

ECONOMIC ANALYSIS OF FACTORS AFFECTING OFF-FARM LABOR SUPPLY IN BAGHDAD GOVERNORATE

Zahraa Ali Al-Haboobi¹  , Eskander. H. Ali¹  

¹Department of Agricultural Economics. College of Agricultural Engineering Sciences. University of Baghdad, Baghdad, Iraq.

ABSTRACT

This research aimed to examine how farmers are impacted by risk by estimating the off-farm labour supply model. The study used a qualitative response model to determine the extent to which independent factors influence the dependent factor, using the Probit model. Information was collected randomly from 134 farms it included all crops grown in it of the agricultural divisions of Baghdad Governorate's Karkh and Rusafa sides for the season 2021/ 2022. The research found that the size of the agricultural family is directly proportional to the probability of participating in work outside the farm, as its parameter was 0.015. Also, the higher the educational level of the farmers, the greater the likelihood of participating in work outside the farm. Farm by 0.364. It is also noted that the inverse proportion between the size of the total holding and the percentage of participation in work outside the farm reached 0.011. Likewise, when animal income based on the availability of farm animals increases, it is inversely proportional to the probability of participation in work outside the farm. Therefore, the research recommends reviewing agricultural holding laws, preparing land use maps, reforming small agricultural holding laws and systems, and developing risk management strategies by providing adequate financing and banking facilities.

Key words: agricultural ownership, farm sustainability, probit, risk strategies, tenure security



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Received: 14/7/2024, Accepted: 16/10/2024, Published: 31/3/2026

INTRODUCTION

The tenure system in Iraq suffers from some old and modern problems because it is originally based on a set of social concepts that are difficult to change, and one of the problems in dealing with risks and uncertainty is that individuals, including farmers, differ in their willingness and preference to bear risks and uncertainty (Kemeze, et al., 2020), as this system did not take into account the minimum requirements of absorbing the degree of full use of labour available within the agricultural family and its ability to absorb modern resources. With high productivity to ensure a net income that satisfies the requirements of these families and to create a surplus that stimulates the stabilization of the status quo in the countryside, and the consequent stunting and fragmentation of holdings, as well as desertification and population sprawl, made farmers vulnerable to shocks and risks. Tenure is the main starting point for increasing production and achieving efficiency, as its optimal and efficient management affects

sustainable development issues directly and indirectly (Edet, et al., 2015). Agriculture is known to be highly biological and sensitive to risk and uncertainty, as it represents one of the main characteristics of agricultural production. In the agricultural sector, decision-making is governed by two basic terms, risk and uncertainty, so farmers make their decisions in a risky environment where price fluctuations and returns are the biggest sources of risk in addition to social, legal, environmental and human labor obstacles (Lass and Gempesaw, 1992). As the agricultural sector is difficult to develop a strategy to face the risk and uncertainty as a result of the multiplicity of risks surrounding this sector, the nature of production in this sector differs from the nature of production in the rest of the economic sectors in terms of being affected by many natural, environmental, social and economic factors because it is carried out in an open environment where it is exposed to many risks, which can be divided into two basic types of risks: Internal risks and external

risks, such as climatic and environmental fluctuations, fungal diseases, insect pests, rodents, soil hazards and lack of information, which are difficult for the agricultural product to accurately predict, control or bear their effects alone, which makes agricultural production a risky process, and negatively affects national agricultural production (Zaidan and Ali, 2023). Knowledge of farmers' perception of risks and preferred risk management strategies is essential to create policy tools that will support agricultural risk management and the development of training programs tailored to farmers' needs (Sulewski and Gajewska, 2014). Therefore, risk and insecurity of tenure were studied by estimating the Off-farm labor supply model. The farmer's willingness to take risks is largely related to his psychological state, and the benefit that the farmer gets from each result fundamentally determines the strategy he or she will follow and maximizes the benefits subject to the constraints imposed by the availability of income that is the ultimate goal of the farmer or anyone else. There are several strategies to address risks, including practices such as early or late planting, supplementary irrigation or adjustment of the mix of inputs and outputs, as well as diversification by growing different crops, production contracts, and marketing contracts (Riabacke, 2006). The ability of farmers to face and bear risks is linked to liquidity procedures, financing and market mastery, and agricultural risks are not independent, but rather interrelated with each other as part of a system that includes all available strategies, tools and policies taken to manage risks, so a comprehensive approach is important and necessary (Aimin, 2010). The research aims to identify risk management and control strategies and to find out how farmers face the insecurity of tenure and risk by estimating the Off-farm labor supply model.

