A Macro Analysis of Time Change in the Distribution of Land

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1. INTRODUCTION

This study is an attempt to extend the analysis of change in the land distribution over time, to 1991. In an earlier study we have shown a strong tendency towards increasing concentration of operated area, between 1972 and 1980. This concentration was seen to be engendered by a dynamic associated with the High Yielding Variety (HYV) technology. This study attempts to examine whether the HYV dynamic has continued to increase concentration of area over the decade of the 80s. The recently concluded Agricultural Census of 1991, allows us to do this.

Our major result is that concentration of operated area has increased further between 1980 and 1991. However, the long run nature of concentration found here, points to another possible explanation. The HYV dynamic may have been one initiating change in a series of price and technology changes, leading to continual change in factor use in the direction of concentration.

2. THEORY ON THE CAUSALITY OF LAND CONCENTRATION

2.1. The Distributions of Owned and Operated Area

The distribution of land is an abstraction, and needs to be examined through two specific distributions. These are, the distributions of owned and operated area. The distribution of owned area will often be the more concentrated of the two. Some of the owned area will not be operated by owners, and rented out to the landless. However, the following conditions state that there are a number of possibilities in going from the distribution of owned area, to rented area, and finally operated area.

If we represent:

1 = land owners,	L = Gini for distribution of owned area,
p = operators,	P = Gini for distribution of operated area,
r = renters,	R = Gini for distribution of rented area.

Then we have the following conditions:

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1. If   l = p   i.e.   r = 0
              R = 0
     then   L = P

2. If   l < p   i.e.   r > 0
              R > 0
     then   L > P

3. If   l = p   but   r > 0
              R > 0
     then   L <> = P

4. If   l < p   i.e.   r > 0
              R > 0
     then
4.1   L > P
4.2   L = P
4.3   L < P

Condition 1 says that if the landowners are the operators, the distribution of owned and operated areas will be the same.

Condition 2 says that if landowners are less than operators, then there are some landless renters. In this case the access of the landless to operated area reduces the concentration of operated area below that of owned area.

Condition 3 says that the landowners are the operators, but some landowners rent land from others. In this case the access of the landless to operated area is not increased. Instead the access of some existing landowners to operated area is increased. This presents three possibilities. If large landowners rent in the area of small landowners, this will tend to raise the concentration of operated area above that of owned area. If small landowners rent in the area of large landowners this will tend to reduce the concentration of operated area below that of owned area. If both large and small landowners rent in land from each other, concentration of operated area could increase, decrease, or remain equal to that of owned area.

Condition 4 combines cases 2 and 3. If landowners are less than operators, but both the landless (as in Condition 2), and some landowners (as in Condition 3) rent in some land. This raises three possibilities. The increased access of the landless could be greater than the increased access of the large landowners, in which case the concentration of operated area would fall below that of owned area. A second possibility is that the increased landless access could cancel out the landowner access, leaving the distribution of operated and owned areas identical. The third possibility is that the increased landless access could be less than the

increased landowner access, in which case the concentration of operated area will rise above that of owned.

2.2. Literature on the Distribution of Operated Area

The distribution of land in colonial Northern India, inherited as a base line position by (present) Pakistan had two primary characteristics. One was a high degree of concentration of owned area. And the second was a very high incidence of share tenancy, (Tables 1 and 2). The literature argues that since independence, these base line characteristics have generated a specific growth pattern which has in turn generated a tendency towards concentration in the land distribution over the 60s and the 70s. The main changes in the macro environment which have generated post independence agricultural growth are the following:

Table 1

Land Ownership in Colonial North India

Area Owned (Acres)	Owners				Area Owned	West Punjab	
	All Punjab					1954-55	
	1924		1939				
	No %	Area %	No %	Area %		No. %	Area %
< 5	58.7	12.0	63.7	12.2	< 5	66.4	15.7
5–<15	26.0	26.6	24.0	22.2	5–<15	23.6	25.0
15–<25	7.0	15.2	5.8	12.8	15–<25	5.4	14.0
25–<50	4.8	20.4	3.9	14.8	25–50	4.1	21.9
> 50	3.3	25.7	2.4	38.0	50–<500	0.5	13.6
					> 500	0.1	9.9
Total	100	100	100	100	Total	100	100

(1924: F. Calvert 1925; 1939; N. Hamid 1980; cited by N. Hamid 1980; 1954-55: Land Reforms Commission Cited by F. Ahmed 1984).

