

**DETERMINANTS OF POVERTY IN RURAL AREAS:
CASE OF SAVEJBOLAGH FARMERS IN IRAN**

Javad M. Sadeghi, M. Toodehroosta, and A. Amini

Working Paper 0112

Abstract

The purpose of this study is to explore the determinants of poverty in rural areas in Iran, for which the Savejbolagh Township located in the north of Iran, was selected as a representative. The study utilizes farm and household cross-sectional data for 1998-99 that was collected through personal interviews with 350 farmers from the Savejbolagh Township, who were selected by stratified random sampling. Different socio-economic factors were compared along the farmers' income deciles. To determine the factors that would affect poverty, a linear regression model (an earnings equation) is used for the analysis. The estimated coefficients of the regressions with positive signs show that the variables will increase income and those with negative signs show the reverse effects. The effects of explanatory variables on income are interpreted to have the reverse effects on poverty. The dependent variable is a natural logarithm of the farmer's annual income. The explanatory variables included such variables as the number of sons, farmer's age and experience, level of education, type of production technologies, and town distance. The results show that, given the current technologies, types of education and other circumstances, alleviation of poverty and income disparities can be achieved by improvements in the assets of the poor farmers. Implicit in these results is that in order to make human capital, such as the level of education, effective in poverty alleviation we need to introduce better technologies and more modern inputs to farmers. Improvements in better roads and communication facilities can also decrease poverty.

1. Introduction

Poverty and income inequalities are two of the important disturbing factors on the way to development in developing countries including the Middle East and North Africa. The percentage of the population that fall below the poverty line and the discrepancies in the distribution of income vary country to country and region to region (see Todaro, 1977, pp 30-32 and 143-186). The percentage of poor people and the income inequalities in rural areas have been larger than in urban areas. In Iran in 1996 for example, people under first and second poverty line were 2.6 and 12.1 percent in urban areas, respectively; whereas the corresponding figures for rural areas were 7.8 and 22.9 percent. The poorest decile in rural areas comprised 1.5 percent of the total consumption of the country, while the poorest decile in urban areas consumed 2.2 percent (Tabibian, 2000, pp. 10-11 and 168-169). We observe these discrepancies even in two adjacent regions of a single township, for example in Savejbolagh, which is selected for our study. The existence of these mentioned variations among the inequalities calls for region-specific investigation including investigations on the determinants of poverty. This is what we aim to do in this paper.

The lack of information on the determinants of poverty in developing countries, especially in Iran, is one of the serious inhibiting factors for devising correct and effective policies for poverty alleviation. Some studies have been done on income distribution and poverty in Iran (Behdad, 1989; Mehryar, 1994; Nili, 1997; Pesaran, 1976; Plan and Budget Organization, 1996; Tabibian, 2000; and Tabibian and Mahani, 1996), none of which have analyzed, at the micro level, the factors determining poverty, especially in rural areas. Among developing countries, India is a rare exception, and perhaps even the only country that has considerable farm and household data that makes studies on the poverty of Indian rural areas possible (see the studies in Mellor and Desai, 1985; Reardon, 1995; and Sen, 1981). The purpose of this study is to explore the income distribution and the determinants of poverty in the rural areas of Iran, for which the Savejbolagh Township was selected as a representative. The peculiarities of the socio-economic conditions of the farms and the feasibility of collecting farm and household data were the reasons for selecting this township.

2. Methodology and Data

A. Methodology

Due to the lack of information on the poverty lines and to avoid unsubstantiated exaggeration on the magnitude of the poverty of the Savejbolagh township, in this paper we do not deal with the analysis that underlies poverty lines. Instead, we illustrate the income inequalities, by using the decile distribution of household income

of the farmers. The decile distribution of other factors such as their different assets will be shown as well¹. To determine the factors that would affect poverty, we use a linear regression model (an earnings equation) for the analysis². The estimated coefficients of the regressions with positive sign show that the variables will increase the income and the negative sign show the reverse effects. The effects of explanatory variables on income are interpreted as to have the reverse effects on poverty. The dependent variable is a natural logarithm of the farmers annual income measured in 1000 Rials (about 800 Rials equal one U.S. Dollar). The explanatory variables are the number of sons living with the family; farmer's age, experience (farmer's age minus six minus years of education), and dummies for level of education; farmer's hectares of cropland, hectares of fruitland and livestock units; dummy for use of technology; and a quantitative variable of town distance. Regressions with other variables were also estimated but their estimated coefficients are not reported here since they were not statistically significant. These other variables included family size, working off-farm, type of farmer's previous job, his father's type of job, variety of farmer's sources of income, and type of farm's main enterprise. Very few of the farmers were unmarried or female. Therefore, the variables of marriage and sex did not have a statistically significant effect on income.

