional price disparities suggests that grain markets are closely related to each other and that prices in the major consuming centers have considerable influence on prices in the producing centers and in other consuming centers. Price differences between comparable varieties are usually not greater than costs of shipment. When the difference is positive, it does not remain so for a long period of time. Prices of different varieties seem to differ considerably and are likely to cause misconceptions about high regional price differences, as the price data, in many cases, do not specify the variety to which they relate. Positive margins (i.e., differences above the cost of shipping) for comparable varieties do not show either an increasing or a decreasing trend during the period under consideration. The margin between the price in the primary market and the parity price in the wholesale market, in some cases, indicates marked seasonality. It tends to be high in the immediate postharvest period and to decline substantially in the off-season. This seasonality can be explained, first, by the lapse of time between the appearance of arrivals in the primary markets and their appearance in the terminal markets, whether or not the delay is exacerbated by pressure on transport facilities. The rather high margins in the postharvest period can also

be explained by the difficulties of transport encountered in that period, resulting from pressure on limited transport facilities. Periods of high margins thus generally seem to be closely related to periods of a shortage of transport facilities. They also appear to be a consequence of a lack of shipments between markets resulting from official movement restrictions, imposed frequently during the period under study. The zonal arrangements failed to balance supply with effective demand within each zone. Restrictions caused an accumulation of grain in the producing markets which was not completely absorbed by the rest of the markets. The failure to shift grain flows from out of state to internal markets appears to result partly from a shortage of facilities for the shipment of grain and partly from the failure of consumer demand to shift to the new supply in the producing center, because of a preference for particular varieties of grains.

The study of market integration thus suggests that a reasonably well-organized and competitive system of private trade exists in India. Price differences between regions at present are due mainly to a lack of adequate transportation facilities and to hindrances to perfect mobility imposed from outside the trading sector, such as transport bottlenecks or official restrictions. These differences should be regarded as a consequence of imperfections in mobility rather than of monopolistic elements.

Seasonal Price Variations

A study of the extent of seasonal fluctuations of rice, wheat, and jowar prices during the period 1955–1956 to 1964–1965 and storage costs indicates substantial year-to-year variation in seasonal price patterns. These price movements, when considered in relation to the costs of storing grain from the harvest until the off-seasonal peak, suggest that storage is not always profitable, because the off-seasonal price rise does not always cover storage costs. Heavy losses in some years are balanced by gains in others. The hypothetical returns, on the average, seem low. Thus the assumption that traders make

excessive profits does not seem justified. The analysis of stock books and profit and loss statements of traders suggests a rapid turnover of stocks. Traders, in actual practice, did not store for as long a time as was presumed in the analysis of hypothetical margins. They neither purchased most of their supplies at the seasonal low nor sold a major portion of their stocks at the seasonally high prices. Their actual margin showed, on an average, lower magnitude as well as lower year-to-year variability in comparison to the hypothetical estimates. Profit rates earned and quantities handled by various traders in a single market showed considerable variation from year to year and from trader to trader.

The relationship between arrivals and production is equally varied. Wheat marketings in Punjab show a highly significant relationship with changes in wheat production in the surrounding areas. This seems of interest in view of the fact that in Punjab almost all of the marketed surplus passes through primary wholesale markets. No such systematic relationship can be established between arrivals and production of jowar and rice in the primary markets of Maharashtra, West Bengal, and Tamil Nadu, partly because of the greater prevalence of village sales in these areas, as compared to Punjab, and perhaps partly because of imperfect recording of market arrivals. Harvest prices, off-seasonal prices, arrivals, and production all show a statistically significant increasing trend between 1955–1956 and 1964–1965. Except in Tamil Nadu, year-to-year variations in the seasonal price pattern cannot be explained by changes in production and/or in arrivals. In other words, an increase in production in one year, in comparison to the previous year, does not necessarily result in a smaller off-seasonal price increase, and vice-versa, probably because of the influence of various other factors on cereal prices. Over-all demand for each of the cereals was to a considerable extent determined by chan[illegible]n the production of the other two cereals. Demand fo[illegible] these cereals was also influenced during the period under study by various official policies, such as those regulating the import and dis-

tribution of cereals; interdistrict, interstate, and interzonal movement restrictions; occasional procurement; and changes in money supply. All these factors had varying influences on prices, depending on the timing of their adoption and on the length and effectiveness of their implementation. Prices were also influenced in some cases by the fixation of ceiling and floor prices.

It cannot be said what the seasonal pattern of prices would be if the grain market were left to a free interplay of market forces. It is likely that prices would still show erratic seasonal behavior caused by erratic changes in production and by misestimates of production and of storage stocks by the trade. Given the nature of the market intelligence available to the traders, it seems unlikely that they would be able to predict the crop size accurately and plan storage operations accordingly. The seasonal price pattern may also depend on the carry-over stocks of grain on farms and the pace and pattern of market arrivals.

Differences between Prices of Paddy and Rice

Varietal differences are much more pronounced in the case of rice and paddy than of the other two cereals. In addition, the available data on processing costs, as well as on processing yields, show a great deal of diversity. The analysis of these intramarket differences between prices of rice and paddy give rise to important questions regarding the structure of the milling industry. Prices of comparable varieties of rice and paddy within a single market show a margin that is usually higher than the costs of processing. The margin was noted to be generally higher in West Bengal than in Tamil Nadu. However, the processing costs themselves seemed to vary considerably from one region to another. The available data on milling costs show much higher costs in West Bengal than in Tamil Nadu. The differences are, however, not due mainly to differences in milling equipment but rather due to governmental policies which result in high incidental costs in West Bengal. The analysis of rice and paddy margins

clearly indicates the direct effect of controls on market efficiency. The examination of the policy on the rice-milling industry also emphasizes the role played by the government in keeping that industry both technologically and economically inefficient.

Implications for Price Policy

The findings of this investigation are of considerable interest both from the short- and the long-run viewpoint. The study demonstrates that the grain market is highly competitive and that regional price disparities are small wherever there are free mobility and a free flow of grain. It further shows that during the period under study movement restrictions and transport bottlenecks led to increased regional price differences. It also shows the generally low returns in storage operations and the unpredictability of the seasonal pattern, due to the influence of a complex set of factors. In view of these findings, it would seem that in the short run an open market in grain would reduce regional price disparities, provided that the basic competitive conditions of entry, knowledge, and mobility were maintained. A number of immediate steps could be taken to foster intramarket and intermarket competitiveness.

The availability of transport should be increased in major exporting markets that tend to be glutted during the harvest season. In the short run, this can be done by assigning more railway cars to the major assembly centers. In the long run, an improved transport network will be reflected in increased market efficiency. A continuous flow of grain between primary and terminal markets will reduce intermarket and intramarket price disparities, both of which occur as a result of depressed prices in producing centers in the peak marketing season. This is of particular importance in view of the recent increases in agricultural production that have caused unprecedented increases in marketing in some areas.

The market information available to the trading sector regarding crop outlook and stock position requires great im-

provement. Intelligence currently available to traders which would help them make their forecasts is inadequate and not likely to improve unless the nature of the intelligence system is changed. There has been general recognition in official circles of the value of improved forecast estimates, and much has been done in the past few years to increase the accuracy and promptness of crop forecasts. However, there is no awareness of the need to make such information available to the trading sector. Also, the size of stocks in various important surplus and deficit regions, at both the farm and the market level, could be estimated by a central market intelligence agency through frequent surveys.

