CHAPTER II
REVIEW OF LITERATURE

The agricultural economy of India is characterised by small-scale, fragmented farming. Of all farms in India, 69.6 per cent is below two hectares which is only 20 per cent of the total land. The central role of the agricultural sector in development is now more widely appreciated than earlier. The relative size of the agricultural sector in the developing countries itself warrants particular attention to this sector. In India it accounts directly for nearly half of the national product providing a major portion of both raw materials and markets for the industrial sector. Agricultural development is essentially a problem of improving productivity, i.e. increasing output per unit of input.

From the point of view of production theory, there are two alternatives to achieve this: (1) If the present pattern of ownership and use of resources are efficient, then substantial increase in output is possible only through technological changes involving improvement in the quality of inputs. (2) If the present pattern of ownership and use of resources are inefficient, then substantial increase in output is possible through re-allocation of resources. Schultz (1964) and Myrdal (1968) have postulated two separate hypotheses resembling respectively the above alternatives.

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7. See Appendix II, Table 2.1, In Himachal Pradesh 78.5 per cent of farmers are below two hectares owning 33.5 per cent of the total land (See Appendix II, Table 2.2).


2.1 The Efficiency Controversy

The need of making allocative decisions on a farm arises because of the scarcity of resources. The farmer, like any other entrepreneur, is faced with the question of how to allocate his limited resources among his various enterprises to get the maximum return. In other words, the question is -- given the resources -- what combination of crop, dairy and/or other enterprises he should follow and how he should allocate the available resources among those enterprises, whose requirements for farm inputs are competitive. Results of a number of studies conducted in India and in various underdeveloped countries confirm the "poor but efficient" hypothesis of Schultz: 10

"There are comparatively few significant inefficiencies in the allocation of the factors of production in traditional agriculture." Schultz (1964), p. 37.

A few other studies are inconclusive or express doubt about the efficiency hypothesis. But there are also studies which indicate the existence of different levels of efficiency in different groups of farms, thereby, suggesting the possibility of

increasing output through resource re-allocation and supporting Myrdal's hypothesis: ¹¹

"Without any innovations and without any investment other than longer and more efficient work agricultural yields could be raised very substantially.... Still greater increase in yields could be attained by applying modern scientific agricultural technology." Myrdal (1968), p. 1253.

The above two hypotheses respectively postulated by Schultz and Myrdal are based on different sets of assumptions about underdeveloped agriculture. ¹² Both Schultz and Myrdal have rejected the hypothesis of zero marginal productivity for part of the labour force in underdeveloped countries: Schultz's hypothesis implies full employment, ¹³ Myrdal's hypothesis implies substantial underutilization and assumes that increased production is possible by full employment. ¹⁴

According to Schultz, differences in institutional arrangements such as resident and absentee ownership, small and large farms, production for sale and for domestic use, are not a key to the problem of traditional agriculture, although these may be important in determining how to modernize traditional agriculture. ¹⁵ He also hypothesized that the investments essential to


¹³ Schultz, op. cit., pp. 40, 52.


¹⁵ Schultz, op. cit., p. 29.
transform traditional agriculture are not dependent upon establishing large farms but that the size of farm may change due to the transformation. Recognizing absentee ownership generally as inefficient, he hypothesized that under competitive conditions, farming under absentee ownership decreases relatively because of inherent inefficiencies as has been evident in the United States.¹⁶

According to Myrdal, there is a lot of difference between the unit of ownership and unit of cultivation in the underdeveloped countries. There is evidence of differences in productivity between farm size groups. Patterns of land ownership and tenancy are one of the main reason for low output and low labour utilization. The patterns differ widely across countries and across districts within a country but have one thing in common: these reduce the possibilities and incentives to cultivators for hard and efficient work. Chances for raising output in agriculture both by effective labour utilization and technological improvement will depend on wide ranging changes in attitudes and institutions, including some kind of land reform which may differ from country to country. Technological change without land reform will increase inequalities, displace more labour from agriculture hastening their exodus to cities where they are as underutilized as in agriculture. Thus, promotion of social and economic equality is a pre-condition for attaining substantial long-term increases in production.

While Schultz's hypothesis applies to intra-farm allocation of resources, Myrdal's implies both intra-farm and inter-farm.

¹⁶. ibid., pp. 111, 118-19.
The generally accepted view about the problem of resource use efficiency in India and the suggested solutions conform more with Myrdal than with Schultz but at the same time also support the allocative efficiency hypothesis of Schultz.

2.2 The Farm Size and Productivity Controversy

Policies on number and size of farms have socio-political and economic implications in any developing country as these affect and influence farm operators and hired farm labours. These effect equity in the distribution of farm income as well as economic efficiency of resource use and progress in improving resource productivity. Farm size factors are obviously closely related to those of land ownership, tenure and the ways of organizing farm production, e.g., privately-owned as opposed to tenant-operated farms, or large-scale private farms as opposed to co-operative, collective, state, or other joint farming enterprises.

In the controversy on farm size and productivity in India, there is no unanimous opinion among the economic analysts. The alleged inverse relationship between output per hectare and farm size strengthened the case of those who have been arguing in favour of small farms as against those who have been advocating the relaxation of land ceiling laws. In particular, that section of public opinion which once favoured cooperative farming to reduce disparities, found it easier to accept the failure of the

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co-operative movement in the light of the findings that small farmers, after all, are not so inefficient. 18

Studies in the Economics of Farm Management (FMS) in India raised several issues which are summed up in the following observations by Sen (1962):

(i) "When family labour employed in agriculture is given an 'imputed value' in terms of the ruling wage rate, much of Indian agriculture seems unremunerative." 19

(ii) "By and large, the profitability of agriculture increases with the size of holding, 'profitability' being measured by the surplus (or deficit) of output over costs including the imputed value of labour."

(iii) "By and large, productivity per acre decreases with the size of holding."

