

## **Asset Effects in Land Price Formation in Agriculture: The Evidence from South Asia**

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The purpose of this paper is to examine the land market behaviour in South Asia, taking the most technologically advanced Punjab (both Pakistan and India) as an example, and to consider the disparity issues in development.

Land market in Punjab was given momentum when the private proprietorship of land was established in the middle of the 19th century. Land market behaviour in terms of the rent-land price ratio or the profitability of investment in land cannot be explained by the conventional rent theory. Land price has never been the discounted value of rent. We try to explain the market behaviour by incorporating asset effects in addition to the technological effects in agricultural production.

Since the land price data are not published after independence both in Pakistan and India, it is difficult to confirm whether or not the observed trend of declining rent-land price ratio can be observed after independence. However, judging from the scattered field survey data, we could presume that the asset effects have been positive and increasing, thereby reducing the R/P ratio much lower than the market interest rate.

The study raises questions with respect to the direction of public investment, land tax policy, and the growing disparity between rent receivers and rent payers.

### **I. LAND MARKET DEVELOPMENT IN PUNJAB DURING THE BRITISH PERIOD**

The purpose of this paper is to examine the land market behaviour in South Asia, taking Punjab both in Pakistan and India as an example and its implications on disparity issues.

As discussed earlier [Hirashima (1978)], private proprietorship on land in Punjab was established at the early part of the British period. James Mill, father of J. S. Mill, who worked in India Office in London did not recommend the provision of private ownership of land to the peasants. He thought it would be far easier for the Colonial government to collect revenue in the form of rent by making entire peasants as state tenants. He thought farmers should have enough incentive to work on land even after rent was taken by the state, since returns to capital, labour, and management were allowed to be retained by farmers. Instead, he apprehended the emergence of absentee landlords if a part of rent was allowed to be retained by farmers. Although his argument was not respected, his notion of rent was taken as a ceiling of the state demand.

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Against Mill's idea, the land revenue in Punjab was set at half the net produce followed after the Madras Settlement of 1885. Since the net produce was equivalent to rent in Mill's definition, and it was approximately one-third of gross produce in practical terms, the Punjabi farmers could capture one-sixth of gross produce, otherwise to be taken as rent to the state, as a part of their income, which was called a "private rent property" at that time. And it was this "private rent property" that gave commercial value to land and gave momentum to develop land market in Punjab. It is important to note that the state demand in real terms had decreased sharply since the revenue rate was fixed in nominal terms for 30 years (later 20 years); it became as low as 1.5 percent of gross produce on the eve of independence. Increasing "private rent property" simply meant the increasing commercial value of land, which stimulated land transactions throughout the British period.

It is interesting to note that land market development was initiated by the Hindu money lenders in Punjab. Based on the profitability of money lending and grain marketing, they soon found out that the investment in land was equally or more profitable than the returns to their traditional occupations. As Malcolm Darling stated, the indebtedness among Punjabi farmers increased not because of their poverty, but because of their prosperity expressed in terms of asset (mortgage) value increase [Darling (1947)]. Participation of money lenders in the land market as well as the number of indebted farmers increased. Apprehended the situation, Thorburn asserted the radical action to be taken against the money lenders participation in land market [Thorburn (1886)]. In response to the emerging situation, the Punjab government passed the well-known the Punjab Land Alienation Act of 1900 to prohibit the participations of non-farmers in land market.

Observing the land market behaviour in terms of rent/land price ratio (hereafter  $R/P$  ratio) in Punjab since 1890 (Figure 1), we could raise the following questions.

First, it is observed that the  $R/P$  ratio had been declining throughout the period under study. This trend cannot be explained by the conventional rent theory; land price is a discounted value of rent. Since rent in Figure 1 is one-third of gross produce which already incorporates technological innovations during the British period, the declining  $R/P$  ratio is influenced by some factors other than technology in agriculture. We temporarily call it the asset effects which, as will be explained later, is the unexplained residuals of land price increase.

Second, although the  $R/P$  ratio had declined over time, there are periods in which the ratio increased in the short-run. The short-run deviation from the long-run ratio needs to be explained.

