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CENTRE FOR DEVELOPMENT STUDIES

69830

Working Paper No.117

POPULATION GROWTH AND COMMERCIALISATION OF AGRICULTURE: INDIA, 1890-1940

Ashoka Mody

Centre for Development Studies
Ulloor, Trivandrum- 11

[Though this paper cannot yet be regarded as complete, I have already accumulated a large debt. Dr. K.N. Raj encouraged me to study the problem, and at different stages helped me gain perspective on the issues involved. Dr. P.G.K. Panikar and Dr. A. Vaidyanathan gave detailed comment on an earlier draft. In addition I have had the benefit of comments from several colleagues in the Centre. In particular, I would like to thank Sudipto Mundle who patiently heard and reacted to several of my half-baked ideas; and Rakesh Basant for substantive comments as well as his insistence that I state explicitly certain internalised formulations]

POPULATION GROWTH AND COMMERCIALISATION OF AGRICULTURE: INDIA 1890-1940

Introduction

The quantitative relationships between population and natural resources on the one hand and population and man-made assets on the other are key variables in the long run dynamics of an economy. Population growth and its implications for economic change have consequently been widely discussed and debated. The growth of population has been variously regarded as either endogenous to the economic system or exogenous to it. The assumption of endogeniety of population growth has a long lineage. The exogeniety assumption is more recent. The justification for regarding the growth of population as exogenous or autonomous to the economic system is based on the fact that certain regions, over certain historical periods, have experienced rapid population growth due principally to a lowering of death rates. The reduced mortality has, in turn, been achieved through better and more widely spread public health facilities, these latter being unrelated to the conventional indicators of economic progress. Mrs. Boserup, for instance, says: "Few observers would like to suggest that the tremendous increases in the rates of population growth witnessed throughout the underdeveloped world in the two post-war decades could be explained as the result of changes in the conditions of food production. It is reasonably clear that the population explosion is a change in basic conditions which must be regarded as autonomous, in the sense that the explanation is to be sought, not

in improved conditions of food production, but in medical invention and some other factors, which the student of agricultural development would regard as independent variables" (Boserup (1965) pp. 11-12). The trend growth of the Indian population between 1890-1940 was also largely unrelated to changes in foodgrain output or national income. Rather it was a function of declining mortality. During the nineteenth century "steps were taken to deal with the more easily controllable epidemic diseases. Sanitation and public health measures were introduced, and in larger cities water supply was introduced. As a result of these and similar services, the death rate was considerably reduced. The birth rate, was unaffected, and remained relatively high. Inevitably, therefore population grew." (Thorner (1962) p.110) So, for the purpose of this paper, population has been regarded as an exogenous variable, and hence the causal relationship sought to be examined is one way: from population growth to the commercialisation of agriculture.

Even within models that take population to be an exogenous variable, there are negative and positive strands. (Ohlin (1976) pp.5-) The negative view point contends that an increase in population has a depressing effect on savings and investment and hence on the growth of per capita income; the positive argument is that the growth of population, in fact, stimulates growth of output via "economies of scale, by forcing men out of their natural torpor and indueing innovation and technical change (Colin Clark, E. Boserup, Hirschman), or by speeding up the replacement of the labour force by better educated cadres (Leibenstein)" (Ibid, p. 9). From the point of view of agriculture's response to population pressure, Mrs. Boserup's

book (Boserup (1965)) has been extensively referred to. Mrs. Boserup's argument that population growth has a positive impact on agricultural output forms a part of the second strand. Her thesis is a convenient starting point for the formulation of the hypothesis of this paper.

Briefly, Mrs. Boserup argues that population pressure (defined as an increasing population density) is a necessary and sufficient condition for the growth of agricultural output, and is a necessary condition for raising labour productivity in agriculture over the long run. (Ibid p. 118. According to her, a rise in the density of population forces more intensive cultivation and the adoption of improved techniques of production, raising land productivity and hence agricultural output; on the other hand, if population density does not rise the intensity of cultivation is not increased, and "the vicious circle of sparse population and primitive techniques" ensures a stagnant output. She, however, makes an interesting, if not critical qualification. She admits that her model may not apply to "densely peopled communities if rates of population growth are high", for in such communities the necessary rate of investment in response to the high rates of population growth may not be possible. (Ibid p. 118). A recent study on population and agricultural change in Japan, India and Sri Lanka has come to the conclusion that the mechanism Mrs. Boserup postulates has not operated in these countries during this century.[1/] Bagchi has also shown that

1/ Sovani (1976). See Summary record of discussion, pp.295-296. The applicability of Boserup's paradigm to Europe has also been questioned on the grounds that it neglects two important points in European history, namely, "the presence of markets and the growth of trade, and the technical changes in the agricultural revolution itself." See Parker (1975) p. 11. However, a number of contributions to the volume edited by Parker and Jones affirm the usefulness of Boserup's paradigm in analysing agrarian change in Europe.

no simple relationship between rates of population growth and growth of land productivity held in India during the period of our study. (Bagchi (1972) Section 4.4). Thorner, however, has put it most strikingly. Referring to India during 1881-1931, he says; "it is indeed a remarkable phenomenon, and one worthy of further investigation, that agricultural production was reported as virtually constant - - - during a half century when India's population rose by nearly one hundred million". (Thorner (1966) p.77). The empirical observation, hence, is that land productivity and agricultural output did not respond positively to population growth. In the light, therefore, of Mrs. Boserup's qualification and the empirical findings, her thesis is not very relevant to India for the period being studied in this paper*.

An alternative view point, belonging to the negative strand discussed above, has been put forth by Dandekar. (Dandekar (1966)). "At the beginning the growth of agriculture was more rapid than the growth of population, so that agriculture could provide either a high standard of living or a larger surplus over subsistence for investment. But sooner or later a stage is reached when the growth in population overtakes the growth in agriculture, and the surplus

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* This is not to reject Mrs. Boserup's point of view. It is possible that the time span over which she visualises her process will work out is longer than just a few decades. It could even be argued that the rise in land productivity in post-independence India fits into her scheme.

over subsistence is gradually reduced".[2/] Elaborating, Dandekar makes "a convenient division of traditional agriculture into two sectors: a sector that is not overburdened with population and therefore produces a surplus of varying degree over subsistence of its population; and another sector where the pressure of population is excessive, agriculture fails to produce a surplus over the subsistence of its population....." (Dandekar (1966) p.372). As population grows, the farms at the margin of the surplus producing sector are "pushed below the subsistence level and they join the other sector. Thus the margin between the two sectors recedes, and the surplus producing sector shrinks". (ibid p.374).

With land productivity not responding to population growth, there was such a decline in the surplus (over the consumption) of the agriculturists in India during the period studied in this paper. Our conceptualisation of the changes in the structure of agricultural holdings following rapid population growth is essentially the same as that of Dandekar's. This is further discussed below. Dandekar's focus (at the conceptual level and not with reference to any region or period) was on the depressing effect that the declining surplus would have on savings and investment. Our

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2/ Ibid p.372. See also Bagchi (1976) where he formulates the following hypothesis: "Traditional techniques of production had reached their highest level of development (during 1901 - 1941) in the different parts of India, and population growth could not in fact affect actual labour intensity on land already cultivated. However, population growth, by eating into the surplus available to peasants, could force them to effectively decumulate the capital applied to land, thus leading to a fall in the productivity per acre. A subsidiary factor working in the same direction would be an increase of acreage under foodgrains, thus lowering the effective quality of land under cereals and pulses and decreasing the average productivity of foodgrains per acre". p.52-53.

focus is on the effect of the declining surplus on the growth of the markets for agricultural products.

That brings us to the "market." The "market" is a ubiquitous economic category. Kaldor has pointed out, however, the market has two principal functions in economic theory: the allocative function and the creative function. (Kaldor (1972)). The allocative function refers to the pattern of utilization of resources according to market price signals; an example of such a study is Dharm Narain's: "The impact of price movements on areas under selected crops in India, 1900-1939". (Narain (1965)). The creative role of the market refers to the long term effects of the growth of markets, in particular the specialisation in production made possible by larger markets. Thomas Smith, commenting upon the gains from expanding markets in Japan, says: "The possibility of specialisation, that is the freedom from the necessity of cultivating uneconomic crops - was a major contribution of market to productivity". Describing a shift of land from paddy to cotton in Wakae county, Kawachi province, where soil and climatic conditions were ideal for cotton, Smith says: "There can be no doubt, therefore, that this shift in cropping was a net economic gain for individual holders, for the region and for the country as a whole." (Smith (1959) pp.97-98). Smith adds that the diffusion of techniques of production, which made an important contribution to the rise in productivity, was also made possible by the growth of markets. How the spread occurred is not known in detail, although it is obvious that the growth of the market played an important role breaking down local barriers, transporting ideas and objects from

place to place whenever merchants travelled." (Ibid p.87). Our concern, then, is with the "creative" role of the market, i.e., its long-term growth and the attendant implications.*

It is now possible to specify the purpose of this study. We are interested in examining the impact of one long term tendency, the growth of agricultural population in relation to food production, on another long-term change, the growth of markets for agricultural products. We hope to demonstrate the simple proposition that the rise in agricultural population in relation to food production had the effect of contracting the marketed surplus of grains and hence had a disintegrative effect on the internal market. We shall also show that, linked to the contraction of the market, there occurred changes in the cropping pattern which, at least in some parts of the country, resulted in a reduced specialisation in production. The changes in cropping pattern, however, were also influenced by external trade and the cash requirements of cultivators. The relative importance of the different factors during different time periods and in different regions will be indicated.

In describing the scope of this paper, we have already implicitly admitted that the population pressure was not the only force influencing the growth of the market. A few other factors which need to b

* It should be noted that we borrow from Kaldor his very useful distinction between the allocative and creative roles of the market though his concern was different from ours. Kaldor wished to highlight the creative role of the expanding market in allowing the realisation of increasing returns to scale. In the context of Indian agriculture during the period under consideration increasing returns are not important.

taken into account have been mentioned. In addition, it would be necessary, for forming any complete picture, to discuss the changes in the pattern of land distribution, and the impact of such changes on the growth of the market. Clearly, it is necessary to consider both the operational and the ownership distribution of land holding As far as the operational structure is concerned, there is considerable evidence that increasing popoulation was resulting in subdivision of holdings, which in turn was increasing the subsistence orientation of farming. (Ambirajan (1978) p.241-242; [illegible] (1966) p.211). However, the ownership structure and the tenurial relationships need also to be taken into account. Specifically, one should distinguish between peasant proprietorship and cultivation under tenancy. (Mendels (1975) p.198). In the case of peasant proprietorship, the operational and ownership distributions coincide by definition and so the effect of population pressure is unambiguously to reduce the market surplus coming from these holdings. In the case of ~~small~~ tenant cultivation, however, there would be two opposing forces. The increase in population would reduce the size of the plots being let out and hence reduce the capacity of the tenant to produce for the market. On the other hand, the subdivision of tenant plots may increase unit rents, and hence increase the marketable surplus in the hands of the landlord. (Ibid p.198). The observed expost decline in marketed output represents the netting out of the different forces. Unfortunately there is little research either on the division of cultivated area between owner cultivated and tenant cultivated holdings or on the changes in rent extracted. Some evidence, however, suggests that our statistical findings on the changes in the degree of commercialisation are consistent with the structure of landholdings and the trend in rents.

Stokes ((1978), pp. 238, 240) has pointed out that the owner-cultivator form (or bhaiachara or ryatwar) was the prevalent form of tenure in the sparsely populated areas, characterised by insecure agriculture. These regions were unable to generate a rental surplus since land was plentiful. On the other hand, densely populated regions, where agriculture was secure, supported landlord forms on a rental surplus. However even in these crowded regions there was a steady shift to owner-cultivation from the late nineteenth century. "..... the joint zamindari and imperfect pattidari tenures proved atavistic devices, landlord structures that had outlived their role ..... Among congested communities conditions inexorably drove the dominant castes into de facto ownercultivator holdings ...." This shift occurred because the "balance of advantage between rental income (or, more strictly malguzari) and profits of direct farming swung decisively in favour of the latter....". The fall in the value of rental incomes relative to profits, in turn due to three factors: (1) reduced revenue demand; (2) promise of greater prosperity in agriculture in the second half of the nineteenth century and early twentieth century due to spread of irrigation and the exapansion of railways; and (3) British tenancy legislation restricting rents.

It would therefore appear that in the first half of the twentieth century a considerable, and growing, portion of the area under cultivation was owner-cultivated. And in such areas, as we pointed out above, the effect of population pressure would be to reduce the marketed surplus. Besides, even in the tenant cultivated areas, the rise in rent was controlled by rent ceiling legislation. To the extent the control was effectively implemented, the tenant cultivated areas also approximated to owner-cultivated areas.

It must, however, be straight away conceded that Stokes' arguments have been used by him in the context of North India. In view of their consistency with our results, we would suggest that they are more generally valid.* Ofcourse, this has to be verified with direct empirical evidence, and we leave it as a hypothesis.

The following sections describe, first the growth of population pressure in India, then the trends in the internal market, and finally the changes in cropping pattern in different regions of the country.

1. The Growth of Population Pressure

1. It would be clear from the above that our concept of population pressure differs from that of Mrs. Boserup's. Mrs. Boserup defines the growth of population pressure as a rise in the population density (or manland ratio). According to her, a higher population density would lead to a series of changes that raise the productivity of land, and hence stem the fall of per capita output in the short-run and raise it in the long run. Our concern, however, is with a situation where the land productivity does not rise (or rises only slightly) with an increase in the man-land ratio so that a net decline in the per capita production of foodgrains follows. Our indicators, then are the land-man ratio and the per capita output of foodgrains as distinct from merely the density of population.

