



*International Food and Agribusiness Management Review*  
*Volume 11, Issue 4, 2008*

## **India's Agrarian Crisis and Corporate-Led Contract Farming: Socio-economic Implications for Smallholder Producers**

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### **Abstract**

The paper discusses India's agrarian crisis and the role of corporate-led contract farming in addressing these crisis. A two-stage Heckman model was used to explain determinants of participation in contract farming, and whether participation in contract farming affects farm income. The results indicate that contract farming has a positive impact on crop productivity and farm income. The socio-economic factors that influenced participation in contract farming were education, age, farm size, access to institutional credit, source of off-farm income and membership to an organization. Factors related to the likelihood of participation in contract farming slightly differed from the factors affecting farm income.

**Keywords:** Agrarian crisis, Smallholder producer, Corporate-led contract farming, Agricultural Produce Marketing (APMC) Act, Heckman model

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## **Introduction**

The importance of the agricultural sector in the economic development of India is clearly indicated by its contribution to the national gross domestic product (GDP). In 2006-07, agriculture contributed 18.5 per cent to GDP (at current prices), industry 26.4 per cent and services 55.1 per cent (GOI, 2008). The agricultural sector is also important to the socio-economic development, as about 70 per cent of the population live in rural areas and most of them depend on agriculture.

While the economy has been growing at about 8 per cent yearly, agriculture growth has been dismal at nearly 2 per cent during the last ten years. This is in sharp contrast to the average annual growth rate of more than 4 per cent during the 80s and early-90s. It is this sharp decline in agricultural growth that is causing distress in rural areas.

The current crisis has led to renewed focus on agriculture and the government has launched several programmes to tackle the crisis. The government has initiated various reforms such as agricultural market sector reforms, research and development, investment, formulation of integrated food laws, incentives for corporate investment in agribusiness sector, etc. A favourable regulatory environment has attracted the interest of several large corporate to agriculture. While earlier corporate intervention in agricultural activities was limited to agri-input companies, the recent times have witnessed a spurt in initiatives by other industry players as well. These companies offer services such as extension, supply of inputs, market information, etc. to the farming community and commit themselves to purchase farm produce.

Contract farming is increasingly being presented by the government as a solution to the problems of Indian agriculture. Private sector participation promoted through contract farming and land leasing arrangements will allow accelerated technology transfer, capital inflow and assured markets for farmers. Corporate contract farming has taken off in states such as Punjab, Haryana, Maharashtra and Gujarat. However, it is argued that only big farmers benefit from contract farming and under direct purchase arrangements by the private sector small and marginal farmers are likely to be left out.

This paper discusses the role of corporate-led contract farming in transforming socio-economic relations in the countryside. It also investigates the determinants of participation of farmers in contract farming and the effects of participation on crop productivity and farm income.

## **Contract Farming in India**

There is a perception that because of market liberalization, globalization, and expanding agribusiness, small farmers will find difficulty in participating in

restructured markets and could become marginalized. One of the reasons for their exclusion is weak backward (inputs and services) and forward (agro-processing and marketing) market linkages. Farmers have poor access to reliable and cost-efficient inputs such as seeds, fertilizers, credit, extension services, and assured and profitable markets for their output. Well-organized contract farming is expected to provide such linkages, and would appear to offer an important way in which small farmers can be linked to the market. Through contract farming, agribusiness companies can assist smallholders to shift from subsistence or traditional agriculture to the production of high-value/export-orientated products. This not only has a potential to increase incomes of smallholders but also to have multiplier effects in the economy.

Contract farming can be defined as an agreement between a farmer and processing and/or marketing firm for the production and supply of agricultural products under forward agreements, frequently at predetermined prices (Charles and Shepherd, 2001). The arrangement also invariably involves the purchaser in providing a degree of production support through, for example, supply of inputs and provision of technical advice. The basis of such arrangements is a commitment by the farmer to provide a specific commodity in quantities and on quality standards determined by the purchaser and a commitment by the company to support the farmer's production and to purchase the commodity. Contract farming is an intermediate production and marketing system that spreads production and marketing risks between agribusiness and smallholders. Similarly, it also provides agribusiness companies with the opportunity to guarantee a reliable source of supplies of required quantity and quality. It can be regarded as a means of reducing high transaction costs that result from the failure of the market and/or government to provide required inputs and market institutions.

The intensity of the contractual arrangement varies according to the depth and complexity of the provisions in each of the following three areas (Charles and Shepherd (2001) :

*Market provision:* The grower and buyer agree to terms and conditions for future sale and purchase of a crop or livestock product

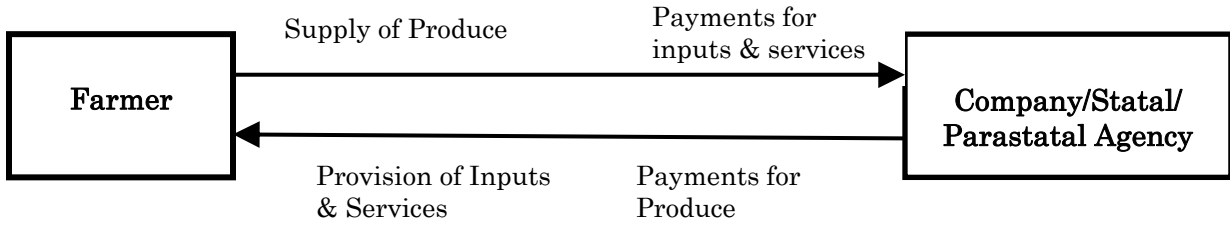
*Resource provision:* In conjunction with marketing arrangements the buyer agrees to supply selected inputs, including on occasions land preparation and technical advice

*Management specifications:* The grower agrees to follow recommended production methods, inputs regimes, and cultivation and harvesting specifications.

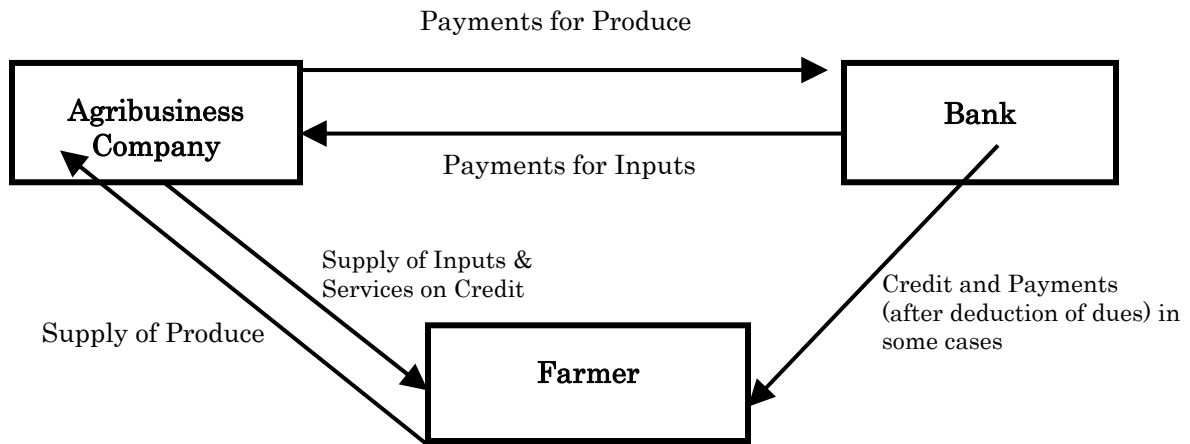
Contract farming emerged as an important phenomenon in developed countries during the 50s and 60s. By 1980, about one-third of total US farm output, and as much as 100 per cent of poultry meat, milk, and certain vegetables, were produced under contracts (Little and Watts, 1994). In developing countries, multi-national corporations introduced contract farming during the late 70s and early 80s. Contract farming in India is not a new phenomenon as informal contract farming has been practised by cooperatives in some commodities like milk and sugarcane for quite some time. However, corporate-led contract farming system in India is a recent phenomenon.