Third, admitting that the Punjab Land Alienation Act of 1900 terminated the money lenders' participation in land market, sharply declined profitability of investment in land as demonstrated by the  $R/P$  ratio (as compared with money lender's interest rate) had already discouraged money lenders to be active in the land market well before 1900.

**Fig. 1. Movement of Rent-land Price Ratio in the Undivided Punjab (1890–1940)**

Source: From Appendix.

Fourth, observing the fact that land market had been active even after 1900 under the situation where the rate of return was less than the on-going interest rate, the main actors are presumed to be those who were well enough to invest in land without expecting short-run economic returns.

**2. LAND PRICE FORMATION IN THEORY AND REALITY**

Let us examine more in detail how land market in Punjab had behaved during the British period. Figure 1 shows the historical movement of  $R/P$  ratio during 1890–1940. Here, the rent is one-third of gross produce which was the state demand during the British period and it was later found to be identical with the theoretical rent or marginal productivity of land [Hirashima (1978)]

Now, let us specify our basic model of land price formation. Assuming a given level of technology and a permanent nature of land (no depreciation), land price can be expressed as follows.

$$P = R/r + V \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1a)$$

where,  $P$ =land price,  $R$ =rent,  $V$ = Asset effects,  $r$  = rate of return.

$$R/P = r - r V/P \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1b)$$

where,  $R/P \geq r$ , if  $V \geq 0$  and  $R/P = r$ , if  $V = 0$

This is our basic long-run model. The important point here is the inclusion of the asset effects in the model. The conventional rent theory assumes zero value of  $V$ , which implies that the land price is always a discounted value of rent. However, the actual movement of  $R/P$  ratio in Punjab demonstrates clearly that the ratio had been declining over time. This means that  $V$  had been positive and increasing, since, as already mentioned, the rent ( $R$ ) in Figure 1 incorporates technological innovation during the British period.

As is observed in Figure 1, there are period in which the  $R/P$  ratio increased. We presume this short-run movement as a result of technological change. We could illustrate the long-run and short-run  $R/P$  ratios as in Figure 2. With respect to the movement of short-run  $R/P$  ratio, we could specify two cases; transit nature of technological change, and the sustained one.

**Fig. 2. Long-run and Short-run Movement of  $R/P$  Ratio.**

If we presume the technological change occurs unexpectedly and has a transit in nature, the following formulation is conceived.

$$R_t = R_0 + e_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2a)$$

where,  $e$  = unexpected increase due to technological change  $R_0$  = the rent without technological change. Then we have,

$$P_t = V_t + R_0/r + e_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2b)$$

since  $R_t = R_0 + e_t$ , we can rewrite (2b) as,

$$\begin{aligned}
 P_t &= V_t + R_0/r + e_t/r + e_t = V_t + R_t/r - (1-r) e_t/r \\
 R_t/P_t &= r - rV_t/P_t + (1-r) e_t/P_t \quad \dots \quad \dots \quad \dots \quad \dots \quad (2c) \\
 \text{if } V &= 0, \text{ the } R_t/P_t = r + (1-r) e_t/P_t > r
 \end{aligned}$$

The Equation (2c) shows the increasing phase in the short-run model. Next, we have to consider the case where technological change is expected and sustained. We could specify the model as follows.

$$R_t = R_0(1+a) \quad a < r \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3a)$$

where,  $R_0$  = the rent without technological innovation, and  $a$  = the rate at which rent is increasing with technological change. Then we obtain the following relationships.

$$P_t = V_t + R_t/(r-a) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3b)$$

$$R_t/P_t = (r-a) - (r-a) V_t/P_t < r \quad \dots \quad \dots \quad \dots \quad \dots \quad (3c)$$

The Equation (3c) shows, the expected and sustained technological change pushes the  $R/P$  ratio lower than  $r$ , if  $V=0$ . However, it suggests also that the ratio becomes much lower if  $V$  is positive and increasing. As we pointed out earlier, our  $R$  in Figure 1 already incorporates technological change that took place during the British period in Punjab, which gives us evidence of a positive and increasing  $V$  during the period under study. In fact, the land price in real terms had been increasing much faster than the agricultural productivity increase during the British period [Hirashima (1978)]. The recent study by Renkow also shows that the increase in land price cannot be explained solely by the technological innovation in the post independent Pakistan Punjab, and that the rent had increased faster than the land price during the Green Revolution period (1976–86) [Renkow (1991)].