(1) The land reforms of 1958, and 1972, whose intended impact, has been the transformation of the land ownership extensive pattern of accumulation into a land intensive.[1]

[1]Herring, R. (1983) *Land to the Tiller, The Political Economy of Agrarian Reform in South Asia.* Yale University.

(2) A significant increase in irrigation endowments, which increased output, and profitability per acre through increases in yields and cropping intensities.[2]

(3) Introduction of the HYV package of inputs which raised yields and profits per acre.[3]

(4) The low pricing of large Horsepower tractors helped capital to substitute for labour.[4]

(5) The macro price regime which increased agricultural profitability marginally since the early 60s.[5]

Table 2

Land Tenure in Colonial North India

Land Rights	All Punjab + NWFP		West Punjab
	1888		1947
	No. %	Area %	Area
Owner Cultivators	47.7	60.7	39.7
Non Rent Tenants	2.8	0.7	0.8
Occupancy Tenants	–	–	5.5
Tenants at Will	49.6	38.6	51.4
All	100	100	100

(1988: H. Calvert 1925, cited by F. Ahmed 1984).

In an earlier study we have argued that the base line land distribution, interacting with these five factors has lead to a concentration of the distribution of operated area over the 60s and the 70s.[6] The argument is the following.

Adoption of the HYV package and increasing yields has not resulted in a uniform increase in profits per acre across the two predominant tenurial forms,

[2]Hussain, S. A. (1980) The Impact of Agricultural Growth on the Agrarian Structure of Pakistan, with Special Reference to the Punjab Province, DPhil Thesis, Sussex University.

[3]Lipton, M. (1978) Inter Farm, Inter Regional and Farm–Non Farm Income Distribution: The Impact of the New Cereal Varieties. *World Development* 6:3.

[4]Herring, R. J. (1979) The Political Economy of Farm Mechanisation Policy: Tractors in Pakistan. In R. Hopkins *et al.* (eds) *Food Politics and Agricultural Development.* Westview.

[5]Nabi, E. *et al.* (1986) *The Agrarian Political Economy of Pakistan, Issues and Policies.* Oxford University Press.

[6]Mahmood, M. (1992) A Macro Analysis of Structural Change Over Time in the Agrarian Sector. Paper presented in the Planning Commission's Seminar on the 8th Five-Year Plan, January, forthcoming in the Papers and Proceedings of the seminar.

owner operated and sharecropped land. If owner operated areas increased their profits per acre by x, then on sharecropped areas this increase in profits had to be shared between landlords and share tenants. This created a large profit differential between owner operated and sharecropped areas, of approximately 0.5x.

Given a well functioning land rental market, this profit differential could be evened out by landlords raising the rent charged to their share tenants. If the prevalent bargaining power conditions did not permit a lowering of the tenants share of output, then another alternative for landlords would be to resume land and fix rent it out at a higher rent. However a secure fixed rental market for land has not emerged. Therefore the third alternative will be significant, with landlords resuming their sharecropped out area to self cultivate it.

The profit differential provides a major incentive for landlords unable to raise share rents, to evict tenants. Land reforms, paradoxically add to this incentive.

The incentive to evict sharecroppers and self cultivate, however still runs into the supervision constraint in that large landowners do not have the family labour to supervise the requisite hired wage labour. Tractors help to ease this supervision constraint by being net substitutes for labour. With tractors, large landowners can increase their level of material inputs, including area, without a proportional increase in labour. So tractors, will permit the resumption of sharecropped out area for self cultivation. The resumption of sharecropped out area from the landless tenants, as seen in Section 2.1 above, will tend to increase the concentration of operated area.

These hypotheses have been confirmed for two time periods using Agricultural Censuses for 1960, 1972, and 1980. Hussain examined the period between 1960 and 1972 and found that there had been a polarisation of operated area at the ends of the size scale, with a depletion in between.[7] We have examined both periods from 1960 to 1980, and using Gini coefficients found that concentration of operated area has increased over both periods.[8] This increase in concentration has then been explained through an analysis of the tenurial distribution. This analysis is detailed in the following empirical section which can now examine change in the land distribution over three time periods, 1960 to 1972, 1972 to 1980, and 1980 to 1991.