Until recently, there were several restrictions on participation of the corporate sector in agriculture and all related activities. The Essential Commodities Act (ECA) of 1955 restricted trade in food products to licensed traders, and defined limits on stock holding. Food processing was reserved for the small-scale sector. Most importantly, the Agricultural Produce Marketing Committee (APMC) Act required that farm produce be sold only at designated government markets through registered intermediaries. Under the Act, the private sector was not allowed to buy directly from farmers. Farmers were also restricted from entering into direct contract with any buyer because the produce was required to be channelized through regulated markets. These restrictions acted as disincentive to farmers, trade, and industries. The Central government, therefore, drafted a model APMC Act (since agriculture falls under the jurisdiction of state governments) in 2002, which allowed private players to set up markets not regulated by the market committees. The model APMC Act provides an institutional framework to support contract farming and direct marketing which would link small farmers to the agro-processing industry and provide them an access to better technology, extension services, seeds, credit, and market linkages. Several state governments have already initiated steps to amend the Agricultural Produce Marketing Committee (APMC) Act. Punjab, a leading agricultural state, was one of the first to amend the APMC Act.

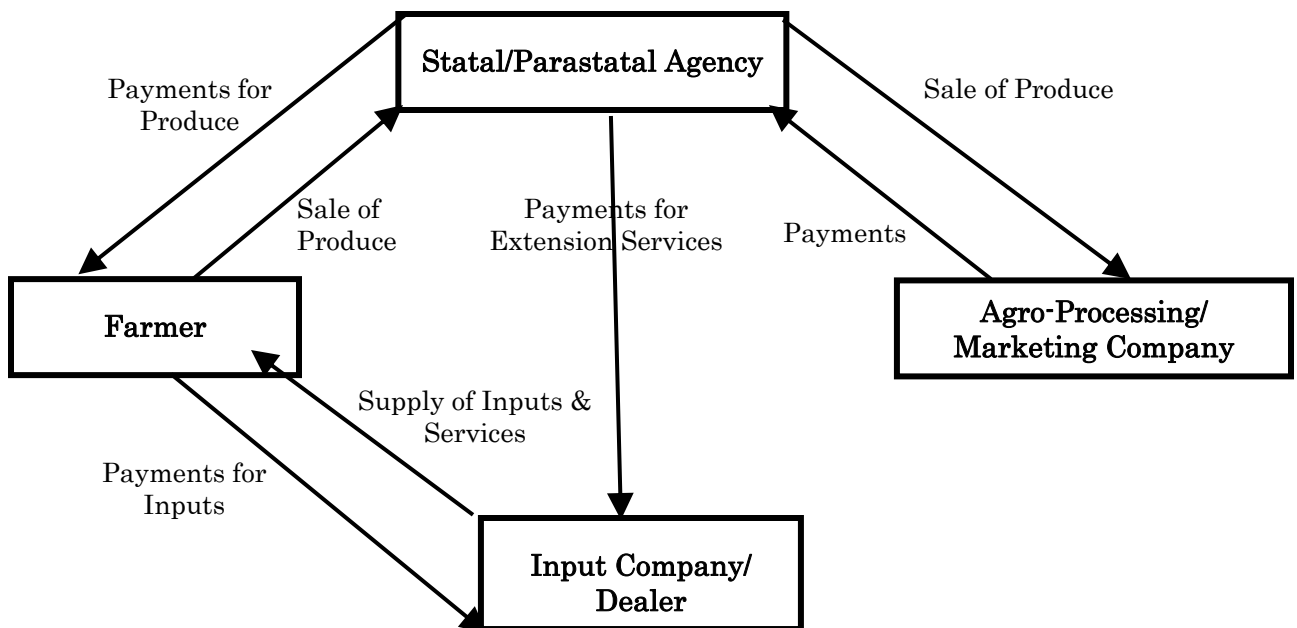
The first contract farming initiative in India was taken by Pepsi Foods Ltd (PepsiCo) in 1989 which set up tomato processing plant in Punjab. With the liberalization of the economy in the 90s, there has been a spurt in contract farming in India. Contract farming is practised by domestic and multi-national corporations in foodgrains, spices, oilseeds, fruits and vegetable crops, cotton, tea, coffee, etc. Financial institutions and banks are also promoting contract farming. Different contract models are available to farmers and agribusiness ranging from simple buyback of produce to provision of inputs and services; single company model to consortium of companies (agri-input, processing, banks, etc.) including statal and parastatal agencies. The partnership will depend on the available institutions to support production and product markets, commodity being produced, resource base of producers and capacity of agribusiness firms. Important contract farming models being practised in India are presented in Figures 1-4.



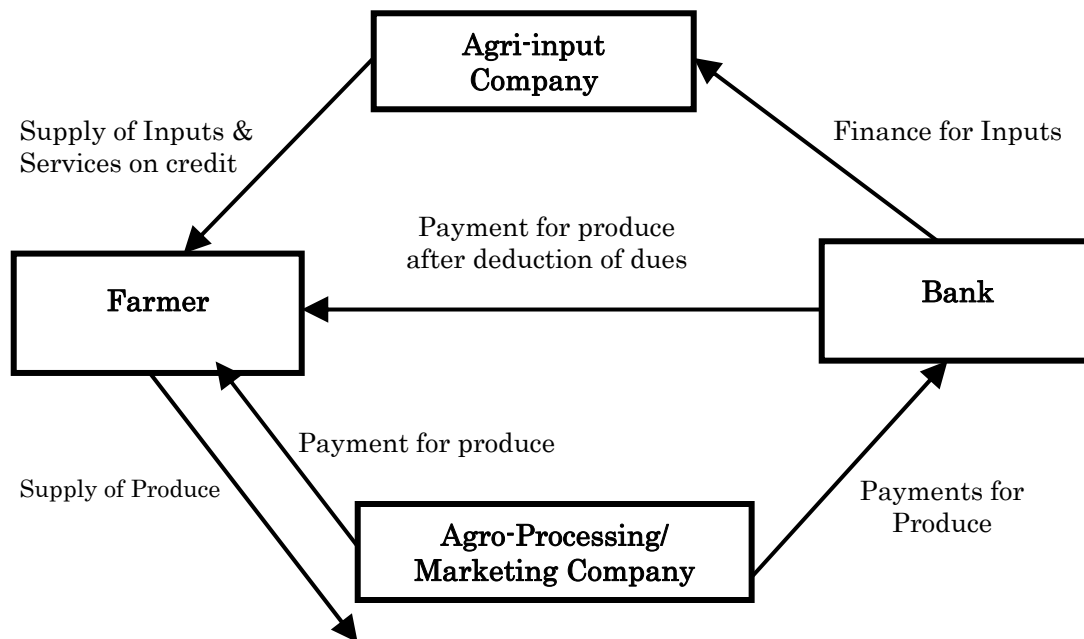
**Figure 1.** Bipartite Agreement between Farmer and Company/Statal/Parastatal Agency



**Figure 2.** Tri-partite Agreement between Farmer, Company and Bank



**Figure 3.** Quad-partite Agreement between Farmer, Input Supplier, Agro-processing Company and Statal/Parastatal agency