### 3. BEHAVIOUR OF LAND MARKET IN PUNJAB: POST-INDEPENDENCE PERIOD

#### 1. Evidence from Pakistan Punjab

Land price data have not been published both in Pakistan and India after independence. Therefore, it is difficult to examine whether the behaviour of land market during the post independence period is identical to the one we have just examined for the British period or not. There is no other way but to resort to the field survey data in villages.

Two sets of field survey data are available for the Pakistan Punjab. One is the data collected by the author in 1971-72 from four villages [Hirashima (1978)], and the other by Renkow for the period 1968–89 [Renkow (1991)].

According to the former study, the average  $R/P$  ratio came to be 4.1 percent in the case of rent in kind, and 3.5 percent in cash rent. The ratio based on the shadow price of land (marginal productivity of land) was 5.3 percent (Table 1). It has to be noted that these ratios are ones in the midst of the green revolution in Pakistan Punjab, which might have pushed the short-run  $R/P$  ratio somewhat upward. Nevertheless, it can be argued that these ratios are more or less in line with the  $R/P$  ratios we observed during the British period.

Table 1

*Rent-land Price Ratios: Pakistan Punjab (1971-72)*

	Rent, Land Price	Rent-land Price Ratio (%)	Rent- productivity Ratio (%)
Average Land Price (Rs/Acre)	4,685	—	—
Average Gross Revenue (Rs/Acre)	689	—	—
Average Rent in Kind (Rs/Acre)	242	5.17	35.1
Average Rent in Cash (Rs/Acre)	152	3.24	22.1
Estimated Rent: Theoretical Value (Rs/Acre)	230	4.91	33.4

*Source:* Hirashima (1978) *op. cit.* Table 32 (Reconstructed).

*Note:* Pooled data of 4 villages in Pakistan Punjab; 3 in rice growing region and 1 in cotton growing region. All villages are irrigated; 2 by perennial canals and tube-wells, 1 by non-perennial canal and tube-wells, and one exclusively by tube-wells.

Another study by Renkow covers the period 1960–89. In this study, the land price data were collected from 37 irrigated villages and 42 rainfed villages in the Pakistan Punjab which were away from the urban centres in order to avoid urban influence. However, data on rent were not collected from the surveyed villages, but borrowed from the PERI (Punjab Economic Research Institute) data collected in other villages. Therefore, the  $R/P$  ratios are not strictly comparable. Nevertheless, it is sufficiently suggestive. The study shows that the  $R/P$  ratio in the rainfed villages had declined from 2.85 percent in 1960 to 1.98 percent in 1989, and from 3.93 percent to 2.59 percent in the irrigated villages (Table 2).

The study confirms the faster increase of land price than rent in general, and the faster increase of rent than land price during the green revolution period (1976–86). The study also found out that the 70 percent of the incremental portion of land price was explained by the technological innovation, and that the disparity between rainfed and irrigated villages has been narrowed mainly due to the influence of remittance money from the oil producing counties in the rainfed villages.

Table 2

*Trends of Rent-land Price Ratios: Indian Punjab (1971-72–1987-88)*

	Region I	Region II	Region III	State
<b>&lt;1971-72&gt;</b>				
Average Rent (Rs/ha)	902	985	810	903
Average Land Price (Rs/ha)	25,444	29,914	17,548	24,310
Rent-land Price Ratio (%)	3.55	3.29	4.62	3.71
Rent-productivity Ratio (%)	34.2	34.8	34.3	34.5
<b>&lt;1987-88&gt;</b>				
Average Rent (Rs/ha)	3,142	4,661	3,074	3,882
Average Land Price (Rs/ha)	100,585	145,158	88,878	119,360
Rent-land Price Ratio (%)	3.12	3.21	3.46	3.25
Rent-productivity Ratio (%)	28.6	24.6	18.9	23.5

*Source:* Restructured from Singh *et al.* (1991).

*Note:* Region I: Sample household (48 in 1971-72, 48 in 1987-88). Northeastern districts, including Gurdaspur, Hoshiarpur and Ropar. High rainfall. Medium irrigation facilities. Sub mountainous tract.