In most studies on poverty, such as those using household expenditure survey data, all families with different employment situations are considered. In our study, however, our sample includes only the self-employed farmers. Hence, further research is needed to investigate the poverty of individuals with other circumstances. One point of caution is that relative to other years, in the agricultural year of 1998-99, the year of our study, the area faced a low level of rainfall and other types of precipitation so that in especially upland, the farmers have less access to ground water, and suffered from

¹ To be brief, we do not deal with Gini ratios because they show almost the same things, as the income decile ratios do. The income-decile-ratio approach might be preferred to the Gini method. For example, we are mostly interested to know the changes in the relative income of the poorest to the richest individuals. With the Gini ratio, however, we could have an improvement in the Gini ratio solely by improvements in the distribution of incomes between the two richest deciles and no improvement in the poorest decile. Hence the improvement in Gini ratio does not show the unchanged situation of the poorest decile as compared to the rest of the population (see Tabibian, 2000, p5).

² A logit regression model, in which the dependent variable is a dummy with one for being poor and zero for non-poor, could be used instead of an earnings regression. In a logit model however, we would get opposite signs for the estimated coefficients that we would get in an earnings regression equation (Bardhan, 1985, p 93). In addition, in a logit model the estimated coefficients of the explanatory variables show some kind of probability of the effects of a person falling into the poor category. We did not use a logit model, again because in a logit model our dependent variable relies solely on how many of the population fall below the poverty lines—something for which we lack data.

water shortage. Hence, the results of the study might not necessarily represent those of regular years.

B. Data

The study utilizes farm and household cross-sectional data of 1998-99 that were collected through personal interviews with 350 farmers of Savejbolagh, who were selected by stratified random sampling. The area under the study was first classified into two districts of lowland and upland. Villages in each district were categorized on the basis of the population size. They were categorized into five sizes: holding up to 50, 51 to 100, 101 to 150, 151 to 200, and 201 and more families. Villages from each category and the farmers from each village were selected on a random basis. The 350 farmers of the sample were distributed among the districts and the villages on the basis of the distribution of the farms.

3. Results and Discussion

A. Savejbolagh and its Income Distribution

Savejbolagh is a township located in the northwest of Tehran province, Iran, which has recently separated from Karaj township. The population of the township was 223,701 in 1996 of which 53.4 percent lived in rural areas. The township includes 278 villages and two cities of Hashtgerd and Nazarabade-Moghadam. It includes the lowland district in the south and the upland (mountainous) district in the north. Inhabitants of the township have access to different size factories and manufacturing firms for their second jobs. Lowland workers with an average of 17 kilometers distance to the cities (as compared to an average of 21 kilometers for upland workers) have better roads and commuting and communicating facilities, and better and less costly access to the labor market for their nonagricultural second jobs. While the farmers of both districts are involved in crop production, fruit production is an important enterprise in the lowland, and livestock production is in the upland (See Table 1). As Table 1 shows lowland farmers with about 37 million Rials of average annual income are richer than the upland farmers whose annual income is about 34 million Rials.

Table 1 also shows that the farmers obtained more than 85 percent of their income from crop, fruit, and livestock products and less than seven percent of their income from second jobs.

The distributions of farmers' assets by income deciles are shown in Table 2. Values of Table 2 show that the quantity of all of the three types of assets - cropland, fruitland, and livestock units - generally increases as we move from the poorest income decile to the richest decile. Regression results, that will be illustrated later, support these

correlations by statistically significant positive effects of these assets on the level of farmers' household income.

Distribution of farmers' average household income, use of technology, and the town distance by income deciles and districts in Savejbolagh are shown in Table 3.