After the following the initial round of observations made by Sen (1962), Mazumdar (1965), Khusro (1964), Morton Paglon (1965), Hanumantha Rao (1963) and others, interest in research of farm size and productivity seems to have revived with the publication of papers by A.P. Rao (1967) and Ashok Rudra (1968a). Rao (1967), on the basis of disaggregated data relating to individual holdings covered by FMS, came up with results contradicting the proposition. Rudra (1968a) subjected the FMS data to statistical analysis and confirmed the doubts raised by Sen (1962) about the statistical basis of the observation around which the discussion on farm size and productivity has been taking place. Rudra's (1968a) analysis was an important turning point in the "size and

18. See Rudra (1968a) and Bharadwaj (1974a).

19. To have an idea about the proportion of family labour to total labour used by different size groups of farms in various states of India see Appendix II, Table 2.3.
productivity" controversy but it certainly failed to bring the discussion to any conclusion. These two studies, however, left open the possibility that the alleged inverse relationship could have arisen on account of the process of aggregation whereby data were presented as size-group average in the FAS. Commenting on Rudra (1968a), Hanumantha Rao (1968) pointed out that disagreement might have arisen because of the use by Rudra of yield per unit of gross cultivated area as the dependent variable instead of yield per unit of net cultivated area. To the extent that intensity of cropping varied systematically with size (particularly inversely), Hanumantha Rao (1968) argued that Rudra's formulation would be biased towards eliminating the inverse relation between size and yield per acre. Rudra (1968b) in reply, questioned the concept of size of farm (net cultivated area) as a proper measure of land input and also pointed out that the relation between size of farm and intensity of cultivation was not 'invariably' inverse as Hanumantha Rao supposed.

After this a number of studies have been conducted which either favoured or contradicted the inverse relationship. Saini (1971) and Battacharya and Saini (1972) found positive evidence while Singh and Patel (1973) contradicted the hypothesis in the context of recent technological development. A Study by Rani (1971) concluded that:

"This controversy of relationship between the size of farm and yield per acre was based on the aggregated data of FAS and on disaggregated data from some other sources, but the results were not put to statistical tests. After taking care of these factors, the conclusion which emerges from the present exercise is that, this whole controversy and all the explanations offered to support the different observations had a very weak statistical basis."
Whatever the situation might have been in the early Sixties when the FMS were conducted, the whole controversy loses much of its importance, in view of the developments which have been taking place in Indian agriculture. In fact, to ascertain the correct implications for purposes of analysis as well as policy formulation, it will be very important and necessary under the present conditions, to search for factors that may explain the relatively higher value-productivity on smaller holdings as compared to the larger ones.

The explanations that have been advanced so far in this direction can broadly be classified under three hypotheses: qualitative differences in land, qualitative difference in labour input, and the dual labour market.

2.2.1 Qualitative Differences in Land

Some evidence can be found to suggest that smaller holdings could be made of better quality lands. But it is important to differentiate conceptually between qualitative differences in land arising from differences in the quantity of other inputs applied to it and intrinsic ecological differences. It is indeed difficult to draw a line between the so-called natural soil differences and man-made differences especially since it is the past investment in land which influences today's quality of soil. In any case, the effect of these two cannot be neatly separated statistically. But cropping patterns can sometimes be used as indicators of differences in soil conditions.
Some economists have tried to explain how these quality differences in land between small and large farms could come about. The first explanation was provided by Sen (1964) in terms of population dynamics. Starting with a theoretical situation where there are lands of equal size but of different qualities, operated by families of uniform size, Sen visualized a process of higher per capita income on more fertile lands inducing expansion in the size of family. He further assumed that this would lead to a more rapid sub-division of such lands so that eventually better quality land would form the smaller size holdings. By the nature of the arguments involved (with their characterization of a dynamic process) it is not possible to test this hypothesis directly. The argument has, however, certain weaknesses. First of all, it relies upon the working of the Malthusian Law of higher incomes necessarily leading to larger families, and then, implicitly upon a standard level of per capita income beyond which land would be necessarily sub-divided. Secondly, it limits the possibility that members of the family may seek alternative employment or move away from the farms.

Another hypothesis by Bhagwati and Chakravarty (1969) attributed the poorer productivity in larger holdings to higher degree of fragmentation of the plots constituting the holding. Bigger operational holdings, they argue, may have been built up by purchases of separate plots of land. Such fragmentation of cultivated area scattered over distances adversely affects the productivity per acre. However, the study by Bharadwaj (1974a)
on FMS shows that fragmentation exists in all size groups and she could not conclude from the data that fragmentation operates more adversely in regard to larger holdings. 20

2.2.2 Qualitative Difference in Labour Input

Another hypothesis in terms of qualitatively different inputs, refers to labour. Hanumantha Rao (1966) argues that the small farmers, mostly working on their own farms, take greater care in performing their tasks and are better managers. But this hypothesis failed to get support. On the contrary, Bharadwaj (1974a) argues that some crops do require more efficient and careful weeding and watering, and in such cases the relative disadvantage of larger holdings in depending upon hired labour would be reflected in the relatively smaller weightage given to such crops in their cropping pattern. If, however, these qualitative differences are not crop-oriented, but general (like better management) they ought to be reflected in the individual crop performances as well. But she found no such systematic inverse relationship between productivity and size in the case of individual crops. It emerges from the preceding discussion that qualitative differences in inputs, so far as they exist, would be most predominantly reflected in the cropping pattern and intensive use of land.

2.2.3 The Dual Labour Market Hypothesis

The Dual Labour Market Hypothesis is due to the opportunity cost of labour differing between farm types. 21 Large farms which


fully depend on hired labour face the market wage rate as an opportunity cost. Small farms who operate primarily on the basis of family labour face an opportunity cost lower than the market wage rate. The difference in opportunity cost can come about in various ways.

Since each group of farms will tend to equate the value of the marginal product to its own opportunity cost, small farms will tend to use more labour per hectare than large farms unless the market for renting land is perfect. The FMS generally do show higher labour on small farms than on large farms. But these raw labour-use figures confound land quality and labour-quality effects with the effect of the lower opportunity cost.