2.3. Determinants of Change in the Land Distribution, 1980–1991

The simplest proposition that can be made about change in the land distribution between 1980 and 1991 is that the HYV dynamic seen to increase concentration of operated area between 1960 and 1980 will persist. However there are several factors working, some which reinforce the proposition, while others modify it.

[7]Hussain, S. A. (1980), op cit.
[8]Mahmood, M. (1992), op cit.

1. Resumption of sharecropped out area is a response of factor use to changing technology. The response is motivated by changing profitability. Given a one off change in technology and profitability, there should be a one off change in factor use to a new equilibrium level. Even assuming some regional lags, the new equilibrium levels of factor use should have been arrived at over at the most two decades. On these grounds resumption of sharecropped out area should have ceased and concentration of operated area should have become constant between 1980 and 1991.

2. Technical change may have been initiated by the tubewell cum HYV cum tractor package. However this does not imply the end of technical change. Several forms of biological, and mechanical technical change are very visible. There has been a gradual introduction of hybrid seeds for cotton, sugarcane and now traditional rice. There has also been a proliferation of pesticides, especially in cotton. These will have added to yields and profitability per acre.

   The potential for mechanisation has also increased over time. The major forms of labour substitution after tractors have been wheat threshers and harvesters for wheat and rice.

   So the continued increases in profitability, combined with further potential for substituting capital for labour will tend to increase concentration of operated area in two ways. First, the HYV dynamic had resulted in the eviction of those sharecroppers unwilling to accept a $0.5x$ reduction in their output share. Assume that the new increases in profitability raises the value of x by y. Now this further enhanced profitability of $(x + y)$ will result in the further reduction of sharecroppers unwilling to accept a further reduction in their output share of $0.5y$.

   Second, the increased land profitability will result in some landowners attempting to increase their operated area by fixed renting in area. According to our conditions in Section 2.1, if some existing landowners rent in area from others, this will tend to increase the concentration of operated area.

3. There is some evidence that the macro price regimes up to the mid-80s had marginally increased the level of profitability per acre.[9] This will also reinforce the concentration effect. On balance then, over the period 1980 to 1991, we expect the distribution of operated area to increase in concentration.

[9]See cf. M. Mahmood (1992), op cit.

3. EMPIRICAL ESTIMATION OF CHANGE IN THE LAND

3.1. Distribution between 1960 and 1991

We have put our new estimates of change in the land distribution between 1980 and 1991 alongside our previous estimates for change between 1960 and 1972, and between 1972 and 1980. This gives a longer time trend over three decades.

Table 3 gives the Gini coefficients for operated area for the four census years of 1960, 1972, 1980, and 1991. The table shows that the Gini coefficients for operated area in Pakistan increased from 0.5137 and 1960 to 0.5177 in 1972, to 0.5353 in 1980. So concentration of operated area increased over the 60s and the 70s. However the newest result is the most significant. The Gini coefficient rises further from 0.5353 in 1980 to 0.5847 in 1991. So concentration of operated area increased unambiguously over the 80s was well. This confirms our hypothesis that the past trend towards concentration of operated area would continue over the 80s.

Table 3

Gini Coefficients for Operated Area

	Adjusted 1960	1972	1980	1991
Pakistan	0.5137	0.5177	0.5353	0.5847

(Calculated from the Agricultural Censuses of Pakistan, 1960, 1972, 1980, and 1991).

The table further shows that not only has concentration increased over these three decades, but also at an increasing rate of growth. Between 1960 and 1972, the Gini barely rises by 0.004. Moreover the comparability of these two censuses is also difficult, since the 1960 census was the only archivally based census, while the rest have been sample survey based. Between 1972 and 1980, the Gini rises by 0.02. And between 1980 and 1991, the Gini rises the most, 0.05.

We can now investigate some of the factors underlying this increase in concentration of operated area between 1980 and 1991. This analysis is severely constrained because the only data that has been made available so far is on the size distribution. Analysis of the tenurial distribution which is critical for explaining the size distribution will have to wait.