2. It should be clarified at this stage that when we talk about land-man ratio, our analytical interest as discussed above is in the ratio of cultivated land to agricultural population. Again, when referring to the per capita output, we refer to the output of foodgrains per head of the agricultural population. The figures presented,

*See Chaudhuri (1977) for evidence on the decline of rent burden in Bengal between 1900-1940. p. 366.

however, are mainly in terms of cultivated land or output of foodgrains per head of the entire population, since these are most readily available. Our interest is primarily in the trends of the land-man ratio and the per capita production of foodgrains. As long, therefore, as the proportion of agricultural population in the total population remains unchanged, the direction of the trend would remain unaltered whether we divide the cultivated area and foodgrain output by the total population or by the agricultural population.3/ As a proxy for population distribution, we have the work force distribution for the period 1881-1931 (Table 1).

Table 1: Working Force Distribution by Industry, 1881-1931
India (including Burma & Pakistan)

		(Percentage)				
		1881	1901	1911	1921	1931
1.	Agriculture, Foresting and Fishing	65	68	72	73	72
	General Labour	9	6	3	3	4
2.	Manufacture, Mining and Construction	16	11	10	9	9
3.	Trade	2	5	5	6	6
3.	Transport and other services	8	10	10	9	9
	Total	100	100	100	100	100

Note: The Table refers to Males only
Source: Thorner, D., Table 1 page 79.

3/ If the ratio of the agricultural population increases (decreases) our method would underestimate (overestimate) the decline in the land-man ratio and per capita output of foodgrains.

It has been suggested that the category "general labour" be also considered a part of agriculture. (Thorner (1966) p.75). We observe, henece an unchanging proportion of workers in agriculture at the all India level. The stability of the proportion of people engaged in agriculture may also be seen for smaller geographical areas. (Table 2). 4/

Table 2: Percentage share of Agriculture in the Work Force, 1911-1931 (Males only)

	1911	1921	1931
Andhra Pradesh	69.4	70.7	66.0
Assam	87.8	88.8	87.4
Bihar	84.1	86.4	87.0
Gujarat	65.9	65.4	67.7
Kerala	65.7	63.0	60.3
Madhya Pradesh	75.6	78.2	80.1
Madras	73.6	74.1	72.1
Maharashtra	70.7	69.4	70.0
Mysore	74.0	72.2	72.6
Orissa	81.1	82.2	83.3
Punjab	63.2	63.8	66.3
Rajasthan	63.3	65.7	69.1
Uttar Pradesh	77.2	79.8	78.0
West Bengal	68.7	68.7	67.9
ALL INDIA	73.6	74.4	74.0

Source: Krishnamurthy, J. (1970): "The Industrial Distribution of the Working Force in India, 1901-1961: A Study of Selected Aspects", unpublished Ph.D. thesis, submitted to the University of Delhi, Table 6.1, p.182.

4/ The only clear exception to the general stability of proper of agricultural population in total population was Kerala. In the other states, if there was a trend at all, it was towards an increase in the proportion of agricultural population, which (as noted in foot note 3) would only result in an underestimation of the decline in the land-man ratio etc.

3. Several parts of India were already densely populated by the 1850s. (Klein (1974). According to Kingsley Davis, however, the growth of the Indian population started accelerating only by the mid 1870s. (Davis (1951)). References to the first signs of population pressure (defined in our sense of food supply not keeping up with population) during 1870s can also be found in the works of W.W. Hunter. (See Thorner pp. 110-111). Though 1921 marked the point of sustained increase in population, the growth rate of population between 1881 and 1891 was not much lower than the growth rates after 1921, at both the national (Table 3) and the regional levels (Table 4).[5/]

Table 3: Decadal Percentage Growth Rates of the Indian Population

	Davis	PCM/DB
1871-1881	0.9	0.78
1881-1891	9.4	9.69
1891-1901	1.0	1.06
1901-1911	6.1	6.29
1911-1921	0.9	0.99
1921-1931	10.6	10.42
1931-1941	15.0	14.36

Sources: (1) Davis, K., p. 28
(2) Mahalanobis, P.C. and D. Bhattacharya, p. 2.

5/ The growth rates for 1881-1891 in Table 4 are slightly exaggerated.

Table 4: Variation of Population (per cent)

	1881-1891	1891-1901	1901-1911	1911-1921	1921-1931
1. Ajmer-Merwara	+17.7	-12.1	+5.1	-1.2	+13.1
2. Assam	+ 6.8	+11.8	+15.2	+13.2	+15.7
3. Baluchistan			+ 3.0	- 4.2	+ 8.6
4. Bengal	+ 7.5	+ 7.7	+ 8.0	+ 2.8	+ 7.3
5. Bihar & Orissa	+ 7.5	+ 1.8	+ 5.1	- 1.2	+11.5
6. Bombay Province	+15.02	- 3.6	+ 6.2	- 1.2	+13.7
(a) Sind	+19.0	+11.7	+ 9.4	- 6.7	+18.5
(b) Presidency	+13.7	- 4.2	+ 5.3	- 0.8	+12.4
7. Burma		+35.9	+15.5	+19.1	+11.0
8. C.P. & Berar	+10.7	- 7.0	+17.9	- 0.3	+12.6
9. Madras		+ 7.2	+ 8.3	+ 2.2	+10.4
10. N.W.F.P.			+79.7	+32.9	- 7.7
11. United Provinces	+ 6.3	+ 1.7	- 1.0	- 3.1	+ 6.7
12. Punjab	+10.2	+ 6.3	- 2.4	+ 5.5	+13.5
13. Central India Agency			+12.9	- 2.1	+10.5
14. Gwalior State	+13.9	-12.7	+ 5.3	- 1.3	+10.3
15. Hyderabad State	+17.2	- 3.4	+20.0	- 6.8	+15.8
16. Madras State Agency	+10.6	+13.2	+14.9	+13.5	+23.7
17. Mysore State	+18.1	+12.1	+ 4.8	+ 3.0	+ 9.7
18. Rajputana	+20.6	-20.5	+ 6.9	- 6.5	+14.2
19. Western India States Agency	+15	-10	+7	+ 0.5	+13

Sources: Census of India, 1931.

Between 1891 and 1921, the census figures show comparatively low growth rates of population. These are explained by famines and epidemics. Thus, the influnza epidemic of 1918 took such a heavy toll of lives, that over the decade 1911-1921 there was an absolute fall in the population in many areas. However, the growth rate of population between 1911 and 1918 was probably of the same order as that after 1921.

4. The high growth rates of population after the mid 1870s reflected themselves, but only slowly, in the land-man ratio trends. It appears that the area under cultivation kept pace with, or rose faster than, the increasing population between the 1870s and 1900; the decades 1901-1921 marked the turning point with the land-man ratio beginning to decline during this period; and there was a fairly dramatic decline in the land-man ratio after 1921.

Table 5 shows the index numbers of per capita cultivated area under all crops between the 1870s and 1900. According to the author who has computed these index numbers, Berar and Central provinces are the only regions with consistent data. 6/ These areas show a steady land-man ratio between the 1870s and 1900, barring a decline in Central Provinces between 1872 and 1881. On account of a change in the coverage of agricultural statistics, the first two time point estimates of land per capita in Bombay Presidency are understated. Bombay Presidency also, therefore, maintained a steady

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6/ McAlpin (1975). The ensuing comments are also based on McAlpin (1975) pp.54 & 56.

or mildy rising land-man ratio. The same was true of Madras. The Punjab, however, experienced a fairly substantial rise in the land per capita, the figure for 1901 being an underestimate.

Table 5: Trends in Land-Man ratio before 1900

	Index of cultivated acres per capita
Berar	
1867	100
1881	101
1891	93
1901	98
Bombay Presidency	
1872	100
1881	104
1891	115
1901	107
Central Provinces	
1872	100
1881	92
1891	94
1901	95
Madras Presidency	
1881	100
1891	102
1901	106
Punjab	
1868	100
1881	121
1891	127
1901	109

Source: McAlpin (1975) Table 3.

It is possible that at the all-India level the land-man ratio began to decline by 1900. (Table 6). An examination at the regional level, however, shows that the period 1901 to 1921 was a transitional one. The decline in the land-man ratio in the different regions began at different dates during this period (Table 7). In the Punjab

Table 6: Area of cultivated land per person dependent upon agriculture

Year	Acreage
1901-2	1.28
1911-12	1.24
1921	1.21

Source: Buchanan (1934) p.131.

and United Provinces, the decline may have started only by the early 1920s. Only in Bengal and Madras there was a continuous decline from 1891 onwards. In Bengal, it would be noticed, that the increase in population was accompanied by an absolute decline in the cultivated area. The decline in acreage in Bengal is normally attributed to a shift in the flow of the Ganga waters which rendered some lands in certain regions submarginal. (Blyn (1966) pp.138-140; Narain (1960)). The decline in the Bengal land-man ratio was, therefore, the combined effect of population growth and ecological changes. The land-man ratio fell quite sharply in all regions after 1921.

Table: 7

	Greater Bengal			United Provinces			Madras			Greater Punjab			Bombay-Sind			Central Provinces		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
1891-1901	0.47	-0.05	-0.33	0.17	1.63	1.40	0.72	0.49	0.45	0.70	0.00	0.36	-0.17	-0.59	-0.60	-0.89	-0.45	0.12
1896-1906	0.54	-0.58	-0.45	0.03	0.71	1.06	0.75	0.43	0.56	0.30	2.74	2.81	0.21	0.11	0.88	0.31	0.19	1.25
1901-1911	0.61	-0.01	0.05	-0.11	0.05	0.34	0.77	0.13	0.38	-0.09	2.98	2.88	0.59	0.64	1.03	1.51	0.53	0.85
1906-1916	0.61	0.19	0.03	-0.11	0.55	0.58	0.77	0.29	0.74	-0.09	1.08	0.94	0.59	0.51	0.52	1.51	0.40	0.39
1911-1921	0.05	-0.21	-0.42	-0.45	-0.16	-0.39	0.20	-0.16	0.06	0.37	-0.10	0.07	-0.32	0.14	-0.13	-0.19	-1.19	-0.57
1916-1926	0.25	-0.65	-0.61	0.25	0.21	0.18	0.42	-0.64	0.01	1.58	0.45	0.82	0.42	0.08	0.61	-0.25	0.25	0.62
1921-1931	0.86	-0.33	-0.23	0.65	-0.24	-0.05	0.97	-0.20	0.52	1.29	-0.03	0.17	1.26	0.57	0.85	1.09	0.86	0.52
1926-1936	0.93	0.13	-0.06	0.97	0.25	0.38	1.04	-0.09	-0.06	1.94	-0.08	-0.02	1.40	0.63	0.39	1.01	0.54	-0.07
1931-1941	1.00	-0.01	0.21	1.29	0.65	0.58	1.10	0.02	0.41	1.59	-0.14	0.13	1.55	0.29	0.52	0.93	0.40	-0.09
1936-1946	1.75	1.56	1.20	1.35	0.44	0.29	1.22	0.13	-0.01	1.58	1.82	1.47	1.58	0.75	-0.10	0.82	0.67	-0.07

A: Annual Growth rate of population
B: Annual Growth rate of area under Foodgrains
C: Annual Growth rate of Total area under cultivation

Source: Blyn (1966) Appendix 5 B.

5. The fall in the land-man ratio in turn reflected itself in a fall in the per capita output of foodgrains.[7] "The unfavourable disparity between population growth and foodgrain output commenced at different times for various regions. Upto 1911-12 in all regions except Greater Bengal, trend underlying the output series appears to slope upward about as much or more than the population series. In Madras and Bombay-Sind the disparity in trends started about mid-way during 1911-1921. In the United Provinces, Greater Punjab, and Central Provinces, the turning point was about 1921. In Greater Bengal, the disparity is observable almost from the outset, perhaps about 1901-02, and as a consequence, for British India as a whole, the 1911-12 period appears as the beginning of the disparate trends". (Blyn (1966) p.100). The time-lag between the fall in the land-man ratio and the fall in the percapita output of foodgrains would depend upon the values of certain parameters (such as the initial land-man ratio, the division of land between food and non-foodcrops etc.) at the turning point. Since, however, the time lag in the instance being discussed by us was quite short, we have not gone into specifying a relationship between the parameters and the time-lag.

7/ Ofcourse, the fall in per capita output of foodgrains was due in part also to the shift in acreage to cash crops in some regions. This apparently anamalous behaviour of shift to cash crops with per capita output of foodgrains declining is discussed in section 2.3. However, for now, we wish to point out that the significant fall in foodgrain output (Table 8) was due primarily to the decline in the land-man ratio, the shift in acreage to cash crops being large only in Madras after 1920.

Table 8 shows the fall in per capita output between the onset of the fall and 1941. The fall was considerable in all regions. The implications of this fall for the growth of the market of agricultural products are discussed in the next few sections. In view of our discussion above, and Table 8, we may expect the effects of the decline in the per capita output of foodgrains to begin showing themselves in the decade 1911-1921.