Region II: Sample household (91 in 1971-72, 112 in 1987-88). Central districts including Amritsar, Jalandhar, Ludhiana, Patiala and Sangur. Medium rainfall. Good irrigation facilities.

Region III: Sample Household (77 in 1971-72, 66 in 1987-88). Southwestern district including Bathinda, Ferozpur and Farid Kot. Low rainfall. Canal irrigated. Unsuitable for Tube-well.

Although, there are some problems in data collection, and it does not give any importance to the level of  $R/P$  ratio (much below market interest rate), it provides us with supportive evidence with respect to the positive and increasing  $V$  in our model.

## 2. Evidence from Indian Punjab

We have two sets of data from Indian Punjab to examine the  $R/P$  ratio in the way we did for Pakistan Punjab. One study covers the two periods (1971-72 and 1987-88) and the other for the most recent period between 1990–95.

In the former study, Punjab was divided into three homogeneous regions based on crop, climate and other factors [Singh, Bal and Kumar (1991)]. Table 3 shows the  $R/P$  ratios in three regions in two period of time. It was found out, first that the  $R/P$  ratios had declined in all cases; 3.55 percent to 3.12 percent in Region I, from 3.29 percent to 3.21 percent in Region II, and from 3.71 percent to 3.25 percent in Region III. Second, the rent of the most productive region (Region II) increased faster. Third, in all cases, the rent/gross produce ratios had declined. It is presumed that the marginal decline of the  $R/P$  ratios in three regions is attributable to the slower land price increase during the politically uncertain situation prevalent in 1987-88 in the Indian Punjab. In spite of these constraints, the study provides us with supportive evidence to our propositions.

Table 3

*Trend of Rent-land Price Ratios: Pakistan Punjab (1960–89)*

	Rainfed Area	Irrigated Rice-Wheat Zone
<b>Pre-Green Revolution (1960–70)</b>		
Average Rent (Rs/ha)	410	1,730
Average Land Price (Rs/ha)	14,400	44,000
Rent-land Price Ratio (%)	2.85	3.93
<b>Green Revolution (1968–75)</b>		
Average Rent (Rs/ha)	564	1,830
Average Land Price (Rs/ha)	24,800	76,700
Rent-land Price Ratio (%)	2.27	2.39
<b>Post Green Revolution (1976–85)</b>		
Average Rent (Rs/ha)	757	2,850
Average Land Price (Rs/ha)	34,400	85,500
Rent-land Price Ratio (%)	2.20	3.33
<b>Post-Green Revolution (1986–89)</b>		
Average Rent (Rs/ha)	1,160	3,080
Average Land Price (Rs/ha)	58,600	119,000
Rent-land Price Ratio (%)	1.92	2.59
<b>Trend Growth Rate (1960–89)</b>		
Rent Price (%)	4.1	3.1
Land Price (%)	5.7	4.4
<b>Trend Growth Rate (1976–89)</b>		
Rent (%)	4.6	3.0
Land Price (%)	10.4	5.9

Source: Renkow (1991), (slightly modified).

The second set of data covers the most recent period (1990–95) and both rent as well as land price were collected from 287 plots of land in four villages in Ludhiana, Punjab by the author with the help of IEG (Institute of Economic Growth). As indicated from Table 4, it is shown that the  $R/P$  ratio has gone down as low as 0.6 percent in the village closer to Ludhiana Town. This evidence suggests that the closeness to the commercial and industrial centre and the accumulation of social overhead capital of the region seem to have more influence on  $R/P$  ratio than the technological innovation has on rent through agricultural productivity increase.



