# Factors Affecting Income and Employment of Marginal and Small Farmers in South-Western Punjab

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## Abstract

*The present study was conducted to examine the factors affecting income and employment level of marginal and small farmers in south-western Punjab during the year 2014-15. The study revealed that average operational area in the case of marginal and small farms was 1.97 and 4.41 acres, respectively. The proportion of leased-in land in the operational area was quite less. Most of the sampled farmers followed cotton-wheat crop rotation in the study area. However, basmati was also cultivated on some area by the sampled farmers as an alternative crop of cotton. The cropping intensity of overall farms was found to be 197.65 per cent. Crop production and dairy farming were the main sources of income of the sampled farmers. The net income obtained from crop farming and dairy farming contributed about 33 and 18 per cent to the total annual net income. Income from off-farm sources has been identified as another important factor contributing significantly to the net income of farm households. The share of income earned from non-farming sector was higher among marginal farms (58.36%) as compared to small farms (40.70%). The study brought out that farm size, crop value productivity, net income from dairy and off-farm income have significant positive impact on the income level. The value of coefficient of multiple determination ($R^2$) in case of overall farm situation was worked out as 0.55, which is significant at one per cent level of significance. As farm size appeared to be a significant variable in improving income from agriculture, but it is not possible for the marginal and small farmers to expand area under cultivation. Therefore, suitable policies should be framed for improving the crop value productivity by increasing area under high value crops. Moreover, multi-pronged policy should be developed for expanding employment opportunities in non-farm sector, which in turn will be helpful for enhancing income of this vulnerable section of the society.*

**Keywords:** *Farm income, employment, marginal farms, small farms, Punjab*

**JEL Classification**: *Q12, Q15, R29*

## Introduction

Agriculture continues to hold the place of pride in our economy since time immemorial. It is well known that farming in India is the major occupation supporting 54 per cent of the population for their livelihood and about 13.7 per cent of gross national product is derived from this sector of the economy (Anonymous 2013). The rapid increase in population, sub-division and fragmentation of land holdings and the changed family system from joint to nuclear families in rural India has made the size of holdings smaller and smaller. The small and marginal farmers account for nearly 83.3 per cent of the total operational holdings in the country, cultivating about 44 per cent of the total area (Anonymous 2012). Thus, the numerically strong but economically weaker section of the rural community is having an average operational holding of about 1.41 hectares. This group is mainly embroiled in the vicious cycle of low savings and even dis-savings, low investments and low returns. Besides this, the major problems of this group are surplus family labour, both under-nutrition and malnutrition and the possession of

un-economic size of farm holdings, which keep these people below the poverty line (Pandey and Kaushal 1980).

Punjab, the most progressive state of India is having a similar type of land distribution though little better than that of Indian situation. Out of 11.7 lakh operational holdings during 1990-91, 26.5 per cent were marginal (<1 ha) and 18.3 per cent were small (1-2 ha) in size. During the year of 2010-11 total holdings declined to 10.52 lakh comprising 15.62 per cent marginal and 18.57 per cent small holdings (Anonymous 2012).The decline in proportion of small and marginal holdings may be due to the operation of reverse tenancy and the small and marginal land owner-farmers leasing out their land to other farm-size groups as the crop raising is becoming less remunerative and there is hardly any scope left for improving their incomes from tiny holdings (Kaur *et al* 2001).

The production pattern of small and marginal farmers is dominated by paddy-wheat crop rotation. This system has increased the dependence of small farmers on the market. Even the commodities, which can be produced at the farm for self-consumption at little cost, are being purchased at a higher market price. So, on the whole this farming system will neither be economically viable nor be sustainable.

On the other hand, in the south-western region of Punjab due to canal irrigation and poor drainage system, the water table is rising at an alarming rate which results in water logging in this region. Water logging is adversely affecting the cropping pattern and crop productivity causing huge socio-economic loss. Due to low net returns from agriculture, indebtedness and suicides among marginal and small farmers has become a burning issue in the Punjab economy, especially in the region under study.

**Data Sources and Methodology**

The present study was conducted purposively in the south-western area of the Punjab state comprising six districts namely Bathinda, Faridkot, Ferozepur, Shri Muktsar Sahib, Mansa and Fazilka representing the cotton belt of the Punjab state. Multi-stage random sampling technique was followed to draw a representative sample for the study with district at first stage, block at second stage and village at third stage to carry out the study. At the final stage of sampling procedure, thirty farmers from each selected village were selected. A total sample of 120 farmers

comprising 60 marginal and 60 small farms were drawn from the study area. Statistical tools like frequencies, percentages, averages, multiple regression analysis etc. were used to analyze the collected data.