Table 8: Decline in per capita output of foodgrains between selected years, British India and Regions

Region	Years	Total Decline (Percent)	Decline per year (Percent)
British India	1911-1941	29	1.14
Greater Bengal	1901-1941	38	1.18
United Provinces	1921-1941	24	1.36
Madras	1916-1941	30	1.40
Greater Punjab	1921-1941	18	1.00
Bombay-Sind	1916-1941	26	1.21
Central Provinces	1921-1941	19	1.05

Source: Blyn (1966) Table 5.3 p.102.

2. The effect of population pressure on the commercialisation of Agriculture

1. There exists considerable evidence of a reasonably well developed market for agricultural products even before the period of the British rule. According to Irfan Habib: "Cash nexus appears as an established institution in the Delhi region as early as the beginning of the fourteenth century". (Habib (1969), 39). Similarly, Rajat and Ratna Ray say: "Cash crop cultivation, organised money markets and development of marts and internal trade had substantially modified the traditionally self-sufficient economy of the villages before the establishment of the British rule in Bengal". (Ray and Ray (1973), III). During the Mughal period, the growth of the market was due largely to the revenue of policy of the State. Thus, Habib says: "In Mughal India our evidence indicates quite plainly that collection of revenue in cash was far more prevalent than collection in kind throughout the Empire, although there were local exceptions, and also periods in certain regions where there may have been a shift from one mode to the other. Even when the revenue was collected in kind, the authorities did so not for purposes of consumption directly, or for storage, but for sale". (Habib (1969), 39). Habib further contends that "enormous sums" were employed as merchant capital and that long-distance trade existed in a significant way.

2. After the establishment of the British rule, both the external and internal markets for agricultural products grew. During the first half of the nineteenth century, the volume of India's exports quadrupled, and at the same time the composition of Indian exports changed strikingly, leading to the "almost entire transformation

of her exports into the category of primary commodities". (Chaudhuri (1971) pp.1 and 26.) In the second half of the nineteenth century there was a further spurt in agricultural exports. (Bhatia (1963)). Moreover, despite the existence of long distance trade in Mughal India, it was only the spread of a transport network, the lifting of internal trade barriers and the reform of weights and measures from the middle of the nineteenth century that effectively integrated the internal market towards the end of that century.[8/] The integration of the internal market showed itself in a sharp convergence of prices, across various regions, of food as well as non-food crops between 1860-1900.[9/] There was, besides, a movement towards specialisation in crop production during this period of price convergence.(See Gadgil (1971), Banaji (1977) and Bhatia (1963)).

As has been outlined in the previous section, population pressure began acting, according to the region, between 1900 and 1921. Thus when the population pressure began to operate, agriculture was by no means at an incipient stage of commercialisation: long-distance internal trade had at least a fifty year history behind it, and external trade of some magnitude had been going on for at least a century. (This is ofcourse, not to deny that a large part of the agricultural sector continued to bear a subsistence character.)

8/ Banerjee (1966), Habib (1962) himself says so. See Chapter II, Sec. I

9/ Mc. Alpin (1974). The convergence of prices has also been shown by Hurd (1975). We shall have occasion to comment on his findings.

3. Our purpose is to demonstrate that population pressure constrained the growth of the internal market in foodgrains, thereby setting a limit to the specialisation in crop production and possibly also causing some de-specialisation. Population pressure also reduced the export of foodgrains. The growth of trade in cash crops (external and internal) was conditioned by the availability of imported foodgrain since population pressure set limits to the expansion of area under cash crops in the absence of foodgrain imports.

Our central focus is around the internal foodgrain market. Metzer has identified four processes consistent with the evolution of an internal market: "(1) A gradual decline in the differences between regional prices of given commodities.....(2) A decline in the uniformity of production across regions, implying a rise in regional specialisation.....(3) A rise in the volume of inter-regionally marketed output, both absolutely and as a share of total output.....(4) A secular decline in the variance of the distribution of regional prices". (Metzer (1974) p.533). Conversely, therefore, if the trend is towards the disarticulation of the market, these four processes would be set in reverse. We begin with the more obvious volume of inter-regional trade.

2.1. Extent of interregional trade

1. The internal rail and river borne trade has been used as the index of interregional trade. These internal trade statistics were collected continuously from the 1880s to 1920-21, after which they were discontinued. The collection of the statistics was resumed in 1933-34. The figures on the volume of trade (See Table) before 1920-21 and after 1933-34 are not strictly comparable. The figures for the period before 1920-21 are estimates of inter-provincial

Table 9: Volume of interregional foodgrains trade (rail and river borne trade) in India, 1909-1945

	Volume of foodgrains trade (m. cwt.)	Volume of foodgrain output (m. tonnes)	Index of proportion of foodgrain output traded (average of 1909-10 to 1913-14 = 100)
1909-10	86.33	59.3	70.90
10-11	88.00	59.1	72.52
11-12	121.16	54.5	108.27
12-13	139.36	52.0	130.52
13-14	114.64	47.4	117.79
14-15	98.59	51.9	92.52
15-16	109.37	56.7	93.94
16-17	105.57	58.3	88.19
17-18	128.22	57.8	108.04
18-19	124.47	39.4	153.86
19-20	91.71	55.3	80.77
20-21	100.95	43.1	114.77
33-34	78.68	48.3	79.33
34-35	92.04	48.5	92.42
35-36	84.73	45.9	89.90
36-37	94.95	50.4	91.75
37-38	96.91	48.9	96.52
38-39	96.44	44.6	105.31
39-40	105.33	48.1	106.65
40-41	95.64	44.7	104.20
41-42	99.18	46.9	103.00
42-43	76.94	48.8	76.79
43-44	78.91	53.0	72.51
44-45	75.49	51.3	71.67

Sources: (1) India, Department of Statistics, "Inland Trade (Rail and River borne) of India", various issues.

(2) India, Department of Commercial Intelligence and Statistics: "Review of Trade in India", various issues

(3) Blyn (1966). Appendix Table 5C.

trade. The figures for the period after 1933-34 are estimates of trade between 22 blocks into which the country was divided. Since each province consisted of several blocks, the latter figures represent inter-provincial as well as intra-provincial trade. Thus the post 1933-34 figures are an over-estimate of inter-provincial trade or correspondingly the pre 1920-21 figures are an under estimate of inter-block trade. Whichever way one looks at it, the series in Table 9 underestimates the decline in the volume of inter-regional trade. Despite this underestimation, there is a fairly clear fall in both the absolute amount of foodgrains traded and in the proportion of foodgrains output traded between the two periods. A consistent series would have shown this fall more sharply.

Ofcourse, the trend decline in interregional trade is partly blurred by fluctuations in volumes traded, which (as will be shown below) are related to the fluctuations in the output of foodgrains. The decline will become clearer if we compare the volumes of trade for the same level of output in the two periods. Thus at the output level of 43.1 m. tonnes in 1920-21 the volume traded is 100.95 m. cwts, whereas at a higher output level of 44.7 m. tonnes in 1940-41 the volume traded is 95.64 m. cwts; at the output level of 51.[illegible] tonnes in 1914-15 the volume traded is 98.59 m. cwts, whereas at output levels of 53.0 and 51.3 m. tonnes in 1943-44 and 1944-45 the volumes traded are 78.91 and 75.49 respectively; at the output level of 47.4 m. tonnes in 1913-14, the volume traded is 114.[illegible] whereas at the output level of 48.5 m. tonnes in 1934-35 the volume traded is only 92.04 m. cwt. In each case the fall in the amount traded at the given level of output is fairly sharp. Such behaviour would be consistent with a falling per capita production

2. The trends in India's external foodgrain trade further show the concurrence of a fall in the per capita foodgrain output and a fall in the marketed output. Simultaneously with the decline in the per capita output and shrinkage in internal trade, India turned from a net exporter of foodgrains into a net importer. Table 10 shows that between 1909-10 and 1913-14 India exported an annual average of 2 m. tons of foodgrains. The annual average of net exports fell to less than a million tons in the next quinquenium. Thereafter, i.e. from 1920 to 1940, India was a net importer (except in a few years) of a fluctuating magnitude of foodgrains. The two foodgrains entering international trade were wheat and rice. The net exports of both rice and wheat declined sharply between 1910 and 1920, and while there was no consistent pattern for wheat thereafter, the net imports of rice rose secularly.

3. In contrast to the long-term trends (decline in per capita output, marketed surplus etc.) we have been considering, it would be useful for a while to shift focus to the short-run dynamic.[10/]

The short-term (i.e. year to year) relationship between foodgrain production and the extent of internal trade in the two periods sheds further light on the character of market involvement in the two periods. But first it would be useful to schematise the problem

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10/ For a distinction between long-term and short-term dynamic see Kula (1976).

Table 10: Net Imports (+) or net Exports (-) of foodgrains into India, excluding Burma (Thousand tons)

	All food-grains (1)	Wheat (2)	Rice (3)
Pre-War average (1909-10/1913-14)	-1967	-1381	-586
War average (1914-15/1918-19)	-884	-877	-7
1919-1920			
20-21	502	-324	824
21-22	1095	+269	826
22-23	-22	-269	247
23-24	-991	-707	-284
24-25	-1752	-1219	-533
25-26	304	-272	576
26-27	144	-220	364
27-28	1285	-317	1602
28-29	1094	+370	724
29-30	634	+268	366
30-31	963	-31	994
31-32	788	+28	760
32-33	1629	+2	1627
33-34	2306	-2	2308
34-35	1770	-20	1790
35-36	1232	-58	1290
36-37	455	-304	759
37-38	856	-527	1383
38-39	2036	-207	2243
39-40	893	+6	887

Source: Column (1) : Blyn (1966) Appendix Table No.5C.
Column(2) : Various issues of "Review of Trade in India".
Column (3) : Column (1) - Column (2), since trade in other foodgrains was negligible.

Foodgrains are grown in all regions of the country. However, some regions produce a surplus over their requirements whereas the other are deficit regions. A uniform (short-term) rise in the output[11] of foodgrains across all areas would have two effects: (1) the supply of foodgrains from the surplus regions would increase and (2) the demand for foodgrains from the deficit regions would decline. Since, one effect may be more pronounced than the other, let us consider them separately. Fig.1 depicts the first effect, wherein the increased output causes a rightward shift in the supply curve.

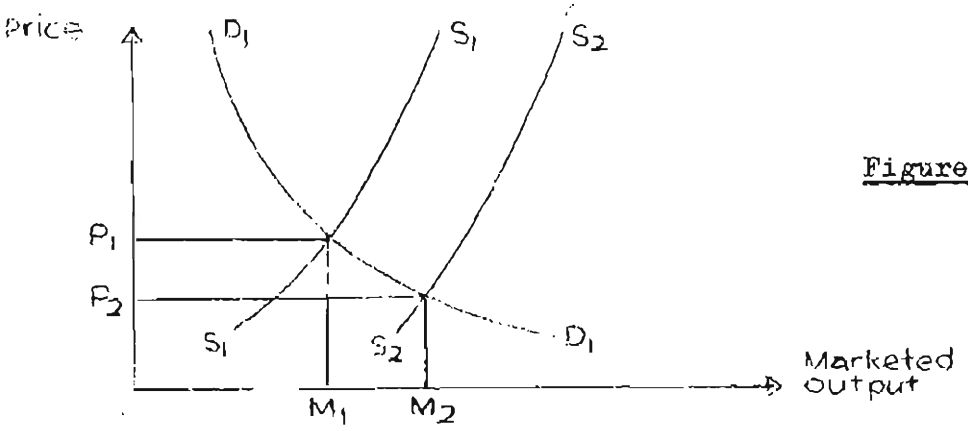


Figure 1

In such a situation the price of foodgrains falls and the output marketed rises. Where the other effect prevails (Fig.2), the demand curve shifts to the left in response to a rise in the output. As a

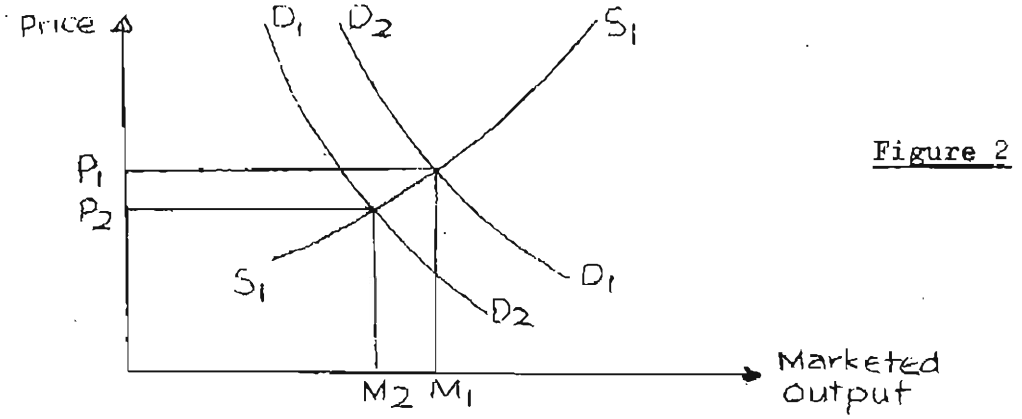


Figure 2

11/ There seems good ground for assuming uniformity of output fluctuations across regions. An analysis of Blyn's provincial foodgrain output figures shows that at least four out of the six provinces showed the same direction of change in 38 out 44 years between 1901-2 and 1944-45.

consequence, price falls and the marketed output declines. Thus, either way the price falls when output rises (i.e. output and price are inversely related), but when the supply effect prevails the marketed output rises (i.e. output and marketed supply are positively related) and when the demand effect is more predominant, the marketed output falls in response to a rise in production (i.e. output and marketed supply are inversely related).