Despite the general competitiveness of the market, and despite the gains that would accrue from adequate market intelligence, there may be a role for public intervention via a policy of open market trading and the building up of buffer stocks. The advantages of such a policy need hardly be emphasized. Purchase operations undertaken in years of bumper crops would keep prices from falling excessively in those years and would provide stocks in years of scarcity for distribution to industrial labor and to vulnerable sections of the population. Such a policy would also create a degree of certainty regarding the governmental role in the grain trade. A buffer stock program is often dismissed as a luxury that an underdeveloped country like India cannot afford. It should, however, be pointed out that the purchase operations under a buffer stock policy need not be on a larger scale than those undertaken by the Indian government in the last four or five years.

The current dependence on imports (mostly under PL 480) has created a great deal of unpredictability about the size and timing of distribution, since the governmental agencies themselves have no control over the stocks available to them. This lack of control is reflected in the sudden imposition and/or withdrawal of movement restrictions and the scramble for procurement to meet widespread distribution commitments made by the government to keep urban prices

under control. As there has been little systematic planning of the distribution program in India, one does not know to what extent the aid-giving nations are to blame for instability in prices and availability. In the future, advance knowledge of the size of stocks will be a *sine qua non* for any perspective planning of distribution. Aid-giving nations will go a long way toward stabilizing domestic food prices by providing some certainty about their aid programs. The unpredictability of governmental action has, unfortunately, not been restricted to its distribution program but has extended to the whole realm of food policy. The movement restrictions, zones, levies, ceiling prices, and stocking restrictions were not part of a planned policy to prevent instability but were more a reaction to an unexpected series of crises. The nature of the interference accentuated the instability by leading to a great deal of uncertainty in private trading operations.

The traders' need for stocks changed from time to time with changes in the area of their trading operations, thus causing sudden excesses and shortages in markets and leading to panicky actions on the part of the traders. The fixation of ceiling and floor prices, which disregarded market forces, resulted in the withholding of stocks by cultivators on a scale unprecedented in the past. Awareness of impending controls also seemed to warrant normally unjustified costs such as bribes, thus increasing market margins. The aim of government policy in the future should be to create stability rather than panic and uncertainty.

Another positive step that needs to be taken to increase competition is to extend the system of market regulation in areas where it has not made any major strides. The purpose of market regulation should be to create favorable marketing conditions through such means as standardization of weights, measures, and market charges; grading of produce; dissemination of market information; open bidding of prices; and better storage facilities in the market centers. Such policies have already been very effective in areas where market regulation has been in operation and in the long run have shifted

marketings from small village markets to primary markets, in which competition is more active.

The overcrowding in the grain markets and the processing industry adequately illustrates the ease of entry into trade and milling. Certain government regulations may, however, discourage such ease of entry. The policies on milling licenses and the threat of nationalization are cases in point. These policies have prevented the installation of technologically and economically more efficient plants, thus resulting in high market margins. Much could be done to foster rather than prevent new entry into trade.

The findings of this study have even longer-range implications. It is true that price and marketing policies on food crops have to accomplish several complex and often conflicting purposes. To maintain wage costs in the industrial sector, governments are frequently tempted to adopt expedients which inhibit rather than facilitate market efficiency, distort rather than sharpen price signals. It must, however, also be recognized that expedients are not always adopted on the basis of economic considerations and choices are frequently made on ideological grounds. The recent policy of establishing modern rice mills mainly in the cooperative and public sector and the Congress party resolution at the Bombay session in December 1969 to nationalize wholesale trading of food grains are illustrative of these facts. Apart from causing inefficiency in the markets, such policies and policy-inspiring pronouncements have had an adverse effect on the modernization of the marketing system in India. In the two developmental decades, the food grain trade neither experienced a change in techniques of marketing nor introduced further packaging and/or processing of food, which it should have done in a labor-surplus economy such as India. This failure is mainly attributable to the uncertainty about the trade's continuing existence and to the lack of a positive and facilitative role on the part of the government. These adverse long-run effects of governmental policies on modernization of the marketing system are often ignored by the critics of the

present government policy in their excessive concern about the distortion of the production patterns.

The available evidence overwhelmingly shows that trade operates efficiently within the technological and policy confines. Three is thus no reason to suspect that the traditional market structure will not be able to handle increases in agricultural production, provided that governmental policies facilitate rather than discourage investment in the new storage and transport facilities that are necessary to handle increases in marketings, and provided that the policies encourage technological improvement in the traditional market structure. Much native entrepreneurial talent is available in the trading sector which could be exploited for overhauling the marketing system. This study shows the need for, and the effectiveness of, facilitative regulations in improving the existing market structure. The scarce governmental resources should be allocated to areas where private resources are not likely to flow abundantly.

APPENDIX 1

Official Policy on Food Grain Prices and Marketing

Agricultural price policy has usually been subordinated to technological change in the agricultural sector in India. There has been a failure to realize that regulation of the price level, though insufficient to bring about substantial production increases by itself, can be inimical to agricultural development if it is not used appropriately. The policy, or rather the lack of it, can be traced to the preindependence period, when the agricultural price level was rejected as an instrument for increasing agricultural production.[1] This rejection may have been a result of several factors. First, farmers were not considered to be responsive to price changes. Second, agriculture's contribution to development has been traditionally viewed in India as the providing of cheap food to the urban industrial sector rather than the payment of high taxes, as the latter is not a politically feasible alternative.[2]

The lack of a carefully thought-out price policy was also partly due to a failure in the early fifties to realize that the food problem in India was going to remain for a long time. The decontrol of rationing in 1953–1954, following the postwar and the Korean War shortages, was viewed in official circles as a return to "normalcy." The good harvests of 1953–

[1] See Knight, *op. cit.*, p. 216.

[2] The agricultural sector generates roughly half of the national income but contributes only 3 percent to the public revenue. See Ved P. Gandhi, *Tax Burden on Indian Agriculture* (Cambridge: Harvard Law School International Tax Program, 1966).

1954 and 1954–1955 were considered, at the time, to be the result of planning rather than a blessing of nature. The government was thus faced with a problem of excessively low prices in the agricultural sector in 1953–1955. A haphazard price-support policy was adopted with a view to preventing an unwarranted drop in cereal prices. The support minimum was set so low that it did not have any significant effect on the market prices. The seasonal bumper crop of 1954–1955 made such chronically deficit states as West Bengal surplus for the first time. That the price policy was more a series of reactions to successive crises in the following period than a planned action can be seen in a review of the various measures adopted in the following years.

The failure of two successive crops, in 1955–1956 and 1956–1957, once again resulted in shortages and sharp price increases. The Food Grains Inquiry Committee appointed in 1957 blamed shortages on antisocial activities of traders and recommended "socialization of wholesale trade" as a solution to combat rising prices.[8] In 1958, the Congress party passed a resolution introducing "state trading" to reduce the price spread between the producer and the consumer. According to the policy announcement, state trading was a temporary measure which was to be replaced by a complete cooperative marketing organization of producers and consumers. The policy of state trading was at first restricted to wheat and rice and was gradually to be extended to other food grains. State trading, instead of resulting in a complete takeover of the grain trade by the government, developed as a policy of myriad movement restrictions, ceiling prices, and large-scale public distribution programs, drawing its supplies mostly from heavy imports of cereals and only marginally from occasional domestic procurement.

During the period studied there was no permanent central

[8] Government of India, Ministry of Food and Agriculture, *Report of the Foodgrains Enquiry Committee*, 1957.

body like the present Agricultural Prices Commission to provide guidelines for support prices for various crops, and no central organization either to plan or prosecute the government's procurement operations, as is now being done by the National Food Advisory Board and the Food Corporation of India. There existed no integrated approach to the processing of agricultural commodities, although numerous controversies occurred over capital-intensive versus labor-intensive methods and private versus public ownership of processing units. Despite several official pronouncements to the contrary, the rice-milling industry remained technologically antiquated, underutilized, and economically inefficient, but still grew at a phenomenal rate during this period. Thus, despite various actions on the part of the government, the grain trading and processing sector continued, to a large extent, to be privately owned and operated. The period studied, therefore, provides an opportunity to examine the working of the private grain trade which is not likely to be afforded by either the preceding or the following period.