One possible source for increase in inequality of operated area can be an increase in inequality of owned area. This is not a very probable source, since population dynamics and land inheritance patterns in the region should really split up holdings over time, reducing concentration of owned area. However to confirm this, we have data on owned area for two points in time, 1972, and 1980. Table 4 gives the Gini coefficients for these two years. The table shows that the Gini coefficient for owned area in Pakistan decreased from 0.6578 in 1972 to 0.6434 in 1980. No comparison could be made for 1960 and 1991 because these data are not give.

Table 4

Gini Coefficients for Owned Area

	1972	1980
Pakistan	0.6578	0.6434

(Calculated from the Agricultural Censuses of Pakistan, 1972, 1980).

So population dynamics plus the possible effect of lowering of land ownership ceilings resulted in the splitting up of larger owned areas. Then if the increased concentration of operated area was not caused by ownership, then it must be caused by tenurial changes as expected in the theoretical Section 2 above.

Table 5 presents the distribution of total operated area, which we do have for 1991. Table 6 presents the distribution of operated area divided into ownership and tenancy categories. We do not have this data for 1991. The tables categorise operated area into six size classes. Table 5 gives the number and area proportions of each size class from the total numbers and area. This allows relative changes in farm size to be observed between 1960, 1972, 1980, and 1991. Table 6 gives the tenurial composition of owners, owner cum tenants and tenants within each size in both numbers and area. This allows relative changes in tenancy within each farm size to be observed between 1960, 1972 and 1980. This information is presented graphically in one 4 dimensional graph.

Table 5

Pakistan: Distribution of Operated Area

Operated Area (Acres)	Number of Farms				Farm Area				Mean Farm Area			
	1960	1972	1980	1991	1960	1972	1980	1991	1960	1972	1980	1991
		(%)				(%)				(Acres)		
<5	19.0	28.2	34.1	47.5	3.0	5.2	7.1	11.3	2.2	2.4	2.4	2.2
5–<12.5	44.3	39.9	39.4	33.4	23.6	25.2	27.3	27.5	7.9	8.2	8.0	7.7
12.5–<25	23.8	21.1	17.3	12.2	27.0	26.6	24.7	21.5	16.9	16.5	16.5	16.4
25–<50	9.0	7.7	6.5	4.7	19.0	18.8	17.8	15.8	31.3	31.9	31.8	31.5
50–<150	3.3	2.7	2.4	1.8	16.0	15.1	14.7	13.9	72.3	72.1	71.9	70.5
>150	0.5	0.4	0.3	0.3	11.5	9.1	8.5	10.1	331.1	277.3	285.4	310.4
Total	100	100	100	100	100	100	100	100	14.9	13.0	11.6	9.4

(Agricultural Censuses of Pakistan, 1960, 1972, 1980, 1991).

Table 6

Pakistan: Tenurial Distribution

Operated Area (Acres)	1960 No %				1960 Area %			
	Owners	Owner+ Tenant	Tenant	All Farms	Owners	Owner+ Tenant	Tenant	All Farms
<5	47.7	13.1	39.2	100	42.5	16.6	40.0	100
5–<12.5	32.2	21.9	45.9	100	31.5	22.3	46.3	100
12.5–<25	30.1	23.2	46.7	100	29.9	23.3	46.8	100
25–<50	32.8	24.7	42.5	100	32.9	25.2	42.0	100
50–<150	44.4	26.2	29.4	100	46.0	25.9	28.1	100
<150	63.3	19.4	17.3	100	68.9	18.1	13.1	100
Total	35.3	20.9	43.8	100	38.3	23.0	38.7	100

Operated Area (Acres)	1972 No %				1972 Area %			
	Owners	Owner+ Tenant	Tenant	All Farms	Owners	Owner+ Tenant	Tenant	All Farms
<5	61.4	11.8	26.8	100	55.9	15.6	28.5	100
5–<12.5	33.3	25.4	41.4	100	31.7	26.0	42.3	100
12.5–<25	31.2	31.6	37.2	100	31.3	32.7	36.0	100
25–<50	38.4	34.4	27.3	100	38.2	35.8	26.0	100
50–<150	49.0	35.2	15.8	100	49.3	36.0	14.7	100
<150	62.8	28.4	8.8	100	62.4	29.6	8.0	100
Total	41.7	23.8	34.5	100	39.5	30.9	29.6	100