We may now ask as to which effect is likely to predominate in two different situations: (1) the average per capita production is sufficiently above per capita consumption in the surplus states to enable them to accumulate stocks and/or the surplus over consumption even in bad years is sufficiently large; and (2) the differences between the percapita production and per capita consumption is narrow to an extent that stock accumulation becomes difficult and the surplus over consumption in bad years is small. Going by the logic outlined above, a fall in output would raise demand (shifting the demand curve to the right); but it would be possible for the surplus regions to respond to this increased demand only if they carried stocks or had a large surplus even in an year when production fell. If surplus margins were narrow and stocks low, a fall in the output would shift the supply curve significantly inward. No <u>a priori</u> judgement regarding the relationship between the directions of change of output and marketed supplies is possible in such a situation. However, if supply shifts sufficiently to swamp the demand curve shift, one would see an expost positive relationship between output and marketed supplies. If surpluses are large, and stocks exist, the output fall would not shift the supply curve significantly to the left and the demand effect would prevail, i.e. a fall

in output would be accompanied by a rise in the amount traded across regions. Our basic argument then is that when sufficient surpluses exist the supply curve will be relatively stable and the surplus regions would respond to demand. When demand falls (due to a rise in the output in the deficit regions) stocks would be accumulated in the surplus region (to prevent prices from falling too low) and when demand rises (due to a fall in the output) stocks would be accumulated. This would imply an inverse short-term relationship between marketed supplies and output as also a relative price stability. On the other hand when the surplus over consumption is small, the supply curve will shift significantly with output, the expost relationships between output and marketed supplies depending upon the extent of the supply curve shift. The shift in the supply curve will, besides, reinforce the directional change in price due to the demand curve shift, and hence increase price fluctuations.[12/]

It would be noted that we are postulating a change in the short-term dynamic as a consequence of long-term trends. Specifically, we are arguing that a long term decline in the marketable surplus, will change the short-term relationship between output and marketed supplies and also increase the amplitude of the short-term price changes.

Let us put this broad schematic to the test of facts. We showed above that the per capita production of foodgrains began to fall in all regions of the country (except Bengal) only during the decade 1911-1921 (in Bengal it started earlier). The period 1909-10 to 1920-21 corresponds to our characterisation of surplus regions possessing an appreciable (though, beginning to decline) marketable surpluses. During this

12/ This is the basis for Metzer's criterion (4).

period India was a net exporter of foodgrains (See Table 10). By the period 1933-34 to 1944-45, the fall in per capita production given fairly high rates of fall (see Table 8), had sufficiently eroded into the internal marketable surpluses (Table 9), and India turned into a net importer of foodgrains (Table 10).

The year to year directional changes of output and marketed supplies may be compared from Table 9. During the period 1909-10 to 1920-21 the output and marketed supplies move in the same direction in three of the eleven years and in the opposite direction in eight of the eleven years. The inverse relationship in eight of the eleven years indicates a relatively stable supply function. This implies existence of surpluses, which permit the accumulation of stocks. It is instructive to see this relationship at a more disaggregated level. Table 11 gives the output and marketed volumes for different foodgrains during 1909-10 to 1920-21. It may be seen that the inverse relationship between output and marketed supplies holds to a considerable extent for rice (seven of eleven years). On the other hand, the inverse relationship holds only in two of the eleven years for jowar/bajra, a positive relationship holding in nine years. The explanation, readily seen, is that jowar/bajra have more of a subsistence character than rice and hence the surpluses of jowar/bajra for the market are small both in absolute and proportionate terms. The supply functions of jowar/bajra, therefore, are more closely tied to their output and hence reflect the volatility of the output (the supply function shifts being, in fact, more than sufficient to counter the demand function shifts). Wheat exhibits a stronger inverse relationship than jowar/bajra (six of eleven years) but a weaker one than rice. Why wheat should show a weaker inverse relationship than rice is not clear, since the proportion of wheat marketed is higher than the proportion of rice marketed.

Table 11 Inter-regional trade of major cereals, 1909-1921

	Jowar/Bajra			Wheat			Rice		
	Volume of Trade (M.cwt) (1)	Volume of output (M.tons) (2)	(1)/(2)x100	Volume of trade (M.cwt) (3)	Volume of trade (M.tons) (4)	(3)/(4)x100	Volume of Trade (M.cwt) (5)	Volume of output (M.tons) (6)	(5)/(6)x100
1909-10	4.80	7.93	3.03	29.8	8.48	17.57	28.7	31.5	4.56
10-11	3.54	7.14	2.48	34.0	8.68	19.58	27.1	32.1	4.22
11-12	8.41	5.72	7.35	36.4	8.46	21.51	33.1	28.6	5.79
12-13	8.48	7.24	5.86	47.7	8.16	29.23	37.1	26.5	7.00
13-14	5.89	5.54	4.50	37.7	7.15	26.36	35.4	25.6	6.91
14.15	9.30	8.30	5.60	26.3	8.50	15.47	35.5	24.3	7.30
15-16	11.41	9.07	6.29	24.9	7.34	16.96	39.4	29.4	6.72
16-17	8.31	7.92	5.24	29.2	8.40	17.38	33.4	30.3	5.51
17-18	4.90	6.55	3.74	40.0	8.28	24.15	36.0	31.0	5.80
18-19	3.57	4.76	3.75	25.1	6.47	19.40	49.7	20.3	12.24
19-20	5.63	7.79	3.61	14.1	6.61	10.67	43.5	27.9	7.80
20-21	6.12	5.60	5.46	25.7	5.67	22.66	35.8	23.3	7.68

Sources: (1) India, Department of Statistics, "Inland Trade (Rail and Riverborne) of India", various issues

(2) Blyn(1966).

Coming to 1933-34 to 1944-45, we see that inverse relationship has almost completely disappeared. In nine of the eleven years the output and marketed supplies move in sympathy, and only in two years do they move in the opposite direction. This indicates that the supply curve now shifts as the output changes, the shift in the supply curve being sharp enough to nullify the effect of the shift in the demand curve. Thus, as was predicted by our simple model, accompanying a long-term decline in the marketable surplus is a change over from a stable supply function to a supply function that shifts in sympathy with the output. While we do not have a breakdown for different crops for this period, rice and wheat have obviously moved towards the jowar-bajra pattern of the previous period.

4. So much for the relationship between output and marketed supplies. Our model also predicted an increased fluctuation in prices as the level of marketed surplus shrinks. In other words, the element of local price determination becomes more pronounced: local short-falls in output and the consequent rise in prices are now less affected by movement of foodgrains since the ability to respond to prices is less. Hence the amplitude of price fluctuations in different regions should rise*. To test this, we have chosen seven districts from different geographical regions and studied the fluctuations of wheat prices over time in these districts. The period covered is 1897 to 1933. This period has been divided into three sub-periods (1897-1905, 1911-1921, & 1922-1933) since the price trends were different in these sub-periods.

* This should not be interpreted to mean that the ability to respond to prices is eliminated. In fact, movement of grains in response to price rise did take place (as will be shown below) but not sufficiently to prevent the amplitude of fluctuations from rising.

Table 12: Trend in Wheat Price Fluctuations

		Trend line	R^2	Coefficient of variation
1. Cuttack				
1897-1905	1.1	188.5-9.41t	0.694	0.1137
1911-1921	1.2	86.3+22.69t	0.819	0.1419
1922-1933	1.3	306.2-12.95t	0.643	0.1495
2. Muzzafarpur				
	2.1	133.2-3.03t	0.162	0.1512
	2.2	99.1+ 14.97t	0.780	0.1253
	2.3	269.7-11.70t	0.648	0.1546
3. Ludhiana				
	3.1	193.4-6.65t	0.318	0.1557
	3.2	146.1+23.85t	0.852	0.1042
	3.3	350.7-14.13t	0.425	0.2187
4. Jubbulpore				
	4.1	184.3-5.65t	0.317	0.1365
	4.2	126.7+20.27t	0.841	0.1114
	4.3	316.2-12.24t	0.493	0.1819
5. Saharanpore				
	5.1	158.7-4.50t	0.255	0.1462
	5.2	120.7+19.54t	0.870	0.0997
	5.3	300.8-12.50t	0.496	0.1926
6. Nasik				
	6.1	163.2-6.62t	0.386	0.1651
	6.2	68.8+19.89t	0.789	0.1725
	6.3	281.4-13.64t	0.789	0.1257
7. Karachi				
	7.1	158.0-4.33t	0.452	0.1013
	7.2	119.7+16.13t	0.867	0.0913
	7.3	276.0-11.48t	0.579	0.1677

Source: Based on retail prices of wheat from various issues of statistical abstract of British India.

Trend lines have been fitted for the three periods and the coefficient of variation of the fluctuations around the trend computed. It will be noted (Table 12) that in all districts, except Nasik, the coefficient of variation is, considerably higher for the period after 1921 than for the earlier two sub-periods. (We have not gone into why the fluctuations fell in Nasik, but it may be worth pointing out that Nasik had the highest fluctuations in the earlier periods). The broad conclusion then holds that the price fluctuations increased after 1921, i.e. after the per capita fall in foodgrains production became generalised.

To recapitulate this section briefly then; accompanying the fall in per capita production of foodgrains was a decline in the volume of foodgrains marketed, a gradual movement away from the short-term inverse relationship between foodgrain output and marketed supplies to a positive relationship between these two variables, and an increase in the amplitude of foodgrain price fluctuations.

2.2. The spatial dispersion of prices

The rising amplitude of fluctuations of foodgrains prices was, we argued, the consequence of a trend decline in the volume of marketed supplies and the resultant growth in importance of local supply and demand conditions in price determination. A further manifestation of the increasing role of local supply and demand conditions in determining price would be a growth in the divergence of price across regions.* It was pointed out above that during the second half of the nineteenth century the prices across space

* Metzer's criterion (1).

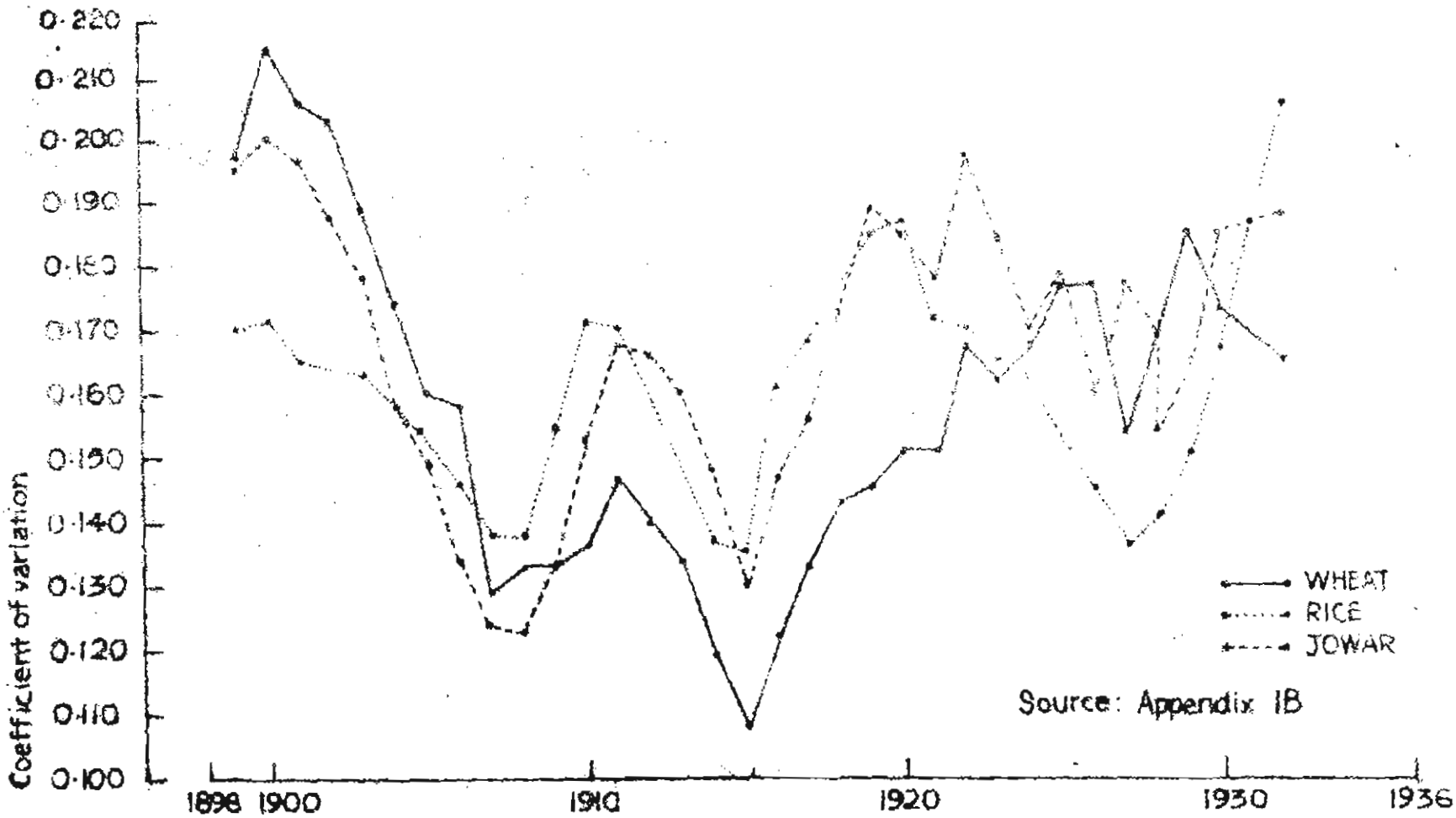
converged with the creation of a transport network and the removal of certain artificial barriers to trade. We consider the subsequent period, i.e. 1897-1933, during which the population pressure began to act.