The various policy measures adopted during this period may be classified into two types: those affecting the volume, physical movement, and price of grain; and those affecting the milling of grain.

Imports

Imports of food grains, particularly of wheat, played a major role in price policy during the last decade and a half, and usually showed an inverse relationship with the size of the domestic crop. In 1951, for example, owing to a poor crop and the Korean War boom, 4.8 million tons of cereals were imported into India. Imports declined in the mid-fifties, when India enjoyed two successive bumper crops. Since 1955, however, there has been a considerable increase in imports of cereals. The level reached an all-time high in the late sixties. In 1966, 10.4 million tons of cereals were imported, in comparison to 6.7 million tons in 1955. It should, however, be

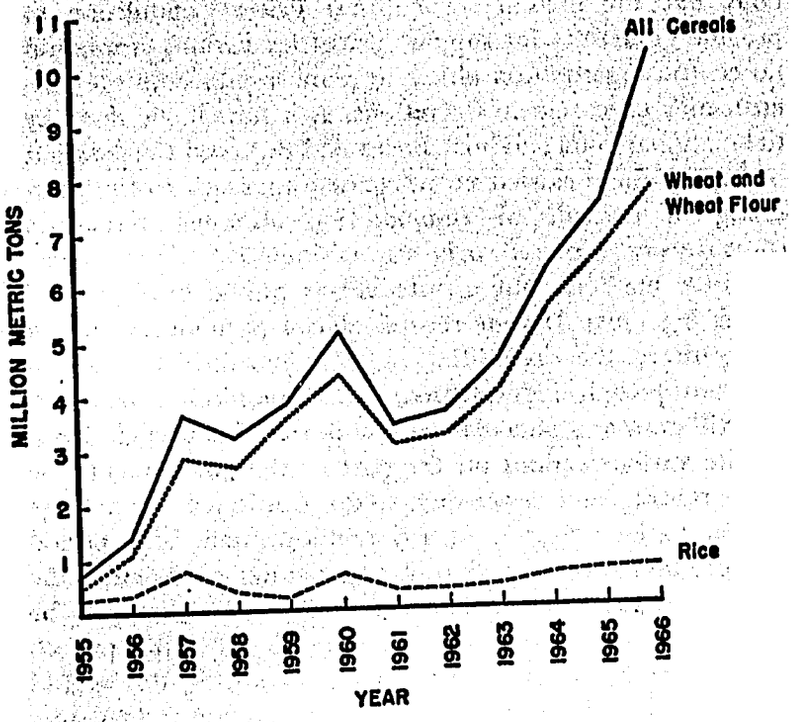

Figure 25. Imports of cereals into India, 1955–1966
Source: Government of India, Ministry of Food and Agriculture, *Bulletin on Food Statistics* (New Delhi, 1955 to 1968).

noted that most of the increase has been in imports of wheat. Rice imports did not increase to any significant extent (Figure 25), primarily because of the relative shortage of rice all over the world which made it difficult to depend upon importing large supplies of rice for any length of time. The increase in wheat imports was mainly under the PL 480 agreement signed by the government of India in August 1956. Most of the imported wheat was purchased with rupee payments and thus did not constitute a drain on India's scarce foreign exchange. Between 1958 and 1965, PL 480 shipments constituted 88 percent of the total wheat imports into India. They were 96 percent of the total wheat imports in 1963.

Internal Procurement and Distribution of Food

To combat rising prices a scheme of fair price distribution that had been used in the past was reinstated in September 1956. It involved the sale of cereals in limited quantities to consumers at government-specified prices. Government stocks were released to selected retailers. With the signing of a PL 480 contract with the United States government in October 1956, fair price distribution became a major instrument of the government's food policy.[4]

Partial procurement of cereals, which had been almost completely abandoned by 1954, was once again undertaken both by the central and the state governments in 1955 (Figure 26).[5] However, the share of the domestically procured cereals in the total amount distributed was negligible until the end of 1958, when the government adopted a policy of state trading in food grains. According to the new policy,

[4] For a critical review of the evolution, working, and effectiveness of fair price distribution, see Government of India, Ministry of Food and Agriculture, *Report of the Study Team on Fair Price Distribution*, 1966.

[5] During the 1950's and early 1960's, procurement of cereals was generally handled by the staff of the Revenue Department on behalf of the Department of Food and Civil Supplies. Since the inception of the Food Corporation of India in January 1965, it has taken over procurement operations in thirteen of the seventeen states of India. The corporation, however, only functions as the agent of the central and state governments. It has adopted various methods of effecting purchases. In states where there is a levy, levy orders are executed by the corporation according to whether they are on cultivators or millers or both. Where the levy is on the cultivators, the corporation uses cooperative societies and staff on deputation from the state governments as collection agents. In some cases the corporation has opened its own collection centers. Where regulated markets function, as in Punjab, Rajasthan, and Haryana, the corporation makes purchases through commission agents. Where prices are controlled, purchases are made at prices stipulated by the states; where prices are not controlled, purchases are made through negotiations. The purchasing methods of the corporation are still in the process of evolution and are undergoing substantial structural changes in accordance with changes in the government policies and consequently in the role of the corporation.

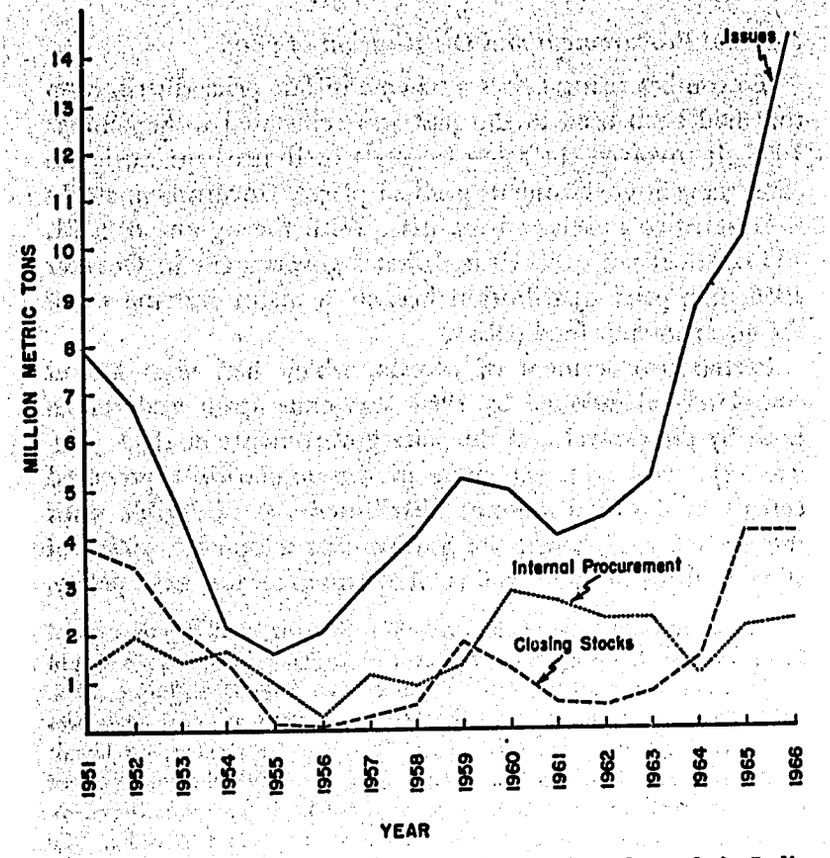

Figure 26. Internal procurement and distribution of cereals in India, 1951–1966

Source: Government of India, Ministry of Food and Agriculture, *Bulletin on Food Statistics* (New Delhi, 1951 to 1968).