**Analysis of data**

Simple statistical tools like frequencies, percentage, averages etc. were used to analyze the collected data. However, taking into account the objective of the study following advanced statistical technique was used:

**Functional analysis**

To examine the factors affecting the income and employment level of marginal and small farmers, both linear and log-linear production functions were fitted and numerous equations were tried by taking different explanatory variables. Best fit function was determined on the basis of level of significance of the explanatory variables, the value of coefficient of multiple determinations ($R^2$) and the logical signs of the explanatory variables included in the model. Cobb-Douglas function of the following form was considered the most appropriate for the present investigation:

$$Y = A \prod_{i=1}^{n} X_i^{b_i} e^u$$

Where,

'Y' represents the gross farm family income of the sampled households

'$X_i$' the selected explanatory variables per crop and dairy farm in value terms

'A' the technical efficiency parameter and '$b_i$' the coefficient of production elasticity of the respective variable '$X_i$' at the mean level of input used and output obtained

'e' is an error term

The estimated form of the equation becomes:

$$\text{Log } Y = \text{Log } A + \sum_{i=1}^{n} b_i \log x_i + u$$

Log Y = Log A + $b_1$ log $x_1$ + $b_2$ log $x_2$+……………..+$b_5$ log $x_5$ + u

The functions were fitted for marginal farms, small farms and overall scenario for the study.

Where,

Y = Gross farm family income (₹)

$X_1$ = farm size (acres)

$X_2$ = crop value productivity in rupees per acre

$X_3$ = Net income from dairy in rupees

$X_4$ = Crop expenditure in rupees

$X_5$ = Off–farm income as a share of total income in per cent

## Statistical significance of the estimates

To test the statistical significance of these estimates, t-value of the estimates was worked out at (n-k-1) degrees of freedom. The t-value of the regression coefficients ($b_i$) were worked out as under:

$$t_{(n-k-1)} = \frac{b_i}{S.E.(b_i)}$$

where, k is the number of independent variables
S.E. is the standard error of the variable $X_i$

## Coefficient of multiple determination ($R^2$)

The coefficient of multiple determination was worked out to estimate the proportion of variations in the income and employment level of sampled farmers explained by different explanatory variables, taken together in the analysis. Statistical significance of $R^2$, which examines the goodness of fit of the function, was tested by working out F-ratio as follows:

$$F = \frac{R^2/(K-1)}{(1-R^2)/(n-K)}$$

where,
'$R^2$' = value of the coefficient of multiple determination
'n' = number of observations
'K' = (k + 1) i.e. total number of b's

## Results and Discussion

### Farm size

The operational land holding of sampled farmers has been depicted in Table 1. In the study area average operational size of sample farms came to be 3.19 acres. Out of the total operational area, owned land and leased-in land was 2.85 and 0.36 acres accounting for 89.34 and 11.13 per cent of the operational area respectively. The average operational area in the case of marginal and small farms worked out to be 1.97 and 4.41 acres respectively. Out of the total operational land, the proportion of owned land was more in marginal farms (95.43%) than that of small farms (86.62%), respectively. Only marginal farmers were found to be leasing out their land. Proportion of leased-in and leased-out land in this category came to be 6.09 and 1.52 per cent of the total operational land, respectively.

### Cropping pattern

Cropping pattern refers to different crop rotations being followed by the farmers. The results with respect to cropping pattern of sampled farmers are given in Table 2. It can be seen from the table that farmers in the south-west zone of the Punjab state mostly followed

**Table 1. Size of operational holding on marginal and small farms in south-western Punjab, 2014-15**

(Acres)

| Particulars | Marginal | Small | Overall |
|---|---|---|---|
| Owned land | 1.88 | 3.82 | 2.85 |
| | (95.43) | (86.62) | (89.34) |
| Leased in land | 0.12 | 0.59 | 0.36 |
| | (6.09) | (13.38) | (11.13) |
| Leased out land | 0.03 | 0.00 | 0.02 |
| | (1.52) | (0.00) | (0.47) |
| Area operated | 1.97 | 4.41 | 3.19 |
| | (100.00) | (100.00) | (100.00) |

cotton-wheat rotation. It is evident that cotton was the major crop in the *kharif* season being cultivated on 1.89 acres of land (29.98 per cent of the total cropped area). Basmati emerged as second most important crop in the *kharif* season and occupied about 14 per cent of the total cropped area. Fodder was cultivated on 0.27 acres of land which accounted for 4.28 per cent of the total cropped area in *kharif* season. Paddy was cultivated only on 0.07 acres of land which accounted for only 1.03 per cent of the total cropped area. Other minor crops during the *kharif* season constituted only 0.79 per cent of the total crop area. In *rabi* season, wheat was the major crop which covered about 45 per cent of the total cropped area. Fodder crop was cultivated on 4.20 per cent of the total cropped area, while other minor crops in the *rabi* season were cultivated on about one per cent of the total cropped area.