MATERIALS AND METHODS

The data was obtained from its primary sources through a questionnaire designed for this purpose and distributed randomly to farmers in Baghdad Governorate, which is located in the central part of Iraq and is bordered by the governorates of Diyala in the

east, Wasit and Babylon in the south, Anbar in the west and Salah Al-Din in the north. The area of Baghdad Governorate is 5169 square kilometres, and it includes 32 administrative units (districts) constituting 10 districts. It is one of the most densely populated governorates as it represents the capital of Iraq and its administrative, economic and cultural center, with a total population of 812675 people for the year 2017 with a population growth rate of 2.1%, as a percentage of the urban population in the governorate constituted 87% while their percentage in the countryside reached 13%, as for economic activity, the rate for the same year was 43.9% and the unemployment rate was 9.3%. Information was collected from 134 farms it included all crops grown in it and belonging to the agricultural divisions of the Karkh and Rusafa sides of Baghdad Governorate for the season 2021/ 2022.

Theoretical framework

Risk can be defined as the irregularity of returns. The fluctuation of these returns in their value or their percentage of the invested capital is what constitutes the element of risk. The process of irregular returns is mainly due to the state of uncertainty in future forecasts (Moussa and Salam. 2011). It means events or changes likely to occur that can be measured experimentally, and from this measurement process, predicting expected events in the future to a degree of approximation. In other words, identifying the probability of a particular event or phenomenon occurring among many cases. This attempt is based on experience with similar recorded and well-known incidents. Therefore, these are called Statistical Risks (Al-Mashhadani,1989). The search for influential factors that cause risk aversion represents a fundamental issue that contributes to risk management (Sulewski,et al.,2020), which should take a special place in agricultural policy (Mateos and Izquierdo. 2020), risk aversion can be viewed as both absolute and relative . Modern technologies contribute to reducing risks by increasing productivity, reducing production fluctuations, and thus ensuring good returns for farms that make them safe. However, the availability and

adoption of these technologies by farmers is not easy, as it depends on several factors, including: social, economic and institutional. The farmer's decision is also affected by several factors, including: human capital represented by experience, age and education. Knowing the reasons for non-adoption is important to contribute to formulating effective policies to overcome difficulties and make the farmer decide to adopt modern technology because it will help in reducing risks by increasing productivity, increasing profits and achieving welfare for the rural family. The theoretical models that dealt with the supply of labor outside the farm were built on a set of assumptions, including maximizing utility and focusing on allocating family time, and the decision of individuals or a husband or wife to work outside the farm is considered a joint decision, and that increasing wages outside the farm has negative and positive effects on the supply of labor. Outside the farm, increasing wages leads to an increase in the supply of labor, and if it is considered that leisure time is a normal good, then increasing wages outside the farm may have the opposite effect and reduce working hours on the farm, and let us assume that the farm family maximizes utility (Hardaker, et al., 1990).

