A Preliminary Exploration of the Differential Effect of the Green Revolution in Punjab And in Sindh

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Punjab and Sindh accounted for 57 and 28% respectively of the cultivated area of (West) Pakistan 1 (in 1971/2) and 68 and 23% respectively of the irrigated area 2 (in 1970/1). In consequence discussions of the agriculture of Pakistan frequently concentrate on Punjab and the assumption is made that the addition of data from Sindh would not alter the picture very substantially. It is this assumption which is examined in this essay.

Sindh and Punjab constitut contiguous parts of the alluvial plain of the Indus and the greater part of the output of crops is raised by means of artificial irrigation, though valuable and reliable amounts of rain fall on the narrow sub-montane belt in the north of Punjab. 3

According to the statement of the province of Punjab to the Indus Waters Committee 1971 Punjab has an annual recharge of groundwater of 20.5 M.A.F. whereas according to the agent for Sindh this figure shoud have been 50 M A.F. while he put annual recharge in Sindh at O.IM.A.F.·Actual pumpage claimed by Punjab

1) Derived from Yearbook of Agricultural Statistics, 1973-4 Table 2.
2) Derived from Yearbook of Agricultural statistics 1973-4 Table3.
3) 35" p.a., declining to 20" at Lahore (25 miles from the hills) and to an unreliable and torrential precipitation of under 10" in the southern part of Punjab and 8" at Karachi. SPATE, O.H.K.' A.T.A. LERMONTH and FARMER-India, Pakistan and Ceylon; The Regions. Methuen, 3rd. edn. 1967 p 519 and p.508.

was 15 M.A.F., whereas the agent for Sindh estimated pumpage in Punjab at 54.46 M.A.F. and pumpage from goverment tubewelln in Sindh as o.1M.A.F., the amount from private tubewells being considered negligible. 1 An accurate picture is difficult to construct in this context of claim and couter-claim for the parties present data which are not strictly comparable and there is the added complication that the greater salinity of the soils of Sindh necessitates limiting exploitation to groundwater of a lower salinity than appropriate in Punjab. Never the less it is clear that Punjab is substantially better endowed with usable groundwater than Sindh. According of official statistics Punjab had 89,539 tubewells in 1970-71 while Sindh had only 4,071, 2 and 5.44m. acres were irrigated by tubewells in Punjab as against only O IOm. acres in Sindh. 1 Evidently this difference is to be attributed to a difference in narural endowments rather than to any difference in government policy towards Punjab and Sindh or to any difference of instit-utional framework. The geometric rate of increase in numbers of tubewells in Punjab contrasts sharply with the very low rate of advance in Sindh; (see graph). If it can be assumed that the distribution of government tubewells reflects the distribution of ground-water then it seems that the sinking of private wells has also been primarily a response to the availability of the resource. In the table below 2 private tubewells by division as a percentage of private tubewells in Pakistan show nearly the same order as public tubewells as a percentage of total public tubewells.

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1) INDUS WATERS COMMITTEE: INDEPENDENT REPORT ON THE APPORTIONMENT OF THE INDUS BASIN WATERS by S.K.Balock, 1971

2) PAKISTAN. MINISTRY OF FOOD AND AGRICULTURE, WING (PLANNING UNIT) ISLAMABAD, YEARBOOK OF AGRICULTURAL STATISTICS 1973-4 Table; Number of Tubewells in Pakistan;

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1) YEARBOOK OF AGRICULTURAL STATISTICS 1973-4 op. cit. Table; Area Irrigated by Different Sources.

2) Derived from Agricultural Census Organisation, Ministry of Agriculture and Works. FARM MECHANISATION IN WEST PAKISTAN. A REPORT, 1969, Table 33 p.55

DIVISION	PERCENTAGE OF GOVERNMENT TUBEWELLS, 1968	PERCENTAGE OF PRIVATE TUBEWELLS 1968
West Pakistan	100.0	100.0
Lahore	40.1	33.5
Multan	19.9	35.1
Sargodha	19.1	14.1
Rawalpindi	10.9	3.1
Khairpur	4.8	1.7
Bahawalpur	2.2	5.4
Hyderabad	0.3	0.5
Karachi	0.2	1.2

The availability of an electric power supply has not been decisive in determinining whether or not to instal tubewells for al though diesel whels are less profitable than electric, they still allow a substantial profit margin. 1

The total supplies of irrigation water, including canal water, are given in the table below2 for Punjab (first five columns), and Sindh (last column), per cropped acre for 1965.

