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THE STRUCTURE OF STAPLE FOOD MARKETING IN NIGERIA AS REVEALED BY PRICE ANALYSIS†

When records of price quotations are plentiful and reasonably accurate, a great deal can be learned from them about the efficiency with which a marketing system is performing its primary function of allocating scarce resources over time and space. Research into the workings of major commodity futures markets, relying largely on price and volume records of the exchanges, has amply demonstrated the value of approaching the study of market organization through price analysis.[1] Reported here is an attempt to employ, in a similar fashion, much less plentiful and less reliable information about the retail prices of staple foodstuffs in Nigeria to reveal salient features of the organization of staple food marketing there. It is a part of a much larger investigation of staple food marketing in Nigeria, Kenya, and Sierra Leone.[2]

The hypotheses derived from the price analysis have yet to be tested against the descriptive and analytical findings of the larger study, but we believe that their presentation at this time may help other investigators to identify critical questions. It is also hoped that informed students of African markets may be able to provide evidence consistent with, or contradictory to, the propositions suggested by our study of the Nigerian data.

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[1] The interested reader is referred to a long series of articles by Holbrook Working and R. W. Gray and to the recent *Proceedings of a Symposium on Price Effects of Speculation in Organized Commodity Markets* (*8*). Many of Working's earlier studies appeared in *Wheat Studies of the Food Research Institute*; later studies both by Working and by Gray have appeared in *Food Research Institute Studies* as well as in other professional journals.

[2] The general study was financed by the United States Agency for International Development and conducted by eight universities—four of them American, four African—under the general supervision of the Stanford Research Institute of Menlo Park, California.

The research was directed by the Food Research Institute (W. O. Jones), and the field research was carried on by the University of Illinois and Njala University College (R. J. Mutti and D. N. Atere-Roberts), Michigan State University and the University of Nigeria (Anita McMillan), Stanford Research Institute and the University of Ife (Alan Thodey and C. O. Ilori), and West Virginia University and University College Nairobi (V. Q. Alvis and Peter Temu). A fifth study, in Northern Nigeria, was conducted by Elon Gilbert, graduate student in the Food Research Institute. It was financed by a Social Science Research Council/American Council of Learned Societies Foreign Area Fellowship, and sponsored by Ahmadu Bello University. Final reports on the Kenya (*1*), Western Nigeria (*29*), and Sierra Leone (*19*) studies have been received. Publication of the reports is at the discretion of the institutions immediately responsible for their preparation.

The general study was undertaken to overcome deficiencies in information about internal marketing of foodstuffs in the tropical African countries and because it was recognized that an effective marketing system is a necessary condition for agricultural development. Such a system facilitates optimum allocation of resources in agricultural production and is a direct contributor to total product as it increases place, time, and form utility of agricultural commodities.

The intent of the research was to provide accurate and detailed descriptions of staple food marketing systems in several tropical African countries, to appraise the efficiency of these systems, and to identify ways in which their effectiveness might be enhanced. Primary emphasis in evaluating efficiency was placed on the determinants of price. The investigations were formulated in terms of commodities, and it was originally intended that each would embrace the four most important providers of food calories in the region to be studied. This was later modified to permit inclusion of other commodities which were of special interest because of their actual or potential importance in internal trade. (The commodities studied in each area are shown in Table 1.) The area of investigation was defined as the hinterland from which a major city drew its supply of these commodities.

TABLE 1.—COMMODITIES STUDIED AND MAJOR CITIES

Kenya	Eastern Nigeria	Northern Nigeria	Western Nigeria	Sierra Leone
		Commodities		
Beans	Cowpeas	Cowpeas	Cowpeas	Peanuts
Potatoes	Gari	Millet	Gari	Cassava
Maize	Maize	Sorghum	Maize	
	Rice	Rice	Rice	Rice
Bananas	Yams		Yams	Palm oil
		Cities		
Nairobi	Enugu	Kano	Ibadan	Freetown

The desirability of pursuing a commodity approach became increasingly clear as price analysis and the field studies progressed. The nature of a marketing system is profoundly influenced by the economic characteristics of the commodities handled—their value, weight, and perishability, and the processing required for human consumption—and by the conditions of production and consumption.[8]

The five areas studied, which were originally selected to illustrate differing marketing systems, differ also in the elasticity of substitution among the staple foodstuffs. The southern Nigerian food economies employ a collection of starchy staples for their basic calorie requirements, whereas Northern Nigerian and Sierra Leonean consumers (or, rather, consumers in the Freetown hinterland) rely on only two starchy staples, and Kenya consumers essentially on one. Statistics of production and consumption are not good enough to allow much precision in measuring the relative importance of these staples in any of the three countries, but the following classification appears to be substantially correct:

Eastern Nigeria: Yams and cassava dominant, supplemented by maize, rice, cocoyams, bananas, and palm oil.

[8] Cf. Polly Hill's study of Ghanaian wholesalers of domestic foodstuffs (*10*).

Western Nigeria: Yams and cassava dominant, supplemented by cocoyams, maize, rice, bananas, and palm oil.
Northern Nigeria (Kano supply area): Bulrush millet and sorghum dominant, supplemented by rice.
Sierra Leone: Rice dominant, supplemented by cassava, which is much less important in commerce, and by palm oil.
Kenya: Maize overwhelmingly dominant, supplemented locally in African diets by millet, sorghum, sweet potatoes, cassava, and bananas.

The overwhelming importance of maize in Kenya and the somewhat lesser dominance of rice in Sierra Leone contributed to the decision of the colonial government in each country to establish special statutory agencies concerned with their marketing. In Nigeria, marketing of staple foodstuffs is free from this sort of regulation, except for governmental control of exports of palm products. But there is a marked difference in the degree of intervention in the other two countries. In Kenya, the law provides that all maize moving across district boundaries in commercial quantities (more than 60 pounds) must be sold to the Marketing Board. In Sierra Leone, the Rice Corporation is the buyer of last resort for homegrown rice, at an officially determined price, and it has a monopoly over the distribution of imported rice.

Historical differences also influence the nature of the marketing systems. The populations of Western and far Northern Nigeria are accustomed to life in cities and towns surrounded by their farmlands, to occupational specialization within the city, and to market trade in which most members of the population participate. Fundamental differences in the position and role of women in the two societies, however, affect the sexual division of labor and the nature of the food trade itself. In Eastern Nigeria, Kenya, and Sierra Leone, cities are a recent development associated primarily with foreign trade or the settlements of colonists. Some Sierra Leoneans, like the Hausa, engaged in interregional trade from an early date—first across the Sahara, later across the Atlantic—while long-distance trade in the interior of Kenya was confined to recent and sporadic penetration by trading caravans from the coast. The villages of Eastern Nigeria were probably little involved in commerce, except for the trade in slaves and palm oil, until the beginning of the twentieth century. That the Hausa and Yoruba have long engaged in intracity exchange, whereas trade in other areas began with exchange between communities, and primarily over long distances, may help to explain observable differences in the present marketing systems.

The size, diversity, and animation of the West African markets are striking features of these societies.[4] Although some find only confusion and disorder in the market scene, the volume of trade—whether measured in terms of the quantity of merchandise available in the market, or the numbers of buyers and sellers present, or in the number of transactions—suggests that an elaborate and complex system of assembling, transporting, redistributing, and pricing must exist. Numbers, and the widespread practice of bargaining over price and quantity, also suggest a high degree of competitiveness. In general, it might be assumed that activi-

[4] Thodey reports the total number of sellers in 16 Ibadan markets as more than 35,000, with more than 6,000 sellers in the Central New Market alone (*29*, pp. viii–12).

ties in the marketplace are manifestations of a system that performs the allocative task well and that affords little room for price manipulation and monopoly profits. We hope to have a better understanding of the validity of this inference when the West African studies are completed, but the analysis of market prices presented below and accounts of trading behavior suggest that the price-making mechanism may be less efficient than the apparent competitiveness and economic aggressiveness at first suggest. The imperfections seem to lie in the location and ownership of stored products, in the means by which market information is transmitted, and in the ease with which wholesalers and assemblers transfer their purchasing from one supply area to another.

THE NIGERIAN PRICE STATISTICS

Before considering the price data themselves it will be helpful to review some of the characteristics of the Nigerian economy that are especially pertinent to the commodities under study and that may significantly affect their marketing. These appear to be five, and are simply listed here. An attempt will be made later to connect them to the price analysis.

1. Already mentioned is the fact that in the dietaries of each of the three Regions at least two starchy staples are of approximately equal importance in terms of food calories, and that several others are customarily eaten as substitute staples.

2. Most, perhaps all, of the staple foodstuffs that enter into commerce are also important elements in the diets of farmers who produce them, although there may be some tendency for farmers to market the higher-valued staples and consume the lower-valued ones; e.g., Western Nigerian farmers frequently sell yams, which command a relatively high price, and hold back cassava for their own consumption.

3. Geographical specialization in production of staples is modest, except for a regionalization determined primarily by rainfall—e.g., millet, sorghum, beans, and peanuts in the north; yams, cassava, cocoyams, maize, and palm oil in the south. In general, the starchy staples that are prominent in the dietaries of a Region are those that are grown there.

4. Despite the existence of fairly large cities, the population is primarily rural and is dispersed broadly, though not uniformly, across the areas available to it. The concentration of population in the cities of Western Nigeria is much more a concentration of residence than of production, which is heavily agricultural.