$$U = u(O, L_1, L_2, H, E)$$

$$PQ = PQ - RS + W_1M_1 + W_2M_2 + V$$

$$Q = F(S, F_1, F_2, H, G)$$

$$T_1 = L_1 + F_1 + Y_1 \text{ and } \dots i = 1, 2y_1 \geq of$$

Rural households that work for off-farm wage work depend on the characteristics of the family and the labor market, and these characteristics constitute constraints, using the first condition we can derive the off-farm labor supply function as follows (Abreha, 2007):

$$H_0 = f(P_q, P_x, A-, Y-, E(\phi), G, K, Z) \text{ if } > w$$

$$H_0 = 0 \text{ if } w > w^*$$

The above equation shows farm work that depends on input prices, fixed input quantity, and non-labor income. Theoretical and practical models have been developed to display wages obtained from outside the farm, family participation and farmers' working hours, and that wages from outside the farm depend on the local labor market, on the human capital of the farmer, as well as the

effects of seasonal factors, life cycle and risk (Daniel, 1982). Participants in off-farm work and non-participants can be included in a single equation. From the above, the off-farm job offer model was described in the research sample according to the following function:

$$L = F(A, E, D, F_s, P_x, P_y, F, A_n)$$

Where:

L: Participation in off-farm work, *L* = 1 in case of participation and = 0 otherwise (Dummy variable).

A: Age.

E: Educational level.

D: Distance to the nearest labor market, employment center or commercial center.

F_s: farm size.

P_x: Input prices.

P_y: Output prices.

F: Peasant family size.

A_n: Dummy variable 1 if he owns farm animals and 0 otherwise.

This approach relies heavily on the independent variables that influence the decision to participate in off-farm work, although the likelihood of working off the farm may not have the same effect on the amount of time a worker spends off the farm (20. Swidinsky & Weersink, 1998), risky farmers also use less labor on the farm. Studies conducted in developing countries have shown that off-farm work contributes 35-50% of total income (Haggblade, et al., 2010). While in developed countries such as the European Union and the United States of America, increasingly interact with the off-farm labor market to improve income or for diversification, and they have noticed in America, for example, that there is a positive relationship between income volatility and off-farm work, and profits from off-farm work play a prominent role in income diversification, as they found through field studies. The majority of women farmers in the United States work off-farm (Chang, et al., 2012). One study conducted in a poor country revealed that more than 60% of farmers are women (Edet, 2007).

RESULTS AND DISCUSSION

First: Estimating the off-farm job offer model: Risks are affected by a number of

factors, including economic factors, including pricing and productivity, social factors, and others related to the farmer himself in terms of efficiency, management, skill, age, and experience, especially since one of the characteristics of agriculture is its exposure to risk, which is an inherent characteristic of it (Jassam,2022). This research is based on the analysis of the illustrative variables affecting the decision to participate by farmers to work outside the farm for the research sample that was collected through the questionnaire prepared for this purpose, as one of the qualitative response models (Probit) was used for the fact that the dependent variable is one of the imaginary variables, i.e. binary) 0, 1, which indicates the presence or absence of work outside the farm. Based on this, we can clarify the relationship between the association of some farmers with other work outside the scope of their farm (the offer of work outside the farm) and the risks that will face through some factors affecting this by estimating the following model:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + ui$$

The dependent variable (Y) is a qualitative variable that represents the offer of work outside the farm, i.e. participation in work outside the farm, that is, it has two values 1, 0, as it is 1 in the case of participation and 0 in the case of non-participation.

The independent variables included the following independent variables:

X₁: Quantitative variable representing the farmer's age (year).

X₂: A qualitative variable that represents the farmer's educational level or academic achievement, as the number 0 represents that the farmer does not read or write, 1 Primary, 2 Middle School, 3 High School, and 4 Higher Education / University.

X₃: A quantitative variable representing the distance from the farm to the nearest labor market, commercial center or employment center (km).

X₄: Quantitative variable representing the size of the farm (donums).

X₅: A quantitative variable representing the prices of production inputs, i.e. the cost of inputs (thousand dinars).

X₆: A quantitative variable representing the prices of the output, i.e. the output (thousand dinars).

X₇: A quantitative variable representing the number of members of one peasant family, i.e. the size of the peasant family (individual).