2.2.4 A Fresh Look at the Farm-size Productivity Controversy

The past studies highlight mainly the following factors responsible for the difference between small and large farms, land quality, labour quality, cropping pattern, crop intensity and technology. Also the main attention was on the input use differences and the explanation was given in terms of quality and intensity of input use. But in this thesis an attempt will be made to quantify the contributions of various inputs to the output difference between small and large farms. Also the contribution of intensity and cropping pattern differences will be measured with the help of the decomposition technique which is used in this context for the first time.

2.3 Factor Markets

The traditional classification of factors of production is into labour, land and capital. Often, in addition, markets in
these factors of production have been assumed to be perfect. But the assumptions have not gone unchallenged as per following excerpts from Bharadwaj (1974a):

"The researcher has yielded much too easily to the temptation of treating the cultivator and his problems of resource acquisition and utilization on the analogy of the producer of a competitive firm. Such analogies give rise to some awkward problems, for example, in handling owned inputs like family labour or owned land. Attempts to impute market prices to such inputs have resulted in the majority of cultivators showing up net losses. This has baffled the theorists and has led to such controversies as whether it is the imputation of wages to family labour or of rent to owned land that is responsible for such a result. Even when the researcher recognizes the inadequacy or irrelevance of such specific assumptions like profit-maximization or mobility of resources guided by freely fluctuating market prices, he is prone to tinkering with only those specific parts of the competitive model, keeping undisturbed the rest of the framework, rather than face the challenge at a more fundamental level of concepts, categories and the nature of economic relationship...

...Property relations between individuals involved in production activity are an integral part of production relations as are the technical characteristics of production. These property relations are particularly complicated in semi-feudal agriculture where power is exercised through privilege as much as through markets."

Bharadwaj's study has clearly indicated the complex nature of market systems existing in Indian agriculture. Sometimes, competitive assumptions fail in fundamental ways in an agrarian economy where the extent of market penetration and the character of markets is not uniform. Bharadwaj (1974a) mentions some of the crucial features that differentiate the agrarian markets as follows:

"...while markets have penetrated into the rural economy in a deep and significant manner, the extent and type of involvement in markets of the different sections of the peasantry are not at all uniform."
The character of markets reflects and to a significant extent is determined by the local patterns of power. At the same time, the functioning of the markets is itself such as to re-inforce the pattern of power. The situation may broadly be sketched as follows: the initial resource position defines the 'bargaining' position of the participants in the various markets. The relative 'bargaining strength' (re-inforced by forces of tradition, custom, social mores) determines the access to resources, the terms on which they can be obtained and the fields of feasible choices open to the individual producer in the various markets or, in short, his current production activities and his income and asset position resulting therefrom. This, in turn, influences his relative 'bargaining' position in the succeeding period.

...broadly speaking, three types of market involvements that may emerge, depending upon the economic position of the participant. There is, first, the category of operators with a clearly dominant 'bargaining' position like the big landlord in the land (lease) market or the money lender in the credit market. These operators are powerful enough to be able to exploit the market from a position of vantage and, more importantly, are able to shape the character of the market relations themselves through contracts which interlock markets. Secondly, we can envisage the category of economically very weak sections of the peasantry, landless agricultural labourers, very small owners or tenants, all of whom have an extremely weak 'bargaining' position in the markets. Yet they cannot avoid involving themselves in market operations.... The third category of peasants falls somewhere between these two; while not powerful enough to exploit markets like the large operators, they can be somewhat more self-reliant than the landless or very small farmers and may be able to protect themselves from markets if they turn unfavourable."

This shows that economic status may play an important role and may influence the degree of land utilisation, cropping pattern, the level of employment and so on.22 Therefore, factor markets will be studied in the light of the above discussion.

22. See Bharadwaj (1974a), p. 4
2.3.1 **Labour Market**

The important aspect concerning this study is the quality and type of labour-use difference on small and large farm which help in explaining the productivity differences. Numerous studies have reported on labour utilisation, by different size groups of farms. The wide coverage was achieved by the Farm Management Survey Reports of the Government of India and some data on labour utilisation for different states are borrowed from them and reported in Appendix II, Table 2.3. They clearly indicate that, as farm size increases, family labour utilisation per hectare of cropped area decreases. On the other hand, hired labour shows the reverse trend. Also total labour utilisation shows a decreasing trend with increase in farm size.

A voluminous literature is available on agricultural labour covering almost all aspects (i.e. supply, demand and wage determination). The recent article by Sardhan (1977) gives a survey of past research. The empirical work done so far on rural labour market can be studied under three broad aspects (i) the size, characteristics and composition of rural working force and employment, particularly the changes over time, (ii) labour demand, implications of agricultural growth with technological change, and (iii) the process of rural wage determination, the allocation of household labour supply and of demand for farm labour by the source of supply. The rural labour force can be classified, on the one hand, into male, female and children, on the other hand into family labour, hired casual labour and attached farm labour, cultivators, and other workers. Most of the studies
highlight the productivity difference among all the above components of rural labour. The second important point regarding the size and characteristics of rural labour over time is that the seasonal nature of agriculture and labour migration play an important role in labour distribution. Some of the studies indicated the productivity differences between the peak and the slack seasons of rural labour and the close relationship between size of farm and labour utilisation.  

The studies covering the second aspect, i.e. labour demand, mainly focuses on the respective employment effects of the seed-water-fertiliser innovation and of the tractor technology depending on the composition of its operational uses on different size of farms. There are no two opinions about the seed-water-fertiliser technology; it is a labour-using one and is normally considered to be technically scale-neutral. But the effective rate of adoption in India, so far, has been rather unequal across size-groups. This has been partly due to the prevailing imperfections in the credit market. Therefore, the distributional gains are also skewed in favour of the large farms. The tractor debate is still going on. But the available studies fail to provide convincing evidence that tractors are responsible for substantial increases, yields, timeliness and gross returns.