**Figure 4.** Quad-partite Agreement between Farmer, Agro-processing/Marketing Company, Agri-Input Company and Bank

## India's Agricultural Sector Crisis

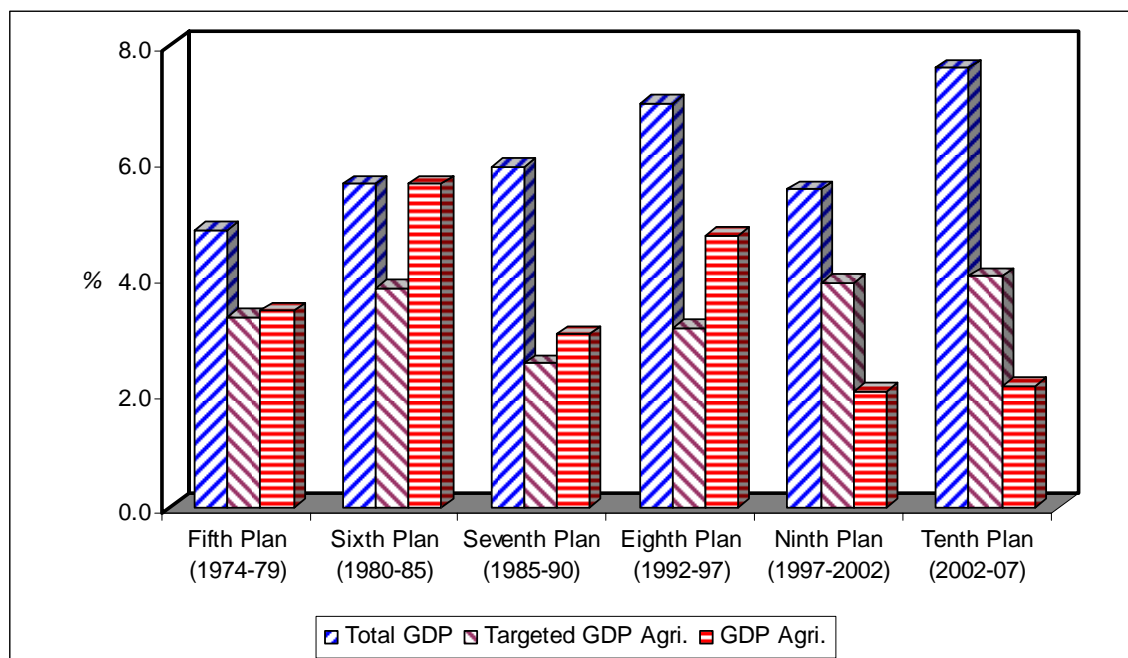
This section discusses deceleration in the agricultural sector, declining investment, deteriorating institutions mainly extension agencies, and ecological crisis in Indian agriculture.

### *Deceleration in Agricultural Sector*

While India's GDP grew at an annual compound growth rate of 7.6 per cent during the tenth plan<sup>2</sup> (at 1993-94 constant prices), agricultural growth declined to nearly 2 per cent, resulting from stagnation or decline in productivity. Plan-wise trends of growth of GDP and agriculture show that India's agricultural sector has grown more than targeted growth during the sixth, seventh, and eighth plans but fell short

<sup>2</sup> After independence, India opted for a centrally planned economy to achieve an effective and equitable allocation of resources and balanced economic development. In order to achieve these objectives the Planning Commission, headed by the Prime Minister of India as its chairperson, was set up in 1950 and given the responsibility of formulation and direction of the five-year plans. Five year plans build a long term strategic vision of the future, decide on national priorities, work out sectoral targets, and provide promotional stimulus to the economy to grow in the desired direction. The First Five-year Plan was launched in 1951 and currently eleventh plan (2007-2012) is in progress. The content and the strategy of successive five-year plans have varied in response to development issues being addressed.

of the target during the ninth and tenth plans. During the tenth plan, agricultural GDP grew at an annual rate of mere 2.1 per cent against the target rate of 4 per cent (Figure 5). Considering the importance of agriculture in the Indian economy, it would be difficult to imagine India meeting the targeted growth of 9 per cent during eleventh plan without strong agricultural growth.



**Figure 5.** Plan-wise Trend of Growth of GDP and Agriculture GDP including Allied Sectors (at 1993-94 constant prices)

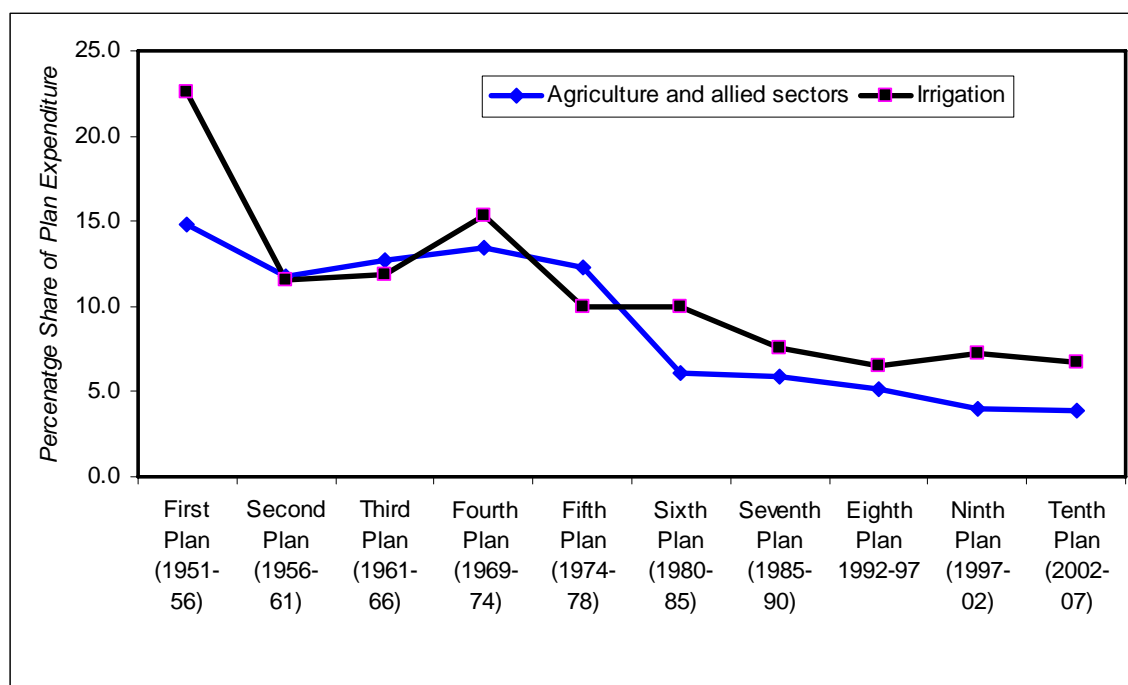
Source: GOI (2006)

### *Declining Investment and Rising Subsidies*

One of the important reasons for deceleration in agricultural growth has been declining levels of investment in agriculture and allied sectors, particularly public investment. The share of agriculture and irrigation in plan expenditure has declined from 37.3 per cent in first plan to 10.6 per cent in the tenth plan (Figure 6). The share of the public sector in gross capital formation in agriculture has declined from 30.9 per cent in 1995-96 to 25.6 per cent in 2003-04, while the share of the private sector has increased from 69.1 per cent to 74.4 per cent during the same period (Sharma, 2007). The share of agriculture sector's capital formation in GDP has declined from 1.9 per cent in the early 90s to about 1.2 in the early 2000s, which is a cause for concern. However, there is an indication of reversal of this trend of late, with public sector investment in agriculture reaching the highest level since

the early 90s at Rs. 5,249 crore<sup>3</sup> in 2003-04 at 1993-94 prices (GoI, 2007). This has helped in improving the share of agriculture sector's capital formation in GDP from 1.28 per cent in 2001-02 to 1.31 per cent in 2003-04.

A key reason for declining public investment in agriculture has been ever increasing agricultural subsidies. Total agricultural subsidies have increased at an annual compound growth rate of about 12 per cent between 1993-94 and 2002-03. Trends in food and fertilizer subsidies during the 1990s and 2000s are presented in Figure 7. Subsidy on fertilizers has increased from Rs. 4389 crore in 1990-91 to about Rs. 22,452 crore in 2006-07 (at an annual compound growth rate of 10.6 per cent). Food subsidies have also witnessed a significant growth during the 1990s and 2000s, rising from Rs. 2450 crore in 1990-91 to Rs. 24,200 crore in 2006-07. Food and agricultural subsidies are far greater than public investment in agriculture and allied sectors. In addition there has been deterioration in quality of institutions/organizations providing inputs and services such as credit, seeds, technology, extension, etc.