the government was to announce maximum and minimum prices and reserve the right to acquire part or all of the market surplus if it considered it necessary. The state governments stepped up their procurement, although the manner and timing of procurement differed considerably from state to state.[6] Procurement resulted in a general reduction

[6] See Government of India, Ministry of Food and Agriculture, *Bulletin on Food Statistics,* 1967, pp. 33–35, for a detailed discussion of the procurement methods and timing in various states.

of market arrivals and consequent high prices. The effect was particularly adverse in deficit states.[7] State trading was, therefore, gradually abandoned in deficit states and, later, in surplus states. Procurement declined as a result and was not resumed again on a significant scale until 1964, when a nationwide crop failure caused a general price rise and scarcity (Figure 26). Even after 1964, domestic grain played only a minor role in the distribution program. In 1965, for example, of the 5.94 million tons of wheat distributed, only 0.379 million tons were domestically procured. Domestic procurement of rice was somewhat more significant, as imports could not be relied upon. Nevertheless, of the 14 million tons of cereals distributed in 1966, only 4 million were domestically procured, most of which consisted of rice.

Most of the wheat was procured in Punjab and distributed in (1) the major wheat-consuming states that are deficient in production, such as Bihar, Uttar Pradesh, and Rajasthan; and (2) those states which have considerable urban industrial populations, such as Maharashtra and West Bengal.[8]

The method of distribution has also been used to change dietary habits. The quantities of wheat distributed in the rice-eating southern states increased in the recent years when wheat purchases were made obligatory for acquiring rice rations.

Procurement of rice was shared more or less equally by Uttar Pradesh, Punjab, Orissa, Andhra Pradesh, Madhya Pradesh, Tamil Nadu, and West Bengal. Most of the rice was distributed in Kerala and West Bengal, the two highly populated major rice-eating states that have shown a perpetual deficit in production. In addition to fair price distribution, in 1956 the West Bengal government temporarily introduced "modified rationing" in Calcutta and other deficit districts through the issuance of family identity cards. This rationing was, however, stopped following the easing of the rice sup-

[7] See *Report on the Pace and Pattern of Market Arrivals* for a detailed discussion of the effect of procurement on market arrivals.

[8] See Lele, Occasional Paper 12. See pp. 21–22 for data on distribution of wheat by states.

plies in 1957. A significantly high proportion of rice was also distributed in Uttar Pradesh and in Maharashtra, mostly in Bombay.

Zoning

Owing to countless changes in the composition of rice and wheat zones, the history of zoning during the 1955–1965 period is both complex and confusing. Zoning, as it is used in the postindependence period is, in essence, the demarcation of an area within which grain moves on private account; the surplus, if any, of the area is transferred to a deficit area on government account. A more drastic concept of zones dates back to the war years when, under the Basic Plan, the total marketable surplus of a surplus area was estimated and procured on government account to be moved to meet the needs of the deficit areas. Zoning, along with other restrictions, continued intermittently until the mid-fifties, when all restrictions on trade were removed subsequent to a bumper food crop in 1953–1954.[9]

As the price situation started getting worse following the poor crop of 1955–1956, the government announced the formation of wheat and rice zones. For ease of presentation, wheat and rice zones are here dealt with separately.

Wheat Zones

In 1957 three wheat zones were formed: Zone 1—Punjab, Himachal Pradesh, and Delhi; Zone 2—Uttar Pradesh; Zone 3—Madhya Pradesh, Rajasthan, and Bombay. In July 1958 the movement of wheat from Madhya Pradesh to areas outside the zone was permitted on a limited scale. In the same month the movement of wheat from Punjab to Jammu and Kashmir was allowed, while West Bengal imposed a ban on the movement of wheat in and out of the state on private account.

The number of wheat zones was increased from three to

[9] For a review of the food policy in British India, see Knight, *op. cit.*

five on February 7, 1959. The new wheat zones were: Zone 1—Punjab the Union territories of Delhi and Himachal Pradesh; Zone 2—Uttar Pradesh; Zone 3—Rajasthan; Zone 4—Madhya Pradesh; Zone 5—Gujarat and Maharashtra.

In addition, various local restrictions were imposed on the movement of wheat. Maximum and minimum prices of wheat were announced in several states. Partial procurement of the two cereals was undertaken. In November 1960 the movement of wheat on private account was again allowed from Madhya Pradesh to Maharashtra and Gujarat.

All zonal and other restrictions on the movement of wheat were abolished on April 5, 1961, in favor of free trade, and procurement of wheat on government account was discontinued. Pressure on cereal supplies again increased at the end of 1963. Wheat zones were reinstated on March 23, 1964. However, the number of zones increased significantly: Zone 1—Punjab, Delhi, and Himachal Pradesh; Zone 2—Rajasthan; Zone 3—Uttar Pradesh; Zone 4—Madhya Pradesh; Zone 5—Maharashtra; Zone 6—Gujarat; Zone 7—Bihar; Zone 8—Andhra Pradesh, Tamil Nadu, Mysore, Kerala, and Pondicherry; Zone 9—West Bengal, Orissa, Assam, and Nagaland.

The larger wheat zones had thus been virtually replaced by single-state zones by the beginning of 1964. In May 1965 the Punjab zone was temporarily combined with Uttar Pradesh. In April 1966 a change was made in the Punjab zone. It then consisted of Punjab, Himachal Pradesh, Uttar Pradesh, and only rural areas of Delhi. Administration of this zone became so difficult that in March 1967 single-state zones of wheat were formed.

Rice Zones

Because of a shortage of rice supplies in 1955–1956, rice from Andhra Pradesh, the only surplus area in the south, was moving to Bombay and to West Bengal. This pushed up rice prices in the southern states. The southern rice zone was, therefore, formed on July 9, 1957, with a view to creat-

ing self-sufficiency within the zone. It consisted of Andhra Pradesh, Mysore, Tamil Nadu, and Kerala. In the same year the West Bengal government put cordons around surplus districts and imposed a ban on the movement of rice and paddy across the state boundaries. The movement restrictions remained in force in West Bengal in 1958. In July 1958, a northern rice zone was formed of Punjab, Delhi, and Uttar Pradesh. Various local restrictions were imposed on the movement of rice in 1959 as well. In Tamil Nadu the surplus district of Thanjavur and in West Bengal the surplus districts of Burdwan and Birbhum were temporarily cordoned off. Maximum and minimum prices for rice were announced in several states and partial procurement undertaken. In December 1959 an eastern rice zone was formed, comprising West Bengal and Orissa. The zone worked reasonably well until 1963, when West Bengal once again suffered rice shortages. This time a poor crop in the state was followed by the Orissa government's restrictions on rice exports from that state to West Bengal beginning in May 1963. The West Bengal government imposed a partial levy and stocking restrictions on millers. Despite restrictions on trade and increases in central-government allocations, pressure on supplies and prices continued to mount. The state, therefore, announced a ban on imports into, and exports from, West Bengal of rice and paddy on private account and formed a single-state zone toward the end of 1964.

The southern rice zone seemed viable until December 1963. However, with the stepping-up of procurement in Andhra Pradesh by the central government, the movement of rice to Tamil Nadu and Mysore became irregular. Tamil Nadu experienced increased pressure on its rice supplies, because of demand from Kerala. Andhra Pradesh imposed a ban on the export of rice from the state in May 1964 to facilitate the procurement of rice. In June of that year procurement was given up and movement restrictions removed. In August 1964 maximum prices were fixed. Maximum prices, however, could not be enforced in any southern state, as the open market prices were so attractive that the

cultivators preferred not to sell their produce at the government-specified prices. Consequently, surplus states began imposing unilateral restrictions on exports from within their boundaries. The southern rice zone disintegrated into single-state zones in October 1964, when the movement of rice on private account was abolished.