X₈: A qualitative variable related to whether the farm owns farm animals or not, the number 1 represents the farmer's ownership of farm animals and 0 his lack of them. The function parameters were estimated using one of the qualitative response models (Probit) and by EVIEWS program, to identify the effect of the independent variables, which are: (age, educational level, distance to the nearest labor market, farm size, input-output prices, size of the agricultural family and animal ownership) on the probability of the qualitative dependent variable, which is (participation in work outside the farm), and the results were obtained as shown in (Table1).

Table 1. Analysis of binary value data using the Probit model

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.560077	0.818330	-0.684414	0.4937
X1	0.009872	0.011517	0.857144	0.3914
X2	0.364798	0.118356	3.082129	0.0021
X3	-0.013573	0.015591	-0.870571	0.3840
X4	-0.011468	0.004187	-2.739100	0.0062
X5	0.002545	0.000983	2.588300	0.0096
X6	-0.000580	0.000206	-2.809438	0.0050
X7	0.015841	0.017144	0.924000	0.3555
X8	-0.483093	0.315552	-1.530945	0.1258
McFadden R-squared	0.148879	Mean dependent var	0.436090	
S.D. dependent var	0.497774	S.E. of regression	0.459468	
Akaike info criterion	1.301299	Sum squared resid	26.17777	
Schwarz criterion	1.496886	Log likelihood	-77.53636	
Hannan-Quinn criter.	1.380778	Deviance	155.0727	
Restr. deviance	182.1983	Restr. log likelihood	-91.09913	
LR statistic	27.12554	Avg. log likelihood	-0.582980	
Prob(LR statistic)	0.000673			
Obs with Dep=0	75	Total obs	133	
Obs with Dep=1	58			

Resource: By Authors using EViews 11

After estimating the function, we know the effect of the studied variables on the offer of off-farm work through the following:

1. Farmer's age

It is a quantitative independent variable that represents the farmer's age in years, and its parameter reached 0.009 and appeared with a positive sign, which means that when the farmer's age increases by one year, this leads to a high probability of participating in work outside the farm by 0.009, with the assumption that the other variables included in the model are constant at the average, but statistically we find that this variable is not significant through the Z test as shown in the table above. This direct relationship is for several years (the period of strength and good health) until the farmer reaches a certain age (old age and disease), where this relationship begins to decrease and shift from the direct relationship to the opposite.

2. Educational level

It is a qualitative independent variable and represents the level of academic achievement of the farmer, as his teacher reached 0.364 and came with a positive sign, and this means that increasing the educational level by one unit, leads to an increase in the likelihood of participating in work outside the farm by 0.364 assuming the stability of the other variables included in the model at the average, but statistically we find that this variable is significant at the level of 1%, and this means that it is representative of the sample population.

3. Distance to the labor market outside the farm: It is a quantitative independent variable that indicates the distance of the workplace from the farm, and its parameter reached 0.013 it appeared with a negative sign and applied with economic logic, and this means that if the distance increases by one kilometer, this will lead to a corresponding change and in the opposite direction with the possibility of participating in work outside the farm by 0.013 when the other variables are fixed at the average, but statistically we find that this variable is not significant through the Z test.

4. Size of holding :It is a quantitative independent variable representing the total area of the farm, where its parameter reached 0.011, and it came with a negative signal and applied with the logic of economic theory and this confirms the inverse relationship between the size of the tenure and the possibility of participating in work outside the farm, as when the volume of tenure increases by one acre, this will lead to a decrease in the probability of participation in work outside the farm by 0.011 when the other variables are fixed at the average, either statistically and through the table above and based on the Z test we note that it is significant at the level of 1% and this means that it is representative of the sample population, that is, when the volume of tenure increases, the work inside the farm will increase, which leads to a decline in work outside its borders.

5. Input prices

It is a quantitative independent variable representing the prices of production inputs, as its parameter reached 0.002, and appeared with a positive and applicable sign of economic logic and this confirms the direct relationship, as it increases the prices of inputs by one thousand dinars, the probability of participating in work outside the farm will increase by 0.002 when other variables are fixed at the average, because the high costs of the production process reduce the size of the project and therefore needs less work, and therefore participation outside the farm is greater, either statistically and through The above table, based on the Z test, we note that it is significant at the level of 1% and representative of the sample population.