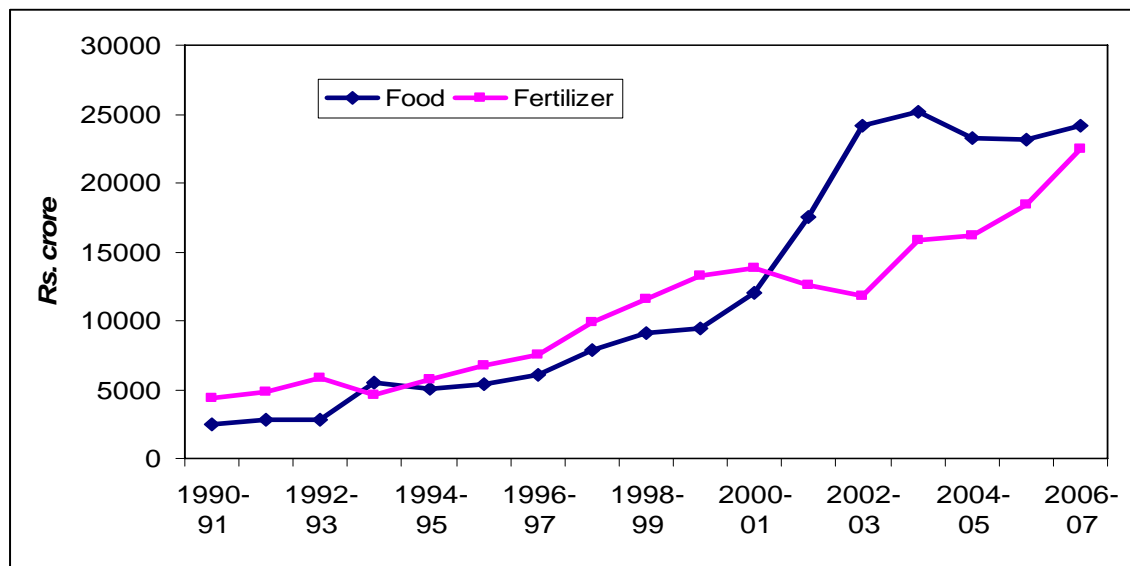


**Figure 6.** Share of Agriculture and allied Sectors, and Irrigation in Total Plan Expenditure during Plan Periods

Source: GOI (2001)

<sup>3</sup> 1 crore = 10 million; 1 US\$ (as on June 8, 2008) = Rs. 42.79





**Figure 7.** Trends in Food and Fertilizer Subsidies in India

**Source:** CSO (2008); GOI (2008)

To boost growth rates in agriculture, India needs massive investments in agriculture, particularly public investment. There is ample evidence to suggest that returns on input subsidies are typically lower than returns on investments in public goods. Investment in public goods such as agricultural research and extension, rural roads, and irrigation typically produce returns two to six times greater than spending on input subsidies (Fan, Zhang and Zhang, 2003; Fan, Hazell and Thorat, 1999, Fan, Zhang and Rao, 2004). Therefore, a reorientation of public spending from input subsidies and increased investment in public goods is likely to accelerate agricultural growth. Many of the key investments required to accelerate agricultural growth – technological research, rural infrastructure, etc. - are public goods. Because the private sector cannot capture gains from these investments, they will not invest in amounts sufficient to ensure broad-based agricultural growth. Therefore, public sector needs to provide the necessary technological, institutional, and rural infrastructure to stimulate agricultural growth. But public investments in agriculture have been stagnating or falling over years, while the subsidy bill on food, fertilizer, power and irrigation has been ballooning. If Indian policy planners can reverse this trend, much of the problems of Indian agriculture will solve themselves.

The government is aware of the problem of misdirected and unsustainable subsidies. In its approach paper to the mid-term appraisal of the tenth plan (2002–07), the Planning Commission has indicated that the existing farm price support and procurement policies combined with input subsidies on fertilizer, irrigation, etc. have led to a sharp increase in subsidy based support while public investment in

agriculture has suffered. The outcome is inequitable since subsidies typically go to rich farmers in irrigated areas, while lack of public investment hurts poorer farmers and those in arid regions. However, agricultural subsidies are a politically complex and sensitive subject. The logic that the present subsidy regime benefits better-off farmers disproportionately has failed to carry much political weight. It is also true that even small and medium farmers depend crucially on subsidized inputs such as seeds, fertilizer, irrigation, etc. Attacking subsidies, therefore, translates politically into a direct attack on all farmers' interests.

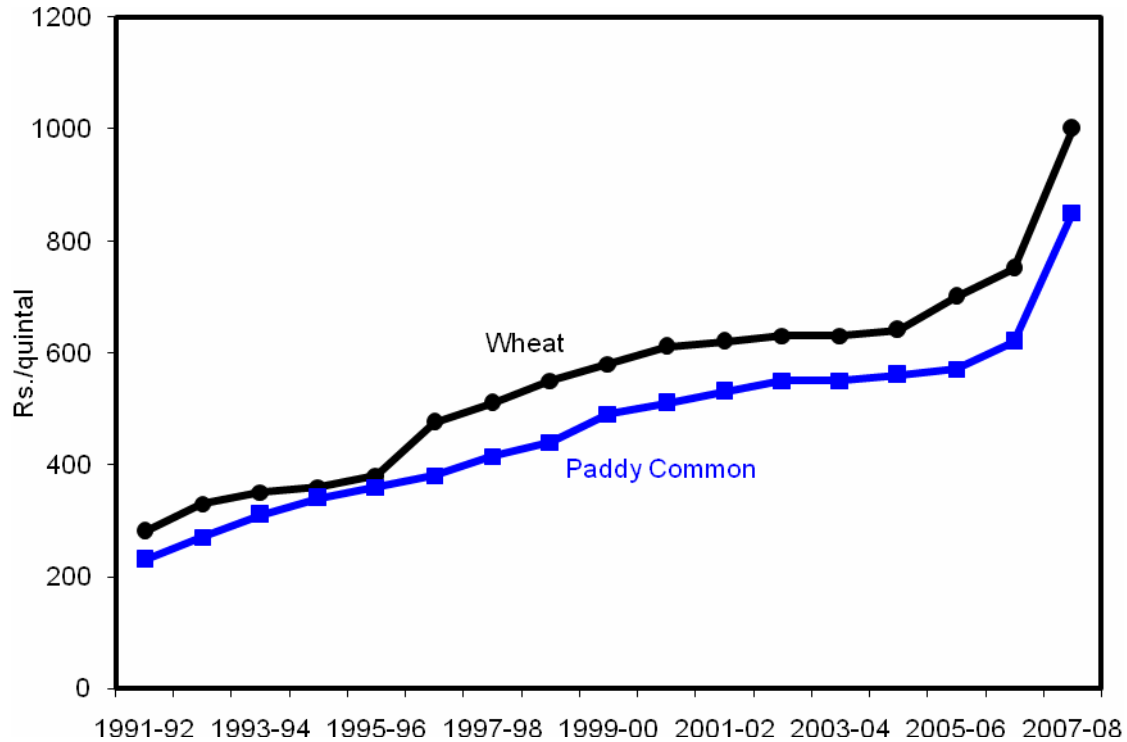
### *Declining Farm Size and Land Fragmentation*

The agrarian structure in India has undergone significant structural transformation since the 70s. Recent data show that the share of marginal and small farmers (farmers owning <2 ha) has increased from 69.7 per cent in 1970-71 to approximately 82 per cent in 2000-01 (GOI, 2007). The average farm size has declined from 2.3 ha in 1970-71 to 1.69 ha in 2000-01. The average size of land holdings in India is not only very small but is subject to fragmentation owing to imposition of ceilings on land holding, population increase, inheritance laws which have stipulated an equal division of property among sons, lack of off-farm occupations, etc. Such small holdings are often overmanned, resulting in disguised unemployment and low productivity of labour. Moreover, there are several tenancy restrictions in many states, ranging from a complete ban of leasing in some states to complete freedom in some states. There is growing consensus about the need to have a relook at current tenancy legislations, which sometimes restrict participation of the private sector in agriculture. However, under the Indian constitution, land administration falls under state governments and reforms at the state level are most difficult to bring about.