The western rice zone of Maharashtra, Madhya Pradesh, and Gujarat met a similar fate in early 1964, when the Madhya Pradesh government began to restrict exports to Maharashtra and Gujarat on private account. In April 1964, the zone was divided into three single-state zones, movement on private account was banned, and the surplus from Madhya Pradesh was moved on government account.

In the context of this study, there was free movement of wheat between Delhi and the primary markets of Punjab between 1954 and April 1966, when statutory rationing was introduced in Delhi. Bombay, however, received wheat supplies from Punjab on private account only up to June 1957 and, later, between April 1961 and March 1964. During the remaining period, Bombay received wheat on private account from Madhya Pradesh and from central and state government stocks composed mainly of imported PL 480 wheat and partly of internally procured wheat. Tamil Nadu remained a part of the southern rice zone between July 1957 and October 1964, during which time there was a free flow of rice among the four southern states. Exports outside the zone were, however, banned on private account. Although the eastern rice zone was formed in December 1959, several movement restrictions were imposed intermittently before 1959, and although the zone continued to exist until the end of 1964, free flow between West Bengal and Orissa was interrupted frequently during the zoning period. There were no major movement restrictions on the jowar trade during the period of this study.

Rice Milling

The government's first action on rice milling was the appointment in October 1954 of the Rice Milling Committee

to investigate the working of the milling industry and to recommend policies for its development. The committee was not concerned about either the economics or the technology of milling. Its prime concern was employment. It recommended the encouragement of hand-pounding on the grounds of its high labor intensity. It further recommended a ban on setting up new mills except in special circumstances. The recommendations were consistent with the policy of encouraging hand-pounding in the first five-year plan under the common production program.

In keeping with the Milling Committee's recommendations, the Rice Milling Industry (Regulation) Act was issued in May 1958; it prohibited the establishment of new rice mills, the expansion of existing ones, or the reopening of defunct mills, except under permits from the government. A permit would be issued only after verification of whether it was necessary for ensuring an adequate supply of rice and whether the functioning of the rice mill for which a permit was required would cause substantial unemployment in the locality and adversely affect the hand-pounding industry. The rules framed under the act provided that in granting a permit for the establishment of a new rice mill, preference would be given to a sheller mill. All of the powers under the act were delegated to the state governments. The act thus gave a great deal of leeway to the states in interpreting the need for the establishment of new mills. The state governments almost never positively encouraged hand-pounding as proposed under the common production program and almost always neglected the employment aspect in giving licenses to new mills. The governments continued to give licenses to rice mills in the organized sector, although fewer licenses were issued to large rice mills and many more to single hullers.

The officially recorded number of rice mills increased from around 20,000 in the early fifties to approximately 50,000 at the end of the sixties. Most of the increase was of single hullers. Until 1963, the policy oscillated between

hand-pounding and mechanical milling; there was little improvement in milling technology. In 1963, however, a team of Ford Foundation experts looked into the working of the rice-milling industry and recommended an integrated approach toward processing, including more scientific drying, storage, parboiling, and milling of paddy. Modernization called for much more capital-intensive processing techniques. The team effectively pointed out the considerable gain in the quality and quantity of rice and by-products that would ensue from a complete modernization of the industry. In July 1964, the Food Department set out to establish India's first seven imported modern rice mills, six of which were established in the cooperative sector through the initiative of the National Cooperative Development Corporation, and one in the public sector. The Food Corporation subsequently established twenty-five more modern mills. Several additional modern mills are also being established in the cooperative sector.

In the initial stages, the role of the private sector in the modernization program seemed highly obscure. The policy subsequently outlined, however, called for the provision of credit to the private sector for modernization of the existing rice mills. If all goes as planned, India will have enough modern rice mills in the public and cooperative sectors to mill the additional 20 million tons of paddy expected to be produced by the end of the fourth five-year plan. Many of the existing private mills may also be modernized if appropriate governmental policies are pursued.

A Concluding Remark

Price movements among time, space, and form were influenced by various governmental policies affecting imports, distribution, prices, and milling. Their effect on price disparities is analyzed in Chapters 4, 5, and 6.

APPENDIX 2

Sources and Nature of Data

Statistical information collected from markets consists of a variety of marketing features, such as wholesale prices, arrivals, production, storage costs, profit-loss and stock statements of selected traders, transportation costs, flows of arrivals and dispatches, working of the markets, and marketing and storage practices of traders. Most of this information was collected in all four states about the three cereals selected for this study. The nature of data collection, however, had to be somewhat different in each state, because of the types of problems in individual states.

Prices

Sources

As far as possible an effort was made to collect data directly from the agencies that maintain records. For wheat and jowar, weekly wholesale prices of various major varieties, for the period 1955–1956 until the end of open market trade, were collected from the records maintained by the regulated market committees in the individual markets.[1] The regulated markets also send these quotations to the Directorate of Economics and Statistics of the Ministry of Food and Agriculture under the Integrated Scheme for Improvement of Market Intelligence. However, the data maintained by the Directorate have various drawbacks. In most

[1] For jowar, prices were collected for the period January 1955 to November 1964; for wheat, from January 1955 until December 1966.

cases, the price series does not begin until 1959, when the market intelligence scheme was initiated. The quality of the data is often inferior to that of the market committee records. Often the varieties to which prices apply are not specified in the reports submitted to the Directorate. In some cases prices are submitted for different varieties at different times, which renders them incomparable over time. Often price quotations for weeks when reports were not received are missing. It is, therefore, often difficult to obtain price data for comparable varieties for a number of markets from the official agencies.

Very little is known about the spread of prices during a day within a single market and its relation to prices in other markets. The regulated markets are supposed to maintain three price quotations for each day. The maximum price is the price paid for the top-quality lot of the day. The minimum price is the price paid for the poorest lot of the day, and the most common price is the modal price of the day. Often the continuous series is not available for daily maximum and minimum prices, and the registers of weekly wholesale prices, maintained by most market and governmental agencies, frequently record only the most common price. Kulkarni, in his study of groundnut and rice prices, briefly examined the relationship between the maximum and minimum prices in a market.[2] His analysis shows that both the maximum and the minimum prices in a primary market follow the movement of prices in the major terminal markets rather closely, although the movements of annual maximum, minimum, and average prices are not exactly parallel. Among the three available price quotations, maximum prices appear to be the most suitable indicators of the effects of the terminal price and other influences. These prices also appear to be comparatively less affected by fluctuations in the condition of the marketed produce. The spread

[2] See A. P. Kulkarni, "The Behaviour of Prices of Groundnut Pods in Some Regulated Markets in Maharashtra," pp. 164–182, and "Prices of Paddy in the Regulated Market of Ghoti," pp. 1–21.

between the maximum and the minimum price, however, depends on variations in the quality of the produce and, therefore, varies considerably from one day to another, from one grain to another, from one market to another, and from one season to another. No systematic analysis of the daily price spread is, therefore, possible unless considerable information is available on the quality and grades of the produce sold. The most common weekly prices were, therefore, collected from committees of the regulated markets.

In the cases of West Bengal and Tamil Nadu, however, prices had to be collected from the departments of agriculture and statistics respectively, because of the absence of regulated markets in the period studied. Whatever price data are available have been maintained by the departments through their market reporters. However, a major part of the data collection began only with the initiation of the Integrated Scheme for Improvement of Market Intelligence of the Ministry of Food and Agriculture. The records maintained by the departments earlier were scanty. Sometimes there were major gaps in the recorded data. There are not many markets for which continuous data are available for a major length of time. The number of markets covered has also been growing over the years. An attempt was made to collect comparable price series for as large a number of markets and for as many years as possible.