Operated Area (Acres)	1980 No %				1980 Area %			
	Owners	Owner+ Tenant	Tenant	All Farms	Owners	Owner+ Tenant	Tenant	All Farms
<5	70.7	9.0	20.4	100	65.4	11.8	22.8	100
5–<12.5	45.1	22.0	32.9	100	43.9	22.6	33.5	100
12.5–<25	45.8	28.0	26.2	100	46.0	28.9	25.1	100
25–<50	49.8	31.9	18.3	100	49.7	33.0	17.3	100
50–<150	61.3	29.2	9.5	100	61.7	29.7	8.6	100
<150	75.6	23.2	4.2	100	73.4	22.9	3.7	100
Total	54.7	19.4	25.9	100	52.1	26.3	21.6	100

(Agricultural Censuses of Pakistan, 1960, 1972, 1980).

Graph 1 shows the size distributions for 1960, 1972, 1980, and 1991 in 4 dimensions. It also gives the tenancy distributions for 1960, 1972, and 1980. The horizontal axis gives the six size classes. The vertical axis measures the percentage area of each size class from the total operated area. The Z axis which gives depth to the graph marks the four years, 1960, 1972, 1980, and 1991. These three dimensions give the size distribution for 1960, 1972, 1980, and 1991. There are six sets of four joined blocks each, in the graph. Each joined set denotes a size class from <5 acres to >150 acres. Within each joined set there are four blocks denoting

Graph. Time Change in the Distribution of Operated Area in Pakisan
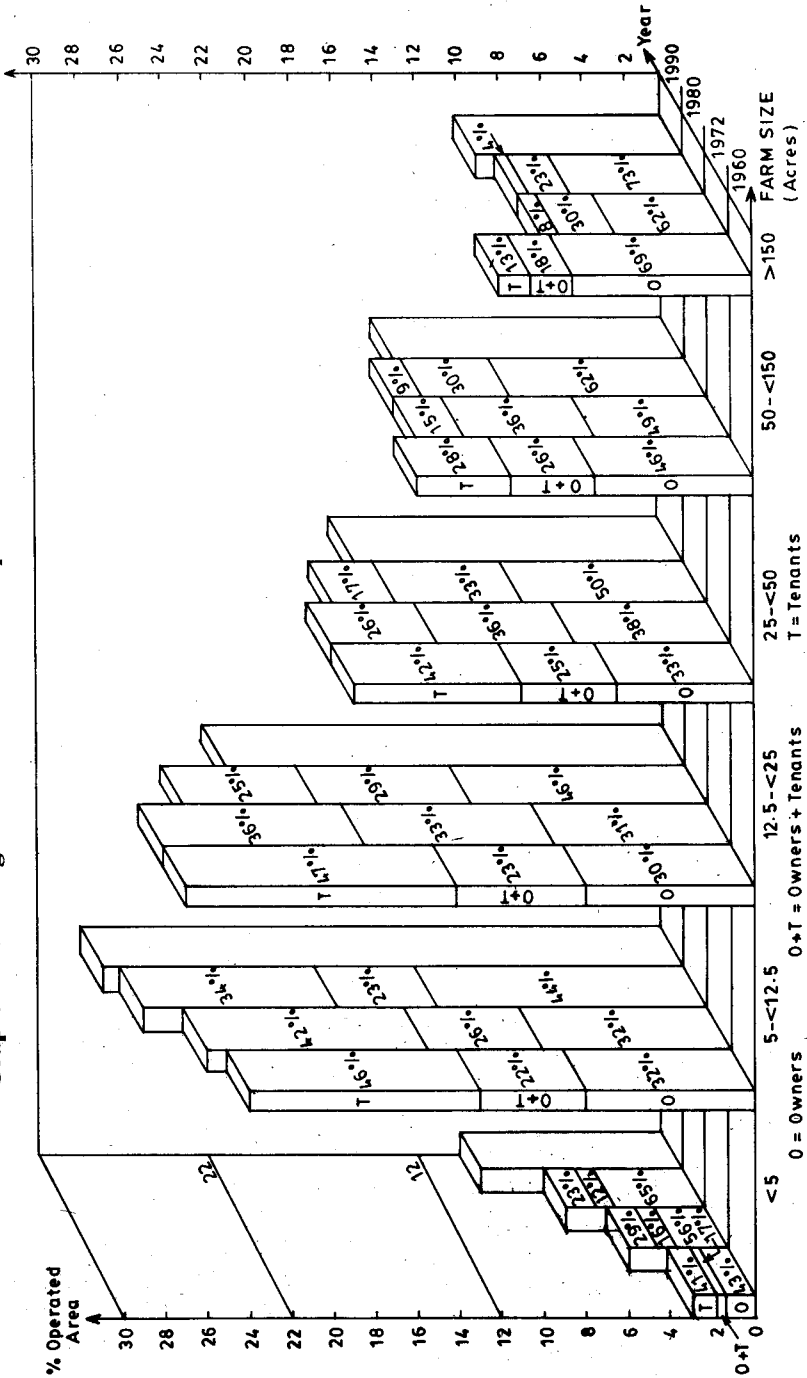
the four years, 1960, 1972, 1980, and 1991. So each joined set of four blocks shows the proportional area of a particular farm size in 1960, 1972, 1980, 1991. The height of each block indicates the proportional area of that farm size in that year. For instance the first set of blocks show that the <5 acre size class operated 3 percent of the total area in 1960. This size class increased to operate 5 percent of total area in 1972. It increased further to operate 9 percent of the total area in 1980.