Table 4

*Trends of Rent-land Price Ratios: Ludhiana, India (1990–95)*  
*Number of Farm Households*

Rent-land Price Ratio %	Village A		Village B		Village C		Village D	
	1990	1995	1990	1995	1990	1995	1990	1995
–2.0	0	54	0	3	1	19	23	73
2.1–3.0	15	17	9	55	4	56	7	0
3.1–4.0	34	0	30	10	37	0	21	0
4.1–5.0	20	0	26	0	12	0	18	0
5.1–	2	0	3	0	21	0	4	0
Total	71	71	68	68	75	75	73	73
Average Rent (Rs/Acre)	4,707	8,250	4,842	8,408	4,484	7,456	4,134	7,358
Average Land Price (Rs/Acre)	131,690	448,028	125,441	317,647	111,733	341,733	266,917	1,223,287
Average Rent-land Price Ratio	3.57	1.84	3.86	2.65	4.01	2.18	1.54	0.60

*Source:* Field Survey Data collected from 287 plots in four villages in Ludhiana, India. These villages were surveyed originally by Dr Ramesh Chand of Institute of Economic Growth in 1993. Data on land price and rent were additionally collected by him on the Author's request in 1995.

*Note:* Village A: 16 Km from Ludhiana town. 2 Km from Ludhiana–Pakhawal main road connected by link road.

Village B: 23 Km from Ludhiana town. 19 Km by Ludhiana–Pakhawal main road and 4 Km by link road.

Village C: 19 Km from Ludhiana town. 14 Km by Ludhiana–Ferozpur Highway and 5 Km by link road.

Village D: 8 Km from Ludhiana town. Located along the Ludhiana–Pakhawal main road.

#### 4. CONCLUDING DISCUSSION

The analysis so far made can be summarised as follows.

First, throughout the British period, the *R/P* ratio had been declining. The movement of the ratio even after the post independence period can be regarded as an extension of the one observed during the pre-independence period.

Second, our analysis confirms the fact that land price has not been the discounted value of rent as the conventional rent theory asserts. The recognition as well as understandings of the asset effects, *V* in our notation, in land price formation seems to be crucial. The magnitude of the asset effects is hypothesised as a function of the accumulation of social over-head capital and the private capital formation of the non-agricultural sectors in the region. And highly likely that the asset effects would be much stronger in land price formation than the technological effects in agricultural production at least in the long-run.

Third, if this argument is valid, it can further be hypothesised that the disparity between the rent payers and rent receivers, and even among rent receivers with different

land ownership, and the disparity between regions with different accumulation of public and private capital may not be reduced only with technological innovation within the agricultural sector through market.

Fourth, the  $R/P$  ratio in contemporary Punjab has gone down to the extent that it is no more possible to buy land for those who do not have initial capital. It follows, therefore, that only those who can afford to wait for the  $V$  effects be captured in the long-run, without expecting much return in the short-run, can participate in land market. In this situation, the income from the outside sector seems to be the only means for the small and marginal farmers or landless non-farm households in villages in Punjab to participate in land market.

Fifth, with respect to the policy implication of our findings, the following four points may be relevant. First, it is important to recognise that the disparity question cannot be answered neither in flow terms (income), nor stock terms (asset) alone, but in the dynamic relationship between the two. Second, one of the key areas for reducing disparity is the pattern and direction of public investment in social overhead capital in the region. Therefore, public investment should be redirected, if necessary, to minimise the growing disparity among regions. Third, it seems to be important to prevent the capital gain from land holding to grow by introducing appropriate land tax policy. Fourth, the effort has to be made to collect land price data systematically and make them accessible to the public.

Appendix Table 1

*Trends of Rent-land Price Ratios: Undivided Indian Punjab (1891–1940)*

Year	Land Price (PL)	Rent (R)	R/PL (%)	Year	Land Price (PL)	Rent (R)	R/PL (%)	Year	Land Price (PL)	Rent (R)	R/PL (%)
1891	63	10.5	16.6	1911	123	13.6	11.1	1931	412	13.1	3.2
1892	66	11.6	17.6	1912	107	12.9	12.1	1932	372	13.2	3.5
1893	69	12.2	17.7	1913	249	13.7	5.5	1933	477	12.7	2.7
1894	70	11.8	16.4	1914	180	13.3	7.4	1934	389	16.1	4.1
1895	75	11.8	15.8	1915	216	10.9	5.0	1935	404	14.9	3.7
1896	78	12.9	16.5	1916	227	11.8	5.2	1936	409	17.0	4.2
1897	81	11.8	14.6	1917	252	12.7	5.0	1937	340	15.3	4.5
1898	83	10.9	13.1	1918	184	13.9	7.5	1938	451	14.3	3.2
1899	81	13.0	16.0	1919	275	14.5	5.3	1939	436	16.0	3.7
1900	83	11.8	14.2	1920	345	12.0	3.5	1940	466	15.4	3.3
1901	71	11.5	16.1	1921	385	14.1	3.7				
1902	71	12.7	17.8	1922	314	14.2	4.5				
1903	85	15.0	17.6	1923	383	14.9	3.9				
1904	85	14.1	16.4	1924	438	12.7	3.0				
1905	85	14.7	17.3	1925	477	13.5	2.8				
1906	103	13.2	12.8	1926	368	13.4	3.6				
1907	101	11.6	11.5	1927	402	12.3	3.0				
1908	114	12.9	11.3	1928	372	11.9	3.2				
1909	121	14.1	11.6	1929	406	14.2	3.5				
1910	129	13.9	10.7	1930	420	13.9	3.3				