The per cent share to the total cropped area corresponding to the area under cotton crop was more in case of marginal farmers (30.49%) as compared to the small farmers (29.75%), while in absolute terms, it was higher on small farms (2.60 acres) as compared to marginal farms (1.18 acres). Being more resourceful than marginal farmers, small farmers put more area under basmati cultivation. It was 1.25 acres on small farms and only 0.47 acres on marginal farms accounting for 14.30 and 12.14 per cent to the total cropped area, respectively. The proportion of *kharif* fodder to the total cropped area was slightly higher on marginal farms (4.91%) than that of small farms (4.00%). In *kharif* season, other minor crops like vegetables, guara etc. were cultivated by the small farmers only and these crops constituted nearly one per cent of the total cropped area. In *rabi* season, wheat was the dominated crop, the proportionate share of this crop to the total cropped area was marginally high in the case of marginal farmers (45.22%) as compared to small farmers (44.85%). On the other hand, the proportion of fodder and other minor crops to the total cropped area

with respect to *rab*i season worked out 4.91 and 0.26 per cent on marginal farms and the respective figures came out 3.89 and 1.49 per cent in the case small farms, respectively. On an overall farm situation, cropping intensity estimated at 197.65 per cent, while it was slightly low in the case of marginal farmers (196.45%) as compared to small farms (198.19%), respectively.

**Income and employment pattern `**

A perusal of Table 3 indicate that on an overall basis, the extent of average annual family income generated from all sources was ₹262944 per farm in the study area. The sampled farmers in south-western zone of Punjab state earned maximum portion of their income from agriculture and allied activities. An amount of ₹182715 per farm was earned from farming

sector (crops and dairy together) which constituted about 68 per cent share in the total annual family income. The extent of income generated from crops (₹ 113768 per farm) was more than that of dairy (₹68947 per farm) and the proportionate share of crops and dairy to the total family income turned out to be 41.71 and 26.07 per cent, respectively. Since the income generated from agriculture sector alone, was not adequate to sustain the livelihood of marginal and small farmers in the study area, therefore, most of the sampled farmers were also found to be engaged in some non-farming activities to supplement their income. The extent of annual income generated from non-farming activities was estimated to the tune of ₹ 80229 per farm household which accounted for 32.22 per cent of the total income.

**Table 2. Cropping pattern followed by marginal and small farms in south-western Punjab, 2014-15**

(Acres)

| Particulars | Marginal | | Small | | Overall | |
|---|---|---|---|---|---|---|
| | Area | %age | Area | %age | Area | %age |
| *Kharif* | | | | | | |
| Paddy | 0.08 | 2.07 | 0.05 | 0.57 | 0.07 | 1.03 |
| Basmati | 0.47 | 12.14 | 1.25 | 14.30 | 0.86 | 13.64 |
| Cotton | 1.18 | 30.49 | 2.60 | 29.75 | 1.89 | 29.98 |
| Fodder | 0.19 | 4.91 | 0.35 | 4.00 | 0.27 | 4.28 |
| Others | 0.00 | 0.00 | 0.10 | 1.14 | 0.05 | 0.79 |
| Total *Kharif* area (A) | 1.92 | 49.61 | 4.35 | 49.77 | 3.14 | 49.72 |
| *Rabi* | | | | | | |
| Wheat | 1.75 | 45.22 | 3.92 | 44.85 | 2.84 | 44.96 |
| Rabi fodder | 0.19 | 4.91 | 0.34 | 3.89 | 0.27 | 4.20 |
| Others | 0.01 | 0.26 | 0.13 | 1.49 | 0.07 | 1.11 |
| Total *Rabi* area (B) | 1.95 | 50.39 | 4.39 | 50.23 | 3.17 | 50.28 |
| Gross cropped area (A+B) | 3.87 | 100.00 | 8.74 | 100.00 | 6.31 | 100.00 |
| Cropping intensity | 196.45 | | 198.19 | | 197.65 | |

**Table 3. Gross farm family income from different sources on marginal and small farms in south-western Punjab, 2014-15**