5. There is very little public information about crops, stocks of agricultural commodities, prices, or weather. The monthly crop and market reports of the Northern Region, for example, were distributed to only 67 people before they were marked "secret" in December 1962 but still sent out to the same distribution list. In the early 1960's even the amount of weekly precipitation was classified as secret to be released only to authorized government servants, allegedly because of fear of speculation in farm crops.

Nigeria is unusual among tropical African countries in the volume of its publicly available records of prices of domestically produced foodstuffs. Beginning in 1952, the Department of Agriculture in each of the Regions (then three) undertook the monthly collection of retail prices of major foodstuffs in town markets throughout the country (*21, 22, 23*). This series was still collected and published in Eastern Nigeria up to the outbreak of the civil war in 1967; it is still collected

in Northern Nigeria, but distribution was discontinued in December 1965; collection stopped in Western Nigeria in 1958, but similar data have been compiled by the Federal Office of Statistics as the basis for its index of retail food prices in 14 Western and Midwestern cities.[5] A description of the way in which these two series were compiled in Northern Nigeria that was written by Elon Gilbert in 1966 may also apply, *mutatis mutandis,* in the other Regions:[6]

Prices Reported in the Ministry of Agriculture's Crop and Weather Reports

a. Coverage. Monthly prices have been collected since mid-1952 for up to 50 markets in Northern Nigeria, but there are many gaps in the coverage and prices for a number of markets are only reported for a few years. Prices are reported for sorghum, millet, rice, cowpeas, yams, groundnuts, maize, and cotton. The choice of the markets in which prices were collected appears to have been determined primarily by proximity of staff, i.e., prices were collected in those towns where staff was stationed and where prices could be collected easily during the normal course of duties.

b. Methods of collection. The prices were collected by the Ministry of Agriculture employees. The actual task of collection was commonly delegated to a low-ranking employee with minimal supervision from above. Initially (until 1964),[7] prices were collected in the local market in pence per local measure and converted to £ per ton before being sent to the Ministry in Kaduna . . . . The details of actual collection were left to the discretion of the local officers and perhaps to a large degree to the man who collected the prices.

c. Principal shortcomings of the series.

Prices reported do not apply to the same day in all markets. Inasmuch as price collectors tended to wait until the last possible moment to collect the prices, they may typically apply to the end of the month, but there generally were no regulations as to the time of month when prices were to be collected.

There is no specification of the quality and variety of the product to which prices apply. For some commodities, notably millet, this does not present a serious problem since quality and variety price differentials are small or nonexistent. For rice, price differentials are large, amounting to 30 to 40 per cent. Choice of varieties and qualities is left to the discretion of the price collector who probably recorded the price of whatever was conveniently available.

A variety of retail measures are utilized in the collection of prices throughout the region and even within individual provinces. In Kano, for instance, three different measures are utilized in the collection of sorghum prices. Sometimes only one type of retail measure is used in a particular market, but more commonly more than one measure is used, with the price per pound varying according to which measure grain is purchased by.

There is a strong possibility that numerous mistakes were made in converting prices from pence per local measure to pounds per ton . . . . There is also a variation in the amount which individual stations report as

[5] Prices had been collected many years before 1952, as is evidenced by occasional references in the Annual Reports of the Agricultural Department. A Monthly Bulletin of Market Information was published during the war, but we have not yet seen copies of it.

[6] Personal communication.

[7] Beginning in 1964 steps were taken to improve the accuracy of price reporting.

being in a particular measure. The variation is most probably due to errors in weighing, but it is possible that some of the reported conversion factors include the *gyara* (an additional dash of grain on top of the heaped measure).

In summary, the data are more suitable for analysis of seasonal movements than for intermarket relationships since there is a good probability of variation of collection procedures between centers, but also a probability of standardization over time in any one center.

Federal Office of Statistics Prices

a. The F.O.S. has collected prices throughout the Northern Region at least since 1951 according to the files of the Kano Native Authority. A publication entitled "Retail Food Prices in the Northern Region" was issued between 1955 and 1963. The series was discontinued in 1963 although local N.A.s still collect prices on occasion.

b. Prices were collected by Native Authority staff in pence per local measure and converted to pence per pound before being submitted to the Office of Statistics. Prices were collected for a large number of items, but only a few were included in the report published by the Office of Statistics (sorghum, millet, and meat). The price collection forms contained fairly detailed instructions on the methods to be used in price collection. Prices were collected every two weeks and reported monthly.

c. The Federal Office of Statistics now collects prices in a few urban centers in the north in connection with its index of consumer prices. None of this data has been published.

d. Summary. The early Office of Statistics series appear not very reliable on a scanning of figures contained in the reports (1955–63). There are many gaps. The series are particularly suspect since collection was in the hands of the Native Authority whose staff is generally of poorer quality than is found in the Ministries.

As Gilbert's evaluation makes clear, these are not very good price statistics, but their length and the number of markets included make them a tempting object of analysis. For the 1960's we have worked with monthly prices in 43 markets in the north, 16 in the east, and 9 in the west. (See Table 2 and Map 1. We have not investigated the available price data in the Midwest.)[8]

TABLE 2.—NUMBER OF CITIES FOR WHICH PRICES OF SELECTED COMMODITIES WERE OBTAINED

Commodity	North	West	East	Total
Gari	—	9	16	25
Yams	11	9	16	36
Maize	12	9	15	36
Rice	33	9	16	58
Millet	29	—	—	29
Sorghum	43	—	—	43
Cowpeas	21	9	—	30
Total cities	43	9	16	68

[8] For convenience in exposition we use throughout the old terminology based on the former four Regions of Nigeria.

MAP 1*

* Shown are those cities for which retail prices of staple foodstuffs were examined in this study.

Until very recently, there have been no attempts to exploit this apparently rich body of price data, even by the rather small number of investigators who had access to it. It was generally believed that the price quotations were based on erratic, and casual, observation;[9] it was obvious from the statistics themselves that some were faked; and the reports contained no information about the quality of product priced, the date within a month when the price prevailed, the unit of sale to which the price referred, or how customary units and volumes of sale were converted into weights for which the prices were reported. It was also frequently asserted that the actual prices at which foodstuffs were sold could only be determined by going through the bargaining process thought to determine the individual terms of each transaction.[10] Despite all of these alleged deficiencies in the series, however, the temptation they offered proved too great to resist, and in 1965 Gilbert was persuaded to see what, if anything, could be done with the series for

[9] A letter from a senior civil servant in the Ministry of Agriculture in Northern Nigeria, December 1964, after a colorful account of how the statistics were compiled, states: "The validity and usefulness of the price series as published is highly suspect. I would not be inclined to support any detailed attempt to analyze this data in view of the high degree of unreliability. . . . The only real value in the C & W Reports are the references to crops and weather; the price side is too uncertain, and I'd not waste much time on it."

[10] Cf. Miracle (*17*, pp. 69–71, 251); Hodder (*12*, p. 114); Dorjahn (*5*, pp. 64–65); Tardets (*28*, p. 97); Dean (*4*, p. 247); Nyirenda (*24*, p. 21); and Hawkins (*9*, p. 105). It is becoming increasingly clear, however, that haggling is of only slight importance in the retail purchase of staple food commodities, and that once prices are established early in the market day they are uniform among all

Northern Nigeria, starting first with a search for regular seasonal patterns, and then looking at spreads between markets. The investigation of seasonals indicated that however poorly compiled they might be, the series for some commodities and some markets displayed seasonal regularities that were consistent with time of harvest and relative storability. Investigation of seasonals was resumed when Gilbert returned from Kano in the fall of 1967, and some of the results of these investigations are presented here. The work with intermarket spreads was less successful, but seemed to show appropriate price slopes if our division of Northern Nigeria into a set of marketing subsystems was correct. We are now engaged in further price mapping of this sort for all Nigeria (ex the Midwest), but so far the results are inconclusive. In the fall of 1967 Alan Thodey calculated bivariate correlation coefficients for 6 commodities in 9 towns of Western Nigeria. Results were confusing, but sufficiently provocative for us to compute similar coefficients for all Nigerian markets for which we have price series. Some of the results of these calculations are also discussed below.

SEASONAL PRICE MOVEMENTS

It is sometimes alleged that prices of food crops in the tropical African countries are unduly depressed in the postharvest period and that they rise to excessive heights in the period just before harvest.[11] This great increase in prices is variously attributed to heavy storage losses, exploitative speculation, and simple improvidence. To the extent that it is true, it may reduce farmers' incomes and thus their incentive to produce, and even provoke actual food shortages. Frank hunger may result when farmers who have sold their crops in the glutted postharvest markets find it necessary to buy them back at two, three, or four times the price in order to feed their families while waiting for the new crop to mature. Suggested remedies for this supposed distressing condition include: ever-normal granaries or buffer stocks maintained by government;[12] complete control of marketing of the staple crop by statutory boards;[13] governmental price support programs; restriction of trade in major staples to nationals;[14] enforcement of regional, district, even community self-sufficiency in staple foods;[15] construction of enlarged and improved storage facilities paid for by government;[16] and ex-

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sellers. In writing of Nupe markets in 1942, Nadel reported that "Cooked food, all victuals, including grain, rice, palm-oil &c., . . . have 'fixed prices', and buyers will never bargain. . . . Real haggling and 'bargaining' is common only with expensive, more rarely sold, commodities, the price of which is always more or less fluid, and commodities the quality and perfection of which show many gradations . . ." (*20*, p. 317), and Christensen, discussing marketing in southern Ghana in 1950–51, drew a distinction between wholesale buying, where bargaining is common, and retail purchase in the market, where it is not (*3*, p. 128).