Source: Hirashima (1978).

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## *Comments*

There is a general dearth of studies exploring land market developments in the less developed countries, especially in the Indo-Pakistan sub-continent. Professor Hirashima's study can, therefore, be regarded as a pioneering work. As such there is a general lack of data on land rents and land prices, the time-series data on these variables from 1891 to date reported in the study fills this data-gap and allows further studies on the topic. Apart from this implicit contribution of the paper, many of paper's conclusions may be explicitly stated as having further implications for a possible recourse to policy and agricultural development as follows:

Firstly, the paper refutes the old theory of land rent which holds that land price is a discounted value of rent.

Secondly and more importantly, it argues that land prices are a function of accumulated capital (social or physical) in the public and private sectors and that asset effect would be stronger than technological effect in land price formation.

Thirdly and given the above argument, it can be hypothesised that disparity between rent payers and rent receivers, even among rent receivers and between regions with different endowments of overhead social capital cannot be reduced with technological innovations alone but should mainly be pursued with redirection of public investment.

Finally, under the falling rent-price ratios of land it has become increasingly difficult for the small and marginal farmers or the landless to participate in the land market without access to incomes from non-farm sources. In order to ensure widespread participation in the land market, the need for an appropriate land tax policy can hardly be underestimated as such a policy is most likely to dampen land price increases and excessive land capitalisation.

While I am in general agreement with the above conclusions, I have some minor differences with certain aspects of the underlying arguments.

The paper uses the falling rent-price ratio to refute the traditional theory of rent and perhaps has a justification to do so. It, however, is not clear if the falling ratio was the outcome of capital formation, technological changes or even growing population pressure on land. The paper assumes, that it was capital formation more than any other factor. As the paper develops no empirical relationship between the dependent and possible explanatory variables, simply assuming that capital formation outside the agricultural sector was important in determining rent-price ratios, would not be enough.

There is no dearth of literature on Pakistan's Green Revolution as to its beginning, its impact on land rent and prices and its implications for income distribution. On the basis of available literature, Green Revolution seem to have made a beginning in Pakistan in the early 1960s and matured in the late Sixties and early Seventies. On this

account, the periods before 1960s, between 1960 and 1975 and after 1975 should respectively correspond with Pre-Green Revolution, Green Revolution and Post-Green Revolution periods. I have problem agreeing with Professor Hirashima who defined 1960–67 as Pre-Green Revolution, 1968–75 as Green Revolution and 1976–89 as Post-Green Revolution periods. In fact, the evolution of new HYVs of cotton would demand that the period since 1984-85 be regarded as another period of Green Revolution in Pakistan. Likewise most of the literature on Green Revolution has postulated the effects of technology on land rents and land prices and it would be difficult to disregard technology as a factor in rent-price ratios. While rents in general are charged on the basis of actual productivity gains, and land prices may change also in anticipation of future technological developments, the outcome would be the falling rent-price ratios. Although social infrastructure may be a factor in class and regional disparities, Green Revolution has been no less important in this respect, can be substantiated by world-wide evidence.

In view of the sharp increase in land prices, I completely agree with Professor Hirashima's conclusion that active involvement of small and marginal farmers and the landless in land markets has become a rising impossibility without incomes from outside of agriculture. There can also be little disagreement regarding the proposal of appropriate taxation of agriculture for checking rapidly rising land prices and excessive land capitalisation.

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