6. Output price

It is a quantitative independent variable that represents the prices of outputs or revenue of crops, and its parameter reached 0.0005, it came with a negative and applicable signal from the logic of the economic theory, which confirms the inverse relationship between product prices and participation in work outside the farm, as the more the price of output increases by one thousand dinars, the more this leads to a decrease in the likelihood of participation in work outside the farm by

0.0005 when other variables are fixed at the average because the increase in prices means an increase in farm income, which helps to invest in assets Medium-term and thus increase the size of the project or increase investments in it, either statistically and through the table above and based on the Z test, we note that it is significant at the level of 1% and representative of the sample population.

7. Family size

It is a quantitative independent variable that refers to the number of members of the peasant family for one farm, and its parameter reached 0.015 and appeared with a positive and applicable reference from the logic of economic theory, which confirms the direct relationship between the size of the family and participation in work outside the farm, and this means that the more the agricultural family by one individual, the more this leads to an increase in the likelihood of participation in work outside the farm by 0.015 when the other variables are fixed at the average, either statistically and through (Table 1). Note that it is not significant based on the Z test.

8. Owning farm animals

It is an independent qualitative variable that represents the farmer's ownership of farm animals or not, and its parameter reached 0.483, it came with a negative and applicable signal from the logic of economic theory, which confirms the inverse relationship between owning farm animals and

participating in work outside the farm, by increasing this variable by one unit, this led to a decrease in the likelihood of participating in work outside the farm by 0.483 when the other variables remained at the average, either statistically and through (Table 1). Based on the Z test, we note that it is Moral.

In terms of the number of farmers participating in off-farm work (qualitative dependent variable) according to Table (1). The number of values that took a value of 1 is 58 views while the number of values that took the value of zero is 75 views of those who are not.

Probit Model Tests

There are a set of statistical tests that help us determine the suitability of this model to the data, including:

Wald Statistic test

The Wald statistics test is used to measure the significance of the parameters of the explanatory variables of the Probit model as a whole, based on the null hypothesis H_0 , and we can see through the results of (Table 2). The value of his Chi-square statistic was 23.04 at degrees of freedom 8, as it was found through the probability level of Chi-square 0.003 that it is smaller than the level of 5%, and this means that the independent variables included in the model have a significant impact on the probability of the dependent variable (Sharing work outside the farm), so the null hypothesis H_0 is rejected, meaning that the parameters of the explanatory variables are not equal to zero.

Table 2. Wald Statistic test of Probit model parameters

Wald Test: Equation: PROPIT			
Test Statistic	Value	df	Probability
F-statistic	2.880491	(8, 124)	0.0056
Chi-square	23.04392	8	0.0033
Null Hypothesis: C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)	Value	Std. Err.	
C(1)	0.009872	0.011517	
C(2)	0.364788	0.118356	
C(3)	-0.013573	0.015591	
C(4)	-0.011468	0.004187	
C(5)	0.002545	0.000983	
C(6)	-0.000580	0.000206	
C(7)	0.015841	0.017144	
C(8)	-0.483093	0.315552	

Restrictions are linear in coefficients.

Source: Researcher's work using EViews 11

Second: The most important factors affecting the offer of work outside the farm:

There are some factors and indicators that must be highlighted to know the extent of their impact on the dependent worker (job offer or participation in work outside the farm), including:

Educational level and participation rate in off-farm work: The results obtained from (Table 3). showed. The total number of farmers participating in the work outside the farm was 58 farmers, which achieved a participation rate equivalent to 43% of the total number of farmers in the sample, and they were divided into five categories based on

the level of their academic achievement, and it was found through this that the lowest participation rate was for the first category (does not read or write), where it reached 0%, meaning that there is no participation in work in this category, while the highest participation rate was for the fifth category (bachelor), as it amounted to 61% and about 25 farmers out of a total of 41 farmers for this category, and it is noted through this that the higher the level of academic achievement, the higher the participation rate of work outside the farm because they have qualifications that help them obtain job opportunities outside the farm or believe that the wage inside the farm is not commensurate with their abilities.