[11] The Food and Agriculture Organization of the United Nations (FAO) 1965 study of Nigerian agriculture, for example, states: "Owing to lack of farm storage facilities and, primarily, to the ever prevailing need for cash amongst farmers, practically all farm surpluses appear on the market immediately after the harvest, thereby depressing prices" (*6*, p. 352). (This 512-page quarto volume devotes 1½ pages to marketing of staple food crops.)

This is but a market version of the preharvest hunger that is said to be a frequent occurrence in African villages. Miracle provides a summary of the argument and some counterevidence in *18*. (See also Jones, *13*, pp. 126ff, and *14*, pp. 39–40.)

[12] The original functions of the Sociétés de Prevoyance in French Africa. Advocated by the FAO team in its survey of Nigerian Agriculture in 1965 (*6*, p. 353).

[13] The Kenyan and Rhodesian solution.

[14] The Sierra Leone solution for rice.

[15] Tanzania (Tanganyika) was an extreme example.

[16] Proposed by H. M. A. Onitiri for Nigeria in 1966 (*25*, pp. 32–34).

tension programs to induce farmers to treat stored grains with insecticides. The magnitude and regularity of seasonal price changes are therefore matters of considerable importance.

The search for regular seasonal price movements provided our first test of the Nigerian series. The first commodity studied was the yam, which should, because of the relatively high cost of storage, show a strong and regular seasonal, as in fact it did—not for all markets, and not for all years, but with enough consistency to confirm that the prices recorded were in fact reflecting the impact of economic forces on the market. We have usable series of yam prices for 33 markets; seasonal indexes[17] show June to be the month of highest average prices in 19 of these

TABLE 3.—NUMBER OF PRICE SERIES SHOWING SEASONAL HIGH IN DESIGNATED MONTHS

Commodity	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Rice													
North					3	3	8	6	6	3			29
West						3	2	1			1		7
East					2	3	1	4	3	3			16
All					5	9	11	11	9	6	1		52
Maize													
North				1	5	6							12
West					3	4	1						8
East		3		3	5	3			1				15
All		3		4	13	13	1		1				35
Cowpeas													
North						3	3	5	2	4			17
West							2	2		2	2		8
All						3	5	7	2	6	2		25
Millet													
North						1	5	4					10
Sorghum													
North					2	1	7	1	2	2			15
Gari													
West	1		1		2	2	2						8
East				4	5	5	2						16
All	1		1	4	7	7	4						24
Yams													
North					3	6		1					10
West					1	6							7
East				1		7	7	1					16
All				1	4	19	7	2					33

[17] Seasonal indexes were calculated as simple averages of the ratio of reported prices to a 12-month centered moving average. (The linear trends of the series appear to be essentially level.) The moving averages in some markets trace out a cycle of about 3 to 4 years' duration, which needs to be investigated further. In Western Nigeria it is not correlated with farmers' receipts from cocoa sales.

Lengths of series used in calculation of seasonal indexes are as follows in number of series:

Commodity	Length of series in years					Total
	3	4–5	6–7	8–9	10–13	
Gari			6		18	24
Yams	1	4	7		21	33
Maize	1	7	7	1	19	35
Rice	3	13	10	3	23	52
Millet					10	10
Sorghum					15	15
Cowpeas		14	9		2	25

Amplitude of seasonal variation appears not to vary regularly with the length of the series from which it was calculated.

TABLE 4.—MEASURE OF SEASONAL MOVEMENTS, SELECTED NIGERIAN MARKETS, 1952/1953 TO 1965/1966

Commodity and market	Seasonal index[a]		Range of seasonal index[a]		Length of series (*years*)	Number of years when high month corresponds with index	
	High month	Low month	Per cent	Pence per pound		Same month	Same or adjacent month
Yams							
Abakaliki	July	Nov.	93	1.97	13	10	13
Enugu	July	Nov.	47	1.24	13	4	8
Onitsha	June	Oct.	39	1.03	13	2	6
Ibadan	June	Nov.	70	1.46	13	7	13
Producer[b]	June	Sept.	57	...	4	...	...
Rice							
Abakaliki	June	Dec.	37	2.52	13	6	9
Onitsha	Sept.	Jan.	15	1.13	13	3	7
Sokoto	Aug.	Dec.	29	1.64	12	3	7
Ibadan	Aug.	Feb.	8	.75	11	2	7
Cowpeas							
Birnin Kebbi	Aug.	Dec.	73	2.58	5	1	5
Kano	Oct.	Mar.	41	1.45	7	5	5
Ibadan	Oct.	Jan.	24	1.27	11	3	4
Ijebu-Ode	Nov.	Mar.	23	1.32	7	1	2
Maize							
Badagry	June	Sept.	51	1.89	7	4	5
Ilorin	May	Aug.	43	1.19	12	6	11
Ibadan	May	Sept.	29	1.02	11	5	8
Onitsha	June	Dec.	17	.47	13	1	4
Producer[b]	May	Sept.	40	...	4	...	...
Gari							
Ijebu-Ode	May	Oct.	20	.56	7	2	3
Ibadan	June	Dec.	15	.46	11	4	7
Ahoada	May	Dec.	39	.96	12	4	9
Onitsha	May	Dec.	34	.75	13	3	6
Producer[b]	Aug.	Sept.	28	...	4	...	...
Millet							
Kano	July	Sept.	16	.43	12	5	7
Sokoto	July	Oct.	46	1.23	12	5	9
Daura	July	Sept.	30	.68	10	2	7
Maiduguri	June	Mar.	17	.35	12	3	6

[a] The seasonal index is described in footnote 17.

[b] Producer prices, Western Region, 1960–63, from FAO, *Marketing of Staple Food Crops in Africa* (Report on the First FAO Training Center on the marketing of staple food crops for African countries, held at Nairobi, Kenya, Aug. 4–29, 1964), p. 43. Range is approximate.

markets (Table 3), with a tendency for the harvest peak to occur earliest in the north (Middle Belt) and latest in the east. Similarly, the seasonal highs for maize, cowpeas, bulrush millet, and sorghum (Guinea corn) are roughly consistent with time of harvest, although they are also affected by the seasonality of supplies of competing crops. Indexes for rice, however, show highest index values spread

over a 6-month period (May to October); and gari—which is not usually considered to be a seasonal product, except insofar as the hardness of the ground makes harvest more difficult—displays a clear annual pattern, with prices highest from April to July (perhaps because of substitution for yams).

Problems of measurement and identification, and differences in the consumer services embodied in foodstuffs at retail, make it difficult to judge the magnitude of the seasonal price fluctuations against the behavior of prices in other countries. Rather than trying to pursue this sort of comparison, the following analysis examines the relative magnitudes of seasonal fluctuations among commodities and among markets in Nigeria.

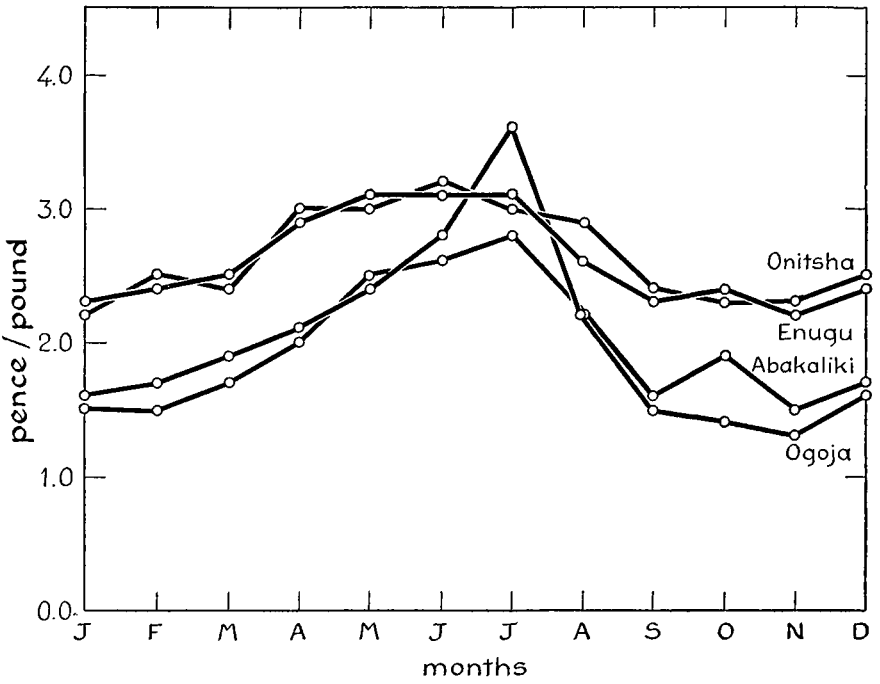
The amplitude of annual price movements, as measured by the seasonal index, differs among commodities more or less as might be expected (Table 4). On the whole, seasonal fluctuations of yam prices are markedly greater than those of cereals and gari. Among the cereals, rice fluctuations tend to be the lowest, and even lower than gari.[18] Cowpeas, however, which are also storable, show large annual variations in the north, small variations in the west; the range of gari prices is smaller in the west than in the east; and there may be similar differences in yam prices between the west and the east.