(₹/farm/annum)

| Sources of income | Marginal | | Small | | Overall | |
|---|---|---|---|---|---|---|
| | (₹) | %age | (₹) | %age | (₹) | %age |
| Crops | 70416.54 | 35.20 | 157120.10 | 48.22 | 113768.30 | 41.71 |
| Dairy | 50931.25 | 25.46 | 86962.50 | 26.69 | 68946.88 | 26.07 |
| Gross farm income | 121347.80 | 60.66 | 244082.60 | 74.91 | 182715.20 | 67.78 |
| Off-farm income | 78700.15 | 39.34 | 81758.33 | 25.09 | 80229.24 | 32.22 |
| Gross farm family income | 200047.90 | 100.00 | 325840.93 | 100.00 | 262944.40 | 100.00 |

On per farm basis, annual gross family income from all sources came out to be ₹ 200048 and ₹ 325840 in case of marginal and small farms. The study brought out that the extent of income earned from crops and dairy came out to be ₹ 70417 and ₹ 50931 per farm on marginal farms and ₹157120 and ₹ 86962 per farm on small farms, respectively. Gross annual income earned by marginal and small farmers from agriculture i.e. crops and dairy together worked out ₹121348 and ₹244083 per farm, which occupied 60.66 and 74.91 per cent share to the total family income, respectively. Although, the extent of income earned by small farmers (₹81758 per farm) from non-farming sector was more than that of marginal farmers (₹78700 per farm) in absolute term, but it was higher among marginal farmers in terms of per cent share to the total income.

It was observed that net income obtained from crops and dairy farming may depict more clear picture than gross income. In this regard, an attempt has been made to estimate the net income of sampled farms from agriculture and the results have been presented in Table 4. The results have shown that on per farm basis, the net annual family income from all sources estimated as ₹167874 on an overall farm situation, while it was ₹134848 on marginal farms and ₹200900 on small farms, respectively. The net income obtained from crop farming and dairy farming contributed about 33 and 18 per cent to the total annual net income i.e. 50 per cent of the total net income of the sampled farmers earned from these two enterprises together. Remaining 50 per cent of the total net income was generated from non-farming occupation. On per farm basis, net annual income received from farm business was ₹56148 in case of marginal farmers and ₹119141 in case of small farmers, which accounted for 41.64 and 59.30 per cent of the total income, respectively. The share of income earned from non-farming sector was very higher among marginal farmers (58.36%) as compared to small farmers (40.70%). Despite, crops and dairy being their main occupation, most of marginal and small farmers were found to be engaged in non-farming activities in order to supplement their family income and share of non-farm income to the total family income was higher among marginal farmers than that of small farmers.

### Factors affecting income and employment of marginal and small farmers

In this section, an attempt has been made to determine the factors that influenced the income of marginal and small farmers in the study area. The results of Cobb-Douglas production function have

**Table 4. Net income from crops, dairy and off-farm activities on marginal and small farms in south-western Punjab, 2014-15**

(₹/farm/annum)

| Sources of income | Marginal | | Small | | Overall | |
|---|---|---|---|---|---|---|
| | (₹) | % age | (₹) | % age | (₹) | % age |
| Net income from crops | 34392.88 | 25.50 | 80410.92 | 40.03 | 57401.90 | 32.77 |
| Net income from dairy | 21755.29 | 16.13 | 38730.46 | 19.28 | 30242.87 | 17.71 |
| Net farm income | 56148.17 | 41.64 | 119141.4 | 59.30 | 87644.77 | 50.47 |
| Off-farm income | 78700.15 | 58.36 | 81758.33 | 40.70 | 80229.24 | 49.53 |
| Net income | 134848.3 | 100.00 | 200899.7 | 100.00 | 167874.01 | 100.00 |

been presented in Table 5. Value of the coefficient of multiple determination ($R^2$) came out to be i.e. 0.32 and 0.51 in case of marginal and small farms indicating that 32 and 51 per cent of the variation in income level of marginal and small farmers in south-western area of the Punjab state was explained by the explanatory variables included in the model. On marginal farms, farm size, crop value productivity, net income from dairy and off-farm income were found to be having a significant influence on income. The regression coefficients corresponding to farm size, crop value productivity, net income from dairy and off-farm income estimated as 0.64, 0.32, 0.14 and 0.20 which revealed that with one per cent increase in these inputs the income of marginal farmers would increase by 0.64, 0.32, 0.14 and 0.20 per cent, respectively. In case of small farmers, among all the independent variables, farm size, crop value productivity, net income from dairy and off-farm income were found to be statistically significant. The value of regression coefficients with respect to farm size, crop value productivity, net income from dairy and off farm income revealed that the income level of sampled farmers would be enhanced by 0.78, 1.06, 0.05, and 0.07 with 1 percent increase in these variables, respectively.