As Table 3 shows, the ratios of income of the richest decile to the poorest decile for the lowland district, the upland district, and the entire township are 9.9, 58.6, and 31.5, respectively. The corresponding figures for the quintiles are 5.9, 24.0, and 13.2. These figures show that the income distribution among the upland farmers with lower average income was worse than that of the lowland farmers. This is consistent with other research results that the distribution of income is worse in poorer populations. The percentage of farmers who used the technology (machine for harvesting wheat and barley) increases as the farm income increases. Use of technology, to some extent, introduces better other farming practices as well. The upland district is farther away from the city, and a general decrease in town distance is observed as we move from poorest to richest deciles. Although some preferences for larger families (around five members) are observed among lowland middle income families, yet no strong correlation between family size and level of income is observed (see Table 4).

For the number of sons- ten years of age and over who live with the family- however, a slight positive correlation with the level of income is observed. This of course was shown by the statistically significant positive relationship in our regression estimates.

Table 5 shows that, on average, farmers of the township were 30 percent illiterate, 23.1 percent could read and write, 31.1 percent had primary school diploma and 15.7 percent had a higher than primary school diploma. It is interesting that the upland farmers who had lower income were less illiterate (23.8 percent) than the lowland farmers (23.8 percent). Except for the upland where the illiteracy level decreases as the level of income increases, we do not generally see any pattern that the level of education follows the level of income. In addition, in the regression analysis we did not find a statistically significant relationship between the levels of education and the levels of income.

B. Regression Results

Means and standard deviations of the variables used for estimating the regressions are shown in Table 6 and the regression results are shown in Table 7. The estimated coefficients show statistically significant positive effects of cropland, fruitland, livestock units, and town distance for both districts. The number of sons living with the family, and technology had statistically significant positive effects on income in the upland district but not in the lowland. Age, experience, and the level of education

of the farmers, that were the important personal characteristics, did not show statistically significant effects on the level of income. One explanation for the insignificance of age and experience is that recently more summer crops are grown in the townships that have substituted for their traditional crops such as potato. The new crops need more skilled work that is done by newcomers to the farming activities. The explanation for the insignificance of education could be that for the current farming activities, education, especially the formal type, is not seriously needed.³ The results imply that in both districts of the Savejbolagh Township what could increase the level of income (or could decrease poverty) were mainly assets: cropland, fruitland and livestock. In upland, however, besides the mentioned three types of assets, the number of sons which by some definitions is an asset, and the town distance are income determining factors as well. It can be concluded that given the current technologies, types of education and other circumstances, alleviation of poverty and income disparities can be achieved by improvements in the assets of the poor farmers. Implicit in these results is that in order to make human capital such as level of education effective in poverty alleviation, we need to introduce better technologies and more modern inputs to farmers and offer them agricultural vocational trainings. Infrastructural improvements such as better roads and communication facilities can also decline poverty especially for the upland district that suffers from low quality roads and communications.

4. Summary and Conclusions

This study attempts to analyze the income distribution and the determinants of poverty in the Savejbolagh Township. When looking at the two adjacent lowland and upland districts, the lowland farmers are richer. Farmers of the township obtained more than 85 percent of their income from crop, fruit, and livestock products and less than seven percent of their income from second jobs.

The following results were obtained from comparing the farmers of different income deciles. The quantity of all of the three types of assets -cropland, fruitland, and livestock units- generally increases as we move from the poorest income decile to the richest decile. The ratios of the income of the richest decile to the poorest decile for the lowland district, upland district, and the entire township are 9.9, 58.6, and 31.5, respectively. These figures show that the income distribution among the upland farmers with lower average income was worse than that for lowland farmers. This is consistent with other research results that the distribution of income is worse in poorer

populations. The percentage of farmers who used machines for harvesting wheat and barley increases as the farm income increases. A general decrease in town distance is observed as we move from poorest to richest deciles. However, for the number of sons, who live with the family, a slight positive correlation with the level of income is observed. It is interesting that the upland farmers who had lower income were less illiterate (23.8 percent) than the lowland farmers (23.8 percent).