24. See Binswanger (198b), The Economics of Tractors in South Asia - An Analytical Review, ADC and ICRISAT, Hyderabad.


The third aspect is about the inadequate literature available on the process of rural wage determination and various implications of institutional differences in modes of wage payment, labour contracts, and the nature of land (lease) markets. The co-existence of unemployment with stable and, sometimes, rising market wage rates has prompted several hypotheses about the nature of labour market imperfections in rural areas. Some of these are as follows:

The first is Lewis' hypothesis of constant level of real wage rate institutionally fixed for minimum subsistence in a labour surplus rural economy, with a perfectly elastic labour supply at that wage. The second, related to that of an institutionally fixed real wage, is in terms of nutritionally-based efficiency wages. It assumes that the rural labour market takes account of the nutrition-productivity relationship. The third is in terms of labour market imperfections arising from the dualism in an agrarian economy with peasants using mostly family labour and capitalist farmers using mostly hired labour. The fourth suggests that the seasonality of labour requirements in agriculture - the required speed and sequence of peak operations encourages 'attaching' of a minimum number of workers in agriculture to a particular farm even if they are not fully utilised throughout the year, and in determining wage rates at levels that would not impede the required availability of labour in the busy seasons. The first two hypotheses have been refuted on many grounds of not being general.

29. In support of this see Sen (1975), Bharadwaj (1974a) and Bardhan (1977).
but only in particular situations, like a closed feudal set up which now, does not either exist nor consider the seasonal nature of agriculture. The last two being pragmatic are receiving more attention. The third hypothesis which is related to a dual-labour system (family and hired) and market imperfections gives importance to the bargaining power of rural labour which is the main factor leading to market imperfection. The bargaining power of rural labour mainly depends on socio-economic status and also on:

(a) distribution of land and number of landless (the more equal the distribution of land, the greater the bargaining power of labour); (b) irrigation (the higher the level of assured irrigation the more work is assured and the greater will be the bargaining power) and; (c) indebtedness, which is related to the income level and/or size of farm (the greater the number of indebted farmers or labourers, the less is the bargaining power of rural labour).

The concluding remark on rural labour market is that the characteristics of the labour market in the agrarian economy cannot be understood without keen observations of the different nature and type of risks that various sections of the peasantry face in the labour market, their varying extent of mobility and freedom of decision-making open to them, the specialised character of agricultural operations, norms and conventions prevalent in operation-wise distribution of work, and the seasonal time-patterns of agricultural activity.
2.3.2 **Land Market**

The land market in India is quite different from the other input markets. Sale and purchase of land is a rare phenomenon but various forms of tenancy are prevalent. Leasing of land by small and landless is common in traditional agriculture. Therefore, any attempt to study the land market must lead to the study of land distribution and the tenurial system. Since the land tenure systems in various regions differ markedly, micro-level studies will be of great importance.\(^{30}\)

In the endless and inconclusive debate that has taken place in the country about the mode of production in Indian agriculture, the focus has been on the name to be given to an assumed single mode of production. For this study, it is not necessary to enter this controversy. The issues are of class structure, class contradictions, and the definition of the ruling class.

Rudra (1978) presents a thesis regarding the class composition of the Indian agriculture. Accordingly, there are only two classes -- "the class of big landowners" and "the class of agricultural labourers", who antagonize each other.\(^{31}\) Landownership plays a decisive role as economic power is derived from landownership leading to different exploiting activities through (a) cultivation with the help of hired labourers; (b) leasing to tenants; (c) money lending; (d) trading in grains and other

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commodities and (e) investments in various kinds of productive as well as unproductive activities in industries and services related to agriculture and the rural society.

The class having these occupations is termed as "class of big landowners" and the other class is agricultural labourers (including landless, landed labourers and poor tenants who do not hire other labourers). The big landowners constitute the ruling class in our agriculture. Thus the above mentioned class structure is associated with unequal access to factors of production creating different bargaining power or different types of farms in rural areas as mentioned by Bharadwaj (1974a).

**Intervention:** Since the market mechanism may fail to give equal access to factors of production in the rural economy, it may become necessary to have government intervention to correct the imbalance. In the past, government intervention was done with economic and/or political motives to change the class structure or the power of different groups in rural areas. The economic objectives of land reforms in India were to raise productivity with a more equitable income and power distribution and create a new structure suited for technological change.

With the above objectives, land reforms at the national level was implemented in the following forms: land ceiling, tenancy legislation, consolidation of holdings and co-operative farming (suitably adjusted to Indian conditions and perhaps without surrender of the individual title of land). By the end

32. Rudra (1978) pp. 1000
of the 1950s almost all States in India had statutory ceilings. With full of loop-holes, it offered ample chances for evasion. In short, "the land reforms in the past failed to deliver the goods as desired from equity and access points of view."

Tenancy: A characteristic feudal institution in India, there are arguments in favour and against tenancy, but the most important

33. For detailed discussion/evolution of different land reform measures see Khusro (1973), Ch-1 to 3, Joshi (1975).

34. In support of this observation there are numerous articles. For details see Joshi, P.C. (1975), Land Reforms in India- Trends and Perspectives, Institute of Economic Growth, Delhi.

35. According to Rudra (1978) "The by-now established intellectual tradition to treating tenancy as a feudal institution almost by definition has probably one of its theoretical roots in the fact that the tenant remains the owner of his means of production...."

"As long as the owner of land is a pure rentier who takes no interest in production decisions and does not perform any entrepreneurial functions and who uses up the rent for purposes of consumption or unproductive investments, tenancy could indeed be regarded as a feudal institution. A tenancy arrangement would be all the more a feudal institution in such historical conditions where there is a relation of domination and subordination between the landlord and the tenant which is extra-economic in nature and which extends much beyond the stipulated conditions regarding the rights and obligations strictly in the matter of crop production on specified pieces of land. Sometimes such a relation pervades all parts of the tenants private and social life. In many situations, the entire village society composed of a majority of poor tenants and other poor peasants is dominated by a handful of non-cultivating landlords, thanks to their power derived from land-ownership. In such situation, characterisation of the village society as feudalistic and treating tenancy as an essential part of such feudalism is quite correct."