Nature of Price Data

The problems of price analysis can best be appreciated through an understanding of the nature of price data in India.

Problem of Grades. A common problem in comparisons of agricultural prices is their lack of comparability over time and space. Numerous varieties of each cereal are grown in India. As many as 100 varieties of jowar and over 4,000 varieties of paddy have been found on the Indian subcontinent. Only a few of these enter trade on a large

scale. However, because of the lack of standardization and grading in the marketing of these cereals, there is a serious problem of price maintenance. In some areas prices are collected for grades and in others for varieties.

In the case of wheat, for example, prices of *dara* wheat, the most widely used trade name in India, do not apply to a specific variety but to a fair average quality of wheat. "Dara is literally a heap and since making a heap implies the blending or mixing of several lots of wheat, each containing varying proportions of foreign matter, red and white, hard and soft grain, its nearest equivalent is fair average quality."[3] The composition of *dara* depends upon the predominant characteristics of the grain grown in a particular area, and the designation is often prefixed by the name of the market the wheat comes from. The comparison of wheat prices is, nevertheless, by no means as complex as that of rice, of which there are hundreds of commercial varieties. In the single state of Tamil Nadu, the state government's official notification lists 38 commercial varieties of Tamil Nadu origin under fine quality, 22 under medium, and 29 under coarse; in addition, a number of other local varieties are mentioned but not specified.[4]

Various factors, which may vary from region to region, determine the quality of rice. The two basic elements in the determination of quality are the size and the shape of the grain. A long, slender grain is usually typed as fine rice, whereas a short, thick grain is treated as coarse or bold.[5] There is such a fine gradation in the ratio of length to breadth that no distinct classification is possible.

There are numerous other factors that enter into the fixation of prices about which nothing is known from the

[3] *Report on the Marketing of Wheat in India*, 1963, p. 30.

[4] See Government of Tamil Nadu, Department of Food, Government Order No. 572, Aug. 8, 1966, p. 3.

[5] Although this is a good generalization, it does not hold true in specific cases: e.g., a number of fine varieties in Tamil Nadu are by no means long and slender.

price data. The manner of processing paddy also affects the price of rice. This is an added complicating factor which does not exist in the case of the other cereals. Paddy is usually converted into rice either by hand-pounding, the traditional way of using a pestle and mortar, or by machine milling. Machine milling in India largely consists of the use of power-driven hullers for removing the husk from the paddy. The proportion of broken grains is smaller in hand-pounding. However, hand-pounded grain is not as white as that which is machine-milled. There is, therefore, a distinct preference for machine-milled rice in the urban areas.

Rice which is hand-pounded or machine-milled can be either raw or parboiled. Parboiling is a process of steeping paddy and subsequently applying heat before it is husked. Raw rice is not subjected to any treatment before it is husked. Outturn is usually higher when paddy is parboiled. Parboiled rice is also more nutritious.[6] The consumption of parboiled rice has been increasing substantially. Presently raw rice is consumed mostly by high-income groups, and in religious rituals. However, raw rice fetches a higher price, because of its white color. It is generally made of only high-quality paddy, whereas medium and coarse varieties are parboiled. However, a significant proportion of the fine paddy is also parboiled. Thus, within these hand-pounded and machine-milled, raw and parboiled types there are four grades: superfine, fine, medium, and bold (or coarse). Superfine is often lumped with fine quality for the purpose of recording data. However, there is often a substantial differ-

[6] "When raw rice is milled, a large proportion of vitamins, proteins and minerals which are concentrated in the germ and the bran layer are lost. But in parboiling, the water soluble nutrients, particularly Vitamin B, infiltrate into the interior of the grains and are not lost in milling. Moreover, parboiled rice retains protein rich parts to a larger extent than raw rice. Washing at the time of cooking also results in reduced loss of nutrients in the case of parboiled rice than raw rice" (*Rice Economy of India*, p. 39).

ence between the prices of superfine and fine qualities. Within each of these qualities or sorts, there are numerous varieties of rice.

There are other factors that enter into the prices of the grain. The *Report on the Marketing of Rice in India* classifies these factors in two categories:[7] (1) general characteristics and (2) special characteristics. General characteristics include translucency or chalkiness, color, polish, fragrance, uniformity, age, and cooking quality. Rice that is translucent fetches a premium over that which is chalky. Color preference, however, varies significantly from region to region. Consumers in Kerala prefer rice that is yellowish in color, whereas those in Tamil Nadu place a premium on white rice. Rice is even artificially colored in some parts of India to suit the local taste. Polished rice is greatly in demand in the urban sector but does not attract a rural consumer. Rice with an inherent natural fragrance fetches a higher price than other varieties. Similarly, grain that is uniform in size and quality fetches a premium over admixtures. Older rice is preferred to new rice, which is usually watery in taste. The cooking quality of rice depends on all these factors, including age. Special characteristics that determine the price of rice are the proportion of foreign matter and of broken, damaged, red, chalky, and weeviled grains.

While the price of a heap of grain sold in a market depends on all these factors, in intermarket transactions often the price quotations determine the quality of the grain shipment. In Barnala, a trader, in estimating the costs of a wheat shipment to a terminal market, allows for the cost of "*dara* labor." This involves the mixing of several varieties of differently priced wheat in order to bring the quality of wheat to a par with the price quoted by the customer. Although this is not done so overtly in other markets, the composition of a shipment does vary according to the price specification. A trader in Moga showed us three types of *dara*

[7] P. 29.

varieties: (1) mill *dara,* with 3.5 percent admixture; and 2 percent dust; (2) Sharbati *dara,* with 1.5 to 2 percent admixture; and (3) Safet (i.e., white) dara, with 1 percent admixture. The admixture usually consists of other kinds of *dara,* bajra, or grain. Even the composition of the admixture changes with the change in the quality and price of the lot. Cheaper lots of wheat usually have a greater admixture of bajra than do more expensive lots, which have a greater grain content. A similar phenomenon was noted in Tamil Nadu. Millers in Thanjavur and Tiruchirapalli district stated that after their principals in Kerala have specified the price and the variety of rice required, the quality of the grain shipped is determined by the price the customer is willing to offer.

Problems of Varieties. In many cases grain prices are recorded by varieties. Comparison is somewhat simpler when prices in two markets apply to the same variety, although price quotations are affected by quality variations. Thus rice prices in several West Bengal markets are recorded for Kalma variety, jowar prices in several Maharashtra markets for rabi white variety, and wheat prices in Punjab and Bombay for Sharbati farm and farm special varieties. Unfortunately, grain of the same variety produced in two different areas is often not as homogeneous as one would expect. Variations in climatic conditions, soil, irrigation, and various other factors cause variations in grain of the same variety. Commercial nomenclature often identifies varieties of cereals by regions. A variety of jowar generally known as Shalu in Maharashtra has several subvarieties, such as C.P. Shalu and M.P. Shalu, named after the former Central Province and Madhya Pradesh, where they are most prevalent.

The problem is even more complicated by the fact that the trade names of a grain often vary from region to region. The same variety may thus be known by two different names in two trading markets. Jowar known as Sholapur jowar in Bombay is known as Shalu in Kolhapur. The Pa-

tanai rice of West Bengal is known as Kalambank in Orissa, whereas Patanai, in hand-pounded, raw form, is known as Seéta. The name Patanai elsewhere becomes Patna, after the city in Bihar. However, the rice is grown mostly in West Bengal and Orissa.

