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FARMERS' BEHAVIOUR TOWARDS RISK IN PRODUCTION OF FRUIT AND VEGETABLE CROPS

*Pradeep Kumar Mehta**

ABSTRACT

Within the horticultural sector, fruits and vegetables differ from each other on the basis of gestation period in production that is expected to influence the risk-taking abilities of farmers differently. In this paper, we assess the typology of risks in production of fruits and vegetables, examine the risk attitudes of these farmers under the safety-first framework and identify factors determining their risk-taking behaviour. The results revealed that stabilising the yield of the crop would be much more effective in stabilising revenues of fruits whereas stabilising price, on the other hand, is a more effective strategy to reduce revenue risk of vegetables. Also, the vegetable growers are more risk-takers than fruit growers. The risk attitudes of farmers growing fruits and vegetables are explained by income and farm-related factors including farm size, access to non-farm income, family size and access to credit. Specifically, access to non-farm income and credit helps farmers take more risk in their production of high value horticultural crops.

Introduction

Risk is generally considered a strong behavioural force affecting decision making in the production of high value commercial crops. In this paper, we concentrate on the risk in the production decisions by the farmers when one commercial crop dominates the farm income. In such cases, farmers are concerned in terms of how far and how often returns fail to reach a below mean target returns level (Roumasset, 1976). Here, risk is considered as a cost in farmers' decision pertaining to land allocation to high value crops. The safety-first principle (Roy, 1952) accounts for such costs in analysing farmers' behaviour towards risk. Farmers are preoccupied not with the objective of maximising income but with maximising their chances of survival (Shahaduddin *et al*. 1986).

Farmer faces two types of risk in his revenue from the crop, i.e., price and production. The variability in both together explains the crop revenue risk. Due to fluctuation in the components of revenue from the crop, one can visualise two groups of farmers: the first group of farmers would prefer not to take risk and hence their production decisions are explained by the income and yield variance of their crop as compared to the disaster level of income[1] of the farm household; their aggregate income is greater than the minimum consumption

* Senior Scientist, Institute for Rural Research and Development (IRRAD), Gurgaon, Haryana.

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requirements at home. The second group constitutes farmers who prefer to take risk in their production decisions. Here, farmers are risk-takers as their disaster level of income remains higher than the average annual income by involving in the production of the commercial crop. Risk taking behaviour in the production of high value crops like horticultural crops could be generic due to two reasons. The first reason is that the decision of allocation is generally based on expectations about the future outcomes and hence farmers tend to operate under imperfect knowledge (William, 1952). When the actual results deviate from the anticipated harvest outcomes, farmers tend to bear the risk of both income and consumption, as they have allocated land to a commercial crop against food crop. Second, due to the existence of huge band of price and yield[2], there are high fluctuations in the revenue of farmers producing horticultural crops. Accordingly, not only rich farmers but also poor farmers take risk to reduce poverty (Kunreuther and Wright, 1979).

It is important to note that in case of horticultural crops, there is marked difference in the nature of crops belonging to fruit and vegetable category. For instance, in case of fruits, there is a presence of gestation period, i.e., the time between planting and production of crop, which is generally 4-6 years[3]. Fruit growers start getting some production only after the gestation period. The decision here is inflexible, unlike vegetable crops, and it is not easy to reallocate land to other crops in the same land, where fruit plantation exists. These differences in the production of the crops are expected to lead to difference in the risk-taking ability of the farmers[4]. Hence, the analysis is done separately for a fruit and vegetable crop. In this paper, we first outline farmers on the basis of their land allocation to fruit and vegetable crop that dominates their income from the livelihood. We then decompose the risk rising from price and yield fluctuations of fruit and vegetable crop. This is followed by outlining the risk typologies of farmers producing fruits and vegetable crops under the safety-first framework. In the last, we examine the factors explaining the risk attitudes of farmers.

Methodology

This study is carried out in the Theog block of Shimla district in Himachal Pradesh (*the Horticultural State of India*). Sub-regions (villages namely; Govai, Sainj, Sandhu and Shilaru) were selected from this region on the basis of higher amount of area under horticultural crops (fruits and vegetables). In the first two villages namely, Govai and Sainj, vegetables cover 72 and 84 per cent of the total gross cropped area, respectively. Among vegetables, most of the land is allocated to cauliflower crop. In villages, Shilaru and Sandhu, fruits are grown at a higher scale. Apple is the major crop in these villages that covers 85 and 89 per cent, respectively of total cultivated area. Both cauliflower and apple crops were chosen for this study. In total, 120 farmers were interviewed with 30 farmers from each village following a stratified and proportional random sample approach (Table 1).