The strength of seasonal forces, or the extent to which they tend to dominate other influences on prices, can be measured by the degree to which annual highs occur in the same month as the index high. Consider the data for yams in Table 4. In Abakaliki, which is in the heart of a major yam-producing area, high prices occurred in July in 10 of the 13 years for which we have prices, and in June in the other 3 years: as yams moved west to Enugu and Onitsha, the seasonal range in prices contracted,[19] and the annual coincidence of high prices declined. This contrast in seasonal amplitude of price fluctuations remains when the range is expressed in pence per pound instead of in per cent of the 12-month moving average, suggesting that more is involved than the higher level of prices in Enugu and Onitsha resulting from greater transport costs. In fact, the seasonal rise in Abakaliki is so great that prices there average higher in July than prices in either Enugu or Onitsha (Figure 1A). When year-by-year comparison is made of monthly prices, the number of instances in which yam prices in Onitsha or Enugu were lower than in Abakaliki or Ogoja, also in the supply area, traces out a smooth seasonal curve (Figure 1B). Something similar may have happened with millet in Northern Nigeria: Sokoto and Daura, both in millet-producing areas, show greater average annual price ranges and coincidence of highs than do Kano and Maiduguri, both in grain-importing areas. In 1966/67, however, both Sokoto and Daura were importing grains from areas that were also supplying Kano and Maiduguri. The relationship is quite marked with cowpeas. Birnin Kebbi, in a major cowpea-producing area, and Kano, a major shipping point for

[18] Seasonal indexes of producer prices in the United States, 1922–41, revealed an average range for potatoes (25.7 per cent) and sweet potatoes (30.9 per cent) that was between 3 and 4 times that for wheat (8.2 per cent) or dry beans (8.7 per cent). Cf. *30*, p. 17. All ranges are strikingly smaller than those calculated from the Nigerian data, although fixed marketing and transport charges might be expected to cause seasonal indexes of producer prices to fluctuate more than seasonal indexes of retail prices. In this connection, it is noteworthy that the range of seasonal indexes of producer prices of yams, maize, and gari in the Western Region as reported by FAO lie within the range of retail price variations (Table 4). This may be due in part to the relatively small amount of services incorporated into the products as they are sold at retail.

[19] This relationship was first noticed by K. H. Shapiro.

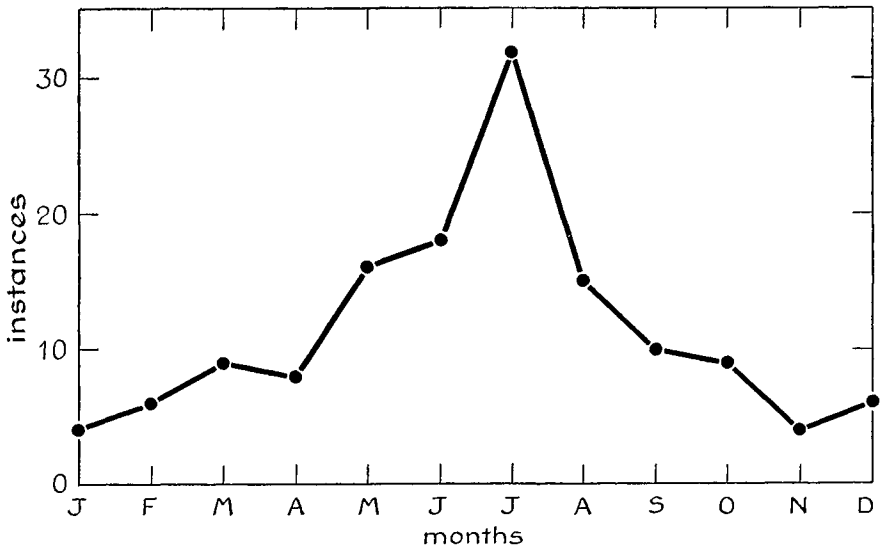
FIGURE 1A.—AVERAGE MONTHLY PRICES FOR YAMS, FOUR EASTERN NIGERIAN MARKETS, 1952–66



cowpeas, show ranges of 73 and 41 as contrasted with 24 and 21 in Ibadan and Lagos, both receiving centers. Coincidence of annual peaks, however, is more or less similar in the north and in the west. The pattern of declining range of the seasonal index as a commodity moves from supply area to consumer area is reported frequently in the data; the implication would seem to be that the strength of seasonal price forces is relatively weaker in consuming centers than in producing centers.

Now seasonal movements of the prices of annual crops result essentially from the cost of holding them from one harvest to the next, but they might be exaggerated if only a few traders or producers have the financial means to hold them for this period, or if collusion, restriction of entry, or disparities in bargaining power permit a few to corner supplies and to extract excessive prices from that part of the population whose price elasticity for the commodity is low. The differences in seasonal price behavior between Ogoja, Abakaliki, Enugu, and Onitsha strongly suggest that merchants in Onitsha, and to a lesser extent in Enugu, are buying yams after harvest and holding them for sale throughout the year, but that merchants in Abakaliki and Ogoja are not, or that they hold supplies insufficient for the local market. If this were true, those few consumers in Abakaliki who were willing to pay the high preharvest prices would only be able to buy yams from retailers who could draw on stocks held in Enugu or Onitsha, thus paying a double transport price. This is what occurs with maize in Kenya, when rural consumers run short and must draw on the Maize Board's stores. But it does

FIGURE 1B.—TOTAL NUMBER OF INSTANCES WHEN PRICES WERE HIGHER IN ABAKALIKI OR OGOJA THAN IN ENUGU OR ONITSHA, 1953–66[a]



[a] One "instance" was recorded if the price at only one town in the producing area was higher than in one town in the major consuming area; if prices in both producing-area towns were higher than in both consuming-area towns, four instances were recorded.

not seem to be consistent with other information we have about yam storage, which typically takes place on the farms. In many instances, however, farm-stored yams are owned by city merchants. We can only speculate that under these circumstances the owners prefer to dispose of their yams on the larger Enugu and Onitsha markets, where a sufficient number of well-to-do consumers are willing to pay the high prices for yams that prevail in the months before harvest. As a consequence, the much thinner markets in Abakaliki may experience extreme shortages of this foodstuff.

More information about who stores yams, and where, is badly needed. It was keenly sought by Anita McMillan, who conducted our research in Eastern Nigeria, and by Alan Thodey and C. O. Ilori, who were responsible for our study in the west, but little was learned. A similar problem exists for each of the commodities in each of the areas where it was studied. Almost none of the merchants who were interviewed would admit to holding stocks larger than were needed for current sales, typically for one to four weeks. Cowpeas are an excellent illustration of the problem. Gilbert is quite certain that in Kano bulk-lot sales to the cities of the south are concentrated in the four to five months after harvest. Seasonal indexes for the northern markets seem consistent with this. On the other hand, Thodey was unable to find evidence that sizable stocks were held in Ibadan. Some of the large wholesaler-assemblers being interviewed in March 1967 were clearly buying heavily, although they insisted—or seemed to insist—that they were buying only for nearby sale. But the seasonal price movements in the south, which are much smaller than in the north, suggest strongly that stocks were being held there and sold gradually over the season.

Commodity characteristics would favor dispersed country storage of yams and concentrated storage of grains; qualitative evidence, however, indicates that a large part of the year's supply of millet and sorghum, including that destined for eventual sale in towns and cities, is held on farms by the growers. The price information does not clearly contradict this, but the relatively low seasonal variation of millet prices at Kano and Maiduguri would be consistent with some stockholding in (or on behalf of) these cities. Polly Hill reports: "It is very common for traders to pay farmers to store grain in Northern Nigeria. The farmer may do the buying on behalf of the trader or hold indefinitely. (The farmer is apt to buy at harvest.)"[20]

It can be argued that the evening-out of seasonal price fluctuations results from other causes. A market that obtains its supplies from several areas with different harvest dates might find much less need for storage, but there is little evidence of this in Nigeria. Where harvest dates are staggered they probably extend the flush period not more than a couple of months. The wide distribution of seasonal peaks for rice probably should be looked into with this thought in mind, although this distribution may be explained by the relatively small amplitude of the seasonal. The quality of our rice prices is also suspect because of unrecorded price differentials for grades and varieties.

Another explanation advanced for the lesser seasonals in consuming centers derives from notions about price and income elasticities in urban and rural areas. The availability and acceptance of a wider variety of staple foodstuffs in the cities, and a wider range in incomes, might have a stabilizing effect on food prices. At this stage of knowledge, however, we have far too little information to determine whether the special combination of circumstances necessary to bring this about actually exists. By far the simplest explanation—and not an unreasonable one—is that seasonal influences are reduced in city markets because some merchants are arbitraging over time.

The average annual variation in prices attributable to regularly recurring fluctuations in supplies as measured by the seasonal index is, of course, much less than the average price variation actually experienced in individual years,[21] even when these are corrected for trend by expressing as a per cent of the moving average (Table 5). This may be attributed partly to annual variations in the timing of harvest. Variation of a little over a month in harvest date might result in a 3-month variation in annual maximum prices when only monthly data are used.[22] But in fact the observed variation in timing of the annual high tends to be greater than this (Table 4). At Abakaliki, for example, although highest price relatives for yams occurred either in June or July during each of the 13 years for which we have data, in only 9 of the 13 years were rice price relatives highest in the same month as the index high, or the months immediately before and after (May–July). It may be that we are misled by concentrating on the timing of the seasonal highest price which may not be much higher than prices a month or two

[20] Personal communication, August 1968.