This visual presentation in three dimensions makes it much easier to see what happened to each size class over time rather than following Table 5. Further each, block or farm size for a particular year, except 1991 for which there is no data yet, contains three sections. The bottom section denotes the proportional area of owner farms in the total area operated by that size class in that year. The middle section denotes the proportional area of owner cum tenants and the top section denotes the proportional area of tenants. For instance, in the smallest farm size of < 5 acres, owner operators proportional area increased from 43 percent in 1960 to 56 percent in 1972 to 65 percent in 1980. This visual presentation in the fourth dimension (within the height of the blocks) makes it much easier to observe tenurial change within each size class over time, rather than following Table 6.

This graph can now be used to understand the observed concentration in operated area on the basis of changes in the area of size classes, and tenancy. In Graph 1 changes in the size distribution over time come out very clearly.

First let us examine the period from 1960 to 1980. All size classes operating 12.5 acres or more lost area between 1960 and 1980. Size classes operating less than 12.5 acres gained area.

There is a qualitative difference in this change between the 60s and the 70s. Between 1960 and 1972, the two middle size classes between 12.5 and 50 acres did not lose net area to the smaller classes. It was the two large size classes above 50 acres that lost net area to the small size classes under 12.5 acres. So while inequality of operated area increased between 1960 and 1972, but it was minimal.

Between 1972 and 1980 the two middle size classes between 12.5 and 50 acres lost net area, while the large size classes above 50 acres did not lose net area. So large farm sizes remained constant between 1972 and 1980 and small farm sizes below 12.5 acres gained net area. Therefore between 1972 and 1980 inequality of operated area increased significantly.

Now let us examine the most recent change, between 1980 and 1992. The middle size classes between 12.5 and 150 acres lost their area. But this loss was not necessarily to the smallest size classes. The size classes below 12.5 acres gained area. But the largest size class above 150 acres also gained area. It is this gain by the largest size class over the 80s, compared to its loss over the 60s, or its constancy over the 70s, that has lead to the largest increase in concentration.

This increase in concentration over the 80s is further quantified by the Appendix Table A1. Table A1 shows that the area losing size classes, those between 12.5 and 150 acres, decreased their mean areas. The area gaining size classes, below 12.5 acres, also inflated their numbers, so they decreased their mean area

over time. However the largest size class above 150 acres, increased its mean area over time, by 8 acres between 1972 and 1980, and by 25 acres between 1980 and 1991.

So it is this gain in area proportions, and mean farm size, by the largest size class above 150 acres, that has lead to the significant increase in concentration of operated area over the last two decades, and especially over the 80s.

These changes in the size distribution are explained by tenurial changes in Graph 1 for 1960, 1972, and 1980. We do not have tenurial data for 1991 as yet, but these past tenurial trends are indicative for change between 1980 and 1991.