REGION	APPROX.ACREFEETAVAILABLEPER CROPPEDACRE1965
BARI DOAB	2.0
SUTLEJ-PANJNAD L.B.	2.2
RECHNA DOAB	2.3
CHAJ DOAB	1.8
THAL & INDUS R.B	2.7
LOWER INDUS (SINDH)	2.9

Notes; L.B Left Bank R.B. Right Bank

1) MOHAMMED. Ghulam Tubewells and Cropping Patterns, PAKISTAN DEVELOPMENT REVIEW, Spring 1965.

2) LIEFTINCK, Pieter, A.Robert SADOVE and Thomas C.CREYKE WATER AND POWER RESOURCES OF WEST PAKISTAN. Vol. I Pubd for world. Bank as Administrator of the Indus Basin Development Fund by John Hopkins Press, Baltimore 1968, p 24

In the same year 10% of the cultivated acreage of Punjab was under fallow while a more than compensating 13% was under multiple cropping, whereas in Sindh 40% of the cultivated acreage was under fallow and only 10% under multiple cropping.3) Taken together these two sets of figures clearly indicate that the availability of water has been a much more severe constraint on production in Sindh than in Punjab, though it is generally acknowledged that even in Punjab taken as a whole, and for holdings in Punjab taken individually except for some tubewell irrigated holdings, water is the binding constraint on production. Whereas net sown area in Punjab has been gradually creeping up, net sown area in Sindh failed to rise in spite of a marked increase in cultivated arer after 1968-9. (see graph). In Sindh, furthermore. thirty three years after the opening of the Sukkur Barrage Command design annual cropping intensities had been achieved on a [feeder canal basis only on the Khairpur feeders 2 owing to a failure to supply the designed deltas: 3 The area which is multiple cropped has not shown the same tendency to increase in Sindh as in Punjab. (see graph). The greater availadility of sweet groundwater in Punjab not only permits of more multiple cropping and hence a better seasonal distribution of employment, but also more timely sowing and an enhanced pattern of distribution of the available water supply over a growing season promoting higher yields than would otherwise have been possible and a movement into a higher-risk higher-profit crop e.g. sugar cane, or variety e.g. Mexipak. Thus a three year average acreage of 6.23 million was under

3) Percentages derived by present writer from Tgures for 1964/5 table: Land Utilisation in Pakistan, YEARBOOK OF AGRICULTURAL STATISTICS 1971/2

1) FINNEY, C.E. FARM POWER IN WEST PAKISTAN,(mimeo)1972
2) LOWER INDUS REPORT One. The Present Situation p 101 et seq.
3) In spite of kharif intensities generally above design, permitted by overloading the canals, annual intensities failed to reach design-owing to below design rabi intensities. The one-in-five-year-mini mum discharges fell below design in February and March, militating against the achievement of the expected rabi intensities. LOWER INDUS REPORT, Part One, The present Situation p.50

Mexipak in Punjab In 1971-2-1973-4 and only 1.33m. in Sindh. The fact that over 1970/1-1973/4 yields of both Mexipak and other wheats tended to be higher in Sindh than Punjab and that the proportion of wheat area sown to Mexipak was consistently higher in Sindh suggests that the entrepreneurs of Sindh were held back not by any unwillingness to innovate but by a shortage of water. 1 The difference between the three year averags acreages of sugar cane for 1971/2-1973/4 and 1953/4-1955/6 was 413,000 for Punjab and 179,000 for Sindh, representing again a much bigger percentage increase for Sindh. 2

After the forties production of food grains in both Sindh and Punjab showed an upward trend to be attributed to an rising trend in acreage which later flattened out at the end of the sixties in Sindh and at the turn of the decade in Punjab, subsequently declining somewhat. The upward trend in production showed an accelerated rate of growth in the second half of the sixties in both provinces. The upturn in production in the late sixties in Pakistan is generally attributed primarily to tubewell development but this cannot have been the explanation in Sindh, though progress with replacement works after the Indus Weters Treaty may have made some contribution. The end of the sixties marked a levelling off of production in Punjab (with an upturn possibly beginning at the end of the data period.) The levelling off was associated with a slight decline in the areaunder food grains in Punjab. The levelling off of the area under food gvaing in Sindh in the late sixties did not prevent production from continuing to rise, but when area declined into the seventies production flattened out. 1