Chart 1 shows the five year moving averages of the coefficient of variation of the prices of a crop across several districts. The crops considered are the major foodgrains, rice, wheat, jowar, and bajra. The districts are chosen so as to give representation to the different geographical regions of British India, excluding Burma. It would be seen from Chart 1 that there is first a trend decline in the co-efficient of variation of prices, indicating a continuation of the nineteenth century trends towards the convergence of prices and the integration of the internal market. The trend, however gets reversed and the divergence of prices across space begins to increase. This is most clearly seen for wheat prices which converge upto 1915 and diverge thereafter. It is interesting and, indeed, understandable that wheat should display the reversal in trend most clearly. The proportion of wheat output traded interregionally was considerably higher than the proportion marketed of other crops (Table 11). Wheat was, therefore a more commercialised crop than the other foodgrains. And, the process of decommercialisation would quite naturally show itself most forcefully in a relatively commercialised crop rather than crops that bear largely a subsistence character.[13/] However, this is not to imply that the coefficient of variation of the prices of other crops did not

13/ In addition, as we shall discuss below, in contrast to rice, there was no augmentation of wheat supplies in the country through net imports.

CHART [redacted]

OF FOODGRAIN PRICES ACROSS DISTRICTS



Note: Bajra was left out at the last moment in the interest of clarity. The bajra curve follows closely the jowar curve, except in the [illegible] for rabi when the figures rise more sharply.

rise. Whilst the trend is punctuated by an occasional fall in the co-efficient of variation, the fall being sharp for jowar and bajra between 1925 and 1929 and for rice between 1921 and 1929, the uptrened is fairly clear from the rising peaks of the co-efficient of variation. However, before going into the reasons for the occasional decline in the co-efficient of variations, we look into the behaviour of wheat prices more closely.

If the absolute prices of wheat in several districts across the country are plotted at different time points, one notices several interesting things. During 1897 and 1910, the prices move in a narrow band, the direction of the year to year movements of prices in different districts coincide and the fluctuations in prices are low. Between 1910 and 1920, the band within which the prices move becomes wider but the other two characteristics of the earlier period remain unchanged. Between 1921 and 1933, however, the price band continues to widen, the amplitude of fluctuations increases and, perhaps, most significant from the point of view of showing that the internal market is getting disrupted, in a number of years the prices in different districts change in the opposite direction.[14/]

To return, then, to the reasons for the occasional fall in the co-efficient of variation. It would now be more proper to look at the actual year to year changes in the co-efficient of variation rather than moving averages. Our starting point must once more be the simple framework outlined in the previous section. We showed that when sufficient surpluses exist, so that stocks can be accumulated marketed supplies are, in the short-term, inversely related to output

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14/ The graphs showing this have not been included. The conclusions are based on the analysis of retail wheat prices, obtained from various issues of the Statistical Abstract of British India.

on the other hand, when surpluses decline over time, there is a gradual shift to a positive short-ter, relationship between marketed supplies and output. Now, in the former case, a fall in output would increase market supplies and hence reduce the spatial disparity in prices, i.e. output and the co-efficient of variation of prices would be positively related. In the latter case, a rise in output would elicit an increase in marketed output and hence cause a reduction in the disparity of prices, i.e. output and the co-efficient of variation of prices would be inversely related.

For testing whether these relationships hold, we have plotted the time series of foodgrain availability (i.e. domestic production plus net imports) against the co-efficient of variation of jowar prices. Jowar was chosen for no special reason. It was found that the curves of wheat, jowar, bajra and rice (the last only upto 1920-21)[15] move in close sympathy. This is as should be expected, given the fact the foodgrains are close substitutes, so that the prices of different foodgrains and hence their co-efficients of variation should be closely aligned.

We note from Chart 2 that the expected positive relationship between foodgrain availability and co-efficient of variation of foodgrain prices exists in ten of the twelve years between 1897 and 1910. Between 1910 and 1921, there exists a positive relationship in eight of the eleven years. However, after 1921, i.e. after the per capita availability of foodgrains starts declining continously in all regions, in nine of the twelve years between 1921 and 1933 the foodgrain availability and coefficient of variation of foodgrain price show the expected (in the changed circumstances) inverse relation-

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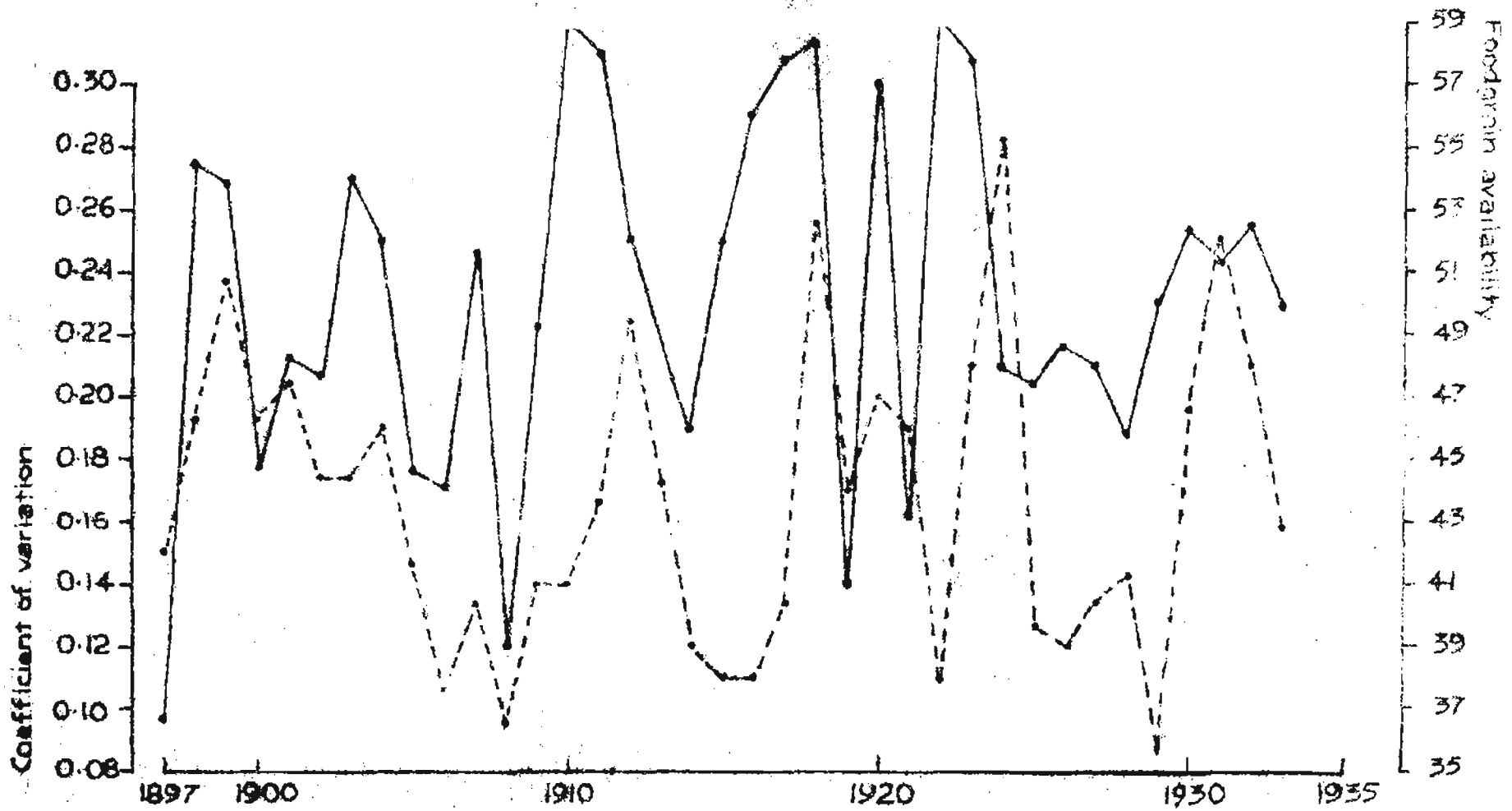
15/ The reasons for the different behaviour of rice after 1920-21 are discussed below.

CHART 2 FOODGRAIN AVAILABILITY AND COEFFICIENT OF VARIATION OF FOODGRAIN PRICES



Foodgrain Availability (m.tons) ----- Coefficient of variation of jowar prices

SOURCES: Appendix table 1A and Blyn(1966): Appendix table 5C

NOTE: Coefficient of variation of 1916 is plotted against availability of 1915-16 and so on

ship. This further strengthens the belief that long-term changes in per capita availability of foodgrains and marketed surpluses cause a shift in the short-term dynamic. The discussion in this section on the short-term relationship between availability and co-efficient of variation reinforces the earlier discussion on output and marketed supplies relationship.

Now we are in position to put forward a possible explanation for the significant fall in the co-efficient of variation of prices of jowar and bajra and the perceptible, though less sharp, fall in the co-efficient of variation of wheat prices between 1924 and 1929. Between 1924-25 and 1929-30 foodgrain availability rose by about five million tons (Table 13).. We observed just above that between 1921 and 1933 there existed an inverse relationship between foodgrain availability and the co-efficient of variation of prices. The increased availability of foodgrains between 1924 and 1929 had the effect, therefore, of reducing the co-efficient of variation. The subsequent decline in foodgrain availability (i.e. after 1929-30) once more raised the level of the co-efficient of variation.

The decline in the co-efficient of variation of rice from th early to the late 1920s, however, cannot be explained by the same logic. Here we have, in fact, no clear explanation. The answer is linked probably to the fact that India became a net importer of rice from around 1920 (See Table 10), being a net exporter prior to that. Since most of the imported rice came from Burma, the prices in the ports and in their hinterlands possibly got linked to Burma prices, and hence the element of local price

Table 13: British India, Output and Availability of Foodgrains

	Foodgrain output	Gross Foodgrain availability
	(million tons)	
1921-22	55.8	56.9
1922-23	55.8	55.7
1923-24	49.0	48.0
1924-25	49.2	47.6
1925-26	48.2	48.5
1926-27	47.9	48.1
1927-28	45.2	45.6
1928-29	49.1	50.4
1929-30	51.4	52.5
1930-31	51.0	51.6
1931-32	51.4	52.4
1932-33	49.0	49.8
1933-34	48.3	40.0
1934-35	48.5	50.8
1935-36	45.9	47.6
1936-37	50.4	51.7
1937-38	48.9	49.3
1938-39	44.6	45.4
1939-40	48.1	50.1
1940-41	44.7	45.6
1941-42	46.9	47.2

Sources: Flyn (1966) Appendix Table N. 5C

determination which operated in the case of the other crops, would have had less force in the case of rice. This would also explain why the annual fluctuations of the co-efficient of variation of rice prices did not move in sympathy with the co-efficient of variation of prices of other crops after 1920-21.

We may now briefly summarise the evidence presented in this section. We showed that there was a trend increase in the coefficient of variation of foodgrain prices from around 1915. The evidence for this was clearest in the case of wheat, which being the most commercialised of the foodgrains would be expected to show up the process of decommercialisation sharply. In the case of the other crops, though a rising trend was discernible we noticed some dips, the reasons for which we tried to outline.16/

16/ We had mentioned above that McAlpin (1974) shows that prices of foodgrains converged between 1860 and 1900. Khan (1978) has also shown the convergence of foodgrain prices upto 1910. Only Hurd (1975) concludes that foodgrain prices converged upto 1921. However, even Hurd's figures show a movement towards the uptrend of the coefficient of variation of wheat and rice prices after 1915. See Hurd (1975), charts 3 and 4. Since Hurd has covered the period 1861-1921, he has chosen to focus on the sharp convergence of prices, rather than the divergence in the last six years of his study.

2.3 The effect on crop specialisation and changes in the cropping pattern

1. Accompanying the trend decline in the volume of interregional foodgrains trade, the rising amplitude of price fluctuations and the increasing dispersion of prices across space, one would expect a decline in the extent of regional specialisation. Decreasing regional specialisation in crop production would be reflected in a growing uniformity in the cropping pattern across regions.

2. Tables 14, 15, 16 and 17 give the spatial distribution of rice, wheat, jowar and bajra areas. One does notice in the case of rice and bajra (Tables 14 and 17) a decreasing spatial concentration of the areas of these crops between the 1890s and the 1930s. In the case of wheat (Table 15) there is a tendency towards the concentration of area in the Greater Punjab till the early twenties after which the pattern stabilizes. The distribution of jowar area remains constant till 1915; between 1916 and 1920 there is a slight increase in Bombay-Sind share of jowar area (this being a movement towards increasing area concentration); but thereafter again the distribution remains unchanged. The evidence then suggests a decreasing concentration of rice and bajra areas, and a stationary distribution of wheat and jowar areas after the early 1920s.