### *Dominance of Rice-Wheat Cropping System and Stagnant Productivity Levels*

Foodgrains continue to occupy an important place in Indian agriculture. Commercial crops such as fruits and vegetables, fibres, condiments and spices, etc. have reported significant increase at the national level during the last decade. The share of foodgrains in the cropped area has declined from about 77 per cent in 1971-72 to about 65.6 per cent in 2001-02. Area under rice has remained almost constant at about 23 per cent while area under wheat has increased from 11.5 per cent to 14 per cent of the cropped area. However area under coarse cereals declined significantly from about 27 per cent in 1971-72 to 16 per cent in 2001-02. Area under pulses has also declined from 13.3 per cent to nearly 12 per cent. In agriculturally developed states like Punjab and Haryana, the rice-wheat monocropping system is predominant. Rice and wheat account for more than three-fourth of the cropped area in Punjab. Share of rice and wheat in the cropped area have increased in recent years. The reasons for this increase are steady increase in minimum support prices (MSP) of wheat and rice and assured procurement by the

government. MSP of wheat has increased from Rs. 280 per quintal in 1991-92 to Rs. 1000 per quintal in 2007-08 and in the case of rice it has increased from Rs. 230 to Rs. 850 per quintal (Figure 8).

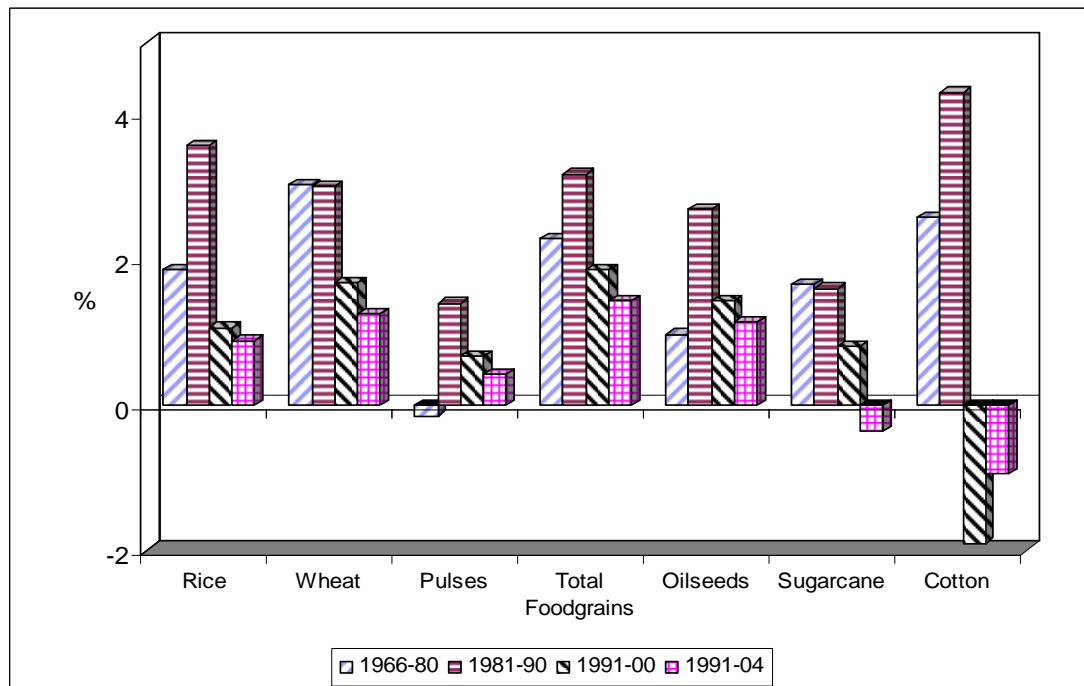


**Figure 8.** Minimum Support Prices of Wheat and Paddy in India  
**Source:** GOI (2007)

Another major problem is of stagnant rate of growth in agricultural productivity. As shown in Figure 9, productivity of wheat, coarse cereals, pulses and oilseeds has decelerated during the last decade which is a cause for concern.

### *Ecological Crisis*

States like Punjab and Haryana that spearheaded the Green Revolution in the 60s and 70s are facing a major crisis on the agricultural front. Because of the high yielding varieties (HYVs) of seeds during the green revolution period and assured market and price for marketable surplus, rice-wheat crop rotation became dominant. HYVs require assured supplied of water and large amounts of chemical fertilizers and pesticides, which have long-term ecological consequences. About 73 per cent of irrigation in the Punjab is from tubewells and the remaining from



**Figure 9. Growth Rates of Productivity of Principal Crops in India**

Source: Computed from GOI (2007)

government canals. With rice being heavily water dependant, farmers have every reason to over-exploit groundwater. The inevitability of groundwater extraction has been politically exploited too. Successive governments have even given free electricity to farmers in the state. Water tables have fallen at alarming rates in many places in the state during the last few decades. The government's policy of providing free electricity for agriculture and very low water charges for canal water have encouraged inefficient use of irrigation water. Intensive use of tubewell irrigation has led to depletion of water resources in the state. About 98 per cent of groundwater resources in Punjab have already been exploited. Nearly 59 per cent of development blocks have overexploited groundwater resources, the highest rate in the country, and another 12 per cent are in dark/critical zone. Injudicious use of canal-irrigation water without regard to soil conditions and inadequate attention to drainage have led to water-logging and salinity in many areas, resulting in valuable agricultural land going out of use.

### *High and Imbalanced Use of Chemical Fertilizers*

There has been a substantial increase in fertilizer consumption in the country. Total NPK (N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O) consumption has increased from 0.7 lakh tonnes in 1950-51 to 22 million tonnes in 2006-07. Per hectare consumption of fertilizers, which was

less than one kg in 1951-52 has increased to about 113 kg in 2006-07 (FAI, 2007). In addition, overuse of nitrogenous fertilizers because of higher amounts of subsidy on urea has led to imbalanced use of fertilizers. The N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O ratio in Punjab and Haryana (agriculturally the most progressive states) is one of the most distorted at 20:6:1 and 30:9:1, respectively as against the generally recommended 4:2:1 (FAI, 2007). In short, intensive use of inputs mainly irrigation water and chemical fertilizers, which was central to the green revolution, has created an ecological crisis in the some states. If remedial action is not taken, the ecological crisis is bound to worsen.

### *Contract Farming Initiatives to Address Agrarian and Ecological Crisis in Punjab*

Concerns about the crisis in Indian agriculture and ecological problems were expressed way back in early 90s. Some state governments and the central government initiated reforms like involvement of the corporate sector in agriculture through contract farming for better access to inputs, extension services, and credit from agribusiness companies; diversification towards high-value agriculture, and assured markets. Contract farming is also supposed to eliminate and/or reduce market and price risks, which farmers face. However, it all depends on the nature of contracts, legislation for regulation of contract farming, enforcement, dispute resolution mechanisms, etc. Punjab is one of the states to introduce contract farming to promote diversification of agriculture, risk management, and address the larger issue of agrarian crisis. The Punjab Agro Foodgrains Corporation (a government parastatal) has been helping in diversifying agriculture through promotion of contract farming in the state. This was facilitated by the state government's incentives such as reduction and/or waiver of certain usually mandatory charges like market fee and rural development cess associated with procurement of agricultural commodities. Pepsico was the first company to start informal contract farming with basmati rice in 1998, followed by Hindustan Lever (HLL) in 2000. At present, several companies are involved in contract farming in the state. This paper is an attempt to understand the socio-economic implications of corporate-led initiatives in agriculture.

## **Methodology**

The study was conducted in three districts of Punjab, Amritsar, Jalandhar and Ludhiana. Initially 150 farmers were selected through stratified random sampling but finally 127 farmers (87 contract farmers and 40 non-contract farmers) formed the sample since 23 households provide incomplete information on most of the parameters. Households were interviewed between May 2007 and October 2007.