The principal food grains included in the above discussion are wheat, rice, bajra (millet) and jowar (sorghum). Production of the last two remained stable, not surprisingly as neither is a high

1) Derived from YEARBOOK OF AGLICULTURAL STATISTICS 1973/4 Table; Area and Production of Mexican Wheat.

2) Deriveb from YEARBOOK OF AGRICULTURAL STATISTICS 1971/2 and 1973/4 Table Sugar cane.

1) See graph: Area and Production of Food Grains

fertiliser-or water-response crop, nor has either been the subject of output price controls. Both provinces experienced an upward trend in the area under wheat from the early fifties which declined over the last few years of the data period. The trend of production similarly rose gradually from the early fifties in both cases, became marked from the mid-sixties but flattened out from the turn of the decade, with a possible upturn indicated in the last year of the data period. In addition to acreage increases an important source of production increases was improving yields. After a decline in the early years yields trended upwards in Punjab from the early fifties and upturned sharply from the midsixties. In Sindh over most of the period yields were lower than in Punjab, trending gradually upwards to the late fifties, then gradually downwards to the early sixties, (possibly in response to water shortage), then registered a steep rise which began three years earlier than in Punjab so that yields were higher than those of Punjab during the seventies. 1)

I have been unable to obtain data of acreage under Mexipak by province for the sixties but would attribute the remarkable increase in yields in both provinces to the adoption of the new seed-fertiliser technolgy. This view is supported by the aggregate data for (West Pakistan). The more rapid rate of growth of yields in Sindh than Punjab in the second part of the sixties is partly a statistical artifact due to stating from a smaller base. Possibly the institutional framework also played a part. The practically unchallenged power of the large landlord in Sindh may have in some cases enabled him to appropriate more than his share of the supplies from a particular watercourse or to concentrate the lion's share of the supplies to his sharecropped holding on his self-cultivated area. This may hve resulted in Mexipak areas receeving a more than proportionate share of total water supplies and enhanced total production in the province. There are of course strict limits to output expansion from this source. Prior to the sixties compulsory purchase, price control and rationing of food grains depressed prices. Surplus areas (Punjab and Sindh) were discouraged from maximising production as surplus output could only be legally sold to the Government at below free

1) See graph: Area, Production and yield of Wheat.

market prices. 1) Subsequently a free market was permitted and minimum prices were fixed at which the Goverment would purchase. The more favourable prices certainly promoted expansion of wheat ourput in both provinces. However the price remained stable at Rs 17 per maund over most of the period 1967/8-Sept. 1972 inclusive so in view of inflation the incentive effect evidently declined substantially. The levelling off in production in the seventies led to new price increases and successive increases brought the guaranteed minimum as high as Rs.37 by 1974/5. 2) The profitability of tbe new seed-fertiliser technology was enhanced for privileged producers by subsidies on fertiliser in circumstances of excess demand and this helped to concentrate the limited supplies of fertiliser on the more highly responsive Mexipak areas which it may safely be assumed were in the ownership of the more privileged producers.

Similar influences affected rice production. After an initial decline in the first few years of Pakistan the rice area of Punjab rose steadily through the fifties and sixties to decline in the seventies. Production rose steadily, particularly from the later sixties and declined in the seventies. Early increases in production were due to extension of area, yields declining into the second half of the fifties, then rising to pass the level of the beginning of the data period in the mid-sixties and making a sharp rise in the late sixties, presumably due to a movement into I.R.R I., followed by a rather slower rate of growth in the seventies. In Sindh production has trended seeadily upwards and particularly rapidly in the late sixties. Area seems to be following a rising trend but with growing fluctuations about the trend such that although area has been increasing in the sevenries it has not yet regained its mid-sixties peak. This probably reflects the greater uncertainty of the water supplies in this province. Yields fluctuated in the range 8.7-9. 9maunds per acre then rose sharply in the late sixties and rather less sharply in the seventies. Increasing yields are again probably due to the adoption of I. R. R. I. , The