3. While the evidence presented is suggestive of decreasing specialisation in some crops and arrested specialisation in the others, it needs to be interpreted very carefully. First, the movement towards greater uniformity in the distribution of rice and bajra area begins towards the end of the nineteenth century. This

Table 14: Spatial Distribution of Rice, 1891-1940: Proportion of rice area in different Provinces

	Greater Bengal	Madras	United Provinces	Assam	Central Provinces	Bombay
1891-1895	57.8	13.7	11.8	4.9	6.9	3.5
1896-1900	58.1	14.4	9.9	5.7	7.1	3.7
1901-1905	56.4	15.2	10.3	5.9	6.5	3.7
1906-1910	55.4	15.7	9.9	6.2	6.3	4.3
1911-1915	55.0	16.1	9.2	6.6	7.4	4.4
1916-1920	53.3	16.5	10.1	6.5	7.5	4.4
1921-1925	53.0	16.3	10.4	6.6	7.6	4.5
1926-1930	51.4	16.8	10.6	6.7	8.2	4.7
1931-1935	51.8	17.0	9.4	7.1	8.4	5.0
1936-1940	50.0	16.8	10.5	7.7	8.8	4.7

Source: Computed from Blyn (1966), Appendix 3A.

was before a general decline in the land-man ratio started (See section 1) and so it is not perhaps right to link it up with population pressure However, certain areas had begun to feel, by the 1890s, the population pressure, and this is probably true of Bengal. But, and this brings us to the second point, the population pressure and hence the declining concentration of rice in Bengal were due not just to rising numbers of human beings but also due to an absolute decline in the area under cultivation (See section 1, Table 7).

Table 15: Spatial Distribution Wheat, 1891-1945: Proportion of Wheat area in different provinces

(percent)

	Greater Punjab	United Provinces	Bombay Sind	Central Provinces
1891-1895	33.4	28.3	11.0	20.8
1895-1900	39.2	31.7	8.6	12.4
1901-1905	38.8	32.0	8.2	14.2
1906-1910	43.0	27.9	8.3	14.3
1911-1915	42.5	29.2	7.9	14.3
1916-1920	42.7	29.0	8.3	14.3
1921-1925	44.3	29.7	7.6	13.1
1926-1930	43.1	29.5	8.2	13.6
1931-1935	40.0	30.1	10.8	13.6
1936-1940	41.0	30.5	11.1	12.4

Computed from Blyn (1966), Appendix 3A.

Table 16: Spatial distribution of jowar, 1891-1940: Proportion of jowar area in different provinces

(Percent)

	Bombay Sind	Madras	Central Provinces	United Provinces
1891-1895	37.9	25.9	17.3	5.4
1896-1900	35.0	25.2	21.1	10.7
1901-1905	35.1	25.6	21.9	11.2
1906-1910	33.3	24.7	21.6	12.2
1911-1915	35.6	26.3	20.8	10.6
1916-1920	39.5	24.1	20.4	10.3
1921-1925	39.9	23.3	20.2	10.7
1926-1930	39.7	22.7	20.4	11.3
1931-1935	39.2	22.9	20.5	11.6
1936-1940	40.6	22.8	20.9	10.3

Computed from Blyn (1966), Appendix 3A.

Finally, bajra shifted from Madras and Bombay-Sind to United Provinces and Greater Punjab. However, at least partly, this shift was due to a displacement of bajra area in Madras and Bombay-Sind by groundnut from roughly the beginning of this century. In as much as the motive for displacing bajra by groundnut did not stem from a pressure of population, the increasing uniformity of bajra area cannot be attributed completely to population pressure.

4. In order then to understand what effect the population pressure had on the cropping pattern and specialisation it would be useful, as an alternative, to look at the changes in the regional division of area between foodgrains and non-foodgrains. It seems worthwhile studying this division since in large parts of the country foodgrains were grown largely for home consumption, and in such parts the proportion of area under foodgrains is likely to increase as population pressure increases. However, areas where foodgrains are grown as cash crops (i.e. for sale) and areas having access to international trade would not necessarily show a shift to foodgrains. This is elaborated below.

Table 17: Spatial distribution of Bajra, 1891-1940: Proportion of bajra area in different provinces

(Percent)

	Madras	Bombay Sind	United Provinces	Greater Punjab
1891-1895	28.9	45.8	7.6	15.1
1896-1900	27.2	41.3	14.7	14.8
1901-1905	27.7	41.1	16.1	13.5
1906-1910	24.1	39.9	16.0	18.6
1911-1915	23.5	39.4	17.9	16.6
1916-1920	24.3	34.0	19.5	20.3
1921-1925	22.2	37.2	15.8	23.0
1926-1930	23.1	39.4	15.1	23.7
1931-1933	20.3	36.4	16.3	25.6
1936-1940	20.8	35.5	17.2	24.7

Computed from Blyn (1966), Appendix 3A.

5. Table 18 shows the proportion of area under non-foodgrains for the different provinces between 1891 and 1940. It should be noted that 1891-1895 is a good base period for comparison since the previous decade, 1881-1891, had been relatively free of natural calamities; the 1891-1895 cropping pattern would then reflect the division of area between food and non-foodgrains under stable conditions. Between 1896 and 1900 there were severe famines, and this shows itself in a fall in the proportion of area under non-foodgrains in all provinces except Punjab. The proportion of area under non-foodgrains recovers in the next quinquennium, the effect of the famines being only temporary. Thereafter the provinces follow different courses.

6. We find three different patterns emerging in broadly three identifiable regions, although there is an overlap in the case of Bengal. The same process operates in the Central Provinces, Greater Bengal and U.P., but since Central Provinces is a very clear example of the process, it has been treated separately. The provinces are, therefore, divided into four groups: (1) Central Provinces; (2) Greater Punjab; (3) United Provinces and Greater Bengal; and (4) Madras, Bombay-Sind and Greater Bengal. Ofcourse, Bombay-Sind was not a homogenous area, and Sind bore more of the characteristics of Punjab than of Bombay. However, a large part of the statistics clubs Bombay and Sind. Where possible we shall treat Punjab and Sind together.

(1) Central Provinces: Central Provinces had by far the highest proportion of area under non-foodgrains in 1891-95. Between 1891-95 and 1911-15 the proportion of area under non-foodgrains in this

Table 18: Proportion of area under non-food grains

	Greater Bengal	U.P.	Madras	Greater Punjab	Bombay Sind	Central Provinces
1891-1895	15.12	18.59	15.53	11.24	17.78	27.89
1896-1900	13.96	16.46	14.27	13.24	16.27	26.30
1901-1905	14.44	18.25	15.17	14.29	20.39	31.11
1906-1910	15.12	19.15	15.73	13.10	21.44	31.40
1911-1915	14.35	19.65	17.92	13.30	21.76	33.04
1916-1920	13.57	18.92	19.01	13.43	20.04	30.24
1921-1925	12.80	18.14	20.56	14.14	22.22	32.70
1926-1930	14.64	19.07	23.76	15.41	23.65	30.95
1931-1935	12.38	19.56	23.33	15.57	22.89	28.60
1936-1940	12.93	19.55	26.10	17.58	24.30	27.34

Source: Blyn (1966) Appendix Table 4C.

province increased fairly sharply from an already high level; there was no trend during the following decade; and from the mid 1920s the proportion of area under non-foodgrains declined considerably to attain once more its 1891-95 level by 1936-40. The pre-1920 shift of area from foodgrains to non-foodgrains was largely the consequence of an expansion of area under cotton in response to "a strong foreign demand". (Bagchi (1972) p. 102). The shift was made possible by the availability of foodgrains from other parts of the country. (Whitcombe (1971) p.15) After the early 1920s, with the growth of population pressure, the supplies from the other provinces would have declined (as discussed above) and the per capita production of foodgrains in Central Provinces also fell (See Section 1). Consistent with the declining per capita availability of foodgrains due to population pressure, we see a shift in area, from the early 1920s, from non-foodgrains to foodgrains.

A district wise, comparison between 1916-20 to 1938-42 shows a decline in the foodgrain area proportion in only two districts of Central Provinces and Berar (See Appendix 2).

2. Greater Punjab

In the Punjab, the per capita production of foodgrains started falling by 1921 (See Section 1). Despite this the proportion of area under non-food crops increased after 1920 (Table 18). However also around 1921, exports of wheat from India, and hence from the Punjab fell sharply (Table 13); and at the same time the extent of supplies from the Punjab (a surplus area) to the other parts of the country declined (as is implied in sections 2.1 and 2.2). As such, the per capita availability of foodgrains in the Punjab probably

did not decline or even increased. The export surplus (both internal and external) was, therefore, a reserve which was drawn upon when per capita production of foodgrains started falling. In view of this, foodgrain area was not a constraint (or at least less so than in other regions of the country) and farmers were relatively free to grow high valued non-food crops.

It would be noted that before 1920, the proportion of areas under foodgrains shows no trend in the Punjab. In the period before 1920, population pressure was certainly not acting as a constraint to the shift in area to non-foodcrops. The constancy in the proportion of area under non-foodgrains till 1920 is a reflection of the fact that, in certain areas of the Punjab, the commercial cultivation of wheat was more attractive than the cultivation of non-foodgrains. This is suggestive of an intra-provincial specialisation in crop production, which in turn is consistent with the growth of the internal market (reflected in the convergence of prices across space till the second decade of this century).

Since the evidence suggests the existence of intra-provincial specialisation, one would expect that the all province increase in the ratio of area under non-foodgrains after 1920 does not imply a uniform increase in this ratio in districts of the province. Table 19 shows the change in the proportion of area under foodgrains between 1916-20 and 1938-42 in the districts of the Punjab. It will be seen that the districts showing the strong tendency to increasing concentration of non-foodgrain area were districts which had a high (low) proportion of area under non-foodgrains (foodgrains) even in the base period. The districts with predominantly foodgrain area (80-100% show a much weaker tendency to an increase in area under cash crops*.

* A similar exercise for Sind gives similar results.

Table 19: Change in the proportion of area under foodgrains in the districts of Punjab between 1916-20 and 1938-42

(Increase in the proportion of area under foodgrains (+); decrease (-))

Proportion of area (%) under foodgrains in the base period (1916-20)	No. of districts showing a change in the relevant range				
	-10% and more	-4.5% to -9.9%	-1% to -4.4%	-1% to +1% (Neg)	+1% to +10%
50 - 60	3	0	0	0	0
60 - 70	1	4	0	0	0
70 - 80	1	4	3	1	1
80 - 90	0	2	2	1	0
90 - 100	0	1	1	1	0

Source: Appendix 2.

We have pointed out that with the growth of the internal market, till the second decade of this century, specialisation in crop production took place. The 1916-20 division of area between foodgrains and non-foodgrains in the various districts, therefore, reflects the comparative advantage of the districts. We further showed that the significant increases in area under non-foodgrains between 1916-20 and 1938-42 took place largely in districts that had a high concentration of non-foodgrains even in the base period. The large measure of changes in the cropping pattern was therefore, a movement towards greater specialisation within the province.

In brief, Punjab did not feel the population pressure, or felt it to a significantly smaller extent than other provinces. This permitted the increase in the proportion of area under non-foodgrains for the province as a whole. The cropping pattern changes at the district level furthered intra-provincial specialisation.

(3) Greater Bengal* and United Provinces

The per capita production of foodgrains began to fall in Bengal by the turn of this century (See Section 1). This, it will be remembered, was due to both a rise in the population and a fall in the area cultivated. Consistent with a fall in the per capita output of foodgrains we notice a decline in the proportion of area under non foodgrains between 1906-1910 and 1918-22. Thereafter, despite the population pressure, the division of area between foodgrains and non-foodgrains remains constant (barring an increase in the non-foodgrains area during the boom period, 1923-30). The constant division at the province level after 1918-22, however, hides a diverse, but systematic, pattern for the districts of Greater Bengal. This

* Greater Bengal includes Bengal, Bihar and Orissa.

pattern, and its relationship to population pressure we shall examine in this section.

In the United Provinces we see no trend in the proportion of area under non-foodgrains. From 1891-95 the proportion rises upto 1911-15; during the following decade it declines; and then it rises once more till 1940. The amplitude of the rise and fall after 1900 is, however, only 1.5%. What is of interest to us, is the pattern at the district level after 1920, i.e. after the per capita food production started declining.

To understand the changes in the cropping pattern in both Bengal and U.P. after 1920, it should first of all be noted that the major foodgrains in these provinces (rice in Bengal and wheat in U.P.) were grown not just for home consumption, but also for sale. A significant part of the foodgrain (rice or wheat) sold was probably carried long-distance to other parts of the country. Like other commercial crops, wheat and rice were grown to meet the cash requirements (rent, tax assessment, debt-repayment, etc.) of the cultivators.[17] With the growth of population pressure, the extent of wheat and rice marketed declined, and hence these two major foodgrains became less commercialised over time.

Population pressure would act differently on areas of foodgrain and non-foodgrain concentrations. Areas of low foodgrain concentration and depending on outside foodgrain supplies would receive reduced supplies of foodgrain; this would induce a shift in these areas to foodgrain cultivation at the expense of non-foodgrain c

17/ See, for instance, Whitcombe (1971). She points that wheat "had long been a crop sold off at harvest by the bulk of the cultivators to meet their changes, amongst which "rent" and "debt" were frequently indistinguishable". (p.15). See Bhaduri (1976) for a similar role played by rice in the Bengal-Bihar region.

cultivation. (We saw such a shift in the Central Provinces). Areas of high foodgrain concentration would, under population pressure, progressively reduce the marketed supply. At the micro-level this would imply reduced marketing of foodgrains from individual cultivators, which in turn would imply reduced cash receipts from the sale of foodgrains to the cultivators. To the extent there are minimum cash requirements, non foodgrain substitutes for meeting cash requirements will be looked for. These substitutes would probably be found in the cash crops, which have a higher value per unit of land, than foodgrains have, and which are being displaced from low foodgrain concentration areas under population pressure. (The implicit assumption here is that areas which grow foodgrains predominantly have a comparative advantage in foodgrains before population pressure starts acting. They are able to grow cash crops competitively for the market (to meet their cash needs) only when these cash crops are displaced from the regions having a comparative advantage in them). [There clearly would, however, be a limit to the displacement of foodgrains by non-foodgrains in high foodgrain concentration areas.]