On an overall farm situation, farm size, crop value productivity, income from dairy and off-farm sector has been contributed significantly towards the income of the sampled farmers. The value of regression coefficients showed that with one per cent increase in the farm size, income of the sampled households would increase by 0.53 percent, while one percent increase in crop value productivity will lead to 0.29 per cent increase in farm income. The respective figures for income from dairy and off-farm sector were found to be

**Table 5. Factors affecting income of marginal and small farmers in south-western Punjab, 2014-15**

| Factors | Marginal | | Small | | Overall | |
|---|---|---|---|---|---|---|
| | Regression coefficients | t-value | Regression coefficients | t-value | Regression coefficients | t-value |
| Intercept | 2.16* (0.86) | 2.52 | 0.18 (1.20) | 0.18005 | 3.60** (0.48) | 7.44 |
| Farm size (acre) | 0.64* (0.28) | 2.29 | 0.78* (0.34) | 2.31855 | 0.53** (0.12) | 4.26 |
| Crop value productivity (₹/acre) | 0.32* (0.13) | 2.34 | 1.06** (0.16) | 6.61145 | 0.29** (0.06) | 4.75 |
| Net income from dairy (₹) | 0.14** (0.03) | 4.03 | 0.05** (0.02) | 1.9499 | 0.08** (0.02) | 3.31 |
| Crop expenditure (₹) | 0.20 (0.19) | 1.06 | -0.01 (0.20) | -0.04928 | 0.01 (0.14) | 0.08 |
| Off farm income as share of total income | 0.19* (0.08) | 2.36 | 0.07* (0.03) | 2.24727 | 0.06*** (0.04) | 1.73 |
| $R^2$ | 0.32** | | 0.51** | | 0.55** | |

*\*\*\*,\*\* and \* significant at ten, five and one per cent level of significance respectivaly*
*Figures in the parentheses indicate the standard error*

0.08 and 0.06 per cent, respectively. The value of coefficient of multiple determinations ($R^2$) in case of overall farm situation worked out 0.55, which is significant at one per cent level of significance. This reveals that 55 per cent of the total variation in the gross farm family income was explained the various explanatory variables included in the model. Cotton crop is very risky crops and highly susceptible to insect pests and diseases. Thus, there is a need of the hour to educate the farmers regarding the judicious use of seed and pesticides and also advised to follow recommended agronomic practices to increase their income level. The study brought out that farm size, crop value productivity, net income from dairy and off-farm income have positive impact on the income of the sampled farmers.

**Conclusion and Policy Implications**

The average size of operational holding in case of marginal and small farms worked out to be 1.97 and 4.41 acres, respectively. Leasing operations were found to be very limited in these two categories. Nearly 6 per cent of the total operational area in the case of marginal farmers, 13 per cent of the total operational area in the case of small farmers was leased-in land. Out of the total operational land, the proportion of owned land was more in marginal farm category (95.43%) than that of small farms (86.62%). Only marginal farmers were found to be leasing out their land and proportion of leased-in land as well as leased-out land in this category came to be 6.09 and 1.52 per cent to the total operational land, respectively. Cropping pattern of the sampled farmers showed that in south-west zone of the Punjab state, farmers mostly follow cotton-wheat rotation. The area under cotton crop was about 30.49 per cent to the total cropped area in case of marginal farms and 29.75 per cent for small farms. Being relatively more resourceful than marginal farmers, small farmers put more area under basmati cultivation. It was 1.25 acres on small farms and only 0.47 acres on marginal farms accounting for 14.30 and 12.14 per cent to the total cropped area, respectively. In *rabi* season, wheat was the dominated crop, the proportionate share of this crop to the total cropped area was marginally high in the case of marginal farmers (45.22%) as compared to small farmers (44.85%). On an overall farm situation, cropping intensity estimated at 197.65 per cent, while it was slightly low in the case of marginal farmers (196.45%) as compared to small farms (198.19%), respectively.

The study brought out that on an overall basis, the extent of average annual family income generated from all sources worked out ₹262944 per farm. The results have shown that on per farm basis, the net annual family income from all sources estimated as ₹222109 on an overall farm situation, while it was ₹ 160531 on marginal farms and ₹283687 on small farms, respectively. The study brought out that farm size, crop value productivity, net income from dairy and off-farm income have positive impact on the income level.

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