1) PAPANEK, Gustav F. PAKISTAN'S DEVELOPMENT SOCIAL GOALS AND PRIVATE INCENTIVES, Harvard 1967 p.149

2) YEARBOOK OF AGRICULTURAL STATISTICS 1971/2 and 1973/4, table: procurement Prices of Wheat nnd Rice.

movement into I.R.R.I. which is markedly higher in its response to water and fertiliser than other popular varieties, Basmati, permal Begmi Kangni, Joshi, but considered poorer in quality, was promoted by the Government's fixing guaranteed minimum prices for I.R R.I, as of 1968/9 which compared favourably with the prices fixed for other varieties. However the prices fixed did not keep with pace inflation and substantial upward revisions have occurred lately bringing he price up to Rs.38 per maund in 1974/5 in an attempt to bolster up the declining production of the seventies. 1) Fertiliser subsidies aided the privileged and probably helped to 'concentrate a dis-proportionate share of the limited fertiliser supplies on the I.R.R.I. area thus enhancing toal output.

Area and production of cotton responded in both provinces to the Korean War boom of 1950/1. The end of the boom brought a fall in cotton prices of nearly 50% 2 causing area and production to level out. Yields in Punjab trended markedly upward from the late fifties making for an upturn in production which was further contributed to by increases in area from the early sixties. In Sindh area under cotton did not make striking increases, perhaps constrained by water supplies, but yield increases beginning a little later than in Punjab, trended upward more sharply and brought an upturn in production from the mid-sixties. Increasing yields can be attributed to a better choice of varieties in small part but largely to higher applications of fertiliser and improved irrigation practices. Tubewells in Punjab permitting more timely operations had a contribution to make here. Although an attempt is made to shield producers from the direct effects of price fluctuations on the world market cotton production has been strongly influenced by world prices.

In 1961 the pressure of population on the available resources was greater in Punjab than in Sindh. By 1972 the situation had been reversed. Population per net sown acre had increased by 33% in Punjab

1) YEARBOOK OF AGRICULTURAL STATISTICS 197/12 and 1973/4 Table, Procurement Prices of Rice and Wheat.

2) GRIFFIN, Keith and Azizur Rahman KHAN-Growth aud Equality in Pakistan p.34.

and by as much as 67% in Sindh. It similar birth and death rates are assumed for all regions of Pakistan so that population increases universally at the all-(West)-Pakistan rate of 51.33% over the period 1961-72, it is possidle to calculate what increment of population for each province can be attributed to indigenous population growth. The difference between the actual increment and and the increment calculated should then represent net population movements. It would appear that over the period Punjab experienced a net outflow of population equal to some 9% of the estimated increment of population attributed to indigenous increase while Sindh experienced a net inflow of around 30% of the estimated increment attributable to indigenous increase. It further appears that the principal source of the inflow to Sindh was the outflow from Punjab. 1)

Province	ABSOLUTE INCREASE OVER 1961 POPULATION ('000s)	NET POPULATION Increase of attribut Able to Populationindigen OUS POPULATION GROWTH ('000s)	Inflow of Population ('000s)	Outflow of popultionincrease ('000s)	Movement as Percentage of Attributable TO INDIGENOUS POPULATION GROWTH
Punjab	11,885	13,083	-	1.198	9.2
Sindh	5,593	4,295	1,303	-	30.4
N. W. F. P.	2,671	2,942	-	271	
Baluchistan	1,056	694	362	-	

Many of those moving into Sindh from Punjab came to seek urban employment, notably in Karachi. The proportion of Sindhi workers in manufacturing industry in Karachi was strikingly low. Many private individuals and members of the armed forces and the bureaucracy from Punjab acquired land in Sindh, particularly in

1) Table derived by present writer from population statistics in YEARBOOK OF AGRICULTURAL STATISTICS 1973/4, Table 1, Population of Pakistan by Divisions.