In order to identify the relative importance of price and production risk, the gross revenue variability is decomposed into price, yield and price-yield interaction components as provided by Barah and Binswanger (1982)[5]. If p is price, y is the yield and R is the gross revenue, the R = py and the variance of gross revenue can be approximated as

$$Var(R) = y^2 Var(p) + p^2 Var(y) + 2y.p\ Cov(p,q)$$

Where Var is the variance operator, p and y are the mean values of price and yield,

Table 1 : Farm Size and Sampling from the Selected Villages

Crops		Vegetables dominated villages		Fruits dominated Villages	
Villages		Village I	Village II	Village I1I	Village IV
Farm size	Unit				
Marginal farmers	Less than 1 Ha	35 (7)	43 (8)	17 (3)	11 (2)
Small farmers	1-2 Ha	49 (11)	67 (12)	47 (9)	29 (6)
Semi-medium farmers	2-4 Ha	37 (7)	48 (8)	63 (14)	51 (12)
Medium farmers	4-10 Ha	13 (2)	16 (2)	15 (3)	30 (7)
Large farmers	More than 10 Ha	14 (3)	0(0)	6 (1)	14 (3)

Note :

i. Figures denote the number of farmers in each village

ii. Figures in parentheses are the sample collected from each village

iii. Village I,II, II and IV are Govai, Sainj, Sandhu, and Shilaru, respectively

iv. Ha is hectare

Source : Primary Data.

respectively and Cov is the covariance operator. Thus, the above identity splits variance of gross revenue into a price component (the first term), and yield component (the second term) and a price-yield interaction component (the third term). The above identity can be used to compute the proportion of variability in gross revenue that is due to its individual components by rewriting it as

$$1 = \frac{y^2 \, Var(p)}{Var(R)} + \frac{p^2 \, Var(y)}{Var(R)} + \frac{2y.p \, Cov(p,q)}{Var(R)}$$

where the first term is the contribution of price, the second term the contribution of yield and the third term the contribution of the interaction term to revenue variability. By multiplying both sides of the above equation by 100, the contribution of the price, yield and interaction terms can be expressed in terms of percentages. If the sum of the price and yield terms exceeds 100 per cent, it means that the price-yield interaction is negative because of negative correlation.

In order to find the role of risk on production decisions in fruits and vegetables, Roy's safety-first coefficient is used. According to a Roy's safety principle, the impact of risk on the decision-maker is given by the risk coefficient (RC) = (d-u)/ ó), where'd' is the farm's household disaster income, 'u' is the household's average income from the crop and 'ó' is the variance of the household crop income. The negative coefficient denotes that the disaster level of income of the household is less than the average income from the crop. It means these farmers are not necessarily involved in any trade-off between return and risk and are not risk- takers in their choice of crop portfolio or land allocation decision. On the other hand, when the disaster level of the income exceeds the average income from the crop, it signifies that farmers are being forced to take risk in the land allocation decisions (Shahbuddin *et al.* 1986).

The procedure used to measure the coefficient is similar to that of Shahbuddin, Mestelman and Feeny but with some modifications. In the safety-first model, the disaster level of income is associated with that income below which the farm family may face either bankruptcy or starvation or the discomfort of adjusting to a significantly lower standard of living. Hence, to measure the disaster level of income of the farm family, information on quantity and price of articles/commodities consumed by the farm family along with expenditure on other critical activities including children's education expenses, other household items etc. was obtained. The disaster level of income is computed as d = MSN, where MSN is the minimum consumption need of the farm family plus other critical expenditures by the household during a year[6]. The mean income and variance of income is calculated by using farmer level data and not using district level data as the price differs dramatically across farmers. The income is defined as the revenue over the variable costs only, and is computed as

$$u = \sum_{i=1}^{3} P_i Q_i - \sum W_i X_i$$

where u is the mean income from the crop, P_i is the price of the crop in the i^{th} year (last 3 years data), Q_i is the quantity of the crop produced by the farmer in the i^{th} year, W_i is the price of the input purchased by the farmer in the i^{th} year and X_i is the quantity of the input purchased by the farmer in the i^{th} year. The variance of income is calculated by standard deviation of income or returns from the crop by using last three years.

