

ESTIMATION OF PROFIT FUNCTION OF WHEAT CROP IN DHI QAR PROVINCE

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ABSTRACT

This research aims to study the most important factors affecting profit function. Cross sectional data were used in the light of a random sample of 130 farmers in Dhi Qar province. The results showed that the proportion of costs of production inputs amounted to 73% of the total production costs. Also, profit function showed that the amount of output has a significant impact on profit compared to other independent variables since value of the parameter of the quantity of production amounted to about 308879 and was significant at the level of 1% according to t-test. The coefficient determination of about 93% for the equation estimated with OLS. However, heteroscedasticity was obvious according to the White Test. So the model was estimated using robust regression method to avoid this problem, but that led to a decrease in R^2 to about 69%. The research recommended the need to increase the rates of production growth and productivity through an organized agricultural economic policy that links the policy of supporting input requirements, both in terms of reducing prices or providing quantity and quality, especially fertilizers and seeds in conjunction with the policy of supporting prices of output. Also, research recommended encouraging farmers to expand wheat crop cultivation in the province of Dhi Qar by increasing the cultivated areas.

Key word: method robust least squares, revenue, economic efficiency.

برباز وآخرون

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باحث

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المستخلص

يهدف البحث دراسة أهم العوامل المؤثرة في دالة الربح. استخدمت بيانات مقطعية في ضوء عينة عشوائية اشتملت 130 مزارع في محافظة ذي قار للموسم الزراعي 2017-2018، بينت نتائج البحث ان نسبة تكاليف مستلزمات الإنتاج بلغت 73% من أجمالي التكاليف الإنتاجية، كما تبين من خلال دالة الربح بأن كمية الناتج لها أثر كبير في الربح بالمقارنة مع بقية المتغيرات المستقلة إذ بلغت قيمة معلمة كمية الإنتاج نحو 308879 وقد ثبتت معنويتها بحسب اختبار T عند مستوى 1%، وقد بلغ معامل التحديد نحو 93% في الدالة المقدره بطريقة OLS، لكن ثبت وجود مشكلة عدم ثبات التباين بحسب اختبار وايت العام، لذ تم التقدير بطريقة الانحدار الحصين لتلافي مشكلة عدم ثبات التباين وقد ادى الى انخفاض معامل التحديد الى نحو 69%، وقد اوصى البحث بضرورة زيادة معدلات نمو الإنتاج والإنتاجية من خلال سياسة اقتصادية زراعية منظمة تعمل على ربط سياسة دعم مستلزمات الإنتاج سواء من ناحية تخفيض أسعارها أو توفيرها كما ونوعاً وخصوصاً الأسمدة والبذور بتزامن مع سياسة دعم أسعار الناتج، فضلا عن تشجيع المزارعين على التوسع بزراعة محصول القمح في محافظة ذي قار من خلال زيادة المساحات المزروعة.

الكلمات المفتاحية: اسلوب الانحدار الحصين، الايراد، الكفاءة الاقتصادية.

INTRODUCTION

The development of agricultural production in general and the development of human food in particular is a major concern of agricultural economic policy planners, especially in developing countries (17). Among them is Iraq, which suffers from the problem of food shortage, as the gap between its agricultural production and its needs is increasing over time. The reason of this problem lies in the growing population at rates that do not keep pace with the rate of increase in agricultural production and this resulted in a food deficit (3)(4). Therefore, studies on the economics of agricultural production need to be addressed through the optimal use of economic resources and achieving high rates of agricultural production and productivity because these studies illustrate the nature of the relationship between economic variables in agriculture (2). Agricultural production also plays an important role in the economies of any country. It is linked to the lives of its inhabitants first and a source of economic activity second (5), especially cereal crops, which constitute 80% of the total plant foods (1). Wheat is the most important cereal crop, which occupies a distinguished economic position in most countries of the world. Its importance in the world food by 40%, in addition to providing the world with 55% of the total carbohydrates and 20% of the food calories consumed (9). It accounts for 17% of the world export volume (13), and the main wheat producing countries are China, India, USA, Russia, France and Pakistan (16). Wheat area constitutes about 17% of the world's cultivated area, world statistics indicate that the cultivated area and production of this crop amounted to 217 million hectares and 671.5 million tons respectively in the world. Asia is ranked first in the world and produces approximately 311.4 million tons, followed by Africa, Europe and the Americas with production of about 24.7, 19.6, 10.8 million tons respectively (10). In the Arab world, production and cultivated area amounted to about 26 million tons and 11.24 million hectares in respectively. The Republic of Egypt ranks first in the Arab world in terms of production and productivity 8.7 million tons and 6.6 tons / hectare respectively. Iraq