According to the reasoning of the previous paragraph, we expect that districts with predominantly non-foodgrain cultivation should shift to foodgrains and districts with predominantly foodgrain cultivation should shift to non-foodgrains, or show no change. This is borne out by the evidence in considerable measure. Tables 20 and 21 show the changes in the proportion of area under foodgrains between 1916-20 and 1938-42 in Greater Bengal and United Provinces respectively. In Bengal, 84% (21/25) of the predominantly foodgrain districts (85-100% of the area under foodgrains), show negligible change or a shift to

Table 20: Change in proportion of area under foodgrains in the districts of Greater Bengal between 1916-20 and 1938-42

(increase in the proportion of area under foodgrains (+); decrease (-)).

Proportion of area (%) under foodgrains in the base period (1916-20)	No. of districts showing a change in the relevant range				
	-5% and more	-1% to -5%	-1% to +1% (Neg).	+1% to +5%	+5% and more
50 - 70	1	1	0	2	1
70 - 85	2	2	3	10	0
85- 100	0	9	12	4	0

Source: Appendix 2

non-foodgrains. The opposite movement towards an increase in foodgrain concentration is seen in only 16% (4/25) of the districts. In contrast, in the districts relatively more oriented towards non-foodgrains (50-70% and 70-85% of the area under foodgrains), 51% (13/22) of the districts shift increasingly to foodgrains, whereas only 27% (6/22) of the districts move to a greater concentration of non-foodgrains. In U.P., the shift in the foodgrain concentration areas (90-100% of the area under foodgrains) to non-foodgrains is very sharp: reflected as it is in 76% (16/21) of the districts of this group. Only one of the twenty-one districts in the group increases the proportion of its cultivated area under foodgrains. In the districts relatively more oriented to non-foodgrains (70-80% and 80-90% of the area under foodgrains), 45% (10/22) of the districts show an increase in the proportion of area under foodgrains. Contrary to our hypothesis, however, a significant fraction, 41% (9/22), of such districts show an increase in the concentration of area under non-foodgrains. The two districts with the greatest non-foodgrain concentration (65-70% of the area under foodgrains) also act contrary to our hypothesis, showing a further movement away from foodgrains. Notwithstanding the exceptions pointed out, a significant proportion of the districts (67% in U.P. and [illegible]% in Greater Bengal) show a movement in their foodgrain -- non-foodgrain area division in the predicted direction.

We had argued above that the period prior to 1920 had witnessed the growth of the internal market, and hence the 1916-20 cropping pattern would reflect the comparative advantage of different districts.

Table 21: Change in the proportion of area under foodgrains in the districts of the United Provinces between 1916-20 and 1938-42

(Increase in the proportion of area under foodgrains (+); decrease (-)).

Proportion of area (%) under foodgrains in the base period (1916-20)	No. of districts showing a change in the relevant range		
	-1% to -5%	-1% to +1% (Neg.)	+1% to 5%
65 - 70	2	0	0
70 - 80	2	1	3
80 - 90	7	2	7
90 - 100	16	4	1

Source: Appendix 2

The shift in the foodgrain areas towards non-foodgrains and the opposite shift in the non-foodgrain areas towards foodgrains implies an increasing uniformity of cropping pattern and hence reduced specialisation in Greater Bengal and U.P. This may be contrasted with the Punjab where the increase in area under non-foodgrains was sharpest in districts which had an already high proportion of area under non-foodgrains.

It will be further noted that Central Provinces also falls into the Bengal, U.P., pattern in as much as the districts in Central Provinces had relatively low proportion of their area under foodgrains in the base period, and showed a uniform shift to foodgrains.

4. Madras, Bombay-Sind and Bengal

Madras showed no trend in the proportion of area under non-foodgrains between 1891-95 and 1906-10. While the per capita output of foodgrains had not started falling in this period, the land man ratio had begun to show a decline so that there was a constraint to the rise of the proportion of area allocated to foodgrains. After 1910, however, the proportion of area under foodgrains declined steadily and sharply, and this was inspite of an increasing population pressure. There was no systematic district-wise pattern in Madras (See Appendix 2).

Bombay experienced a rise in the proportion of area under non-foodgrains right through the period under study. Upto 1920, Bombay did not experience any significant population pressure. However, the increase in the proportion of area under non-foodgrains subsequent to 1920, by when the population pressure had begun to operate, needs

explanation. Like Madras, Bombay showed no systematic district-wise pattern. (See Appendix 2).

In addition, as we showed above, the proportion of area under non-foodgrains remained the same in Bengal after 1918, except the spurt during period of economic boom during 1923-30, despite the continuing fall in per capita foodgrains output.

The common element linking Bengal, Bombay and Madras is the absence of a fall in the proportion of area under non-foodgrains (with Bombay and Madras actually experiencing a rise) during a period when these areas were experiencing an increasing population pressure. For Bengal, we have already pointed out that the constancy in foodgrain-non-foodgrain area division was partly due to opposite movements among districts. Further, India became a net importer of foodgrains sometime after 1915. That the presidencies displaying the common behaviour were the hinterlands of the three major ports, besides Karachi, is suggestive. The available evidence indicates that Bengal and Bombay became net importers of foodgrains around 1920. (See Table 22). While we do not have the necessary figures for Madras Presidency, the fact that Karachi continued to be a net exporter of foodgrains during the 1920s and the 1930s, and that total net imports of British India were higher in most years than the imports of Bombay and Bengal suggests that Madras Presidency was also a net importer of foodgrains in the 1920s. It appears, therefore, that the expansion of area under cash crops at the expense of foodgrain area in Bombay and Madras, and a stable proportion of area under foodgrains in Bengal were made possible by the import of foodgrains that supplemented local production and hence increased availability.

Table 22: Foodgrains sea trade of British India (excluding Burma) and the provinces with foreign countries

(Thousand tons: Net imports (+); Net exports (-))

	British India	Bengal	Bombay (excluding Sind)
1901-02	-178	-279	
02-03	-1343	-508	
03-04	-1978	-707	
04-05	-2803	-1048	
05-06	-1266	-680	
06-07	-622	24	
07-08	-598	278	
08-09	632	353	
09-10	-707	-301	-19
10-11	-1493	-676	-21
11-12	-2933	-1197	-191
12-13	-3279	-655	-310
13-14	-1425	21	-174
14-15	-140	496	56
15-16	-710	533	23
16-17	-629	464	-41
17-18	-2394	27	-361
18-19	-545	-38	142
19-20	1760	419	627
20-21	502	200	446
21-22	1095	72	385
22-23	-22	-337	232
23-24	-991	-584	135
24-25	-1752	-551	142
25-26	304	32	142
26-27	144	- 22	
27-28	389	265	
28-29	1285	839	
29-30	1094	221	
30-31	634	82	
31-32	963	265	
32-33	788	31	
33-34	1629	404	
34-35	2306	919	
35-36	1770	267	
36-37	1232	-137	
37-38	455	-43	
38-39	856	191	
39-40	2036	627	
40-41	893	298	

Sources: Blyn (1966) Appendix Tables 5C & 5D and "Annual Statement of Sea-borne Foreign Trade", various issues.

The increase in the relative importance of the area under cash crops in Bombay and Madras was largely the result of a rapid expansion in the area under groundnut. The drive for this expansion was the growing export market for groundnut. (Narain (1965) p.69). Thus in effect, Bombay and Madras exported groundnut and imported foodgrains. The growing exchange, in turn, reflects a growth in specialisation of production. However, what should be noted is that in a situation of population pressure, these provinces were able to take advantage of a growing export market and hence specialise because of the possibilities of foodgrain imports.

Why, it may be asked, did Bengal not show a rise in the proportion of area under cash crops although foodgrain imports were available to it. The reason lies with the nature of the export market of jute (Bengal's principal cash crop). Indian exports of groundnut formed only a small share in the international trade of groundnuts, and hence the supply of groundnuts from India could be increased without significantly affecting the price of groundnut (i.e. India faced an elastic demand curve). However, in the case of Jute India held practically a monopoly position in the world market. Thus supplies could not be increased indefinitely without lowering price and causing a fall in the revenue, unless there occurred a demand shift. It will be noted that a demand shift during the period of world trade boom, 1923-1930, did increase the proportion of area under cash crops in Bengal.

7. We set out to examine whether the growth in population pressure, and the resultant contraction of the internal market for foodgrains, reduced specialisation in crop production. The distribution of foodgrains area across provinces gave some evidence of despecialisation or arrested specialisation in the production of foodgrains. However, this evidence we noted, must be interpreted with caution. In order to gain more insight into the specialisation/despecialisation process, we then looked into the foodgrain-non-foodgrain area division. We found three patterns: (1) In the Central Provinces, Greater Bengal and United Provinces, we found that districts with a low proportion of area under foodgrains when the population pressure began operating had a tendency to shift to foodgrain cultivation as the pressure increased. However, the districts in these provinces with a high concentration of foodgrain areas in the initial period showed either no change or a tendency to shift to non-foodgrain cultivation. The net consequence of the population pressure was, therefore, a movement towards uniformity in the division of area between foodgrains and non-foodgrains, and hence reduced specialisation. (2) In the Punjab we argued that despite a fall in per capita output of foodgrains per capita availability probably did not fall. The growing population was then not (or at least less so than in the other states) a constraint on the expansion of non-foodgrain area at the expense of foodgrain area. The absence of the population pressure (or its presence in a muted form) was accompanied by a growth in specialisation in crop production (3) In Madras, Bombay-Sind and Bengal, the availability of imported foodgrains reduced the pressure on foodgrain availability. However, the shift to cash crops took place only in Madras and Bombay-Sind since these regions possessed in cash crop which had an elastic world demand, while Bengal

Summary and Conclusions

1. We were concerned in this paper principally with the impact of population pressure on the growth of the internal foodgrain market.

2. Where necessary for our main theme, we also considered the influence of other variables on the commercialisation of agriculture. These were possibilities of foreign trade and the cash needs of cultivators.

3. Shifts in the industrial structure away from agriculture have historically been closely associated with the growth of agricultural commercialisation. However, we could abstract from its effects since the period studied by us (1890-1940) was remarkable in that the industrial distribution of the work force remained unchanged.

4. We postulated that significant parts of the country were owner-cultivated. In these areas demographic pressure would increase the subsistence orientation of farming through sub-division of landholdings. Even in areas where landlord forms prevailed, we hypothesised that rents did not increase sufficiently to offset the decline in marketed output due to sub-division.

5. The decline in land-man ratio and per capita output of foodgrains (with land productivity failing to respond) set in during the decade 1911-1921.

6. Agriculture was at least partially commercialised when population pressure began to operate. Besides the export trade in agricultural commodities, the internal market had grown significantly with the spread of the railways and the removal of artificial barriers to trade. Population pressure had its most visible impact on the

internal market. The disintegrative effect of the population pressure on the internal market was manifested in:

(a) a fall in the volume and proportion of foodgrains traded interregionally;

(b) a gradual shift from the short-term inverse relationship between marketed supplies and fodgrain output (and hence a positive relationship between the coefficient of variation of foodgrain prices and foodgrain availability) to a positive relationship between marketed supplies and foodgrain output (and hence an inverse relationship between the coefficient of variation of foodgrain prices and foodgrain availability). The shift occured since marketable surpluses were gradually declining and hence the stock carrying capacity was declining; as a consequence the marketed supplies became more closely tied to the output and began to reflect output variations.

(c) an increasing amplitude of foodgrain prices;

(d) an increasing spatial dispersion of foodgrain prices.

Thus we found that despite the existence of a large transport network (the major necessary condition for the growth of the internal market) there was a disarticulation of the internal market with the growth of population pressure. Smith has pointed out that even in Japan, improvement of commercial organisation and transportation were important to the development of markets, but did not "assure a surplus". The "steady improvement in farming methods, with the resulting increase in crop yields" was crucial to the production of "a consistent surplus". (Smith (1959) pp.157-158.

It should be noted that the internal market disarticulation we talk of nothing to do with the arguments of the dependency theorists.(See Alavi (1975) and Amin (1974).

7. We also looked into the effects population pressure and the consequent disarticulation of the internal market on specialisation in crop production. Greater Bengal, U.P. and the Central Provinces showed strong evidence of an association between population pressure and despecialisation of crop production. In contrast, we found that the Punjab, which was relatively free of population pressure, moved towards increased specialisation. However, Madras and Bombay were able to increase specialisation despite population pressure on the basis of foreign trade.[18]

8. It follows then that there was a sharp break around 1921. The fall in per capita output had an important impact on the internal market as well as cropping patterns. These, in turn, would have their long-run implications. The declining surplus after 1921 would also have (as Dandekar and Bagchi have suggested) resulted in dissaving and disinvestment. A complete understanding of the post 1921 period would, therefore, also require analysis of the accumulation process.