The major tenurial change between 1960 and 1980 is a reduction in tenant's proportional area in each farm size and an increase in that of owners. Between 1960 and 1972 tenants in each size class lost area, while owner cum tenants gained. Between 1972 and 1980 all tenants and owner cum tenants lost area. If this change is aggregated, tenants' area decreased in proportion from 39 percent in 1960 to 30 percent in 1972 to 22 percent in 1980. The total number of tenants decreased from 44 percent of the operators in 1960 to 35 percent in 1972 to 26 percent in 1980. In other words the proportional numbers and area of tenants decreased by approximately 10 percent in each decade leaving them almost halved by 1980. The concentration of operated area between 1960, 1972, and 1980 is explained by tenants falling out of the distribution and their area being resumed by the owners.

The decrease in tenanted area proportions seen in Graph 1 are further specified to be decreases in sharecropped area in Table 7. This table decomposes owned area into owner operated area, sharecropped out area and fixed rented out area. Between 1960 and 1970 sharecropped out area decreased from 44 percent of total operated area to 39 percent. Between 1970 and 1980 the sharecropped out proportion decreased much more to 29 percent. Since the fixed rented out area actually increased in proportion from 4 percent to 6 percent between 1960 and 1984, so the concentration in operated area and the increase in polarisation is largely explained by the reduction in sharecropped out area.

Given this marked trend in the reduction of sharecropped area associated with the increase in concentration of operated area between 1960 and 1972, we can expect a similar explanation for the increased concentration between 1980 and 1991. Our *a priori* hypotheses have lead us to expect this. And now our estimation of the trends between 1960 and 1980 have confirmed this explanation. We now need data to test this explanation for the 80s.

Table 7

Pakistan: Distribution of Rented Area

Operated Area (Acres)	Owner Operated	% Rented Out			Total
		Sharecrop	Fixed	Other	
		1960			
<5	52.4	41.5	3.8	2.3	100
5–<12.5	43.9	49.4	5.2	1.5	100
12.5 –<25	42.5	51.7	4.4	1.5	100
25–<50	46.7	48.3	3.6	1.4	100
50–<150	61.3	34.4	2.8	1.5	100
<150	82.2	14.0	2.4	1.5	100
Total	51.0	43.5	4.0	1.6	100
		1972			
<5	63.0	30.8	4.9	1.3	100
5–<12.5	42.9	50.9	5.5	0.7	100
12.5–<25	45.2	47.6	6.6	0.7	100
25–<50	54.5	36.6	8.1	0.8	100
50–<150	67.5	23.0	8.5	0.9	100
<150	79.3	12.3	6.9	1.5	100
Total	53.8	38.6	6.8	0.8	100
		1980			
<5	70.7	24.9	4.0	0.4	100
5–<12.5	53.7	40.7	5.2	0.3	100
12.5–<25	58.7	34.2	6.5	0.6	100
25–<50	64.9	26.6	7.6	0.9	100
50–<150	76.9	15.3	6.7	1.1	100
–<150	85.8	6.8	6.4	1.1	100
Total	64.3	28.9	6.2	0.7	100

(Agricultural Censuses of Pakistan, 1960, 1972, 1980).

Appendix Table A1

Pakistan: Farm Operated Area

Farm Size (Acres)	Farms No			Farms Area (Acre)			Mean Area (Acre)		
	1972	1980	1991	1972	1980	1991	1972	1980	1991
<5	1059,038	1386,451	2412,254	2562,734	3319,737	5338,608	2.4	2.4	2.2
5—<12.5	1500,772	1603,941	1697,399	12337,629	12855,250	13051,826	8.2	8.0	7.7
12.5—<25	793,928	705,180	619,926	13061,022	11616,789	10173,756	16.5	16.5	16.4
25—<50	289,146	263,695	236,994	9215,260	8386,432	7471,975	31.9	31.8	31.5
50—<15	102,641	96,157	93,504	7402,094	6912,767	6596,169	72.1	71.9	70.5
>150	16,163	14,031	15,471	4481,803	4003,710	4801,440	277.3	285.4	310.4
Total	3761,688	4069,455	5075,548	49060,542	47094,685	47433,774	13.0	11.6	9.4

(Agricultural Censuses of Pakistan, 1972, 1980, 1991).