connection with the extension of the irrigation system. They frequently brought share-croppers from Punjab to work the land. They believed Punjabi cultivators would be more hard-working and they hoped to avoid problems arising out of linguistic and cultural differences and to exploit the "loyalty" of cultivators with whom they had already existing ties. Cultivators from Punjab also migrated into Sindh to seek employment as sharecroppers. They were impelled by pressure of population on their own small holdings or by floods or other natural disaster. For some of them the transition was eased by their being able to settle with relatives already living in Sindh. Over the period 1961-72 the population of Punjab increased by 47% and that of Sindh by 67% 1) constituting and increase of 79. 72%in the urban population of Sindh and 56 83% in the rural population of Sindh 2) Enormous increases of rural population of 91.47 and 81.61% were recorded in Nawabshah and Hyderabad Districts respectively 3)

These population movements had their impact on the indices of welfare. While her capita output of cotton was substantially higher in Sindh than Punjab in 1951 by 1972 a rise in Punjab and a decline in Sindh had broguht them to about the same level, this in spite of a higher rate of growth of yield in Sindh. Per capita output of food grains rose slightly over 1951-61 in Punjab and declined somewhat in Sindh then rose sharply over 1961-72 in both cases but still leaving per capita output lower in Sindh than in Punjab. 5)

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1) Figures derived by present writer from YEARBOOK OF AGRICULTURAL STATISTICS 1973/4 Table: Population of Pakistan
2) POPULATION STATISTICS OF SINDH, Bureau of Statistics, Planning and Development Department, Government of Sindh, Karachi, 1974 Table 1.4 p.15
3) Ibid.
4) See graph: Area, production and Yield of Cotton.
5) Table derivd from YEARBOOK OF AGRICULTURAL STATISTICS 1971/2 and 1973/4. Three year averages taken to eliminate exceptional weather effects. Population figures for 1951, 1961 and 1972 taken from YEAKBOOK OF AGRICULTURAL STATISTICS 1973/4

3 YEAR AVERAGE PER CAPITA OUTPUT OF:	1950/51-1952/53	1960/61-1962/3	1971/2-1973/4
Cotton-Punjab (bales)	0 04943	0 05359	0.07163
Cotton-Sindh (bules)	0.08350	0 06573	0.07010
Food grains-Punjab (tons)	0.1626	0.1668	0.1936
Food grains-Sindh (tons)	0.1531	0.1445	0.1885

The question now arises of how far goverment policy towards Punjab and Sindh differed in its relevant aspects. In the critical matter of water resource development the early start given to the Punjab during the British era eahanced the estimated benefitcost raios of subsequent agricultural development expenditures in Punjab relative to Sindh, encouraging the adoption of new techniques and at the same time, in the early stages at least, aggravating water shortages in Sindh and simultaneously augmenting the salinity of the lower riparian areas.

In the British period policy in respect of the disposal of newly irrigated land favoured the movement of population from areas of high density in the old settled districts of the north of Punjab to the "canal colonies". In recent years government policy towards the disposal of land in the Ghulam Mohammed and Gudu Barrage Commands has favoured the movement of population into Sindh from Punjab.

The role of agricultural extension work in the sixties and seventies has been limited in both provinces and failed to reach the majority of farmers. The fault lay partly in the quality of the information offered and partly in deficiencies in the projection of this information. These darwbaks are closely linked with the institutional framework which embraces a social system in which manual work carries low status so that field testing is neglected and a poor quality

of extension worker comes forward and is offered a correspondingly poor wage so that the situations perpetuated.

Under the Basic Democracies system instituted by Ayub Khan District Councils were supposed to develop and execute "rural uplift" schemes and to co-ordidate the activities of the Thana/Tehsil and Union Councils. Scope for initiative at local lovel was in practice small and the benefits of the scheme accrued mainly to the Basic Democrats themselves and to locallevel power holders1) as the scheme was manipulated to serve political ends. High hopes were entertained of the Rural Works programme in East Pakistan. The programme undertook local projects related to rural infrastructure and the payment of labour was financed by P.L.480 wheat imports. However this programme was also utilised for political manipulations. In West Pakistan the system of large land holdings meant that such a programme was less needed, local government units were less developed ond decentralisation of management more difficult to implement. Consequently the programme was smaller here and less successful. 1) The Agricultural Development Corporation was charged with making available at local level the "green revolution input–package" including short and medium term credit and with the formation of local co-operatives to take over these and other functiones. In the event the Corporation nni ther made loans nor initiated the organisation of co-operatives and failed to make generally available a co-ordinated adequate and timely supply of inputs 2) be it in Punjab or in Sindh.