[21] Calendar years, rather than crop years, are used to avoid the problem of shifting harvest dates and to facilitate comparisons between commodities and regions.

[22] Polly Hill reports that the planting date for a village in Katsina Province, in which she resided in 1967, was two months later than it had been the previous year (personal communication, August 1968).

TABLE 5.—RANGE OF ANNUAL PRICES, SELECTED NIGERIAN MARKETS

Commodity and market	Range of index	Number of years in which the annual ranges of monthly prices were the specified per cents of the 12-month moving average						Mean range[a]	Ratio of means
Per cent of average:		All	0–19	20–39	40–59	60–79	80–99		
Rice									
Abakaliki	37	13	—	3	5	2	3	57	1.54
Onitsha	15	13	1	6	3	3	—	41	2.73
Sokoto	29	12	1	6	4	—	1	40	1.38
Ibadan	8	11	8	3	—	—	—	16	2.00
Cowpeas									
Birnin Kebbi	73	5	—	—	—	3	2[b]	85	1.16
Kano	41	7	—	1	4	—	2	56	1.37
Ibadan	24	11	—	7	1	3	—	41	1.71
Ijebu-Ode	23	7	—	5	1	1	—	40	1.74
Maize									
Badagry	51	7	—	2	1	2	2	61	1.20
Ilorin	43	12	—	—	6	4	2	64	1.49
Ibadan	29	11	—	6	2	1	2	48	1.66
Onitsha	17	13	2	2	5	1	3	51	3.00
Gari									
Ijebu-Ode	20	7	1	4	2	—	—	34	1.70
Ibadan	15	11	4	6	1	—	—	24	1.60
Ahoada	39	12	—	1	6	5	—	54	1.38
Onitsha	34	13	1	4	3	3	2[c]	56	1.65
Millet									
Kano	16	12	—	6	5	—	1	42	2.63
Sokoto	46	12	—	—	5	7	—	59	1.28
Daura	30	10	1	3	4	2	—	46	1.53
Maiduguri	17	12	1	4	5	2	—	42	2.47
Per cent of average:		All	15–49	50–84	85–119	120–54	155–89		
Yams									
Abakaliki	93	13	—	5	4	2	2	109	1.17
Enugu	47	13	5	4	4	—	—	63	1.34
Onitsha	39	13	5	6	1	1	—	63	1.62
Ibadan	70	13	2	5	4	—	2	85	1.21

[a] Mean of the annual ranges as per cents of the 12-month average.
[b] One of these 134.
[c] One of these 146.

earlier or later. But the situation is not much changed if we look at the month of first major decline in prices, presumably associated with the harvest. The first large decline in prices of rice at Abakaliki occurred once in August (1960), twice in September, three times in October, five times in November, and twice in December. Assuming that harvest normally occurs in November, the first sharp declines occurred in that month or the month before or after it in 10 out of 13 years.

The annual range of price relatives in the Onitsha market seems particularly high when compared with the range of the seasonal index:

Commodity	Annual range			Seasonal index, range
	Lowest	Highest	Mean	
Yams	19	141	63	39
Rice	19	73	41	15
Maize	16	95	51	17
Gari	2	146	56	34

This sort of comparison is perhaps more than the data should bear, inasmuch as it places maximum weight on individual observations any one of which may be egregiously inaccurate. Taken together with the lack of coincidence of annual highs and the relatively small amplitude of the seasonal indexes, however, it suggests that the Onitsha markets are subjected frequently to severe and unpredicted, although perhaps not unpredictable, shocks.

The contrast with Ibadan markets is interesting. The annual ranges of price relatives and the range of the seasonal index there were:

Commodity	Annual range			Seasonal index, range
	Lowest	Highest	Mean	
Yams	31	169	85	70
Rice	4	29	16	8
Cowpeas	21	76	41	24
Maize	22	80	48	29
Gari	17	55	24	15

Prices in Ibadan are also marked by relatively greater annual coincidence of highs for all five commodities.[28]

On the whole, the evidence supports the inference that storage is more effective in reducing the magnitude of seasonal price changes in the major consuming centers than in towns in the supply areas. At the same time, however, prices appear to be subject to irregular fluctuations greater than might be expected. If the Ibadan markets do a somewhat better job of anticipating changes that will affect staple food prices than is done in Onitsha, it is still not a very good job.

SPATIAL INTEGRATION

In an attempt to form an overall impression of the extent to which Nigerian markets provide an integrated system for the provisioning of cities, simple bivariate coefficients of correlation of reported prices for each commodity in every pair of markets were calculated. They are summarized in Table 6. On first inspection they appear to be very low. Of 4,836 coefficients only 19 are as great as .90, and 424 are zero or negative. Again, however, there are large differences among commodities; more than one-third of the r's for gari were .80 or higher,

[28] The relationship may be summarized by calculating the ratio of mean range to range of the seasonal index and the degree of coincidence, defined as the number of years in which the highest price relative fell in the same month as the highest value of the seasonal index, divided by the number of years in the series.

Commodity	Ratio of means		Degree of coincidence	
	Ibadan	Onitsha	Ibadan	Onitsha
Yams	1.21	1.62	1.00	.46
Rice	2.00	2.73	.64	.54
Maize	1.66	3.00	.73	.31
Gari	1.60	1.65	.64	.41

Ratio of means is consistently higher in Onitsha than in Ibadan, and the degree of coincidence is consistently lower.

TABLE 6.—BIVARIATE CORRELATION BETWEEN PRICES FOR EACH COMMODITY ALL PAIRS OF MARKETS
(Per cent of r's with indicated values)

r	Gari	Cowpeas	Rice	Sorghum	Yams	Millet	Maize
.95+	.3						
.90–.94	4.7	1.0					
.85–.89	10.7	4.9	.1				
.80–.84	19.7	5.9	.2	.6		1.0	.7
.75–.79	17.7	8.1	.8	1.4	.3	3.2	.7
.70–.74	18.0	9.9	2.4	2.4	1.1	3.0	.7
.65–.69	11.7	13.8	5.3	6.3	3.3	3.9	1.0
.60–.64	7.0	12.6	6.9	8.4	4.9	4.4	3.0
.55–.59	5.3	11.3	9.6	9.5	8.1	3.7	3.5
.50–.54	2.3	9.4	10.9	10.3	7.5	5.4	3.7
.0 –.49	2.6	22.9	61.4	56.2	71.6	64.8	75.1
Less than 0	—	.2	2.4	1.9	3.2	10.6	11.6
Total	100	100	100	100	100	100	100
Number of markets	25	29	57	43	30	29	35
Number of pairs	300	406	1,596	903	630	406	595
Q_1	.80–.84	.70–.74	.55–.59	.55–.59	.50–.54	.45–.49	.35–.39
Q_2	.75–.79	.60–.64	.40–.44	.45–.49	.35–.39	.35–.39	.25–.29

and approximately 30 per cent of the *r*'s for cowpeas were above .70, whereas no yam coefficient was as high as .80 and no more than 1 per cent of the coefficients of the other commodities reached this level.[24]

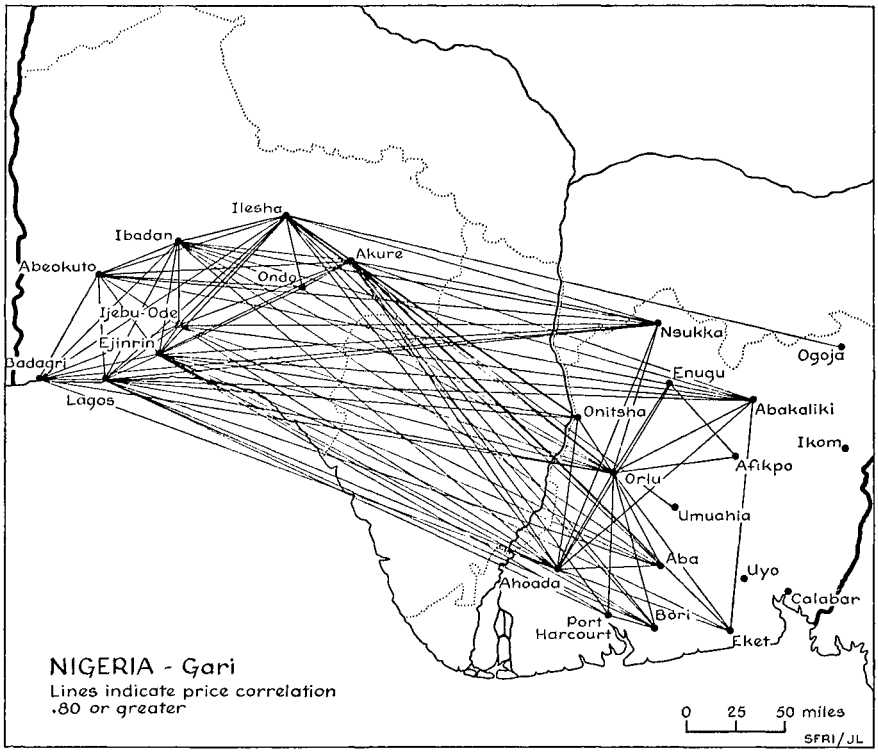
The correlation among gari prices seems to describe a fairly well-integrated system, embracing most of the Eastern markets as well as those of the nine Western towns. Among 8 of the 9 Western towns all but two of the coefficients are .80 or greater. Only Ondo does not appear in a pair with a coefficient of .90 or more; of the 28 coefficients for the other 8 towns, 14 are .90 or higher. The coefficients for Western markets with each other seem to describe a system centered around Akure and Ibadan as follows:

Western markets	Number of *r*'s .90 or greater, gari prices
Ibadan	6
Lagos	3
Abeokuta	3
Akure	7[a]
Badagry	1
Ejinrin	4
Ijebu-Ode	2
Ilesha	3
Ondo	0
Sum of figures	29
Correlations represented	14½[a]

[a] Includes correlation with Nsukka of .91.