Typology of Land Allocation

The typology of land allocation in favour of horticultural crops is measured by the extent of land allocated towards the selected crops. Land allocation towards these crops would be identical to the area under the selected crops in the total net cropped area. The results of the extent of land allocation towards apple and cauliflower in the villages show that these crops are of high significance for the farmers in terms of their livelihood; the crops cover over 50 per cent of their net cropped area in the villages (Table 2). The typology of land allocation across different farm sizes shows that in the case of cauliflower, large farmers score over others in the extent of land allocation made towards the crop. Below them comes the category of marginal farmers (Table 3). This illustrates that marginal farmers also have been able to allocate a considerable amount of area. Coming to apple crops, we find that small and marginal farmers made the highest allocation of land in favour of the crop. It is important to mention that small and marginal farmers together own less area than farmers of other groups; their decision of allocating more area to high value crop can be either an accumulative or survival strategy (Chaplin, 2000). In several circumstances, small and marginal farmers allocate large area to high value but risky crops in order to fight against poverty, which confirms the risk-taking capacity of small and marginal farmers. Hence, it is not right to view on high allocation towards high value crop as a high growth strategy; additional information about the effect of land allocation decisions on farmers' welfare in terms of its effect on income and risk patterns of the farmers need to be collected to make the analysis meaningful.

Table 2 : Extent of Land Allocation in Favour of Horticultural Crops

Variable	Indicator	Cauliflower			Apple			Aggregate
		Village I	Village II	Total	Village III	Village IV	Total	
Proportion of selected crop area to net cropped area	(a_i/SA)	49.95	54.21	46.47	70.05	67.18	68.85	54.25

Note : i. (a_i/SA)= proportion of area (a) under particular crop (i) in the Net Cropped Area (A)

Source: Primary Data.

Table 3 : Extent of Land Allocation in Favour of Horticultural Crops by Farm Size

Farm Size	Share of area under apple or cauliflower to GCA
Cauliflower	
Marginal	58.33
Small	52.67
Semi-medium	51.78
Medium	35.20
Large	62.61
Apple	
Marginal	71.62
Small	72.98
Semi-medium	69.06
Medium	51.86
Large	66.90

Source : Primary Data.

Socio-economic Characteristics and Land Allocation : Socio-economic factors can exert significant influence on the extent of land allocation towards horticultural crops through their effect on resource availability and risk management abilities of farmers. The results indicate that family size and number of dependents tend to decrease the level of land allocation in favour of apple and cauliflower increases (Table 4). This shows that more dependants and higher food requirements at home act as a constraint to increasing allocation to high value commercial crops. Land allocation in favour of horticultural crops is higher among the farmers with low farm size. In terms of irrigation, which is important for the cauliflower crop for its production and profitability, there is a positive relation between level of allocation and irrigation intensity. As the land allocation to cauliflower increases, the net irrigated area also increases. But, the same is not the case with apple, which does not require irrigation for production purpose. Higher ratio of land to labour indicates availability of home labour, which in turn influences the decision of land allocation towards horticultural crop. In both the cases of apple and cauliflower, there is a negative relation between the level of land allocation to high value crop and land to labour ratio. This indicates that more the quantum of home labour, for which the farmers are not supposed to incur any additional cost, more the land allocation to high value crops. Reluctance to hire more labour and disinclination to bear more input costs results in lower level of land allocation towards high value crops.

Table 4 : Socio-economic Characteristics at Different Levels of Land Allocation

Share of selected crop area to Gross Cropped Area (GCA)		Family size (No.)	Number of depen-dants (No.)	Farm size (ha)	Irrigation intensity*	Land/ Labour	Annual non-farm income (₹)
Cauliflower	Low (<0.33)	7.83	2.92	4.56	55.07	0.44	101955
	Medium (0.33-0.66)	6.17	2.03	2.72	63.60	0.33	87331
	High (>0.66)	6.92	2.50	1.93	88.13	0.23	50439
Apple	Low (<0.33)	7.57	2.86	6.05	14.92	0.77	181403
	Medium (0.33-0.66)	7.33	2.25	4.23	18.55	0.50	171584
	High (>0.66)	5.78	1.51	4.67	7.80	0.69	93958

* Percentage of Net Irrigated Area to Net Cropped Area.