The present government has three schemes afoot. The first is a further people's Works Programme. The second is a scheme for Agovilles under which urban facilities will be improved in a very limited number of rural connurbations by the provision of a market,

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1) Pakistan, Ministry of Food, agriculture and Underdeveloped Areas INTEGRATED RURL DEVELOPMENT PROGRAMM E-A REVOLUTIONARY APPROACH, 1975, pp. 7-8

1) PAPANEK, Gustav-PAKISTAN'S DEVELOPMENT: SOCIAL GOALS AND PRIVATE INCENTIVES

2) I.R D.P. A REVOLUTIONARY APPROACH op. cit. p.10

the offices of co-operatives, a town hall etc. Thirdly the Integrated Rural Development programme is to supply the "green revolution input-package "at local level under the direction of technical functionaries in the field. 3) In the first instance plans were initiated for nineteen I.R.D.P. markazes in punjab and twenty nine in Sindh, but nine months after the programme was launched the prime Minister was advising the Minister of Food and Agriculture. "I am afraid the progress so far falls short of our expections and the major reasons seem to be administrative bottlenecks.,' 1)

In fact all such programmes tend to falter because the institutional framework is unfavourable. Bureaucratic directives are still prefered to local initiative, a state of affairs dating right back to the tradition of the British District Administration. The development of strong independent local-level bodies is prejudiced by the prior existence of the landlord-tenant system which embraces and provides for many of the functions (such as the supply of inputs and credit) which the new institutions are designed to fulfil and for others whuch the new institutions generally fail to fulfil, usually grouped together in the category of "protection". A local-level power holder deriving his status from the functioning of the land lord-tenant system may be able, if he feels his interests to be threatened by the proposed changes, to use his influence to prevent them. This resistance to change is stronger in Sindh than in Punjab owing to the difference in tenurial structure. Since the ownership of land is less polarised in Punjab middle-peasant biraderis provide some counter-weight to the power of the landlords. 1)

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3) LABOUR AND EMPLOYMENT IN PAKISTAN prodd. for Planning Commission by Plan Publicity Cell, Ministry of Information and Broaed-casting, Auqaf and Haj, Govt. of Pakistan, Islamabad 1973 pp. 34-42

1) Pakistan. Ministry of Food, Agricultur and Rural Development, Islamabad-DIRECTIVES AND MESSAGES OF PRESIDENT Z.A. BHUTTO ON INTEGRATED RURAL DEVELOPMENT PROGRAMME (FEB 1972-JULY 1973) n.d.

1) ALAVI Hamza-Political Dependence; A Village in West Punjab, South Asian Review, 4, 1970/1

The rural institutional framework exhibits considerable stability in the face of small and even quite large disturbances 2) but is vulnerable to change induced by marked profit potential. The institutional framework is more rigid in Sindh where production decisions are mainly the responsibility of the landlord than in Punjab where they are mainly the responsibility of the tenant. Also the landlord in Sindh supplies virtually all the tenant's credit whereas in Punjab other sources also exist. 4). Where high profit methods with mechanisation are adopted a large landlord frequently takes an area under self-cultivation and retains all his sharecroppers but keeps their holding size down to a point which necessitates their working for additional remuneration on his self-cultivated area at peak season. Mechanisation on a relatively small owner's family to undertake most of the wrok and leads to the ejectment of tenants. 5)

This latter situation is of some importance in Punjab but not in Sindh It is the difference in institutional framework that accounts for the greater success of the co-operative movement in punjab. In 1972/3 Punjab had 14,719 agricultural co-operative Sindh had only 503 societies with 88,000 members. credit societies with 712,000 members./Rs. 32 41m. was advanced to individuals in punjab

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2) Former tenants buying land in the Ghulam Mohammed Barrage area have frequently resumed their relationship with their former landlord, offering him the customay share of the crop from their own land in exchange for credit and protection. LOWER INDUS REPORT, op. cit. Vol.9 p.9/167

3) I.B.R.D. PROGRAMME FOR THE DEVELOPMENT OF IRRIGATION AND AGRICULTURE IN WEST PAKISTAN. COMPREHENSIVE REPORT. by Sir Alexander Gibb and Partn. ers, International Land Development Consultants, N.Y., Hunting Technical Services, May 1966, London and Arnhem. Annexure 10 Land Tenure. p.14

4) Ibid.