9. There appears to have been a historical precedent to the process discussed in this paper. Europe in the 12th and 13th centuries also experienced the "pressure of an increasing peasant population on scarce resources, the consequent fragmentation of holdings, exhaution of the soil and impoverishment of small holders". The population pressure

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18/ Panikar et al (1974) show that Kerala also has been able to specialise through import of foodgrains and export of cash crops.

checked a "dynamic and market oriented economy", making it "more self-sufficient, less market oriented".19/

10. And, finally, a word about the use of British India statistics. Considerable doubt is often expressed regarding their validity, and many might indeed wonder why the legitimacy of their use was not discussed earlier. Our justification for not having done so is simple. We tested some a priori posulates against figures. These figures were of a very diverse nature: production, area, prices, trade etc. That they fit into a more or less coherent pattern is reason enough to accept these figures, at least as good approximations. Serious distortions in all the figures would require "wholesale falsification of statistics over long periods" through "co-operation among too many unconnected people". (Desai (1979) p.444).

19/ This description is based on the work of M.M. Postan (especially "The Medieval Economy and Society", London, 1972) to which I have not had access. The above quotations are from Hilton (1976, p. 28) where Postan's thesis is summarised.

APPENDIX I

IA: COEFFICIENT OF VARIATION OF FOODGRAIN PRICES ACROSS DISTRICTS

	Rice	Wheat	Jowar	Bajra
1897	0.1308	0.1398	0.1509	0.1826
98	0.1944	0.2176	0.1930	0.1492
99	0.2034	0.1944	0.2377	0.1572
1900	0.1911	0.2150	0.1919	0.1919
01	0.1313	0.2315	0.2041	0.1866
02	0.1328	0.2184	0.1744	0.1592
03	0.1675	0.1680	0.1749	0.1367
04	0.1975	0.1803	0.1895	0.1710
05	0.1858	0.1458	0.1468	0.1495
06	0.1052	0.1595	0.1066	0.0735
07	0.1056	0.1460	0.1334	0.1274
08	0.1375	0.0925	0.0947	0.0973
09	0.1556	0.1036	0.1398	0.1482
1910	0.1864	0.1633	0.1399	0.154C
11	0.1921	0.1605	0.1676	0.182C
12	0.1825	0.1597	0.2236	0.1852
13	0.1346	0.1129	0.1723	0.142S
14	0.1165	0.1032	0.1210	0.120S
15	0.1145	0.1120	0.1109	0.1104
16	0.1387	0.1055	0.1114	0.127C
17	0.1742	0.1053	0.1336	0.1381
18	0.2618	0.1815	0.2569	0.252C
19	0.1516	0.1603	0.1691	0.139[illegible]
1920	0.1552	0.1632	0.1984	0.151[illegible]
21	0.1833	0.1145	0.1876	0.160[illegible]
22	0.1835	0.1357	0.1148	0.153[illegible]
23	0.1862	0.1829	0.2083	0.257[illegible]
24	0.1409	0.2357	0.2822	0.257[illegible]
25	0.1286	0.1419	0.1274	0.162[illegible]
26	0.1292	0.1358	0.1195	0.107[illegible]
27	0.1410	0.1909	0.1326	0.145[illegible]
28	0.1385	0.1820	0.1419	0.149[illegible]
29	0.1684	0.1186	0.0865	0.128[illegible]
1930	0.1795	0.2156	0.2161	0.234[illegible]
31	0.2094	0.2176	0.2499	0.286[illegible]
32	0.2398	0.1294	0.2286	0.272[illegible]
33	0.2323	0.1412	0.1589	0.193[illegible]

Source: Statistical Abstract of British India, various issues.

IB: COEFFICIENT OF VARIATION OF FOODGRAIN PRICES - FIVE YEAR MOVING AVERAGES

	Rice	Wheat	Jowar	Bajra
1899	0.1702	0.1966	0.1955	0.1735
1900	0.1706	0.2154	0.2002	0.1688
01	0.1652	0.2055	0.1966	0.1663
02	0.1640	0.2026	0.1870	0.1691
03	0.1630	0.1888	0.1779	0.1606
04	0.1578	0.1744	0.1584	0.1380
05	0.1523	0.1599	0.1502	0.1316
06	0.1463	0.1579	0.1342	0.1237
07	0.1379	0.1294	0.1242	0.1192
08	0.1380	0.1329	0.1229	0.1201
09	0.1554	0.1331	0.1351	0.1418
1910	0.1708	0.1359	0.1531	0.1533
11	0.1702	0.1469	0.1686	0.1625
12	0.1624	0.1399	0.1649	0.1570
13	0.1480	0.1341	0.1591	0.1482
14	0.1373	0.1187	0.1478	0.1372
15	0.1357	0.1078	0.1299	0.1279
16	0.1611	0.1215	0.1468	0.1497
17	0.1682	0.1329	0.1564	0.1533
18	0.1763	0.1432	0.1739	0.1615
19	0.1852	0.1450	0.1891	0.1681
1920	0.1871	0.1509	0.1853	0.1713
21	0.1719	0.1512	0.1756	0.1723
22	0.1698	0.1663	0.1983	0.1959
23	0.1645	0.1620	0.1840	0.1981
24	0.1539	0.1663	0.1705	0.1875
25	0.1452	0.1774	0.1769	0.1858
26	0.1356	0.1773	0.1607	0.1644
27	0.1411	0.1535	0.1216	0.1386
28	0.1513	0.1686	0.1393	0.1531
29	0.1673	0.1849	0.1654	0.1890
1930	0.1871	0.1726	0.1846	0.2143
31	0.2059	0.1645	0.1880	0.2231

APPENDIX 2

Proportion of Area under foodgrains in British India districts, 1916/20 and 1938/42

(Percentage)

BENGAL

Districts	1916/20	1938/42
1. Dacca	67.9	64.4
2. Faridpur	75.0	78.2
3. Backerganj	85.6	85.9
4. Maimensingh	55.9	69.9
5. Tippera	77.0	79.0
6. Naokhali	84.4	83.0
7. Chittagang	93.0	92.6
8. Chittagang Hill tracts	72.2	50.9
9. Jessore	83.7	84.0
10. Murshidabad	87.3	84.5
11. Malda	83.4	83.6
12. Dinajpur	85.0	79.1
13. Rajshahi	84.7	80.4
14. Rangpur	65.2	59.5
15. Bogra	82.5	82.1
16. Pabra	70.3	78.3
17. Jalpaiguri	63.5	68.0
18. Darjeeling	55.0	60.1
19. Burdwan	90.2	92.8
20. Bankura	91.7	92.5
21. Birbhum	94.7	95.3
22. Midnapur	93.9	96.9

Districts	1916/20	1938/42
23. Hoogly	74.4	82.7
24. Howrah	81.9	89.2
25. Khulra	84.5	91.3
26. Nadia	80.4	84.2

MADRAS

1. Ganjam	88.9	84.6
2. Vizagapatnam	803.	74.5
3. Godawari	78.9	83.0
4. Kistna	82.2	75.0
5. Guntur	69.5	62.5
6. Nellore	88.8	87.7
7. Karnul	72.5	67.8
8. Bellary	70.5	62.0
9. Anantpur	73.1	69.6
10. Cuddapah	70.5	72.8
11. Tinnevelly	65.8	58.2
12. Nilgiris	29.1	--
13. Malabar	56.4	50.9
14. South Canara	86.3	83.9
15. Chittoor	83.3	73.3
16. North Arcot	77.5	65.9
17. Chingleput	86.4	86.6
18. South Arcot	69.5	67.2
19. Salem	86.5	78.3
20. Coimbatore	77.5	66.9

	1916/20	1938/42
21. Trichinapally	81.5	77.3
22. Tanjore	87.0	89.6
23. Madura	75.7	69.7
24. Ramnad	70.5	68.9

BOMBAY

1. Ahmadabad	53.2	59.6
2. Kaira	65.0	59.4
3. Panch Mahals	71.0	
4. Broach	37.7	
5. Surat	35.9	34.8
6. West Khandesh	58.5	62.8
7. East Khandesh	48.5	47.8
8. Nasik	82.2	76.1
9. Ahmadnagar	85.4	82.1
10. Poona	84.3	82.9
11. Sholapur	80.2	80.2
12. Satara	70.4	64.1
13. Belgaum	71.8	68.1
14. Bijapur	70.3	71.4
15. Dharwar	59.9	58.3
16 Tonna	69.6	65.3
17. Kolaba	89.3	85.9
18. Ratnagiri	82.2	80.4
19. Kanara	67.3	68.6

SIND

Districts	1916/20	1938/42
1. Karachi	81.3	80.6
2. Hyderabad	77.5	64.6
3. Sukkur	92.3	91.0
4. Larkana	87.2	88.4
5. Upper Sind Frontier	89.7	87.0
6. Thar and Parkar	82.5	64.9
7. Nawabshah	70.1	63.6

AGRA

1. Dehradun	75.8	1 .7
2. Saharanpur	75.9	70.7
3. Muzzafarnagar	69.2	60.9
4. Meerut	70.0	65.8
5. Bulandshahar	74.3	77.9
6. Aligarh	77.7	81.9
7. Muttra	75.4	74.9
8. Agra	83.6	86.0
9. Farikhabad	84.1	83.8
10. Mainpuri	84.1	88.7
11. Etawah	85.3	87.5
12. Etah	84.2	86.8
13. Barcli	85.7	80.4
14. Bijnor	77.0	73.9
15. Budaun	87.6	89.7

Districts	1916/20	1938/42
16. Moradabad	83.0	80.8
17. Shahjahanpur	86.6	84.8
18. Pilbit	86.6	80.2
19. Caunpore	88.9	89.4
20. Fatchpur	88.6	89.7
21. Banda	91.0	92.3
22. Hamirpur	84.6	82.2
23. Allahabad	92.4	91.0
24. Jhansi	81.8	80.0
25. Jalam	88.4	90.2
26. Benaras	86.5	82.7
27. Mirzapur	90.3	86.5
28. Jaunpur	89.9	87.5
29. Ghazipur	92.6	88.3
30. Ballia	93.0	91.6
31. Gorakhpur	90.0	85.8
32. Basti	93.0	92.7
33. Azamgarh	91.0	89.7
34. Garwal	98.1	--
35. Nainital	76.5	81.9
OUDH		
1. Lucknow	90.7	89.2
2. Umao	90.9	89.4
3. Rai-Bareili	94.0	93.9
4. Sitapur	92.6	88.2
5. Hardoi	91.3	88.5

Districts	1961/20	1938/42
6. Kheri	91.6	84.1
7. Faizabad	89.5	89.9
8. Gonda	93.8	92.0
9. Bahraich	94.6	93.1
10. Sultanpur	92.8	90.6
11. Partabgarhi	92.6	91.0
12. Barabanki	90.9	90.3

CENTRAL PROVINCES

1. Saugor	79.5	78.3
2. Damoh	86.6	--
3. Jubbalpore	86.2	86.8
4. Mandla	84.1	85.8
5. Hoshangabad	75.7	74.9
6. Nimar	46.7	52.8
7. Betul	80.9	84.9
8. Chindwara	76.2	82.2
9. Wardha	50.8	56.3
10. Nagpur	64.1	70.8
11. Channa	76.3	79.4
12. Bhandara	90.1	90.0
13. Balaghat	89.0	88.4
14. Durg	90.7	88.6
15. Raipur	88.9	89.4
16. Bilaspur	88.7	90.8

BERAR

Districts	1916/20	1938/40
1. Akola	50.1	53.7
2. Amraoti	45.8	49.5
3. Buldana	52.3	56.1
4. Yeatmal	55.5	56.0

PUNJAB

1. Rohtak	82.5	75.0
2. Gurgaon	81.2	80.1
3. Karnail	76.0	71.1
4. Ambala	71.1	66.3
5. Kangra	91.1	91.0
6. Hoshiarpur	75.9	75.3
7. Jalandhar	63.1	58.2
8. Ferozepur	78.7	68.9
9. Ludhiana	73.9	63.8
10. Multan	61.3	51.2
11. Jhang	69.8	60.0
12. Lyallpur	58.5	48.2
13. Montgomery	57.1	45.4
14. Lahore	59.0	48.2
15. Amritsar	60.8	55.8
16. Gurdaspur	72.9	70.7
17. Sialkat	77.2	75.5
18. Gujrat	80.3	71.8
19. Gujranwala	74.6	70.2
20. Shahpur	66.1	61.6

Districts	1916/20	1938/42
21. Jhelum	89.0	89.0
22. Rawalpindi	91.1	89.7
23. Attock	89.5	87.3
24. Mianwali	90.5	82.0
25. Dera Ghazikhan	77.9	83.7
26. Muzaffargarh	74.5	70.0

BIHAR & ORISSA

1. Patna	92.0	91.4
2. Gaya	91.4	90.6
3. Shahabad	88.0	87.8
4. Sarbhanga	81.3	76.9
5. Muzzafarpur	80.1	82.1
6. Saran	78.3	80.0
7. Champaran	86.3	87.3
8. Monghyr	88.7	87.8
9. Bhagalpur	87.4	81.5
10. Purnea	72.9	67.0
11. Santhal Parganas	88.0	88.7
12. Cuttack (Orissa)	89.3	90.5
13. Balasore (Orissa)	92.1	97.8
14. Singhbhun	91.7	89.4
15. Puri (Orissa)	88.5	87.0
16. Sambhalpur (Orissa)	91.0	92.0
17. Hazaribagh	87.5	87.2
18. Ranchi	88.5	86.6
19. Palaman	83.3	84.8
20. Manbhun	91.8	84.2

Source: Agricultural Statistics of British India.

Note: There is no entry against some districts for one of the time periods. This is so since individual years showed a large fluctuation, and

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