produced 3 million tons of wheat, with a cultivated area of 1.7 million hectares and a yield of 1.7 tons / ha (6). Despite its economic and nutritional importance, wheat production is still below the required level of self-sufficiency (8). Therefore, the problem of research is that despite the existence of arable land in the province of Dhi Qar, but the areas planted with wheat crop in the province is still low, this leads to low production of wheat crop, which may be attributed to production problems facing the cultivation of the crop, including farmers away from the concept optimization, both in terms of production and resources used, which reflected on the economic efficiency in crop production, especially since wheat fields are considered useless to cultivate in small areas, due to their low financial return (7). Therefore, the aim of the research was to estimate the profit function of wheat crop in Dhi Qar governorate, and to determine the most important variables of it, which cause not to expand the cultivated areas in the province. The importance of the research is that it is one of the important economic studies that dealt with the most important factors affecting the profit function of the wheat crop and measuring the economic, technical, price and profitability efficiency, which can be a basic basis through which the farmers can determine the amount of production that can be produced and that maximize their farm profits according to market changes. Therefore, the hypothesis of the research is based on the fact that the farmers of the sample did not reach the optimization in terms of both production and resources used, which led to low economic efficiency in the production of wheat crop.

MATERIALS AND METHODS

The study was based on a questionnaire for a sample of wheat farmers in Dhi Qar province for the agricultural season 2017-2018. A total of 130 questionnaires were distributed to a random sample of farmers in Dhi Qar governorate, where the statistical data were collected through personal interviews of the farmers of the sample, which included different information on production, costs, and the cultivated areas and was loaded and analyzed using the computer program SPSS, Eviews11.

Theoretical framework

Wheat profit function: The profit function model was estimated based on the economic theory that profit is equal to total revenue minus total costs (15) as follows:

$$TR = TR - TC \dots(1)$$

$$TR = \sum P1 * Q1 + \sum P2 * Q2$$

$$TC = \sum Vi * Xi$$

$$\Pi = \sum P1 * Q1 + \sum P2 * Q2 - \sum Vi * Xi \dots(2)$$

where: Π : profit, TR: total or total revenue includes (primary and secondary revenue), TC: total costs, P1: output price, Q1: The output quantity, P2: price of by-product, Q2: The amount of by-product, Vi: input price, Xi: supplier quantity. Through equation 1 and 2 we get the profit function as in the following formula: $\Pi = F(P, C, Q)$, Based on the above, the profit function model (14) can be described as follows:

$$\Pi = B_0 + B_1 P - B_2 C + B_3 Q + U_i$$

where: Π : Profit. P: output price of wheat (ID), C: average production costs (ID/ton), Q: The output quantity of wheat (tons), B_0 : intercept, B_i : represents regression coefficients
 U_i : The random variable

RESULTS AND DISCUSSION

Descriptive analysis of the structure of the costs and revenue of wheat production. Production costs are an important and fundamental issue in economic studies, because the production decisions depend largely on the level of production costs, as the volume of production is always linked to production costs, as the importance of studying the costs of production because it is a key factor in determining the net income (12). Therefore, this aspect will be highlighted in the study. Table 1 shows that the variable costs constitute 73% of the total production costs, while the fixed costs represent 27% of the total production costs. Fixed cost items came in first place with 14%. Table 2. shows that the total revenues amounted to 4,119,370,000 dinars, and an average of about 31,207,348 dinars at the farm level, while the total profit amounted to 2,102,930,107 dinars, with an average of about 15,931,289 dinars. The area cultivated in the research sample reached about 8617 dunums.