"It is important to recognise that tenancy, as an institution, does not necessarily occur as an integral part of a social organisation involving domination based on direct compulsion or extra-economic coercion, nor does tenancy contract necessarily involve such feudalistic features as unpaid or underpaid labour
point is that it is an important economic system (where sale and purchase of land is very rare) to equalise demand for and supply of land in land market. Therefore, its theoretical aspects and the risk hypothesis as described by Hanumantha Rao (1971) are discussed.

"Farm lease contracts may be defined as institutional devices for allocating risk among landlords and tenants (Schultz, 1968). Cash rents guaranteed in advance of production imply that the risks of production are shared entirely by the tenants, while crop-sharing rentals indicate the distribution of such risks among the tenants and the landlords in proportion to their respective share in output. Fixed kind rents settled in advance of production imply the sharing of price uncertainties but allocate the yield risks entirely to the tenants."36

services. Tenancy arrangements can be straightforward contracts between two parties and, when this is so, the arrangement can fit very well into a capitalist social organisation or be a vehicle for emerging capitalist tendencies. The latter is all the more true when the landlord takes interest in production to the extent of sharing in costs and making advances to the tenant to enable him to bear his part of the cost. We have discussed this matter in detail with a lot of supporting evidence in the paper by Bhaduri (1973)."

"Tenancy can be a full-fledged capitalist institution when it is the tenant who is the dominant party and the lessor is a small poor landlord. An emerging trend in different parts of the country is that of enterprising farmers leasing in land from poor small landowners for enlarging the scale of their farm business. It is, of course, true that in quantitative terms, the phenomenon has not yet acquired any great significance. That, however, is beside the point, which is that, tenancy as an institution can accommodate capitalist relations and that too of two kinds. One kind with the landowner as the capitalist and the second with the tenant as the capitalist and both these can and do co-exist with tenancy arrangements which are basically feudal."

The above hypothesis is of relevance for the semi-arid tropics where agriculture is too risky and uncertain than elsewhere. This is one aspect of looking at the lease markets. The other aspect is to know the reasons for which farmers go for contracts and do they have equal access in the matter or what are the imperfections of the lease markets. The answer to this will depend on the social and economic position of the participants. There are two groups of interested parties. First "the class of big landowners" and second "the class of agricultural labourers" (which includes landless labourers, landed labourers, and poor tenants who do not hire other labourers). In the former class, the condition under which they opt for tenurial contract is discussed by Hanumantha Rao (1971 pp. 580-81) as follows:37

"Since conditions of production in agriculture are extremely varying and important decisions must be made at different intervals, large farms may face managerial (supervisory) diseconomies (Robinson, 1962, p. 44). Also, since indivisibilities are relatively few in agriculture, technical gains on a large scale may be negligible (Schultz, 1965, p. 122), especially under labour-intensive farming. Therefore, in situations where the element of uncertainty is smaller and entrepreneurial functions are relatively unimportant and where, therefore, the farm takes on the character of a managerial or supervisory unit, the landlords may find it profitable to lease out (on a share-rent basis), beyond a point, the land they own rather than cultivate the entire holding through hired labour. The incentive to lease out on a share basis, however, would exist only if the landlords can expect that the share rents, on the average, would not be lower than the fixed rents or the net income from own cultivation with hired labour."

This gives sufficient explanation for landlords entering land market. In the case of landed labourers and poor tenants,

the decision to enter the land market and lease-in or lease-out land depends on various factors viz., their resource base, economic conditions, and bargaining power. Without enough alternatives they fight for their survival and are left with two options: either lease-in land and increase their land size to provide sufficient employment to their families or lease-out land and join the labour force. The higher the uncertainty in the labour market, the greater will be the incentive to leasing-in land. Similarly, the higher the uncertainty in production, greater will be the inclination towards share-cropping arrangements. Bliss and Nick (Forthcoming) have discussed the theory of share-cropping and listed the following possible reasons for the existence of share-cropping:

(i) There are labour hiring costs for the landlord, and/or dislike for working for wage labour together with prospective tenants being unwilling to take on the risk of fixed rent.

(ii) The labour market is risky too - the tenant cannot be sure of finding as much work as he likes at prevailing wage rate.

(iii) Incentives, rather than disincentives, effects are provided by share-cropping where labour or effort input is unobservable.

(iv) Mixing labour and fixed rent contracts to achieve risk sharing may be costly and the same goal may be achieved more easily by a share contract.

In addition to a rigorous analysis of the above reasons for share-cropping, more attention should be given to determinants of the particular terms of tenancy. Most of the theoretical work

has been on the circumstances in which share tenancy may or may not occur and most empirical work has been on the incidence of share-cropping.39

There has been valuable theoretical work on the terms of tenancy by Bell and Zusman (1976) where using a game theoretic model of bargaining between tenants and landlords, explicit shares are calculated and values close to one-half are quite easy to generate using Cobb-Douglas production functions. The paper is the first attempt to incorporate bargaining theory. The scope for, and potential value of, further theoretical work is substantial.

2.3.3 Capital Market

The third important factor of production is capital and with a technological breakthrough occurring in parts of Indian agriculture, its importance is further enhanced. Before discussing the capital market, it will be useful to have a quantitative idea about the differences in purchased inputs on small and large farms. The FMS give information about the break-up of total cash input per hectare of cropped area by different size groups of farms. Table 2.4 in Appendix II gives an idea about credit requirements by different size groups of farms. Griffin (1974) and others have agreed that bigger farmers will use the purchased inputs such as fertiliser and irrigation more intensively than smaller ones. Credit to finance inputs is available more cheaply.

to them. It is claimed that there exists a bias of government and financial institutions towards the larger farms, the bias being connected with the influence which larger farmers can bring to bear on these institutions.