Just a listing of the factors affecting the recording of data is adequate to make apparent the complexity of price comparison over time and space. In the present analysis a special effort was made to collect prices either of uniform varieties or of uniform grades, depending on the nature of the price data available.

Varieties and Grades to Which Price Data Apply. In Maharashtra, jowar prices were collected for rabi and kharif jowar in Sailu and Jalna; for rabi, kharif, and yellow jowar in Parbhani, Parli, and Nanded; and for rabi, kharif, yellow, and *malli* jowar in Latur. Except for Parbhani, for which price quotations are available for the Talki variety of rabi jowar, prices for all of the markets apply to the rabi white jowar. All kharif prices apply to the *varadi* variety. Prices for the Bombay market were collected for rabi white jowar and Sholapur jowar.

In Punjab, prices of *dara* wheat were collected for all the primary markets and for Delhi, and of farm and farm special wheat for some of the primary markets and for Delhi. In Bombay, wheat prices were collected for Punjab, *dara,* Sharbati, and farm special wheat. All Bombay prices were obtained from the Grain, Rice, and Oilseeds Merchant's Association in Bombay.

In West Bengal, wholesale prices of rice and paddy were collected for five primary markets, and of rice for Calcutta, a terminal market for these primary centers. The price data apply mostly to the Kalma variety, a medium-quality paddy. Wholesale prices for Burdwan, Guskara, and Sainthia were obtained from the records maintained by the marketing branch of the Department of Agriculture of the government of West Bengal, while those for Ahmadpur and Bolpur were obtained from the market reporters stationed

at those places. For Calcutta and Sainthia, prices for the Kalma variety were not available for certain periods. Therefore, prices for the Bhasmanik and Nagra varieties, closely related to the Kalma, were collected for Sainthia and Calcutta respectively.

Harvest prices of paddy were collected from selected millers in the primary markets of West Bengal for the two months of harvest. These prices apply to the Kalma variety in all five markets. District farm harvest prices maintained by the Department of Agriculture were also obtained.

In Tamil Nadu, prices of sort I and sort II paddy and of sort I rice were collected for 13 primary markets for the period 1955 to 1964. However, owing to the incomplete nature of the price series, only a fraction of the data could be used effectively. In the terminal market of Madras, prices were collected for raw and parboiled rice. District farm harvest prices maintained by the Department of Statistics were obtained for all the districts in Tamil Nadu.

Arrivals

Sources

Data on monthly arrivals of wheat were obtained from the regulated market committees in the primary markets in Punjab. In Maharashtra, data on monthly arrivals of jowar were available, classified according to crops. Data on arrivals were, therefore, collected for rabi, kharif, yellow, and *malli* jowar. In Tamil Nadu, because of the absence of regulations, no systematic data are available on market arrivals. However, the market reporters of the Department of Statistics have been maintaining records of arrivals. Such data were collected from records wherever they were available. In West Bengal, no arrival data are available except for the records of purchases submitted by the millers to the Civil Supplies Department. However, because of the procurement undertaken by the West Bengal government during the period of this survey, the authorities did not cooperate in making those earlier records available.

Nature of Arrival Data

The reliability and the usefulness of the arrival data are to a considerable extent dependent on the nature of marketing. In Punjab, where a very high proportion of the marketed surplus is sold in the wholesale markets, arrival data are fairly good indications of the size of the marketed surplus. In Tamil Nadu most of the paddy is disposed of in the villages directly to various purchasing agents. Only a small quantity reaches the primary wholesale market. As the arrival data are compiled from the records of the auctions in the regulated markets, not all of the marketings get recorded. The arrival data, therefore, are not always very comprehensive. Besides, the extent of arrivals left unrecorded is likely to vary from one year to another, the coverage being more complete in years of small marketings. The arrival data, in such cases, are not useful for analysis. Even in Punjab, where most of the wheat is marketed in the primary market, it is difficult to delineate the area from which a market receives its supplies. Since a producer has the choice of taking his produce to any of the nearby markets, the market area may change from year to year. There is also some intermarket flow between wholesale markets, the extent of which varies from time to time. This complicates the problem of interpreting changes in the size of marketings. This problem is discussed at a greater length in the section on the market structure and seasonality in market arrivals.

Milling Costs

In order to estimate costs of converting paddy into rice, data on fixed and variable costs of operation were obtained from various types and sizes of mills. These consisted of such items as capital costs, interest on fixed and working capital, storage and milling capacity, wages of temporary and permanent employees, fuel, and electricity. Information was also collected on prices and quantities of the by-products

obtained, the number of rice mills, the increase in their number, their capacity, employment, and the seasonality of stocking and milling operations. Similar data were collected from modern rice mills for a comparison of the costs and benefits of traditional and modern rice mills.

Storage Facilities

Data were also collected on capital and operating costs of flat and silo storage facilities, and information was obtained on the advantages and disadvantages of the two types of storage, given the environmental and other constraints.

Profit-Loss Statements and Stock Records

Sources

The obtaining of profit-loss statements of individual traders and of statements of their stock positions was the most difficult task in data collection. Traders were most reluctant to part with the records, for various understandable reasons. Because of severe official restrictions on trade in India, government authorities have frequently seized record books of those whose activities are suspect. There is, therefore, a great deal of hostility toward anyone demanding stock books. Even barring these abnormal circumstances, there has been a great deal of secretiveness about trade records. The trading community, in general, considers trade records to be sacred and highly personal, and a peek into a stock book by an outsider or even by a fellow trader is considered equivalent to an invasion of privacy.[8]

[8] Many traders state that a trader would not mind showing his records to an outsider as much as he would to a fellow trader. Many presidents of the traders' associations stated that they would invite the wrath of fellow traders if they insisted that others show us their records. The author and investigators had to use varied techniques to acquire stock records. Usually an introductory letter was sent by the General Secretary of the Federation of the All India Foodgrain Dealers' Associations from Delhi. This was usually supplemented by an additional letter from the

Despite the difficulties, profit-loss and stock statements were collected from 21 traders in the five primary markets of Punjab. In Tamil Nadu, profit-loss statements were collected from 15 millers and stock statements from 1 miller. In Maharashtra and West Bengal, owing to much stricter restrictions on trade, traders were not very cooperative. In Maharashtra, profit-loss statements were collected from 12 traders in areas in which the author had earlier contacts, and stock records from 2 traders. In West Bengal no such records could be collected at all.

Nature of Profit-Loss and Stock Data

Profit-loss statements of the traders and records of quantities purchased, retained, and sold should provide guidelines to the accuracy of the hypothesis that profit rates in the food grain trade are high. The profit-loss statement generally specifies the quantities and values of the commodities purchased and sold. The difference between the value of the sale and the value of the purchase after proper allowance is made for changes in stocks gives the gross income or profit of the trader. A statement of the maintenance and other costs can be used to arrive at the net income of the trader during a specified period. The periodical record of quantities purchased and sold which may be termed a stock statement can be used to cross-check the validity of the profit-loss figures provided by the traders.

There is considerable doubt about the truthfulness of the profit-loss statements submitted by traders to the income-tax authorities. There general contention is that both

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president of the local trade association stating that the study was in the interest of the trading community. After receiving assurance from a trader that the records would be made available, the investigator would have to make frequent visits, often listening to most unconvincing excuses about why the stock books could not be made available. The investigators would often spend a whole day at a shop without getting anywhere, and then be presented with a stock book the following day just so they would leave.

the quantities and the values are juggled in order to show a small margin of profit. The stock statements should tell us something about the actual quantities purchased and sold. Further, it should be possible to compare stock statements with profit-loss statements to verify the reliability of the latter.