Table 3. Educational level categories and off-farm work participation rate

Academic achievement categories	Number of participants in off-farm work	Number of farmers per category	Participation rate in off-farm work %
He neither reads nor writes	0	6	0
Primary	9	40	23
Middle School	6	16	38
High school	18	31	58
Bachelor	25	41	61
Total	58	134	43%

Resource: By authors based on questionnaire form Total holdings and participation rate in work off the farm: The results in (Table 4). Show the area or total possession is divided into five categories as well, where it is noted that the lowest category in terms of the participation rate of work outside the farm was the fourth category 61-80 dunums, as it amounted to 8% and the number of farmers amounted to 1 farmers out of 12 farmers for

this category, while the highest participation rate was at the second category 21- 40 dunums, as their participation rate reached 56% and the number of farmers reached 23 farmers out of 41 farmers for this category, where it was found that the greater the size of the holding, the more This led to a decrease in participation in off-farm work.

Table 4. Categories of tenure and participation rate in off-farm work

Categories of possession (donums)	No. of participants in off-farm work	No. of farmers per category	Participation rate in off-farm work (%)
20-1	28	55	51
40-21	23	41	56
60-41	4	15	27
80-61	1	12	8
More than 80	2	11	18
Total	58	134	43

Resource: By authors based on questionnaire form Type of tenure and participation rate in off-farm work: The results of (Table 5) show.

Participation rates in work outside the farm, are distributed into three categories according

to the type of agricultural tenure, where it was found that the tenants of agricultural land are the highest in terms of participation rate, which reached 67% with several participants amounting to 14 farmers out of a total of 21 farmers for the same category, while the lowest was the share of farmers with contracts with the state and the participation rate

reached 36% with the number of participants amounting to 27 farmers out of 76 farms for this category. The participation rate in off-farm work depends not only on the income generated from the size of the holding but also on the size of the farming family within these groups.

Table 5. Type of tenure and participation rate in off-farm work

Categories of type of possession	No. of participants in off-farm work	No. of farmers per category	Participation rate in off-farm work (%)
Rent	14	21	67
contract	27	76	36
king	17	37	46
Total	58	134	43

Resource: By authors based on questionnaire form.

Livestock Preparation and Participation Rate in Work Outside the Farm

To identify the extent of the impact of livestock, which included (sheep, cows, goats, buffaloes) on the offer of work outside the farm, a table was created showing the number of livestock (head) divided into three

categories and explaining the number and rates of farmers' participation in work outside the farm through (Table 6)., It is reveal that the more livestock per farm, the lower the percentage of farmers' participation in work outside the farm, as noted in the table below.

Table 6. Livestock Preparation and Participation Rate in Off-Farm Work

Livestock Categories (Head)	No. of participants in off-farm work	No. of farmers per category	Participation rate in off-farm work (%)
20-1	11	21	52
21-40	26	61	43
and more 41	7	21	33
Total	58	134	43

Resource: By authors based on questionnaire form.

Third: Risk Management Strategies

To identify the mechanism by which risks can be managed, a set of strategies have been developed, which in turn give a clear vision of how to control and control somewhat the risks facing farmers (Zaidan,et al.,2023), (Ahmed,2022), and this was done by designing a questionnaire form that contains a set of questions and inquiries that were directed to a sample of farmers, and these strategies are:

Prevention strategies

After the questions were asked to the respondents, collected and bobbed, the results of the survey are show in (Table 7). The number of farmers who received extension programs reached about 95 farmers who constituted 71% of the total farmers of the sample, while the training seminars achieved the highest participation rate of 78%, which

was provided by the agricultural extension departments of the agricultural divisions in all districts and districts of Baghdad Governorate and the number of farmers reached 105 farmers out of a total of 134 farmers, while the participation rate of farmers with research centers was 34%, while the application of scientific programs achieved a participation rate good amounted to 71% of the total farmers of the sample, as for the group of technological methods that contribute to plant protection, including: farmers' use of microelements, which are: (iron, manganese, copper, zinc, molybdenum, boron, chloride) as well as the pesticide package (pesticides, fungicides, bushpesticides of both types for thin leaves and broad leaves) was 55% of the total farmers of the sample each, while the lowest participation rate is in their use of laser leveling of agricultural land, as it reached 29%

The reason for the reluctance of most farmers to the use of such technology and its replacement with old traditional machines and means to increase their prices, as well as the

fragmentation of large farm holdings and their conversion to small holdings, where they have become economically unviable.

Table 7. Prevention strategies and participation rate

Prevention strategies	Number of participants	Participation %	
Are there guidance programs?	95	71	
Did he participate in a training seminar?	105	78	
Is there coordination with research centres?	46	34	
for control seeding, Is there the application of scientific programs fertilization	95	71	
Are there technological methods?	Potassium trace elements Laser leveling Pesticide package	74 39 74	55 29 55

Resource: By authors based on questionnaire form.

Mitigation strategies:

These strategies include a set of questions regarding the availability of support, subsidy, off-farm labor offers, insurance, cold stores and manufacturing industries near the farm, as shown in (Table 8). About 75% of the sample farmers receive support for product prices, especially wheat farmers who market their production to the state, and in return, the state buys it from them at a price that exceeds the local market price, while the subsidy carried out by the state for production requirements is of two types: the first is free distribution such as pesticides and the second is the subsidy at nominal prices for wheat seeds, fertilizers and

kerosene to encourage farms to cultivate and improve production, and the percentage of benefit from farmers reaches 71%, as for the insurance aspect of crops and farm assets from Fires, floods and others, as well as the availability of manufacturing industries such as vegetable oil industry, cotton, leather, paper and other industries that agricultural products supply with raw materials for them and close to the sample farms, they are non-existent according to the answers of the sample farmers, while the percentage of beneficiaries of cold stores are few and constitute 12% of the total sample farmers.

Table 8. Mitigation strategies and utilization rate

Mitigation strategies	Number of beneficiaries	Benefit Rate %
Is there product price support?	100	75
Is there a subsidy for production elements?	95	71
Is there work off the farm?	58	43
Is there insurance?	0	0
Are there cold stores?	16	12
Are there downstream industries near your farm?	0	0

Resource: By authors based on questionnaire form.

Risk Adaptation Strategies

These strategies also included a set of questions posed to the sample farmers regarding the mechanism of adaptation to risks, including loans, the possibility of expanding production, direct sales, manufacturing within the farm and family work, as shows in (Table 9). The lowest benefit rate amounted to 5% with 7 farmers borrowing from the Agricultural Bank without interest, and about the expansion of production, their percentage reached 40% of the total farmers of the sample. The only

obstacle for the rest of the farmers was the scarcity of water and the low share of water farms, which prevented the increase in production, while direct sale obtained a high percentage of 88% of the total farmers of the sample, while local manufacturing within the farm reached 49% of the total farmers of the sample, such as the manufacture of dairy products of all kinds. And leather and tanning industries, while family work reached the highest percentage 92% as most of the sample farmers work with their family members on the farm, which is one of the fixed-cost items.

Table 9. Risk Adaptation Strategies and Utilization Ratio

Risk Coping Strategies	Number of beneficiaries	Benefit Rate %
Are there loans?	7	5
Is there an expansion of production?	54	40
Is there a direct sale?	118	88
Is there local manufacturing within the farm?	65	49
Is there a family business?	123	92

Resource: By authors based on questionnaire form.