[24] As with the seasonals, we have not searched for comparable correlation coefficients from other countries. A study of sorghum marketing in India by Uma Jayant Lele, however, provides bivariate correlation coefficients of weekly wholesale prices among two large consuming markets (Bombay and Kolhapur), five primary markets in a major sorghum-producing district of Maharashtra State, and one primary and assembly market in another district of that State. Of the 28 coefficients of correlation, 13 were .90 or greater, and all of the rest were greater than .80 (*15*, p. 66). Correlations between futures prices of wheat in United States markets approach 1.00 (*7*, p. 192).

MAP 2



Coefficients of .80 or greater bring Ondo into the system but also incorporate 12 markets in the western half of the Eastern Region (Map 2). Correlation among prices in these Eastern markets, which seems to center around Orlu and Ahoada, is no higher than between them and the Western markets as shown below:

	Number of *r*'s .80 or greater, gari prices		
Eastern markets	With Western markets	With Eastern markets	All
Orlu	8	10	18
Ahoada	8	7	15
Nsukka	8[a]	2	10
Abakaliki	6	3	9
Aba	6	2	8
Bori-Ogoni	5	2	7
Onitsha	4	2	6
Eket	2	3	5
Port Harcourt	3	2	5
Enugu	0	3	3
Afikpo	0	2	2
Umuahia	2	0	2
Ogoja	1	0	1
Sum of figures	53	38	91
Correlations represented	53	19	72

[a] Includes correlation with Akure of .91.

To the extent that correlation coefficients measure trading connections—including flow of information—among markets, the gari system seems reasonably well integrated. The correlation analysis would also be consistent with a net flow of gari from a supply area centered about Orlu, Aba, and Ahoada to the cities of the west, and this might help to explain the lower seasonal variation of prices in the Western markets. Here again we need more information. There is known to have been a large movement of gari to far Northern markets from Eastern cities along the line of rail, and some gari sold in Lagos comes from the east. If the Western cities receive significant supplies of gari from Eastern Nigeria, this may help to explain the differences in amplitude of seasonal variation, not because gari is stored in Western cities, but because these cities draw on a much wider range of producers than do those in the east. Perhaps this will be confirmed by reports from the field studies, although it has not yet been.

The correlation coefficients for cowpeas reveal quite a different picture:

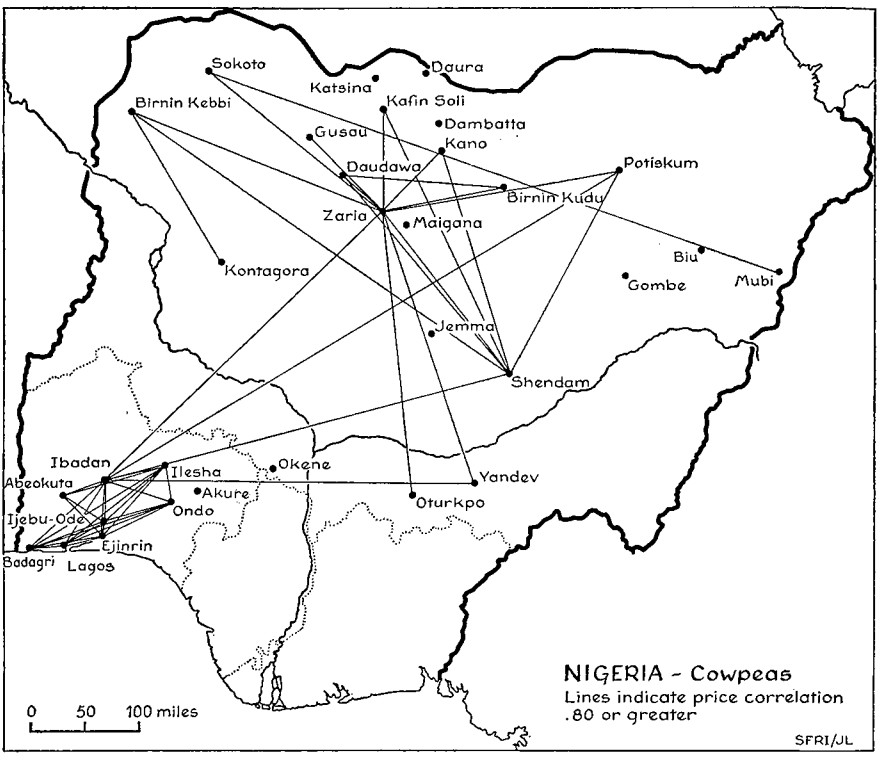
Market	Number of *r*'s .80 or greater
Ibadan	10[a]
Lagos, Ejinrin, Ijebu-Ode, Ilesha	7
Ondo, Badagry	6
Abeokuta	4
Zaria	12[b]
Shendam	7[c]
Daudawa, Birnin Kebbi, Potiskum	3[d]
Sokoto, Yandev, Kafinsoli, Birnin-Kudu, Kano	2[e]
Gusau, Kontagora, Oturkpo, Mubi	1

[a] Four with Northern markets.
[b] With Ibadan, .87; with Potiskum, .90.
[c] With Ibadan, .80.
[d] Includes Potiskum–Ibadan, .81.
[e] Includes Yandev–Ibadan, .87.

Among the Western markets correlations are in the .80's, but there are only 4 correlations of this magnitude between Northern and Western cities, all with Ibadan. Zaria appears to dominate the Northern trade as Ibadan does the Western (Map 3). Zaria is not a major assembly point for shipment of cowpeas to the south, but it may in fact be an information center, as the correlation map suggests. The railway lines from Lagos and Port Harcourt join at Kaduna, just 50 miles to the south, to continue on north to Kano; and main motor roads link Zaria with Sokoto in the northwest and Maiduguri in the northeast. Again, we need more information to confirm or refute the implications of the correlation maps.

Whether there is any point in trying similarly to delineate marketing systems for the other commodities, which have so very few high correlations, is open to question. We have not yet done so, although it may be worthwhile to see what can be learned from the coefficients in the .70's. Coefficients in the .80's for rice show only a connection between Lagos, Badagry, and Ejinrin, and one between Shendam and Akwanga. Even low coefficients, however, may be helpful. Ikom, for example, which we are told is an important yam market in Eastern Nigeria, has 3 coefficients in the .70's and 7 in the .60's out of a total for all yam markets of 9 and 51 in these categories. (Ibadan has only 2 in the .70's and 2 in the .60's.)

MAP 3



Causes of Small Intermarket Correlation Coefficients

When we attempt to explain the generally weak correlation among markets, and the rather remarkable difference between the integration of cowpea and gari markets and those for other commodities that the correlation coefficients imply, three possible causes suggest themselves. First, of course, defects in the data may be so great as to conceal any congruence in price movements between markets. Second, it may be that traders simply do not know that they could buy more cheaply or sell more dearly at one place than another, because the market information system is so poor. And third, there is the possibility that the economic motivation of traders is not strong enough to cause them to alter their buying and selling habits when they can get a better price. We shall consider each of these hypotheses in turn.

It is certainly possible that defects in the data are the principal cause of the low correlations. "Sampling fluctuations" are the probable cause of zero and negative ones. Inspection of some of the series involved in these comparisons confirms this. On the other hand, the rather high coefficients found for gari and cowpeas demonstrate that, at least for these commodities, the prices reported for a number of markets are reliable. But it is much more difficult to obtain reliable prices for some commodities than for others. In particular, units of sale may be so unstandardized as to prevent consistent conversion into a common unit, and quality differences not recognized in the data may affect price significantly.

Problems presented by the unit of measurement received a great deal of attention from the field teams in 1966–67. Thodey presents a detailed, illustrated account of the wide range and lack of standardization of volume measures used in Western Nigeria, and McMillan's notes contain a number of references to concealed variations in units of sale by the use of "magic cups."[25] There are also discussions in all of the field studies of "heaping"[26] and of "dash."[27] These problems are real, and they might be expected to affect the general level of correlation coefficients, but they should be just as important for gari and cowpeas as they are for rice, sorghum, millet, and maize. They cannot be used to explain differences in correlation.