Unfortunately, this seemingly simple approach is beset with many difficulties. Even if one decides to accept the profit-loss statements at face value, it is often difficult to estimate the rate of profit on a specific commodity over a period of years, since many traders do not maintain separate commodity accounts but only an over-all account of all of the food grains purchased and sold within a year. Trade in agricultural commodities in India greatly lacks specialization. A single trader deals in a variety of commodities, ranging from oilseeds and cotton to chilies and inferior local grains. One of the explanations often given by the traders for this lack of specialization is the high risk element in the trading of agricultural commodities. It is said that profits on any single agricultural commodity vary significantly from one year to another, and that therefore it is not possible to make a living by dealing in only one commodity. In addition, the type of skill and experience required for dealing in different commodities is more or less the same. A trader who deals in a few agricultural commodities may easily enter into other, related trade. It is, therefore, often possible to study the over-all rate of profit but not the individual profit rate for different commodities.

If one is lucky, one may acquire data from a number of traders on single-commodity accounts. From these accounts, one can discern the gross profit on that commodity in a year. It is, however, very difficult to estimate the net profit, since the costs have to be allocated in proportion to the volume of business in that commodity in relation to the trader's total volume of business. As the quantities of any specific grain transacted vary substantially from year to year, it is impossible to estimate the share of that grain in the

total business of a trader in a single year unless one studies records of total business operations and their components. Traders are often very reluctant to make all of their income statements available.

From the profit-loss statements one can determine if and how the gross profit and the rate of profit on a commodity vary from year to year. In order to examine the validity of the profit-loss statements, one would have to turn to the stock records. Comparison of these periodical records of quantities purchased and sold with records of the annual totals should tell something about the reliability of the profit-loss statements.

One, however, encounters a number of difficulties at this stage. As the traders do not specialize in trading in a single commodity, they also do not specialize in performing a specific function in the long chain of marketing operations. Just as there is no horizontal specialization in trade, there is no vertical specialization. The same trader may, and often does, operate as a commission agent between a wholesaler and a cultivator and also act as a wholesaler who purchases goods on his own account. The same trader is, then, sometimes operating as a retailer and often as a commission agent for a trader in the terminal market. Hence, there are at least two accounts that are lumped together in a stock book: (1) the quantities that he purchases on his own account, and (2) the quantities that he purchases on account for a principal in a consuming market. It is very difficult to separate the two accounts unless one goes into each transaction and examines the origin of that transaction.

There is then the problem of examining the validity of the value figures, i.e., the value of the quantities purchased and of the quantities sold. It is difficult to examine hundreds of thousands of individual transactions to determine the reliability of these figures. Not much can be discerned from the stock figures themselves, for stocks are always revolving. One can only determine how much was

purchased, how much was sold, and what the balance was. It is impossible to discover which particular lot was purchased and sold at which prices.

Despite all these difficulties, one may not want to discount the worth of the stock figures altogether, for there are a number of questions about the trading pattern of agricultural commodities that could be answered in this type of enquiry. One of the questions often encountered is, at what stages of marketing is stocking undertaken on a significant scale? Until very recently, it was the general contention (which was supported by the available data on arrivals) that the marketings were highly seasonal and that most of the stocking was done by the trader. It is necessary to examine data on arrivals to compare the seasonality of arrivals and of stocks. Another unknown, of course, is the extent to which stocks are held by the traders in the terminal markets (either locally or in the producing centers) in comparison to those held by the traders in the primary markets. The rate of purchases and sales of the primary market traders should tell something about the extent of stocking done at the primary market level.

Miscellaneous Data

General information on costs and length of storage was obtained by interviewing major traders in each market. Traders were also questioned for information on sources of market intelligence, factors which enter into stocking and shipments, patterns of interregional flows, credit operations and marketing practices, transport availability and bottlenecks, and attitudes toward governmental policies.

Information on policy matters, such as interdistrict, interstate, and interzonal restrictions on the movement, procurement, and distribution of food was obtained from various governmental publications.

Glossary

Adatya, or *arhitya.* A commission agent in a grain market.

Bag. Used as a unit of measure in agricultural trade. In Punjab and Maharashtra, a bag is equivalent to 0.95 quintal and is used as the equivalent of a quintal. In Tamil Nadu, a bag is usually 57 kilograms. In some areas a bag consists of 75 kilograms.

Bajra. *Pennisetum typhoideum;* a millet grown mostly in Maharashtra, Gujarat, Rajasthan, Uttar Pradesh, Tamil Nadu, and Punjab.

Bania. A caste group in Hindu society engaged mainly in money-lending and the trading of agricultural commodities in rural areas.

Cereals. In India, include rice, wheat, jowar, bajra, maize, barley, ragi, and small millets.

Chettiyar. A community in Tamil Nadu traditionally engaged in trade and commerce.

Dal. Split and shelled lentils.

Dara. Mixture; used in central and north India to describe a fair, average-quality wheat.

Farm special. A superfine variety of wheat prevalent in northern India.

Food grains. Cereals, gram, tur, and other pulses.

Gram. *Cicer arietinum.*

Gur. Sugar-cane juice, boiled, clarified, and reduced to semisolid consistency in open pans, where on cooling off it produces a dry crystalline mass, yellow or dark brown in color.

Hundi. A bill of exchange or promissory note.

Jat. A community in Punjab, traditionally engaged in cultivating, also well known for valor in the army.

Jowar. *Sorghum vulgare;* a millet popularly known as sorghum in English, produced mostly in Maharashtra, Gujarat, Andhra Pradesh, Madhya Pradesh, Tamil Nadu, and Mysore.

Kachha arhitya. A commission agent.

Kar-samba. A rice crop raised in parts of Kanyakumari and Tirunelveli districts in Tamil Nadu, harvested in August–September.

Kharif. An autumn harvest. Crops are sown at the beginning of the rainy season (i.e., June–August) and harvested between October and December. The main kharif crops are rice, jowar, bajra, maize, ragi, and small millets.

Kuruwai. A rice crop season in Tamil Nadu; the crop is sown between July and September and harvested between September and January (also known as early *kar*).

Levy. Compulsory submission of grain by cultivators and/or traders to the government at statutorily fixed prices.

Mandi. A wholesale market.

Maratha. A caste in Maharashtra, traditionally engaged in cultivating, also known for gallantry in the Indian army.

Marwari. A community that originally migrated from Marwad to various parts of India to practice moneylending, trade, and commerce.

Maund. A unit of weight that varies from one area to another. A standard maund is 82.28 pounds; 2.68 maunds equal 1 quintal.

Nadar. A community in Tamil Nadu.

Naidu. A community in Tamil Nadu.

Paddy. Unhusked rice grain (*Oryza sativa*). In India the ratio of paddy to rice is assumed to be 3 to 2.

Paisa. An Indian currency unit; 100 paisas equal Rs1.00.

Procurement. Government purchase of supplies, usually undertaken for public distribution, with a view to influencing prices.

Pucca arhitya. A wholesale trader.

Quintal. A metric measure of weight of 100 kilograms.

Rabi. A spring harvest. The crop is sown in September–October and harvested in March–April. The main rabi crops are wheat, gram, linseed, rape, mustard, barley, and (mainly in Maharashtra) jowar.

Roller flour mills. Large mills used by commercial manufacturers of wheat products for the conversion of wheat into flour.

Rupee. An Indian currency unit. The official exchange rate was

Rs5.00 for $1.00 from 1949 until June 1966, when the rupee was devalued to the rate of Rs7.50 for $1.00.

Samba. A rice crop season in Tamil Nadu; the crop is sown between September and November and harvested between January and March.

Sort I, II, III. Nomenclature in south India for grades of paddy and rice.

Taluka. An administrative subdivision of a district.

Tamil Nadu. The former Madras State was officially renamed Tamil Nadu on January 14, 1968.

Vani. A caste in Maharashtra, traditionally engaged in trade.

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