After estimating the off-farm work offer model and identifying the most important factors affecting it and the most important risk management strategies, it became clear that the size of the agricultural family is directly proportional to the likelihood of participating in work outside the farm, where the larger the size of the agricultural family, the greater the likelihood of participating in work outside the farm. Another factor affecting off-farm work is the educational level, as the higher the educational level of farmers, the more likely they are to participate in off-farm work. The inverse proportion between the size of the holdings is also noted. College and participation rate by working outside the farm, where the greater the size of the holding, this leads to farmers staying working inside the farm and the lower the participation rate for work outside it. Also, when increasing animal income based on the availability of farm animals, it is inversely proportional to the likelihood of participating in work outside the farm, as the more farm animals there are, the less likely it is to participate in work outside the farm. Therefore, the research recommends reviewing agricultural holdings laws, preparing land use maps, reforming small agricultural ownership laws and systems, which represent an obstacle to the adoption of modern technologies in agriculture, developing risk management strategies by providing adequate financing by providing banking facilities, activating the role of agricultural cooperatives in restoring the agricultural grouping system, which contributes to benefiting from capacity savings and providing requirements Production with appropriate specifications, quantities and prices for farmers, reduces the obstacles and restrictions currently faced by small farmers, and activates the Local Product Protection

Law and the Investment Law. Encouraging the manufacturing industries of agricultural products through the issuance of legislation to maintain prices and the standard of living of agricultural families.

CONCLUSION

Risk is an inherent characteristic of agricultural production, necessitating strategies for risk management. One such strategy is off-farm work, and the supply of off-farm labor was studied using probability models, which are employed when the dependent variable is qualitative. A range of factors influence the supply of off-farm work and participation in it, including: the size of the cultivated area, educational level, family size, and others. Outside the farm, increasing wages leads to an increase in the supply of labor, and if it is considered that leisure time is a normal good, then increasing wages outside the farm may have the opposite effect and reduce working hours on the farm, and let us assume that the farm family maximizes utility.

ACKNOWLEDGEMENT

We thank the farmers who cooperated with us in providing data. We also thank the Ministry of Agriculture.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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تحليل اقتصادي للعوامل المؤثرة في عرض العمل خارج المزرعة في محافظة بغداد

زهراء علي محمد الحبوبي¹، إسكندر حسين علي^{1*}

¹قسم الاقتصاد الزراعي - كلية علوم الهندسة الزراعية - جامعة بغداد

المستخلص

يهدف البحث إلى دراسة كيفية تأثر المزارعين بالمخاطر من خلال تقدير نموذج عرض العمالة خارج المزرعة. استخدمت الدراسة نموذج الاستجابة النوعية لتحديد مدى تأثير العوامل المستقلة على العامل التابع، وذلك باستخدام نموذج Probit. جمعت المعلومات بشكل عشوائي من (134) مزرعة شملت جميع المحاصيل المزروعة فيها والتابعة للشعب الزراعية لجانبين الكرخ والرصافة لمحافظة بغداد للموسم 2021 / 2022، وتوصل البحث ان حجم العائلة الفلاحية يتناسب طردياً مع احتمالية المشاركة بالعمل خارج المزرعة اذ جاءت معلمته 0.015، كما انه كلما ارتفع المستوى التعليمي للمزارعين كلما زاد من احتمالية المشاركة بالعمل خارج المزرعة بمقدار 0.364، ويلاحظ ايضاً التناسب العكسي بين حجم الحيازة الكلية ونسبة المشاركة بالعمل خارج المزرعة اذ بلغت 0.011، كذلك عند زيادة الدخل الحيواني المعتمد على توفر حيوانات مزرعية يتناسب عكسياً مع احتمالية المشاركة بالعمل خارج المزرعة. لذلك يوصي البحث بمراجعة قوانين الحيازات الزراعية واعداد خرائط استعمالات الأراضي واصلاح قوانين ونظم حيازة الملكية الزراعية الصغيرة، ووضع استراتيجيات إدارة المخاطر من خلال توفير التمويل الكافي عن طريق تقديم التسهيلات المصرفية.

الكلمات المفتاحية: الملكية الزراعية، استدامة المزرعة، probit، استراتيجيات المخاطرة، الأمن الحيوي.