The following results were obtained from the regression estimates. The estimated coefficients show statistically significant positive effects of cropland, fruitland, livestock units, and town distance for both districts. The number of sons living with the family, and technology had statistically significant positive effects on income in the upland district but not in the lowland. Age, experience, and the level of the education of the farmers did not show statistically significant effects on the level of income. The results imply that in both districts of the Savejbolagh township what could increase the level of income (or could decrease poverty) were mainly assets - cropland, fruitland and livestock. In the upland however, besides the mentioned three types of assets, the number of sons which by some definitions is an asset, and the town distance are income determining factors as well. It can be concluded that given the current technologies, types of education and other circumstances, the alleviation of poverty and income disparities can be achieved by improvements in the assets of the poor farmers. Implicit in these results is that in order to make human capital such as level of education effective in poverty alleviation, we need to introduce better technologies and more modern inputs to farmers and furnish them with agricultural vocational trainings. Infrastructural improvements such as better roads and communication facilities can also decline poverty especially for the upland district that suffers from low quality roads and communication facilities.

³ Studies on the determinants of earnings in urban areas show positive significant effects of education on the earnings level, however (see Sadeghi, 1997 and 1998).

References

- Bardhan, B. 1985. "Poverty and "Trickle-Down" in Rural India: A Quantitative Analysis," in J.W. Mellor and G.M. Desai (eds.), *Agricultural Change and Rural Poverty Variations on a Theme by Dharm Narain*. Baltimore: The John Hopkins University Press, pp. 76-94.
- Behdad, S. 1989. "Winner and Losers of the Iranian Revolution: A Study in Income Distribution." *International Journal of Middle East Studies*, 21: 327-358.
- Mehryar, A. 1994. "Poverty: Definition and Measurement." *Planning and Development*, Institute for Planning and Development, Tehran, Iran, 2(8): 39-89 (in Farsi).
- Mellor, J.W. and G.M. Desai (eds.). 1985. *Agricultural Change and Rural Poverty Variations on a Theme by Dharm Narain*. Baltimore: The John Hopkins University Press.
- Nili, F. 1997. "Review of Changes in Poverty, Income Distribution and Social Welfare in the Past Years," in M. Nili (ed.), *Economics of Iran*. Higher Institute for Research in Planning and Development, Iran: Sooreh Publishers, pp. 261-318 (in Farsi).
- Pesaran, M.H. 1976. "Income Distribution and its Major Determinants in Iran," in J. W. Jacqz (ed.), *Iran: Past, Present, and Future*. Aspen Institute for Humanistic Studies, pp. 267-287.
- Plan and Budget Organization. 1996. *Conference Proceedings on Reviewing the Problem of Poverty and Poverty Elimination, (volume one)*, Tehran, Iran (in Farsi)
- Reardon, T. 1995. "Links between Rural Poverty and the Environment in Developing Countries." *World Development*, 23(9): 1495-1506.
- Sadeghi, J.M. 1997. "Factors Affecting Wage Rates Among Bakery Workers in the City of Isfahan, Iran." *Research in the Middle East Economics*, Vol. 2 pp. 67-76.
- Sadeghi, J.M. 1998. "Private Rate of Return to Education of Male and Female Household Heads in the City of Isfahan, Iran, 1992." Paper presented in the conference on Regional Trade, Finance and Labor Markets, The Economic Research Forum for Arab Countries, Iran and Turkey. Tunisia, August 31-September.
- Sen, A. 1981. "Ingredients of Famine Analysis: Availability and Entitlements." *The Quarterly Journal of Economics*, 96(3): 433-464.
- Tabibian, M. 2000. "*Poverty and Income Distribution in Iran*." Institute for Planning and Development, Country Management and Planning Organization, Tehran, Iran (in Farsi).
- Tabibian, M. and R.S. Mahani. 1996. *Some Discussion on Poverty*. Institute for Planning and Development, Tehran, Iran, 62 p. (in Farsi).
- Todaro, M.P. 1997. *Economic Development in the Third World*. New York: Longman.

Table 1: Average Annual Income of the Farmers of Savejbolagh Township by Source of Income and District, 1999

	Source of income (1000 Rials) ¹					Total
	Crops	Fruits	Live-stock	Second Job	Other Sources ²	
Districts:						
Lowland (N=182)	14,023	10,245	8,817	1,942	1,851	36,878
%	38.0	27.8	23.9	5.3	5.0	100
Upland (N=168)	10,017	4,548	11,660	2,012	2,593	30,830
%	32.5	14.8	37.8	6.5	8.4	100
Total (N=350)	12,100	7,511	10,182	1,975	2,207	33,975
%	35.6	22.1	30.0	5.8	6.5	100

Notes: 1. About 800 Rials= 1U.S. Dollar. 2. Includes such incomes as rent, retirement, and direct transfer payments from welfare programs.