### *Econometric Model*

In this section we wish to explain determinants of participation in contract farming, and whether participation in contract farming scheme affects farm income. To explain these relationships, we have to account for unobserved factors that may affect both likelihood of participation and farm income. We do this by applying a two-stage Heckman model (1979) to produce statistically unbiased estimates of programme impacts. Two equations estimate the impacts of farmers' characteristics on decisions to participate in contract farming programme. We use this information to produce a statistically unbiased estimate of the impact of program participation on farm incomes. In the first stage a probit model, which is a choice model where the dependant variable is a binary variable (zero [0] or one [1] type of response) is used. This model is estimated using probit model to evaluate the determinants of farmers' participation in contract farming. The second stage model uses ordinary least squares (OLS) method for estimating the impact of contract farming on farm income. The first stage model is specified as:

$$Z_i = \alpha_0 + \alpha_1 \text{ AGE} + \alpha_2 \text{ EDUCATION} + \alpha_3 \text{ Farm Size} + \alpha_4 \text{ CREDIT} + \alpha_5 \text{ EXTENSION} + \alpha_6 \text{ MEMBERSHIP} + \alpha_7 \text{ OFF-FARM INCOME} + \varepsilon_i \quad (1)$$

$Z_i$  is equal to 1 if the respondent is a contract farmer, 0 otherwise. Equation (1) is estimated using a bivariate probit model. After estimating equation (1), an inverse of the mills ratio (IMR) is computed for each observation and included as an independent variable in the second stage model.

The second stage model is:

$$Y_i = \beta_0 + \beta_1 \text{ AGE} + \beta_2 \text{ EDUCATION} + \beta_3 \text{ Farm Size} + \beta_4 \text{ CREDIT} + \beta_5 \text{ EXTENSION} + \beta_6 \text{ MEMBERSHIP} + \beta_7 \text{ OFF-FARM INCOME} + \beta_7 \text{ IMR} + u_{ij} \quad (2)$$

Farm income  $Y_{ij}$  is hypothesized to be affected by farmer's participation in contract farming and  $\beta_i$ s are the estimation parameters. We estimate the model using OLS. Based on the theoretical framework and previous research, several hypotheses are formulated. Household heads who are younger are hypothesized to be more likely to participate in contract farming. Education is expected to have a positive effect on the likelihood of participation in contract farming and farm income. Households with more assets such as land are expected to be more likely to be part of contract farming initiatives. Those who have better access to institutional credit, extension services, off-farm income and are members of farmers' groups/cooperatives, etc. are more likely to participate in contract farming and have higher farm income.

## Results and Discussion

The following discussion is focused on identifying and comparing factors that can be used to explain differences in participation in contract farming. Results for participants of contract farming are compared with non-participant farmers.

### *Socio-economic Characteristics of Sample Households*

Table 1 shows demographic and socio-economic characteristics of sample households. Almost all households in the sample were male-headed with an average family size of six members per household under contract farming and nine members in the case of non-contract households. Contract farming farmers were more educated, had larger farm size, and were young compared to non-participants. Crop farming is a main occupation for almost all contract and non-contract farmers. Dairy farming is a subsidiary occupation for more than 80 per cent of households.

The average size of operational holdings was higher (10.3 hectares) in the case of contract farmers than non-contract farmers (4.8 hectares). Tenancy is allowed in the state, therefore, leasing of land is quite common. The average area under lease is higher in case of the contract farmers than non-contract farmers. Area under lease has increased from 2.3 hectares in 2002 to 4.3 hectares in 2007 in the case of contract farmers; while the corresponding figures for non-contract farmers are 1.4 and 2.2 hectares. Largely medium and large farmers lease-in land to increase their operational holding to enter into contract farming, since most companies prefer large landholdings. Fixed rent and payment in cash are dominant practices. The average cropping intensity is marginally higher in the case of contract farmers than non-contract farmers.

### *Cropping Pattern*

Farmers grow a variety of crops in the study area but rice (basmati and non-basmati) is the main crop occupying 41 per cent of the gross cropped area during summer and wheat (34.9%) in winter, accounting for over three-quarters of the cropped area. Area under basmati rice has increased between 2002 and 2007, whereas, area under non-basmati rice has declined during the same period. The cropping pattern of non-contract farms is also dominated by rice (36 per cent) in summer and wheat (42 per cent) in winter season. It is interesting to note that area under basmati rice is significantly higher (23 per cent) in the case of contract framers than non-contract farmers (8%). In contrast, area under non-basmati rice is higher (28%) in non-contract farmers compared to contract farmers. It is evident that there is shift in area from water-intensive non-basmati rice to less water intensive basmati rice by both contract and non-contract farmers. However, this shift is more pronounced in the case of contract farmers than non-contract framers.

These results clearly show the impact of government efforts to shift area from water-intensive non-basmati rice to less water intensive basmati.

**Table 1. Socio-economic Characteristics of Contract and Non-contract Farmers\**

	<b>Contract farmers</b>	<b>Non-Contract farmers</b>
Age of household head (Years)	38 (8.10)	43 (9.23)
Education (Years of schooling)	10 (2.86)	7 (3.85)
Family Size	6 (1.24)	9 (0.99)
Main occupation		
Agriculture	94	100
Subsidiary		
Dairy	80	87
Others	20	13
Farm size (ha)	10.3 (8.40)	4.8 (3.38)
Leased-in-land (ha)	4.3 (3.82)	2.2 (3.79)
Area under rice + wheat (% to total cropped area)	76 (11.32)	78 (14.36)

Figures in parentheses show standard deviations

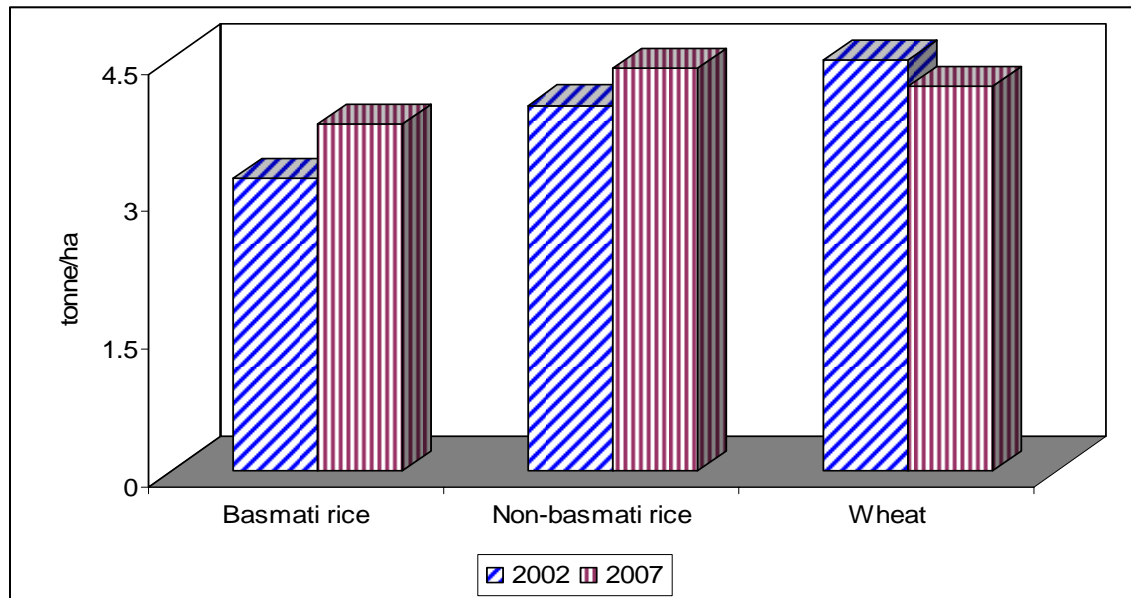
### *Impacts of Contract Farming on Crop Productivity*

Contract farming has been used to promote new high-value crops, which are more input intensive, risky, and market dependent for profitability, to lower costs either by yield improvement or cutting input costs through better quality inputs and services, and to raise returns by value addition to primary produce. In order to examine impact of contract farming on yields, we compared productivity levels of major crops such as rice (basmati and non-basmati) and wheat between 2002 and 2007 on contract farms as well as between contract and non-contract households in 2007.