The rural capital market has two different sub-markets: Institutional Credit Market and the Informal Credit Market, the former is a formal one while the latter is informal.

The study of capital markets in retrospect shows that informal agents like private money lenders, professional money lenders, landlords, money lenders-cum-traders were dominating the market. Agriculture remained stagnant and debts continued to rise. The main objective of these agents was not agricultural development but to accumulate wealth by lending to small, marginal farmers and landless labourers at the highest possible interest rates. 40

The Royal Commission on Agriculture, while commenting on this situation in 1925, referred to the enormous extent of rural indebtedness. 41 There were clear indications that the informal market failed to distribute the access to factors of production in an equitable manner. Realising the situation, ameliorative measures were undertaken.

A number of remedial measures like the Agricultural Relief Act, Money Lenders Act and others were enacted. 42 While it was necessary to give immediate relief, it was more important to


devise an alternate system to provide credit to the agriculturists through a co-operative credit system. While this was initiated before Independence, it was only afterwards that efforts were directed with greater intensity to promote the co-operative movement (of which co-operative credit was an important part) and other formal government agencies to enter the rural capital market. These formal agencies were the co-operative banks, commercial banks, land development banks and government tezccavi.

**Evaluation of Government Intervention:** The achievement in this direction by government can be judged broadly in two ways: first the extent of improvement in the informal markets, which can be judged by looking at whether there are any changes in the extent to which farmers and other rural classes depend on these markets. Secondly, how much have the formal agencies been able to emerge as a competitive force in the dual market system and are able to provide access to credit to various types of farms.

Table 2.1 shows the comparative importance of borrowings from various sources at three points of time 1951-52, 1961-62 and 1971-72. The position regarding dependency on informal sources did improve somewhat. While in 1951-52 borrowings from informal sources were 92.7 per cent of all borrowings they dropped slightly to 78.30 per cent in 1971-72 with most of the drop occurring prior to 1961-62.

The micro-level data for Maharashtra and Himachal Pradesh are also given in Table 2.1. They indicate much higher proportion

43. Borrowed from AIRCS and AIRDSIS reports by RBI.
### Table 2.1: Cultivators Borrowing from Different Sources

<table>
<thead>
<tr>
<th>Period</th>
<th>Formal</th>
<th>Informal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951-52&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.30</td>
<td>92.70</td>
</tr>
<tr>
<td>1961-62&lt;sup&gt;b&lt;/sup&gt;</td>
<td>18.70</td>
<td>81.30</td>
</tr>
<tr>
<td>1971-72&lt;sup&gt;c&lt;/sup&gt;</td>
<td>21.70</td>
<td>78.30</td>
</tr>
</tbody>
</table>

- **Village Data**<sup>d</sup> (Maharashtra)
  - a) Small: 81.65
  - b) Large: 92.48

- **Village Data**<sup>e</sup> (Himachal Pradesh)
  - a) Small: 61.46
  - b) Large: 100.00

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<sup>a</sup> The data for 1951-52 are taken from All India Credit Survey (1951-52) and the data for 1961-62 taken from All India Rural Debt and Investment Survey (1961-62), Table I, p. 100. For 1971-72 data taken from All India Debt and Investment Survey (1971-72) - Statistical Tables relating to Cash borrowings and repayments of rural households during 1971 to June 1972 and Cash dues outstanding as on 30th June 1972, Statement II, p. 20.

<sup>b</sup> The data from villages (i.e. Kinkheda, Kanzara and Kalman combined) under study at ICAIISAT, 1975-76.

<sup>c</sup> The data from 20 villages under study by ICF of Cultivation Scheme, H.P. University, SIMLA, 1974-75.
of official credit than the RBI averages and may indicate that a significant change took place during the last decade. The data suggest that large farmers borrow more from formal sources than small ones.

Supply of Credit: Most of the formal agencies came into existence in order to alienate both qualitative and quantitative inadequacies of informal sources. Hence, because of the very purpose of their existence, i.e., as a "public intervention" in the market, they have some characteristics such as, non-competition and adherence to overall social goals suggested by the government. Hence their participation in the market influences the situation in terms of volume of credit, accessibility, credit network, disregard to certain market norms etc. As a corollary of all this - the conventional terms of market competition etc. are subdued if not completely neglected.

The informal sources of credit include private and professional money lenders, land lords, big farmers, relatives etc. Here also the theoretical norms for judging competition or market situation hardly helps in reaching any conclusion. Because the interaction of forces e.g. their number and volume of transaction, their class, caste, power position etc. determine the situation or type of market.

The second aspect of supply is how much competition do the formal and informal agents have among themselves. It may broadly be said that there is hardly any competition; on the other hand, they are rather complementary to each other.  

44. See chapter IV for empirical evidence.
Therefore, it is difficult to conclude what type of overall market situation is existing in rural credit market. To judge the success of government intervention in terms of competition with informal agencies and imparting services to different farm classes, following criterion can be used:

(i) Extent to which they served to reduce dependency on informal sources;

(ii) Terms and conditions on which they served and;

(iii) How far they were able to achieve the equity goals.

From the above discussion, it emerges that in the past, there was unequal access to credit market by various size of farms. Hence, it will be important to study the access to credit by various size of farmers, imperfections and biases of formal agencies.

2.4 Production Function and Profit Function Approaches

The framing of objectives and selection of suitable analytical techniques are the most important parts of a study. There are three approaches available to examine the allocative efficiency of farmers: (1) linear programming approach, (2) Production function approach and (3) Profit functions. Linear programming studies are normative and not useful in analysing the present differences among farmers. Profit function studies usually require data for several years which are not available. The choice, therefore falls on production function analysis.