Source: Calculated from sample data.

Table 2: Distribution of Farm Average Hectares of Land under Crops and Fruits and Livestock Units 1 by Income Deciles 2 and Districts in Savejbolagh Township, 1999

Districts Deciles from Poorest to Richest	Lowland (182 farmers)			Upland (168 farmers)			Total (350 farmers)		
	Crops	Fruits	LS Units ¹	Crops	Fruits	LS Units ¹	Crops	Fruits	LS Units ¹
1 st	2.44	0.57	0.28	0.24	0.39	0.0	0.38	0.60	0.0
2 nd	2.32	0.83	1.67	0.36	0.85	0.0	1.37	0.65	3.96
3 rd	2.03	0.58	3.47	1.03	0.79	1.61	1.87	0.56	8.31
4 th	2.33	0.65	3.65	0.99	0.40	10.74	1.81	1.02	8.20
5 th	2.67	0.69	3.73	1.50	0.61	13.40	2.49	0.72	6.65
6 th	2.07	1.49	6.71	2.03	1.31	8.44	2.45	0.91	9.33
7 th	2.93	1.25	16.07	2.46	1.19	20.39	2.13	1.46	9.90
8 th	3.27	0.97	6.44	2.24	1.64	23.43	3.29	1.10	15.54
9 th	4.92	1.43	15.86	4.06	1.53	13.09	4.42	1.56	7.57
10 th	4.48	1.72	43.04	7.53	1.99	41.48	5.89	1.85	46.51
Average	2.94	1.02	10.04	2.25	1.07	13.29	2.61	1.04	11.60

Notes: 1. Livestock units are calculated as each cow or bull=5, each heifer or steer=2.6, each sheep or goat=1, and each lamb = 0.6 units. 2. Income deciles are shown in Table 3.

Source: Calculated from sample data.

Table 3: Distribution of Farmers' Average Household Income, use of Technology, and the Town Distance by Income Deciles and Districts in Savejbolagh Township, 1999

Districts Deciles from Poorest to Richest	Lowland (182 farmers)			Upland (168 farmers)			Total (350 farmers)		
	Ave. Income ¹	Tech. ²	Town Distance ³	Ave. Income ¹	Tech. ²	Town Distance ³	Ave. Income ¹	Tech. ²	Town Distance ³
1 st	11,349	33.3	15.7	2,541	5.9	29.9	4,129	8.6	29.7
2 nd	16,386	50.0	22.7	5,610	5.9	30.3	9,555	28.6	20.3
3 rd	20,127	33.3	16.7	8,316	23.5	23.1	13,374	25.7	22.1
4 th	22,536	38.9	15.7	11,547	23.5	20.5	17,051	34.3	20.4
5 th	26,827	42.1	15.9	13,837	25.0	21.4	20,896	34.3	16.1
6 th	30,462	36.8	16.2	16,994	25.0	20.9	25,273	34.3	15.5
7 th	35,932	33.3	17.1	21,598	29.4	16.2	30,608	34.3	14.7
8 th	42,137	44.4	18.9	30,348	11.8	13.4	38,509	31.4	17.9
9 th	51,783	50.0	21.6	46,845	41.2	11.5	50,279	50.4	16.5
10 th	112,154	22.2	11.4	148,853	41.2	18.9	130,075	28.6	15.1
Average	36,878	38.5	17.2	30,830	23.2	20.6	33,975	31.1	18.8

Notes: 1. In 1000 Rials; about 800 Rials= 1U.S. Dollar. 2. The percentage of the farmers who used technology, here using machine for harvesting wheat and barley. 3. The distance of the farm from the nearest town by kilometers.

Source: Calculated from sample data.