Appendix Table A2

Pakistan: Change in Farm Operated

Farm Size (Acres)	Farm No Change Between		Farm Area (Acres) Change Between		Mean Area (Acres) Change Between	
	'72 and '80	'80 and '91	'72 and '80	'80 and '91	'72 and '80	'80 and '91
<5	+327,413	+1025,803	+757,003	+2018,871	0	-0.2
5 –<12.5	+103,169	+93,458	+517,621	+196,576	-0.2	-0.3
12.5 –<25	-88,748	-85,254	-1444,233	-1443,033	0	-0.1
25 –<50	-25,451	-26,701	-828,828	-914,457	-0.1	-0.3
50 –<150	-6,484	-2,653	-489,327	-316,598	-0.2	-1.4
>150	-2,132	+1,440	-478,093	+797,730	+8.1	+25.0
Total	+307,767	+1006,093	-1965,832	+339,064	-1.4	-2.2

(Agricultural Censuses of Pakistan, 1972, 1980, 1991).

Comments on
"A Macro Analysis of Time Change in the Distribution of Land"

This is a very interesting, though also disturbing paper. I say disturbing because of the findings of a continued concentration of land in the post-Green Revolution period. Some of the analysis of the dynamic of change in agrarian structure has interesting parallels to Binswanger's comparative historical study.

I think it is important to look at what has happened to the distribution of land in a timely manner (as this paper does), even if it means that all of the data one might want are not yet available. I hope further data will become available from the 1991 Agricultural Census, and that the author will continue with this analysis. The following points which I raise include comments on this paper as well as points which go beyond this analysis, but may be worth following up on.

Gini coefficients as they are conventionally constructed (including in this paper) *understate* the degree of inequality of access to land in the agrarian sector because those who own or operate *no* land are omitted. Including landless tenants and agricultural labourers in the analysis of land ownership (or landless agricultural labourers in the analysis of land holding) adds a long flat tail to the Lorenz curve, and increases the Gini coefficient. I do not mean to suggest that all the landless should be included, but it seems that those who are primarily dependent on agriculture, especially tenants and agricultural labourers should be included. While this would increase the level of the Gini coefficient, as non-agricultural employment opportunities improve and a lower proportion of the population is dependent on agriculture and land, the Gini coefficients would improve.

The effect of land rental on the concentration of holdings is complex. While renting to landless tenants clearly decreases the concentration, renting to other land owners can either increase or decrease the concentration. One way to test what effect renting has is to decompose the Gini coefficient for operated holdings into owner-operated, sharecropped, and fixed rent areas. This technique is usually used for incomes, but shows considerable promise for land holdings as well. If, for example, the landless and small owners are sharecropping and larger land owners rent in at fixed rates, we might find that owner-operated and fixed rent area contribute to inequality, while sharecropping has a concentration coefficient of less than 1, and therefore contributes to *equality*.

On Table 7, it is somewhat surprising to find that the percentage of total operated holding which is owner operated increases with ownership size category. One would normally expect larger land owners to rent out *more* than small farmers.

Finally, let me ask the question of what are the implications of land

concentration. While it is clearly important in an agrarian society, land is not the whole picture. Two limitations are:

> First, land ownership and holding size, as they are presented, do not control for the quality of land. It is clear that an acre of irrigated land can be as productive as several acres of *barani* land without irrigation. Thus the concentration of productive potential may not be as great as this analysis indicates if the small holdings are irrigated and large holdings are extensive *barani* lands. If, on the other hand, large farmers also own tubewells which enhance the productive capacity of their land (as appears to be the case), the concentration of productive capacity will be greater than indicated by this analysis. Giving regional breakdowns by province or agroecological region may at least partially control for this effect, but it would not get at the dynamic effect of irrigation development (including both canal and groundwater irrigation) which took place over the period covered in this paper.

> Second, land is not the sole (or even necessarily the primary) source of income in rural areas. In IFPRI sample villages, income from land (including agriculture, rental, land livestock income) accounted for an average 55 percent of total income (see Richard Adams' 1993 at this conference).

This does not mean that we should stop examining the dynamic patterns of distribution of land; rather, that we should refine the analysis and be clear about its purpose.

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