45. Different views are expressed by various authors for example see Donald (1976), p. 88.
The choice of function is generally based on its theoretical fitness to agriculture and its computational manageability. Keeping in view the nature of the problem under study, it is worth mentioning a few relevant functions, viz., Transcendental, log-log inverse and Cobb-Douglas production function. Since almost all production function studies in agriculture have used the Cobb-Douglas type of function, and in order to have comparability with other studies, the choice of the function is further restricted to the Cobb-Douglas type.

2.4.1 **Methodological Issues**

The whole approach of examining the allocative efficiency of farmers by using the Cobb-Douglas production function and judging it on the criterion of equality of marginal value product (at the geometric mean of input) to the market price of inputs, which is relevant for the 'average farms', has been questioned.\(^4\)\(^6\) Bardhan (1973) held that "the equality of market price to the marginal value product at average point directly implies that one section of the farmers are over-allocating their resource and the remaining under-allocating it. In other words, every individual farm is - by the assumption of model itself - inefficient.\(^4\)\(^7\) But if all the farmers are equally efficient, they would be expected to have the same size, same input combinations and the same input-output ratios and hence there could be no regression. Apart from those methodological problems, there are reasons to believe that even if all the farmers maximise their

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47. See Bardhan, P.K. (1973), pp. 1370-1386.
profits, they may not be equally efficient in the use of their factors of production because of imperfections in the factor and product markets and also because of price and weather uncertainties resulting in widening gaps between expected and actual returns. In spite of these limitations, the test of allocative efficiency for the 'average farmer' is quite relevant, at least, for knowing whether agricultural production of a region or a country could be increased profitably to a significant extent by making adjustments in the existing use of the factors of production. With all these drawbacks the Cobb-Douglas production function may still have an edge over the other types of functions because of its simplicity. The important characteristics of the function are briefly discussed below.

The Cobb-Douglas function has globally diminishing returns but marginal returns never reach zero. The output elasticities are constant in this function and the calculation of marginal value products of inputs (at their geometric means) for the average farms is straightforward.48

The next important aspect of model specification for analysing cross-sectional production functions is the selection of variables49 wherein it is necessary to look into: (i) Are the selected variables relevant? (ii) Are all the relevant variables included? (iii) What is the degree of multicollinearity among the variables? and (iv) Is the degree of aggregation appropriate?

Omission of a relevant variable would bias the estimate of the regression coefficients associated with the variables included in the model if the omitted variable is correlated with the included ones. On the other hand, the inclusion of an irrelevant variable does not bias the estimate of the regression coefficients, but it is undesirable since it does not satisfy a criterion of logic behind selecting a variable, reduces the degrees of freedom, increases the possibility of multicollinearity, and possibly leads to autocorrelated residuals.\(^{50}\) A high degree of multicollinearity leads to imprecise estimates of the parameters.

The resource use efficiency of the farmers is judged on the criterion that each factor of production is paid the value of its marginal product. A significant difference between value of marginal product and market price of individual inputs would indicate that the farmers are using their factors of production inefficiently. If the difference between the two is insignificant, this would imply that they are efficient in the use of factors of production.

Hence, MVP's of all factors of production will be calculated (at their geometric means) and will be equated to their respective prices.

\[
\frac{\text{MVP}_{x1}}{p_{x1}} = \frac{\text{MVP}_{x2}}{p_{x2}} = \cdots = \frac{\text{MVP}_{x5}}{p_{x5}} = 1 \quad \cdots(1)
\]

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\(^{50}\) For details see Johnston (1963), pp. 159-169 and 243-249, and Koutsoyiannis (1973), pp. 194-249.
These relationships are based on the assumption of existence of competition in factor market and availability of plenty of capital at a fixed price.\textsuperscript{51} But such an assumption does not usually hold good in a village context. If there are scarcity of resources, only a restricted profit maximising solution can be achieved. The ratios of the above equation can no longer equal unity but the following equiproporionality still holds:

\[
\frac{MVP_{x_1}}{P_{x_1}} = \frac{MVP_{x_2}}{P_{x_2}} = \ldots = \frac{MVP_{x_5}}{P_{x_5}} \quad \ldots \quad (2)
\]

In the Cobb-Douglas case, for a limited capital situation, this implies that capital should be allocated among inputs on the basis of the ratios of the respective elasticities of production.\textsuperscript{52}

\[
\frac{b_1}{x_1 P_{x_1}} = \frac{b_2}{x_2 P_{x_2}} = \ldots = \frac{b_5}{x_5 P_{x_5}} \quad \ldots \quad (3)
\]

The maximisation problem with limited capital can be more easily solved if a profit function approach is adopted.

2.4.2 \textbf{Profit Function}

For a given technology and a given endowment of fixed factors of production, the profit function expresses the maximised profit of a firm/farm as a function of the prices of output and variable inputs and to other exogenous variables such as fixed inputs, or climatic and soil variables. The main assumptions in the formulation of the profit function are:

(a) firms are maximising profits or returns to variable factors of production
(b) firms are price takers in both output

\textsuperscript{51} Achari (1965), pp. 101-107  \textsuperscript{52} ibid, pp. 101-107
and variable input markets, and (c) the production function is concave in the variable inputs.53

The profit function relates maximised profits to the prices of outputs and inputs and to the quantities, if any, of the fixed factors. The usefulness of the profit function arises out of Shephard's lemma which states that the negative of the first derivatives of the profit function with respect to the input prices are the optimal input quantities or the factor demand curves. Instead of having to solve a system of simultaneous equations as in the case of production function approach, one can get the factor demand curves simply as the first derivatives of the profit function. Also the output supply functions are the first derivatives of the profit function with respect to the output prices and they can be estimated jointly with the input demand functions.54

With all advantages of the profit function, it is not possible to use it in this context because of the lack of variability in price data for various inputs in cross-section data with a limited geographic scope.