5) ALAVI, Hamza-THE RURAL ELITE AND AGRICULTURAL DEVELOPMENT IN Pakistan (mimeo) pp 26-27 to be published in Rural Development in Bangl desh and Pakistan

and Rs. 7.9m. to societies. In Sindh a mere Rs. 2 03m. was advanced to individuals and only Rs. 0.10 to societies. 1) Evidence from the Indian Farm Management Surveys indicatses that output per acre is inversely related to size of holding. Consequently it is likely that the cause of the "green revolution" is advanced in Punjab by this institutional change.

An examination of the trends in agricultural output in Pakistan since 1947 suggests that the sharp uptrent occurred in those crops where the adoption of a high yielding variety with a good response to applications of water and fertiliser offered a market improvement of profit potential 2) particularly in the context of new higher prices fixed by the government and the removal of constraints on freedom of marketing. It is therefore necessary to examine how goverment policy affected the distribution of fertiliser. The Central Government sets the the retail price for each fertiliser at a uniform level for the whole country, which involves a subsidy since the retail price does not cover the import costs. 1) However a surcharge is currently imposed on the urea production of two private plants producing domestically. 2)During the period1955/61965/6inclusive theaverage fertiliser subsidy ranged between 25 and 66% of the cost and averaged 48%. 3) In the season 1969/70 the subsidy represented about 22% of total fertiliser cost, the proportionate subsidy being higher on domestic than on imported fetiliser. 4) In 1973 the subsidy on domestic production was removed with a sharp accompanying increase in the farm prices of fertiliser, which almost doubled between 1969/70 and

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1) YEARBOOK OF AGRICULTURAL STATISTICS 1973/4 Table29 Agricultural Go operative Credit Societies.
2) JOHNSON AND COWIE-THE SEED-FERTILISER REVOLUTION
1) AFZAL.MOHAMMED ET AL.-THE PRICING OF AGRICULTURAL CAPITALINPUTS IN pAKISTAN, pakistan Institute of Development Economics, Islamabad 1974 p.15
2) AFZAL op.cit. pp.24-25
3) AFZAL op.cit. p.24 citing Chemical Consultants Ltd -FERTILISER MARKETING AND DISTRIBUTION IN WEST pAKISTAN. laeore august 1970
4) AFZAL op. cit. p.24

1973. However the subsidy on imports continue. 5) The wisdom of the fertiliser pricing policy is not at issue here. The imporant point is that it has been uniform as between Punjab and Sindh. However it is not clear whether availability has been equally uniform for figures of the consumption of fertiliser do not represent the distribution which would result from the free play of the market. Priority of fertiliser purchases goes to those are near an outlet and have influence in the community or are willing to pay ablack market price. A survey in 1970 revealed the following distribution of fertiliser distributing agents at mandi town level. 1)

PROVINCE	PRIVATE(A)	PUBLIC (B)	TOTAL
Punjab	928	161	1,089
Sindh	403	53	456

A–Dawood, Esso, Jaffer and P.N.O.
B–A.B.C. and R.S.C.C.

Whence;

$$\frac{\text{Agents in Punjab 1970}}{\text{Agents in Sindh 1970}} = 2.3777$$

$$\frac{\text{Nutrient tons of fertiliser consumed Punjab 1970/1}}{\text{nutrient tons rf fertiliser consumed Sindh 1970/1}} = \frac{187.000}{82.500} = 2.2667 \text{ 2)}$$

$$\text{Net sown acres per agent punjab 1970/1} = \frac{2417000}{1089} = 22195 \text{ 3)}$$

$$\text{Net sown acres per agent Sindh 1970/1} = \frac{7390000}{456} = 16206 \text{ 3)}$$

$$\text{Cultivated acres per agent Punjab 1970/1} = \frac{27160000}{1089} = 24940 \text{ 3)}$$

$$\text{Cultivated acres per agent Sindh 1970/1} = \frac{13450000}{456} = 29496 \text{ 3)}$$

5) AFZAL op. cit. pp.25-6

1) AFZAL et al. p,11

2) Derived from YEARBOOK OF AGRICULTURAL STATISTICS 1971/2, Table; Estimated consumption of fertiliser.