Source : Primary Data.

Relative Role of Price and Yield Risk In Fruits and Vegetables

Farmer faces two types of risk in his revenue from the crop, i.e., price and production. The variability in both together explains the crop revenue risk. The revenue risk for apple and cauliflower is decomposed separately mainly because the difference in the nature of the crops lies broadly in terms of the gestation period of production and marketing options which in turn influences the significance of prices and yield risk. Cauliflower is an annual crop and the decision of area allocation is very flexible in the sense that every year farmer can think of changing the area under the crop. In apple, there is a gestation period in production of 5-7 years initially, only after which farmers start getting returns and only after 12-15 years of planting, farmers get higher level of yield from the crop. The decision here is inflexible, unlike vegetable crops, and it is not easy to reallocate land to other crops in the same land, where apple plantation exists. Fruit crop (apple) is relatively less perishable as compared to vegetable crop (cauliflower) and there are more marketing opportunities for the fruit crop. Due to high perishability of vegetable crop, farmers in Himachal Pradesh are not able to sell their crop beyond Delhi market, whereas apple growers are able to sell in far away markets like Kolkata and Bangalore. Apple growers are able to hold their crop in the farm and also in the markets in order to wait for a better price. This improves their bargaining power in selling the crop at higher prices. Vegetable growing farmers on the other hand cannot hold their crop in the field and once they take their produce to a major market like Delhi, they cannot either hold back the produce or move to any other market. This bestows to poor bargaining power to the vegetable crop growers in comparison to the higher bargaining power of fruit crop growers. These differences in the production and marketing of the crops highlight the disparity associated with the risk of price and production as also the correlation between price and production of the crop.

By using data[7] on prices and production levels of the selected horticultural crops, the revenue from the crop is decomposed into price, yield and their interaction. The results of risk decomposition are summarised in Table 5. A stark difference is found between apple and cauliflower. Fifty two of the sixty apple growing farmers experienced high variability in yield of the crop as compared to variability in price, whereas majority of farmers growing cauliflower experienced high price variability than yield (32 out of 60). Negative interactions indicate that prices and yields negatively covariate. The negative correlation between prices and yields reduces crop revenue fluctuations and provides a natural hedge to farmers. This suggests the possibility that perfect price stabilisation could destabilise income for some farmers (Ramaswami *et al,* 2004). This would happen if the 'yield' component is greater than the sum of 'price' and the price-yield interaction components. Higher chance of this means larger is the negative correlation between price and yield. Indeed, when the price term and the price-yield interaction term is set to zero (as would be the case with perfect price stabilisation), the variability of crop revenues increases in the case of 40 apple growing farmers as against 18 cauliflower growers. Thus, the major beneficiaries of reduced price variability are the cauliflower growers and not apple growers. Stabilising yield of the crop would be much more effective in stabilising revenues of apple whereas stabilising price, on the other hand, would be a more effective strategy to reduce revenue risk of cauliflower.

Table 5 : Decomposition of Income Risk from Apple and Cauliflower

Number of times	Price risk less than yield risk	Price risk greater than yield risk	Negative interaction
Apple	52	8	40
Cauliflower	28	32	18

Note : i. The units are the number of sampled farmers. The first two columns would add to 60.

Source : Primary Data.

The correlation between production and price provides a picture of difference in the nature of marketing of these crops. Table 6 indicates a positive and significant correlation between price and production for apple, whereas same is negative for cauliflower. It means apple growers who received higher level of production have been able to receive higher price of the crop. This is mainly because they are able to sell the produce in different forms and at different locations including Delhi, Kolkata and Bangalore. Lack of such opportunity in vegetable market results in negative correlation between production and price. Farmers with higher produce of cauliflower also did not receive higher price. The correlation between the variability in price and production illustrates that cauliflower growers experienced a positive correlation between the variability of production and price, whereas this is not the case for apple. Vegetable is a more perishable crop with fewer opportunities in terms of scope of marketing.

Table 6 : Correlation Between Production and Price of Apple and Cauliflower, 2004-06

Correlation Coefficient	Mean Price and production	Coefficient of Variation (CV) in price and production
Apple	0.317*	-0.287*
Cauliflower	-0.111	0.462**

* 1% level of significance.

** 5% level of significance.

Source : Primary Data.