Table 4: Distribution of Average Farmers' Age, Family Size, and Number of Sons by Income Deciles and Districts in Savejbolagh Township, 1999

Districts Deciles from Poorest to Richest	Lowland (182 farmers)			Upland (168 farmers)			Total (350 farmers)		
	Age of Farmer	Family Size	Number of Sons ¹	Age of Farmer	Family Size	Number of Sons ¹	Age of Farmer	Family Size	Number of Sons ¹
1 st	54.2	4.1	1.6	70.9	4.2	1.2	67.7	4.5	1.4
2 nd	54.6	4.7	1.4	56.8	4.7	1.5	60.6	4.6	1.7
3 rd	52.4	5.2	2.1	61.4	4.5	1.7	55.5	4.8	1.8
4 th	52.9	5.0	1.9	58.6	5.5	2.2	52.8	4.3	1.4
5 th	49.5	4.2	1.7	54.4	4.3	1.3	56.5	4.7	1.7
6 th	53.2	5.4	2.5	53.8	4.3	1.5	54.9	4.7	1.9
7 th	53.2	4.3	1.4	61.0	4.1	1.4	51.4	5.0	2.1
8 th	52.3	4.8	1.7	60.1	4.8	1.7	58.7	4.6	1.6
9 th	56.9	4.7	2.0	55.3	4.9	1.8	52.3	4.8	1.8
10 th	59.1	4.7	2.3	60.2	4.8	1.9	60.1	4.6	2.1
Average	54.1	4.7	1.9	60.2	4.6	1.6	57.0	4.7	1.8

Notes: 1. Number of sons, ten years of age and older, who live with their family.

Source: Calculated from sample data.

Table 5: Distribution of Average Farmers' Level of Education by Income Deciles and Districts in Savejbolagh Township, 1999 (%)

Deciles from Poorest to Richest:	Illiterate ¹	Read & Write	Primary Sch.	Guidance Sch.	High Sch.	Higher Edu.
Lowland district (182 farmers)						
1 st	38.9	16.7	27.8	16.7	0.0	0.0
2 nd	38.9	16.7	22.2	5.6	16.7	0.0
3 rd	16.7	16.7	61.1	5.6	0.0	0.0
4 th	22.2	11.1	50.0	5.6	11.1	0.0
5 th	26.3	15.8	31.6	5.3	21.1	0.0
6 th	36.8	10.5	42.1	10.5	0.0	0.0
7 th	50.0	11.1	27.8	5.6	5.6	0.0
8 th	27.8	11.1	38.9	16.7	5.6	0.0
9 th	44.4	22.2	22.2	0.0	5.6	5.6
10 th	55.6	11.7	22.2	0.0	5.6	0.0
Average	35.7	14.8	34.6	7.1	7.1	0.5
Upland district (168 farmers)						
1 st	58.8	35.3	5.9	0.0	0.0	0.0
2 nd	29.4	29.4	23.5	0.0	17.6	0.0
3 rd	17.6	47.1	11.8	11.8	11.8	0.0
4 th	23.5	41.2	29.4	5.9	0.0	0.0
5 th	31.3	37.5	18.8	6.3	6.3	0.0
6 th	18.8	18.8	25.0	18.8	12.5	6.3
7 th	17.6	29.4	35.3	0.0	11.8	5.9
8 th	17.6	23.5	35.3	0.0	11.8	11.8
9 th	11.8	17.6	47.1	0.0	17.6	5.9
10 th	11.8	41.2	41.2	0.0	5.9	0.0
Average	23.8	32.1	27.4	4.2	9.5	3.0
Total township (350 farmers)						
1 st	42.9	31.4	17.1	0.0	8.6	0.0
2 nd	25.7	40.0	17.1	11.4	5.7	0.0
3 rd	34.3	31.4	22.9	8.6	2.9	0.0
4 th	22.9	14.3	34.3	11.4	14.3	2.9
5 th	25.7	17.1	45.7	2.9	5.7	2.9
6 th	17.1	25.7	31.4	2.9	20.0	2.9
7 th	31.4	8.6	42.9	8.6	5.7	2.9
8 th	42.9	17.1	25.7	8.6	2.9	2.9
9 th	20.0	17.1	45.7	2.9	11.4	2.9
10 th	37.1	28.6	28.6	0.0	5.7	0.0
Average	30.0	23.1	31.1	5.7	8.3	1.7

Notes: 1. Individuals with seven years of age and older.
Source: Calculated from sample data.