Per hectare productivity of basmati rice under contract farming showed an increase of about 19 per cent (3.8 tonnes in 2007 against 3.2 tonnes in 2002), followed by non-basmati rice (10 per cent increase). Wheat productivity declined from 4.5 tonnes per ha in 2002 to 4.2 tonnes in 2007, which is consistent with state level productivity trends (Figure 10). Because of improvement in crop productivity, area under basmati increased over the years.



A comparison of productivity levels between contract and non-contract farmers shows that the average yield of rice (basmati and non-basmati) is higher in the case of contract farmers (Figure 11). Basmati rice yield is about 23 per cent higher in the case of contract farmers than non-contract farmers. Important reasons for higher yield include better quality seeds, appropriate crop management practices introduced by sponsors, and close monitoring of the crop at all stages. The average cost of production is higher on contract farms than non-contract farms but increased costs are compensated by higher yields. Net income per hectare is higher on contract farms than non-contract farms (Sharma, 2007).

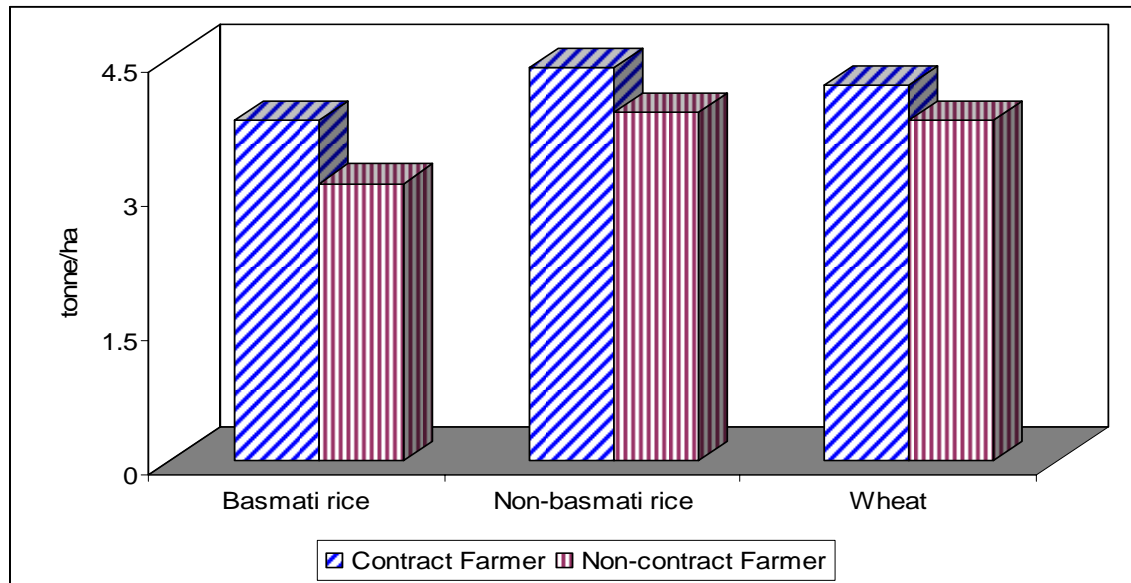


**Figure 10.** Trends in per hectare Productivity of Rice and Wheat on Contract Farms

### *Perceived Benefits of and Constraints in Contract Farming*

Selected households were asked to list reasons for adopting contract farming and the results are presented in Table 2. Although producers participate in contract farming for many reasons, access to assured market was the most opted reason with 76 per cent respondents. Assured price was another reason for adopting contract farming in the case of about two-thirds of the respondents. This shows that farmers prefer assured market to assured price. Some companies offer a floor/minimum price in the agreement and final price is decided based on market conditions, while in some cases companies announce a pre-decided price. However, under both conditions, farmer is free to sell in the market if market price is higher than sponsor price. Some estimates indicate that more than half of farmers honour the agreement and sell to the company. Other reasons for contract farming include higher returns compared with competing crops, less water requirement of basmati rice, inspiration from fellow farmers who had adopted contract farming, and

personal relations with the company. Access to better seed and extension services are also reasons for participation in contract farming.



**Figure 11.** Productivity of Rice and Wheat on Contract and Non-Contract Farms

It is also important to understand the downside to contract farming. Some farmers have discontinued contract farming or changed the company. Majority of farmers identified stringent quality control provisions by the company to be the most problematic since they were accustomed to quality checks by private traders and/or Food Corporation of India (government parastatal), whose quality standards were not very stringent. Most companies engaged in contract farming are export-oriented, therefore, emphasize on quality. The rejection rate was quite high in some cases and that was one of the reasons for discontinuing contract farming. Some companies paid a marginally lower price than market price because they provided better extension services, seeds, and other inputs, which improved farm productivity, thereby enabling the farmer get higher net income. However, the farmers could not appreciate the increase in net income owing to better quality seeds, and better extension services; they were driven more by price and discontinued contract farming. Some farmers reported other reasons such as distance of sales/delivery point from farm and delay in payments for discontinuing contract farming. However, failure to meet quality standards turned out to be the most important reason for discontinuing contract farming. Therefore, farmers should be trained to improve agricultural practices to improve standards and thus, meet buyers' expectations.

Non-contracting farmers cited small size of holding to be the major constraint to enter into contract farming because companies prefer large farmers. In some cases market prices were marginally higher or at par with contract prices, so farmers did not find it beneficial to enter into contract farming. Public good nature of extension services/knowledge was also mentioned as one of the reasons for not adopting contract farming. Other reasons were reluctance on the part of farmers to share information about land with private companies, uncertainty about company policies and lack of provision of credit by agribusiness companies.

**Table 2.** Perceived Benefits of Contract Farming as Reported by Respondents

<b>Reasons</b>	<b>Percent of respondents</b>
Access to assured market	76
Assured price	67
Access to better seed	50
Access to better extension services	42
Less water requirement	26
Higher returns than competing crops	18
Inspired by other contract farmers	15
Less incidence of crop diseases	10
Personal relations	8

Factors influencing Farmers' Participation in Contract Farming: Probit Analysis

The results of probit analysis were obtained to examine the probability of participation in contract farming and provide the inverse mill's ratio for the second stage analysis (Table 3). As hypothesized, farm size, human capital, and credit constraints were related to the likelihood of being a participant in contract farming. The positive and significant coefficient of farm size indicates positive influence on participation in contract farming. Small farmers are highly risk averse because of limited holdings, moreover, firms are also not interested in having contracts with small farmers because of high transaction costs. The positively significant coefficient of credit implies that availability of institutional credit encourages farmers to participate in contract farming as they are less dependent on informal sources, mainly money lenders, for credit requirements. Small farmers are forced to sell their produce to traders who finance credit requirements. Age and age squared were tried to measure a possible curvilinear effect on participation in contract farming but did not change the results so age variable was included in the final analysis. The coefficient of age was negatively significant, which implies that older the farmers, lesser the probability of participation in contract farming. It means that risk aversion increases with increase in age and experience.

The coefficient of years of schooling was positively significant, which implies that participation in contract farming goes up with increase in years of schooling. The coefficient of education was expected to decrease risk aversion behaviour and

increase participation in contract farming. The coefficient of off-farm income was found positively significant, which implies that it widens the possibility of participation in new models/innovations by mitigating the shortage of capital. Households without off-farm income are likely to be highly risk averse. The coefficient of extension service by public agencies was found to be non-significant, which implies that public extension system is not very effective. Membership in farmers' group/association /cooperatives significantly determines participation in contract farming. Membership is positively related to participation; if a farmer is a member of farmers' group/association/cooperatives, he/she is likely to participate in contract farming. It is also known that collective action enables small farmers to attain better bargaining power, economies of scale and reduce transaction costs.