Typology and Determinants of Risk Attitudes of Farmers

In case of our sampled farmers, only one commercial crop dominates the farm income. In such cases, farmers are concerned in terms of how far and how often returns fail to reach a below mean target returns level (Roumasset, 1976). The risk coefficient provided by Roy, 1952, accounts for such costs in analysing farmers' behaviour towards risk. Results based on the Roy's risk coefficient measure show that most of the cauliflower growers are risk-takers than averse to risk; more than 66 per cent of the farmers growing cauliflower have a positive risk coefficient (Table 7). This indicates that risk-taking behaviour is displayed by many farm households in the production of cauliflower. However, for apple, most of farmers take a safety-first position on the basis of their land allocation decision; around 60 per cent of the apple growers have negative risk coefficient points their safe position. Interestingly, for both group of farmers, the safety-first position gives the rationale for increasing land allocation to high value commercial crop; group of farmers showing negative risk coefficient (facing low risk) have allocated relatively higher proportion of land to the commercial crop i.e., cauliflower and apple.

Table 7 : Frequency Distribution of Farmers on the Basis of Risk Attitudes and Their Land Allocation

Risk Coefficient	Cauliflower		Apple	
	Percentage of farmers within given ranges of Risk Coefficient	Percentage of land allocated to commercial crop within given ranges of Risk Coefficient	Percentage of farmers within given ranges of Risk Coefficient	Percentage of land allocated to commercial crop within given ranges of Risk Coefficient
Below – 2	6.67	68.41	6.67	88.31
- 2 to - 1	10.00	77.52	26.67	88.95
-1 to 0	16.67	86.02	26.67	82.02
Negative	33.44	79.62	60.01	85.59
0 to 1	20.00	66.49	18.33	80.02
1 to 2	23.33	69.37	13.33	61.87
Above 2	23.33	58.47	8.33	73.12
Positive	66.66	64.87	39.99	76.05

Note : i. Figures are in percentage of farmers, where the number of farmers is 60 for each category.

Source : Primary Data.

As per the risk coefficient, the difference in the disaster level of income and crop income explains the situation of risk of farmers. Hence, it is either higher food consumption requirements at home or low income from the crop that influence the value of the risk-coefficient. The socio-economic conditions including access to non-farm income source, family size, farm size, assets etc. affect the risk behaviour of the farmers. In order to examine the role of socio-economic factors that influence risk behaviour of the farmers, regression model is used with risk coefficient as the dependant variable. Independent factors include household-specific factors like age, family size, gender, access to credit, non-farm income and farm-specific factors including farm size, farm assets etc. The results are presented for cauliflower and apple growers separately and for all farmers together. Specification of the equation is as follows:

RC = f (Age, Credit, Gender, Farm Size, Family Size, Non-farm income source and Assets)

Where,

RC : Risk Coefficient

Age : Age in number of years

Credit : Access to formal credit agency (0=No Access, 1= Access to Formal Agency)

Gender : Sex of the household head (0=Female, 1=Male)

Farm Size : The size of the farm (in Hectare)

Family Size : Number of household members

Non-farm income source : Having non-farm income source (0=No, 1=Yes)

Assets : Value of assets (in ₹)

The results of regression analysis are presented in Table 8. We found a difference in the factors affecting risk-taking abilities of farmers growing fruits and vegetables. In case of apple, due to presence of gestation period, it is the access to non-farm income source that explains the risk-takers among the apple growers. Additionally, value of assets or wealth also explains their risk-attitude. Both these factors enhance the risk-bearing abilities of farmers growing fruit crop. On the other hand, the risk-taking abilities of vegetable growers are explained by their access to credit, and higher value of assets. As farmers can also grow other crops in another season of the year, availability of credit enables them to invest in other crops or activities for meeting the subsistence needs of the household. Family size is also positively and significantly correlated with the risk attitude of cauliflower growers. As the family size increases, the disaster level of income is expected to increase as family members require more food for consumption which can influence the risk coefficient adversely.