Yams, however, present a special problem because they are sold neither by volume nor weight but by the piece, i.e., by the yam, and commercial yams vary in weight from 5 to 20 pounds. The crop and market reports do not tell how yam prices were converted into pence or shillings per unit of weight. In collecting yam prices in Eastern Nigeria, McMillan worked out procedures to enable her enumerators to distinguish between large, medium, and small yams and then used standard factors to convert into pound weights. It is doubtful that the statistics we are using here were collected with similar care. It seems likely that this difficulty in yam pricing might disturb intermarket spreads, and through them correlation in price movements, but it is not clear why it should affect correlations directly more than it affects seasonal movements.[28] Nevertheless, part of the explanation of the very low yam correlations may rest in the data, as it probably does for rice.

Quality differences might be expected to be most important for yams, somewhat less important for gari and rice. Yams are of many varieties, each of which has its own preferred use. Gari varies in degree of sourness and in its oil content. Rice varieties find quite different consumer acceptance. Millet and sorghum, however, do not display these characteristics, nor does maize, except as it is sold semi-mature or mature. The quality of cowpeas appears to be primarily a matter of how long they have been stored. If reported prices are seriously distorted by quality differences, the pattern of seasonal variations should be disturbed, but there is no evidence of this for yams or gari, little for maize. The rice seasonals, on the other hand, stand by themselves in their lack of consistency in timing. Analysis of gari prices suggests that quality differences are not as important as once thought (*14,* pp. 216–17); the uniform yam seasonals may result because quality of yams present in the market is correlated with the calendar, as is the quality of cowpeas.

Let us consider now the question of economic behavior of foodstuff merchants. There can be no question that Nigerian traders are motivated by the desire for gain and that their reply to economic stimuli is in orthodox directions (cf. *13*). Nor can there be questions about their experience in trade. Market exchange in Hausaland and Yorubaland long antedates the British occupation. Commerce is a more recent development in Iboland, but few would challenge the acuity of the

[25] Cigarette tins with false bottoms.
[26] How high the grain or meal is piled in a container.
[27] Gift from seller to buyer, usually after the transaction is completed.
[28] Assuming that in any one market prices are collected for yams of the same sizes.

Ibo trader. This is not to say, however, that all traders participate equally in price making, or that price incentives ruthlessly override all others. In fact, most sellers in the retail market are essentially price takers, buying at a price determined by their customary supplier and selling at a price they hope will yield a bit more than cost. When farmers sell their own produce at retail, it may be expected that their prices are in line with those of retailers who have purchased their stock. Wholesalers, too, have their customary sources of supply, and one of the characteristics revealed by interviews is their tendency to buy regularly in the same producing centers, and not to know what prices are elsewhere, or if they do, to buy there.[29] Further than this, traders in most of the commodities included in our study confess to knowing very little about prices in nearby towns that are also consuming centers. There are differences in the various commodity trades, however; the implications of these differences are explored below.

The buying patterns of wholesalers also influence the quality of market information. Because there are no public market news services, all information about supplies and prices must come through the actual trading activity itself. If traders are only interested in buying in a few markets, the information that guides their decisions is communicated primarily in the form of variations in the amount of the commodity that is actually offered. Usually this means the amount that is visibly offered. The assembler-wholesalers, who must be regarded as price makers, react to supplies currently available from their customary sources and to supplies recently available in their own town markets.

"Gold Points" and Hierarchies

If the behavior of wholesalers of the staple foodstuffs and the organization of production of these commodities are as we believe them to be, two quite different models may help to understand the relatively high intermarket correlations of cowpea and gari prices and the relatively low correlations of the others. The first model is suggested by the role the "gold points" play in international gold movements, the second by current discussions of anthropologists and geographers about market hierarchies.

Consider first markets A and B, each of which produces and consumes commodity Y. Assume that trade in Y is possible and customary between A and B, determined only by cost of transport and by prices in the two markets. Now clearly the price in A can be above or below the price in B by an amount equal to the cost of transport between them, i.e., it can vary by as much as *twice* the cost of transport without affecting the price in B.[30] Can we find anything analogous to this in Nigeria? Perhaps we can. Maize is grown over a very wide area in the south, there is very little tendency toward specialized areas of production, and farmers customarily sell only part of their crop, holding the rest back for their own needs.[31] Imagine that A and B draw from the same generalized producing

[29] Even though most traders behave in this fashion, a few large wholesalers may be allocating their purchases among a number of supply areas. To the extent that they do so, and if the volume they handle is large enough, effective arbitrage over space may be achieved.

[30] Just as the inland price of maize in a country like Kenya, that sometimes exports maize and sometimes imports it, will approximate world price *plus* transport when it is importing and world price *minus* transport when it is exporting.

[31] Not strictly true of the Yoruba according to Gloria Marshall (*16*).

area, which has its own generalized reservation demand. Consuming center A can expand its requirements considerably, drawn primarily from supplies otherwise destined for own consumption, before it impinges on supplies going to B. The converse also is possible. Under these circumstances an approximation of the gold-point situation might be reached, and prices in A could be relatively insensitive to prices in B over a rather wide range.[82] On the other hand, if A and B both draw their supplies from a point source C, changes in prices in A should be promptly reflected in C and through C in B. This condition approximates the market for cowpeas in Nigeria, with A and B in the west and C in the north, perhaps in Zaria. This sort of relationship should be susceptible to statistical test, but we have not yet attempted it. It might be appropriate for gari if gari manufacture were concentrated in a few discrete areas—"points"—from which it was distributed to major consuming centers. There are some indications that this may be true, but the question is as yet unresolved.

The gold-point model is intriguing, but it is perhaps not as attractive as is a modification of the "market hierarchy" or "central place" model. This hierarchical model is probably best illustrated by G. W. Skinner's study of Chinese markets (*27*). He describes a system in which clusters of lower level ("standard") markets are linked together by an "intermediate" market, which in turn is linked to other intermediate markets by a central market. Goods do not move directly between markets of the same level, but through the intermediary of a market of higher order—at each higher level in the system a broader range of goods is available and a wider range of services is performed. The anthropological and geographical analysis develops intricate elaborations of the determinants of numbers and locations of markets at each level and of the complex of economic, social, and political activities associated with them. But from the standpoint of price analysis, the essential characteristic of such a system is that it is made up of bulking and distributing markets. It is probably a fairly good approximation of the organization of marketing of imported consumer goods in Nigeria, although this is only a guess, and marketing of exported commodities has been organized more or less in its image. But it may be a misleading model for understanding the marketing of staple foodstuffs.

To the extent that wholesaler-assemblers do in fact travel a fairly standard route between their own city and a specific supply area, the hierarchical model is inappropriate. Instead we have a two-level system made up of a supplying center and a consuming center. Polly Hill earlier pointed out the possible inappropriateness of the hierarchical model for many regions of West Africa (*11*, p. 289). She has recently suggested to me that:

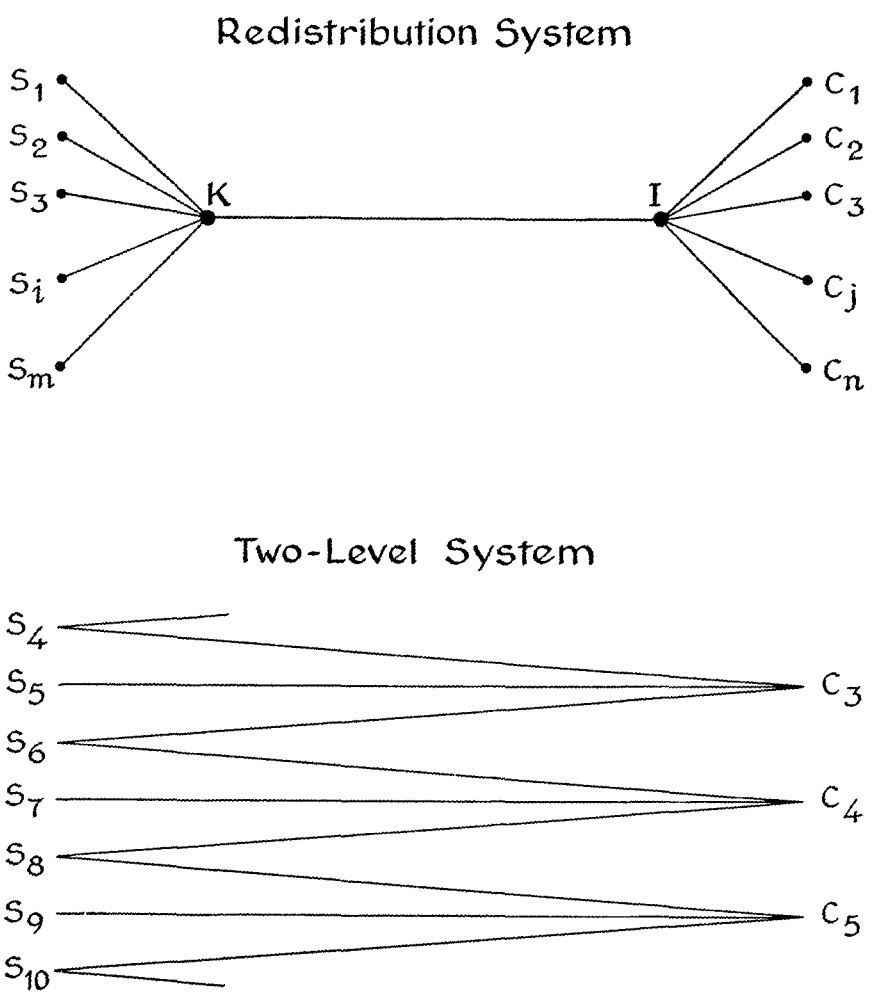
[82] Something like a gold-point situation is described by S. K. Seaver between the Los Angeles and San Francisco egg markets in *26*. These two markets received a major part of their supplies from the Middle West, i.e., from a distant-point source, as did Chicago, Seattle, and Portland. The two California markets also drew on nearby supplies which were sometimes surplus to their requirements, and there were resulting movements of eggs between the two markets. Coefficients of correlation of average monthly prices in the western markets with prices in Chicago were from .90 to .93 (p. 21); between San Francisco and Los Angeles they were .965 to .975. But the coefficient for *daily* prices, Los Angeles and San Francisco, was .80 (p. 23). Seaver explains the markedly lower correlation of daily prices as resulting from imperfect knowledge and delays in shipments, but it may well be that "gold points" or "import-export parities" were operating, if distant supplies are the equilibrating force in the longer term, and local supplies in the shorter term.