**Table 3.** Probit Estimation of Factors affecting Participation in Contract Farming and Farm Income

Explanatory variables	Parameter estimates			
	1 <sup>st</sup> Stage: Participation <sup>@</sup>		2 <sup>nd</sup> Stage: Farm Income	
	Coefficient	Std. Error	Coefficient	Std. Error
Constant	0.0759	0.8531	7234.96	1456.65
Age of the farmer (years)	-0.0512***	0.0198	11.21	33.98
Education of the farmer (years of schooling)	0.1273**	0.0562	427.35***	89.15
Farm Size (ha)	0.0743*	0.0452	35.08	46.43
Access to institutional credit (1 = yes; 0 = No)	0.5412*	0.3075	1653.45**	646.95
Access to extension services (1 = yes; 0 = No)	0.1036	0.0519	1147.91*	695.98
Membership to an organization (1 = yes; 0 = No)	0.8090***	0.3048	-563.30	603.52
Source of off-farm income (1 = yes; 0 = No)	0.7708*	0.4086	501.35	620.92
Lambda (Inverse Mills Ratio)	-	-	109.67**	41.59
Number of observations	127	-	-	-
Chi <sup>2</sup>	55.20	-	-	-
Probability > Chi <sup>2</sup>	0.0000	-	-	-
F (8, 118)	-	-	8.85	-
Probability > F	-	-	0.0000	-
Log pseudo-likelihood	-51.52	-	-	-
R <sup>2</sup>	-	-	0.38	-

<sup>@</sup> Probit equation for participation in contract farming, 1 if participant, 0 otherwise

\*\*\* Significant at 1 per cent level; \*\* significant at 5 per cent level; \* significant at 10 per cent level of significance.

### *Impact of Participation in Contract Farming on Farm Income*

Table 3 also provides second-stage impact results using gross farm income as the dependent variable. Ideally, our dependent variable should be net income. Unfortunately, accurate data on the value of some of inputs are difficult to obtain. This is particularly true for inputs for which markets are not well developed. Therefore, we have use gross income per hectare per household as the dependent variable in the second stage of regression.

The second stage is corrected for sample selection bias. The inverse mill's ratio, lambda, corrects the error terms in the impact equations to achieve consistent and unbiased estimates. Lambda is the expected value of the residuals that are truncated at the second stage OLS. The coefficient estimates in the second stage are used to determine whether and how household characteristics, farm size, and other factors affect farm income.

The second stage results support two conclusions. First, the Heckman selection model used in this study is systematically related to the variables, showing a statistically significant coefficient. Second, many of the variables are statistically significant with coefficient signs consistent with expectations. However, the factors that are statistically significant are not the same as those in the first stage suggesting that there are differences in the determinants of being contract farmers and farm income.

The results indicate that education has a statistically significant and positive impact on farm income, which supports our hypothesis. Contract farming firms demand minimum quality standards from producers while traditional channels are not so strict about quality issues. Educated producers are more capable of meeting these standards. Farmers with better access to institutional credit and better extension services are likely to have higher income.

### **Concluding Observations**

Agriculture is and will remain the mainstay for a large part of the rural population in India in the coming years. Promoting more rapid and broad-based agricultural growth, particularly achieving 4 per cent agricultural growth not only in the eleventh plan but for medium to longer term, will be extremely important not only for achieving higher economic growth but also for alleviating poverty in rural areas. Most farmers are small and marginal, who have poor linkages with markets and who have low risk-bearing capacity restricting their participation in fast changing dynamic markets. Corporate agriculture, especially through contract farming, is being promoted by central as well as state governments as a part of the strategy to solve some of these problems. Contract farming is expected to enable farmers to

access better quality inputs such as seeds, fertilizers, pesticides, extension services, and credit from the corporate sector. Contract farming has also potential to eliminate and/or reduce market and price risks, which farmers face. However, it all depends on the nature of contracts, legislation for regulation of contract farming, enforcement, dispute resolution mechanisms, role of government, etc.

The conclusions from this study have wider significance in connection with the question of how successful approaches to contract farming can be developed. First, there is a need to assist farmers to have better education, access to timely and quality inputs such as extension services, institutional credit, and better opportunities of off-farm income to improve financial status. The results have shown that membership to farmers' organization was positively related to the likelihood of being a contract farmer. Thus, there is a need to promote non-political farmers' organizations to improve smallholders' bargaining power as well as reduce transaction costs to agribusiness companies.

Second, it is important to provide an integrated set of services including credit and not just extension services and seed as is being done. In order to provide these inputs and services, partnership between public and private sector companies is needed. Collaboration between public and private sectors for providing extension services can take place easily. Government should initiate amendments in legal and regulatory frameworks in input and output markets, land market policies, etc. to promote private sector participation in agriculture.

Finally, small farmers will be able to participate in the changing markets effectively and establish links with new market chains (supermarkets, agribusiness companies, processors, exporters, etc.) only if they have access to better infrastructure, inputs and services, and are better organized. Policy makers can support farmers through provision of required infrastructure and technology, timely information, extension services, enabling policy environment, and promoting public-private partnership through providing incentives.

## **Acknowledgements**

The author wish to thank two anonymous reviewers and Managing Editor of the journal for their valuable comments.

The paper derives from the Regoverning Markets Programme to analyze growing concentration in the processing and retail sectors of national and regional agri-food systems and its impacts and implications for rural livelihoods and communities in middle and low income countries, which was coordinated by International Institute for Environment and Development (IIED), London. The author would like to thank IIED and other institutions/individuals who have helped during the study.

## References

- CSO (2008), National Accounts Statistics, various issues, New Delhi: Central Statistical Organization, Ministry of Statistics and Programme Implementation, Government of India.
- Eaton, Charles and Andrew W. Shepherd (2001), Contract Framing: Partnerships for Growth, FAO Agricultural Services Bulletin 145, Rome: Food and Agricultural Organization (FAO) of the United Nations.
- FAI (2007), Fertilizer Statistics 2006-07, New Delhi: Fertilizer Association of India, New Delhi.
- Fan, Shenggan, Linxiu, Zhang and Xiaobo Zhang (2003), The Role of Public Investments, *Research Report No.125*. Washington, DC: International Food Policy Research Institute.
- Fan, Shenggan, Peter Hazell, and Sukhadeo Thorat (1999), Linkages between government spending, Growth and Poverty in Rural India, *Research Report No.110*. Washington, DC: International Food Policy Research Institute.
- Fan, Shenggan, Xiaobo Zhang, and Neetha Rao (2004), Public Expenditure, Growth and Poverty Reduction in Rural Uganda, Development Strategy and Governance Division Discussion Paper No.4. Washington, DC: International Food Policy Research Institute.
- GoI (2001), Indian Planning Experience - A Statistical Profile, New Delhi: Planning Commission.
- GoI (2006), Towards Faster and More Inclusive Growth: An Approach to the 11th Five Year Plan (2007-2012), New Delhi: Planning Commission.
- GoI (2007), Agricultural Statistics at a Glance 2006, New Delhi: Directorate of Economics and Statistics, Ministry of Agriculture.
- GoI (2008), Economic Survey 2007-08 and back issues, New Delhi: Economic Division, Ministry of Finance.
- Heckman, J (1979), Sample Selection Bias as a Specification Error, *Econometrica*, 47(1), pp. 153-61.

Little, Peter D, and Michael J Watts (1994), *Living under Contract - Contract Farming and Agrarian Transformation in Sub-Saharan Africa*, Madison: University of Wisconsin Press, pp. 216-47.

Sharma, Vijay Paul (2007), "India's Agrarian Crisis and Smallholder Producers' Participation in New Farm Supply Chain Initiatives: A Case Study of Contract Farming", W.P. No.2007-08-01, Ahmedabad: Indian Institute of Management, Ahmedabad.