3) Derived using acreage figures from YEARBOOK OF AGRICULTURAL STATISTICS 1971/2 Table: Land Utilisation in pakistan.

Afzal et al. say "The distribution pattern was determined by agricultural production, cropping patterns and other factors" 1) "We are not certain how much attention is given to actual farm demand as compared with potential demand suggested by the above factors." 2) The ratios calculated above suggest that there may perhaps be a rather close relationship between the number of agents and the quantity distributed. In 1970/1 each agent serviced on average fewer net sown acres in Sindh than in punjab but more cultivated acres. perhaps one should conclude that Sindh had a slight edge over punjab that year in the matter of fertiliser supplies but as figures are not available for other years it is a matter for speculation whether this situation applied In other years. Furthermore no evidence is available on the level of activity of the black market in either province or the direction of net black market transactions between the provinces. The best that can be said is that evidence is not available which would indicate that one province has been consistently favoured over the other in the matter of fertillser supplies.

Encouraged by the effects of land reforms which con-solidated or enlarged the holdings of middle owner peasants and reduced some large sharecropped holdings Punjab has experienced a "green revolution" led by capitalist landlords and middle owner peasants. In Sindh it has been capitalist landlords who have been responsible fer the upturn in production. In both provinces price incentives and high-yielding varieties have given a big boost to production increases arising out of acreage expansion In both provinces a shortage of water has been the binding constraint but this shortage has been more acute in Sindh than in Punjab. This is partly because Sindh is the lower riparian and barrage management does not seem to have taken adequate account of the need to avoid supplying to a barrage command water in excess of the amount formerly lost to the sea prior to the construcion of the barrage. It is partly because irrigation development got off to an earlier start in Punjab than in

1) AFZAL et al. op. cit. p.11

2) AFZAL et al. op. cit. footnote 3 p.11

Punjab than in Sindh right from British days. It is partly due to the more favourable endowment of groundwater in Punjab and the allocation of total water Supplies between the provinces in such a way as to neeessitate a higher proportion of fallow in the rotation in Sindh. It is for the politician rather than the economist to pronounce on what constitutes a proper weighting of benefits to the different provinces in assessing what would constitute an ideal allocation of water resources. Even if we ignore the need to balance the claims of the various pressure groups involved it is difficult to estimate with any degree of accuracy the projected benefits of alternative distributions. Ignoring differential fertility and political questions and giving similar weight to benefits wherever they accrue it would be reasonable to attempt to move towards an identical resource mix in the two provinces. As net emigration form Punjab into Sindh increased population pressure in Sindh would be allocated a growing proportion of the total water resources of the Indus Basin. However, what in practice is decided will depend at least as on much political judgments as on the guesstimates of economists. What can be said with certainty, if the statistics are to be believed, is that Sindh managed an upturn in agricultural production in the second half of the sixties which unlike that of Punjab did not have private tudewell development as its major contributing cause. 1)

Leaving aside population movements and water resource development government policy appears to have been neutral as between the two provinces but ist impact has differed between them because of the relative dominance of the sharecropping landlord class in Sindh and the relatively greater importance of the middle owner peasant biraderis in Punjab. Policies to promote capitalist enterprise by direct owner cultivators have consequently proved much more effective in Punjab than in Sindh. It will avoid the waste of resources if this is borne in mind in the formulation of future development policy.

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1) FALCON, Walter p. and GOTSCH Carl H. - LESSONS IN AGRICULTURAL DEVELOPMENT: PAKISTAN, in PAPANEK, Gustav F. ed: 1968-DEVELOPMENT THEORY AND PRAGTICE.

Alread in the seventies the upsurge in agricultural has come to an end and new sources of growth and renewed incentives are being urgently sought. Employment is likely to become an increasingly pressing problem. If we are to formulate the most effective possible policies to cope with what are bayond any doubt crucial questions capable of making or breaking governments we shall have to disaggregate more than we have in the past. In particular distinctions will have to be made between areas according to their available resources of water and according to their systems of land teunre.