2.5 Induced Innovation Hypothesis55

In the late 1960's and the early 70's considerable theoretical and empirical evidence was accumulated to the


55. This section heavily draws on the paper by Ryan and Rathorn (1976), "Factor Proportions, Factor Market Access and the Development and Transfer of Technology," ICRISAT, Hyderabad.
effect that the direction and extent of technical change in agriculture in various countries was not a result of exogenous factors, as was presumed earlier. Rather technical change was seen to be endogenously determined by changes in relative resource endowments and hence in relative factor prices, and by changes in the social and economic environment. This induced innovation hypothesis (IIH),56 was originally articulated by Hicks (1932) and was re-stated by Hayami and Ruttan (1971) as below:

"The process of technical change in agriculture can best be understood as a dynamic response to the resource endowments and economic environment in which a country finds itself at the beginning of the modernisation process. The design of a successful agricultural development strategy involves a unique pattern of technical change and productivity growth in response to the particular set of factor prices which reflect the economic implications of resource endowments and accumulation in each society."

(Hayami and Ruttan, 1971, p. 26).

The induction process is described by Ruttan et al. (1977, p. 27) in their more recent exposition as a more explicit process involving farmers, scientists, and administrators.

"Farmers have been induced, by shifts in relative factor prices, to search for technical alternatives which save the increasingly scarce factors of production. Perceptive scientists and science administrators have responded by making available new technical possibilities and new

56. For historical review of work done on Induced Innovation Theory see Ruttan, Binwanger and Hayami (1977), pp. 3-12. In this article the authors have discussed the development of five broad approaches of Induced Innovation Theory, i.e. (i) Growth theory approach, (ii) Micro-economic approach (iii) An investment approach (iv) Demand approach and (v) An evolutionary approach.
inputs that have enabled farmers to profitably substitute the increasingly abundant factor for increasingly scarce factors. Successful scientists and science administrators are encouraged through increased support for their research, to intensify their efforts to eliminate the constraints on production which have the highest economic payoff."

The IIH has so far focussed on the explanation of differential paths of technological change between countries with different resource endowments. Three basic endowment groups have been considered (Ruttan 1977, p. 205). These consist of countries with:

(i) high land/man ratios - called the American type group.

(ii) intermediate land/man ratios - the European type group.

(iii) Low land/man ratios - the Japanese type group.

The land/man ratios of these groups, along with their factor productivity ratios, are shown in Figure 2.1, as reproduced from Ruttan; (1977), p. 206. The American group is situated in its northwest corner; the Japanese group in the southeast corner, and the European group in between. To illustrate the impact of these endowments on the paths of technological change, the contrasting cases of the U.S. and Japan are chosen.57

The U.S. in 1880 had a total agricultural land area per male worker 36 times larger than in Japan. By 1960 this had

57. Most of the following details are taken from Hayami and Ruttan (1971).
**Induced innovation and agricultural development**

**Figure 1.** International comparison of labour/output and land/output ratios in situations characterised by different land/labour ratios.

Diagonal lines represent constant land/labour ratios and numbers in parentheses are percentage ratios of non-agricultural workers to the total economically active population.

increased 96-fold. As a result, the U.S. price of labour rose relative to land whereas in Japan the price of land rose sharply relative to the price of labour. In spite of these vastly different resource endowments, the compound output growth rates were almost the same during 1880 - 1960 i.e., 1.5 and 1.6 per cent annually in the U.S. and Japan respectively. Total factor productivity increased over the same period by 0.7 per cent and 1.0 per cent compound per annum, respectively. However, the patterns of productivity growth were quite different in the two countries. Increases in land area per worker explained more than 80 per cent of productivity growth in the U.S., whereas it was less than 40 per cent in Japan.

The basic reason for the differential productivity growth patterns in these two countries is that in the U.S. the land supply was more elastic than labour, whereas in Japan the reverse was true. With increased demand for farm products in the course of economic development, the prices of less elastic factors rose relatively to more elastic factors. In both countries prices of fertilisers and machinery supplied by the non-farm sector also tended to decline relatively to the prices of land and labour. Such trends induced farmers, public research institutions, and private agricultural supply firms to search for new production possibilities that would offset the effects of the relative price changes. Thus, mechanical innovations of a labour-saving type were induced in the U.S. and genetic research of a yield-increasing type were
induced in Japan. These contrasting paths are illustrated in Figure 2.2 (from Ruttan et al., 1977, p. 34) with Japan's movement being along a much more land-saving path than that of the other countries.

There is an increasing concern at the national and international levels for the development of technologies specifically designed to benefit operators of small farms. The basic premise behind this concern is in the context of the IIM, that the resource endowments of small farms differ substantially from those of large farms in an analogous way to the case of Japan and the U.S. as discussed above. Is there a lesson from the empirical tests of the IIM conducted at the international level for the guidance of research at the farm level?

2.5.1 Induced Innovations and Technologies for Small Farms

There is a widespread agreement on the importance of technology as a source of growth for agriculture (Schultz, 1964). Furthermore, there is increasing evidence that factor endowments and relative factor prices play an important role in inducing technological change in directions which augment the supply of scarce factors (Hayami and Ruttan, 1971). In India the "Green Revolution" due to technological change has been widely

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59. The use of modern inputs such as fertilizers, high-yielding varieties of seeds, tractors, pumps, threshers and harvesters combined.
FIGURE 2.2 INPUT-OUTPUT RATIOS FOR SIX COUNTRIES, 1880-1970 (in logs). DIAGONALS ARE LAND/LABOUR RATIOS.

Source: Reproduced from Ruttan et al. (1977)
discussed and analysed. While Vyas pleads for a small farm bias in both technology and institutions, Rao finds no fault with the technology and emphasised the institutional part only. On distributional impact of technological change among producers Binswanger (1976) also argues that, if access to input and credit markets is unequal prior to the introduction of new technology, any scale neutral innovation which leads to greater dependence on these markets will lead to a regressive distribution of gains. Hence, one needs to study whether there is a need for a differential technology for small farms.

60. For good review work on Green Revolution see Byers (1972), pp. 99-116.