Table 6: Means and Standard Deviations of the Variables Used for Estimating the Regressions on the Farmers of Savejbolagh Township, 1999

	Lowland District		Upland District		Total Township	
	Mean ¹	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Variables:						
Ln annual earnings	10.293	0.61	9.664	1.09	9.991	0.93
Annual earnings ²	36,878	37,996	30,830	61,492	33,974	50,668
Number of sons ³	1.87	1.46	1.64	1.22	1.76	1.35
Farmers' age (years)	54.10	14.51	60.23	13.87	57.04	14.51
Experience (years) ⁴	44.55	16.94	50.26	16.45	47.29	16.93
Education dummies ⁵ :						
Illiterate	0.357	0.480	0.238	0.427	0.3	0.459
Read and write	0.148	0.356	0.321	0.468	0.231	0.422
Primary school dip.	0.346	0.477	0.274	0.447	0.311	0.464
Guidance school dip ⁶	0.071	0.258	0.042	0.200	0.057	0.232
High school dip.	0.071	0.258	0.095	0.294	0.083	0.276
Higher education	0.005	0.074	0.030	0.170	0.017	0.130
More than prim. Sch.	0.148	0.356	0.167	0.374	0.157	0.364
Cropland (hectares)	2.94	2.72	2.25	4.24	2.61	3.55
Fruitland (hectares)	1.02	1.50	1.07	1.28	1.04	1.40
Livestock units ⁷	10.04	23.96	13.29	25.03	11.60	24.50
Technology Dummy ⁸	0.385	0.488	0.232	0.423	0.311	0.464
Town distance ⁹	17.2	10.0	20.6	12.7	18.8	11.5
Sample size	182		168		350	

Notes: 1. Notice that if the means of the dummy variables are multiplied by 100, they show the percentages of the farmers who have that variable characteristic. 2. In 1000 Rials; about 800 Rials= 1 U.S. Dollar. 3. Number of sons ten years of age and older who live with their family. 4. Calculated as farmer's age minus six minus years of education. 5. For seven years of age and older. 6. Eight years of schooling. 7. Livestock units are calculated as each cow or bull=5, each heifer or steer=2.6, each sheep or goat=1, and each lamb = 0.6 units. 8. Dummy variable equals one if the farmer used technology, here using machines for harvesting wheat and barley. 9. The distance of the farm from the nearest town by kilometers.

Source: Calculated from sample data.

Table 7: Estimated Coefficients of the OLS Regressions, the Dependent Variable is Natural Logarithm of the Annual Earnings of the Farmers of Savejbolagh Township, 1999

Regressions	Lowland district		Upland district		Total Township	
	Est. Coef.	T value	Est. coef.	T value	Est. coef.	T value
Explanatory variables:						
Number of sons ²	0.0324	1.32	0.1292***	3.17	0.0852***	3.4
Farmers' age (years)	-0.0123	-0.39	0.0505	1.30	-0.0121	-0.45
Experience (years) ³	0.0046	0.14	-0.0605	-1.55	-0.0007	-0.03
Education dummies ⁴ :						
Primary school dip.	-0.1056	-0.62	0.1744	0.89	0.0959	0.67
More than prim. Sch.	-0.1677	-0.50	-0.3797	-0.84	-0.0356	-0.12
Cropland (hectares)	0.1120***	6.98	0.0845***	6.51	0.1024***	9.81
Fruitland (hectares)	0.2074***	7.76	0.1966***	4.92	0.2181***	8.77
Livestock units ⁵	0.0106***	6.80	0.0210***	10.20	0.0161***	11.46
Technology Dummy ⁶	0.0022	0.03	0.2501*	1.93	0.2289***	2.84
Town distance ⁷	-0.0084**	-2.25	-0.0248***	-5.74	-0.0201***	-6.72
R ²	0.4660		0.6883		0.5643	
R ² (adj)	0.4348		0.6684		0.5515	
F ratio	14.92***		34.66		43.913***	
n ₁ , n ₂	10, 171		10, 157		10, 339	
SEE	35.92		61.98		131.02	
Intercept	10.252***	34.78	9.241***	20.48	10.166***	37.00

Notes: 1. Annual earnings were measured by 1000 Rials; about 800 Rials=1 U.S. Dollar. 2. Number of sons with ten years of age and older who live with their family. 3. Calculated as farmer's age minus six minus years of education. 4. For seven years of age and older. 5. Livestock units are calculated as each cow or bull=5, each heifer or steer=2.6, each sheep or goat=1, and each lamb = 0.6 units. 6. Dummy variable equals one if the farmer used technology, here using machine for harvesting wheat and barley. 7. The distance of the farm from the nearest town by kilometers. *, **, *** Represent statistically significant at 10%, 5%, and 1% level.

Source: Estimated from sample data.