Table 8 : Factors Influencing Risk Attitudes of Farmers

Roy's Risk Coefficient as a Dependent Variable	Cauliflower Growers	Apple Growers	All Farmers
Constant	-1.560 (-1.424)	-2.112 (-1.805)	-1.569 (-2.053)**
Age	-9.198E-03 (-0.578)	-2.404E-02 (-1.398)	-1.776E-02 (-1.668)
Credit	1.058 (2.513)*	0.102 (0.297)	0.557 (2.216)**
Gender	0.151 (0.342)	0.555 (1.381)	0.362 (1.261)
Farm Size	-3.320E-02 (-1.249)	-2.176E-02 (-0.625)	-2.367E-02 (-1.189)
Family size	0.155 (2.220)**	0.170 (1.595)	0.129 (2.415)*
Non-farm income	0.185 (0.499)	0.848 (2.389)**	0.583 (2.388)*
Assets	4.016E-05 (2.590)*	-7.235E-05 (3.548)*	5.380E-05 (4.619)*

Figures in the parentheses are t-values

All Farmers : R^2: 0.356 Adjusted R^2 :0.316, N=120

Cauliflower R^2: 0.376 Adjusted R^2 :0.292, N=60

Apple R^2: 0.411, Adjusted R^2 :0.332, N=60

* and ** signifies level of significance at 1% and 5%, respectively.

Source: Primary Data.

While considering all farmers, access to non-farm income source and credit played a significant role in explaining their risk behaviour. Farmers, whose disaster level of income is higher than the average income from the crop, can afford to take risk as non-farm income source provided them safeguard, in terms of money available for meeting the minimum subsistence needs of the households. Also, availability of credit, on the one hand provide them money for investment in these high capital and labour intensive crops and on the other hand also hedge against risk at the time of failure of price and/or production of the crop. More importantly, higher level of assets or wealth is found significant in explaining the risk-taking behaviour of farmers of both the groups. Farmers with higher amount of assets are more prone to take risk especially because they can always liquidate some of their assets at the time of requirement (or in the event of crop failure).

Conclusions

In this paper, we examined the typology of risks and risk attitudes of farmers growing fruits and vegetable crops. The results show that fruit growers experienced high variability in yield of the crop as compared to variability in price, whereas majority of the vegetable growers experienced high price variability than yield. This means stabilising yield of the crop would be much more effective in stabilising revenues of fruits whereas stabilising price, on the other hand, would be a more effective strategy to reduce revenue risk of vegetables. Using Roy's risk coefficient, we found a difference between the fruit and vegetable growers in terms of their risk-taking nature in the production decisions; cauliflower growers more risk-takers than apple growers. The difference between apple and cauliflower growers can be attributed mainly to the difference in the flexibility in land allocation and income potential of the crop concerned; income potential is relatively higher for apple growers. In addition, most apple growers have large farm size as compared to cauliflower growers, which again might contribute to the difference in income between the two groups. Access to non-farm income source and credit are found to have played a significant role in the risk behaviour of farmers. Farmers whose disaster level of income is higher than the expected income from the crop can afford to be risk takers as non-farm income source would provide them secure position. Family size is positive and significantly correlated with the risk attitude. As the family size increases, the disaster level of income is also expected to be high as family members require more food for consumption and higher outlays for expenditure. Availability of credit is positively related with the risk coefficient, indicating that risk-takers could do so by having access to credit.

Notes

1 The disaster level of income is the minimum consumption requirements of the farm family plus other critical expenditures by the household during a year.

2 This is very normal feature in the case of horticultural crops whose price fluctuates widely within a single season.

3 There are categories of fruits, which have lesser gestation period also but in general, most of the fruit crops have higher production or gestation period as compared to vegetable crops and are perennial in nature.

4 As during the gestation period, there is no production of apple from non-bearing trees and additionally farmers have to incur costs to maintain non-bearing trees. This might result in low allocation of land to high value fruit crop as farmers may not like to bear high risk.

5 The discussion of Barah and Binswanger's work is substantially drawn from Walker and Ryan (1990) as their paper is cited as a discussion paper circulated in International Crops Research Institute for Semi-Arid Tropics (ICRISAT) and it is therefore, unpublished.

6 Roumasset (1976) provided d = MCN + UD – LA – OFI where UD is the urgent debt and LA is the resale value of liquid asset. We have not included the data on LA as we found it extremely difficult to get such information from the interview and debt frequency by farmers for home needs in the selected villages is very low and negligible. We however, collected disaggregated information on the consumption needs and other critical expenditure at home and put it under MSN instead of taking the subjective levels of MSN by the farmers.

7 Three years (2004, 2005 and 2006) farm level data are obtained from the farmers on the price and production levels.

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