> In some regions of West Africa a high proportion of foodstuffs passes through one marketplace only (often no marketplace at all) before reaching the final consumer in town or city, so that there is little relationship between the size of a marketplace and its hierarchical position in terms of the bulking of non-imported goods. House-trade is apt to be very important in both town and countryside, and much bulky produce, such as yams and plantain, is common, bought by wholesalers directly from farmers.

Does this mean that there are no redistributive systems, as defined here? Certainly in Nigeria there are many indications that both kinds of systems exist side by side, with one dominant for certain staple foodstuffs, the other dominant for others.

The implications of the two kinds of systems for intermarket correlations appear to be quite different. In the simplest form, consider m supply areas (S_i) all sending their produce to a bulking center K (Figure 2). From there it is shipped

FIGURE 2



in wholesale lots to merchants in I, who resell to wholesalers in *n* consuming centers (C_4). Merchants in K are promptly aware of any deficiency or surplus available in the *m* supply centers, and will adjust their bargaining position accordingly. Buyers from I, who are met in K by assemblers fully informed about the total supply situation, are themselves equally informed about the total demand situation in the *n* consuming centers. With buyers and sellers well informed about economic conditions on their side, and assuming competitive conditions, the price arrived at should reflect all knowledge in the system. This, of course, is the competitive price, which will be disseminated throughout the system by both the producer and retailer price takers. This model approximates the market system for cowpeas, with Ibadan playing the role of I, and some northern city, possibly Kano, playing the role of K. In actuality there is more than one northern bulking point, and it may be that the northern point with maximum price information, although not maximum supplies, is not K for Kano but Z for Zaria.

The two-level system produces a quite different situation. In the redistributive system merchants at a few points can be in possession of knowledge about total system supplies and total system demand—in fact they must be if they are to survive. In the two-level system merchants know only what supplies are in their own city (consuming center) and in the supply area where they usually buy. Under these circumstances, suppose a shortage of supplies of 50 per cent in area S_7 that sells only to city C_4 (Figure 2 and Table 7). If C_4 normally obtains half of its supplies from S_7, and the rest from S_6 and S_8 in equal parts, when the trucks go out again, or after they have gone out several times, they might be able to make good this shortage by taking half of the deficit from each of the other supplying areas. Now if consuming centers C_3 and C_5 also obtain supplies from these same areas, they will find themselves short by the amount that C_4 has taken from each, and will in turn take steps to replace these supplies, either by bidding against C_4 in the supply areas they share or by bidding in more supplies in areas they share with other consuming centers. (Time period 3A in Figure 2 represents a situation in which all of the shortfall in supplies is obtained from other supply areas than are shown; time period 3, a situation in which half of the shortfall is obtained from other supply areas.) Eventually, the shortages at S_7's unique supply point will be reflected throughout the system, but each step in its spread will be no faster than the movement of trucks from and back to a consuming center. If markets in the supply areas are periodic, meeting only once every four days as they often do in Nigeria, the response will be further delayed. At each step the impact of the original shortage on price will be diminished. To the extent that shortfalls or surpluses in supplies result from local conditions, the system will be characterized by random shocks with greatly differing impacts on individual markets.

This model has great appeal because it seems to accord with the qualitative information we have about the behavior of traders. It, too, should be susceptible to statistical test, but such a test must await more precise mathematical formulation of the model than we have been able to achieve.

Under either the hierarchical model or the gold-point model, we should expect relatively higher intermarket correlations for cowpeas and rice than for millet, sorghum, maize, and yams simply because the long distances that cowpeas

TABLE 7.—THE TWO-LEVEL SYSTEM: AN ARITHMETIC ILLUSTRATION,
QUANTITIES MOVING FROM PRODUCING CENTERS S_i TO CONSUMING CENTER C_j AT TIME PERIODS T_k

	T_0			T_1			T_2			T_{3A}			T_3			T_4			T_5		
	C_3	C_4	C_5	C_3	C_4	C_5	C_3	C_4	C_5	C_3	C_4	C_5	C_3	C_4	C_5	C_3	C_4	C_5	C_3	C_4	C_5
S_4	40	..	..	40	..	..	40	..	..	*60*	..	..	*50*	..	..	50	..	..	*55*	..	..
S_5	80	..	..	80	..	..	80	..	..	80	..	..	80	..	..	80	..	..	80	..	..
S_6	40	40	..	40	40	..	*20*	*60*	..	20	60	..	*30*	*50*	..	*20*	*60*	..	*25*	*55*	..
S_7	..	80	..	..	*40*	..	..	40	..	..	40	..	..	40	..	..	40	..	..	40	..
S_8	..	40	40	..	40	40	..	*60*	*20*	..	60	20	..	*50*	*30*	..	*60*	*20*	..	*55*	*25*
S_9	..	..	80	..	..	80	..	..	80	..	..	80	..	..	80	..	..	80	..	..	80
S_{10}	..	..	40	..	..	40	..	..	40	..	..	*60*	..	..	*50*	..	..	50	..	..	*55*
Total	160	160	160	160	*120*	160	*140*	*160*	*140*	*160*	160	*160*	*160*	*140*	*160*	*150*	*160*	*150*	*160*	*150*	*160*
Price change from previous period	±	±	±	±	+	±	+	−	+	−	±	−	−	+	−	+	−	+	−	+	−

S_i = supply area.
C_j = consuming center.
T_k = date ; T_{3A} represents an alternate solution for time period 3.
Numbers that differ from preceding period are italicized.

and rice travel, and the concentration of production, should make their marketing approximate more closely to the point source model or to the redistributive model. Descriptive information has not revealed a similar specialization in gari production, except to supply the Northern markets, but the correlation coefficients strongly suggest that such a specialization exists. The failure of rice prices to move more closely together we can only attribute to defects in the data.[33]

IMPLICATIONS FOR OTHER AFRICAN MARKETING SYSTEMS

Let us advance as a general proposition that between the narrowly confined marketing system concerned only with local trade and the integrated national system with fully informed price-making centers, there lies an intermediate system which can handle very large movements, but which reacts slowly and sluggishly to changes in the basic economic magnitudes. Every change eventually runs through all markets, but its timing and its impact vary in no regular way. The influence of change is harmonic rather than arithmetic, serial rather than simultaneous.

In Nigeria this system has been partially transformed into an integrated distributive system; as the transformation progresses it will be reinforced by the specialization in production that it fosters. In Kenya, however, the government's legal monopoly of the maize trade, while it has not at all stopped private trade, forcefully holds it in the early stages of a two-level system. Furthermore, the governmental licensing system for transport of other foodstuffs enforces a two-level system by restricting individual transporters to trade between one supply area and one consuming area. Price data from Kenya, which apparently have never been seriously collected by official agencies, are too meager to test intermarket correspondence. Data compiled by Alvis and Temu, however, suggest that correlation is poor.

In Sierra Leone the rice trade—which, like maize in Kenya, has international connections—shows signs of redistributive organization. Unfortunately, our study there was conducted shortly after the trade had been disrupted by the outlawing of aliens from it. The disruption caused by this action prevented accurate observation of the system as it has operated in the past or as it is likely to operate in the future. The trade in cassava fufu, which is a highly perishable product, is entirely two-level, as perishables frequently are. Peanut marketing, which was a subsidiary trade of the alien rice merchants, appears to be in disarray and essentially two-level. Palm-oil marketing, too, is two-level except to the extent that the Sierra Leone Produce Marketing Board participates. Rice moving into eastern Sierra

[33] Elon Gilbert criticizes the foregoing sections because the conclusions rest almost exclusively on analysis of the price series:

> I wonder if the discussion doesn't give the impression that our case rests more heavily upon the price analysis than it really does. Although the field studies are mentioned in the beginning of the paper they are not brought into parts of the later discussion as much as they might be, particularly in the models. More liberal use of specific examples such as cowpea trade would help emphasize that we have a lot of quantitative and qualitative data to draw upon in addition to the price data. A discussion of the position of Zaria—a comparison of its position as viewed from the price data and from the field—would show how we are trying to reach a true appraisal of what is happening by approaching it from different perspectives.

This is true only in part. In general the propositions advanced here came directly from the price analysis and have been tested only in a preliminary way against the case studies, partly because results from the case studies are only now becoming available in final form.

Leone, where much of the rice trade is still local, shows clear signs of developing a redistributive pattern. It may be that because Sierra Leone has only one city of any size, it will develop an integrated national marketing system for domestic foodstuffs before Nigeria develops integrated subsystems.

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