Table 1. Cost structure of wheat crop production

Items	Cost per project (ID)	Total cost in the research sample (ID)	Relative importance
Seeds	1686484.177	219242943	11%
Fertilizers	3730174.615	484922700	24%
Pesticides	76769.23077	9980000	1%
Fuel	734230.7692	95450000	5%
Maintenance	275269.2308	35785000	2%
Marketing Costs	1108461.538	144100000	7%
Mechanical Labor	3597038.462	467615000	23%
Variable Costs	11208428.02	1457095643	73%
Land Rent	228200.7692	29666100	1%
Depreciation	2163815.385	281296000	14%
Interest on Capital	1143464.615	148650400	7%
Hand Labor	647538.4615	84180000	4%
Fixed Costs	4183019.231	543792500	27%
Total Costs	15391447.25	2000888143	100%

Source: Prepared by the researcher based on the questionnaire data

Table 2. Total revenue and profit of wheat crop production.

Items	The Average In Sample Level The	Total	Relative Importance
Production (Tons)	55.5	7219.05	
Main Revenue (ID)	29,870,577	3,883,175,000	94%
Secondary Revenue (ID)	1,952,808	253,865,000	6%
Total Revenue (ID)	31,823,385	4,137,040,000	
Total cost (ID)	15,391,447	2,000,888,143	
Profit (ID)	16,431,937	2,136,151,857	

Source: Prepared by the researcher based on the questionnaire data

Table 3. Results of wheat profit function

Dependent Variable: PROFIT				
Method: Least Squares				
Date: 10/12/19 Time: 18:36				
Sample: 1 130				
Included observations: 130				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-38082283	7699131.	-4.946309	0.0000
PY	75.61372	13.47515	5.611344	0.0000
ATC	-15.24400	3.823503	-3.986919	0.0001
Y	342329.2	8315.898	41.16563	0.0000
R-squared	0.937736	Mean dependent var		16431937
Adjusted R-squared	0.936253	S.D. dependent var		32042907
S.E. of regression	8090237.	Akaike info criterion		34.68050
Sum squared resid	8.25E+15	Schwarz criterion		34.76873
Log likelihood	-2250.233	Hannan-Quinn criter.		34.71635
F-statistic	632.5431	Durbin-Watson stat		2.039965
Prob(F-statistic)	0.000000			

Source: Prepared by the researcher based on the results of the statistical program reviews 11

Table 3 shows variables that are in line with the logic of economic theory. The output price and output quantity parameters are positive with profit indicating the positive relationship. The mean of the average production costs parameter is negative with profit. The statistical analysis confirmed that all the parameters were significant at the 0.01 level according to t-test. The model is highly significant, which reflects the importance of the variables included in the function on the one hand and the realism of the function on the other. The value of the coefficient of determination was 0.93 in the function, which reflects the quality of alignment of the regression line, showing that 93% of the changes in profit are due to wheat price, quantity of output and average production costs. To show how the estimation is efficient, econometric tests applied. There was no Autocorrelation between residuals as DW value was 2.03, which is greater than du of 1.764 and smaller than $du-4$ of 2.234 at 0.05. The model's correlation coefficients are greater than the simple correlation coefficient between the variables. We conclude that the model is free from the problem of collinearity. The white test used the error square is a variable of the independent variables against independent variables and their squares and interference limits (11). It was found that there is a problem of instability of variance in the model estimated by the White test in Table 4.

Therefore, the new model was estimated using method robust least squares and the new model was estimated without problems of the second degree. Table 5 the statistical analysis of the new function is confirmed, all parameters are significant at 0.01 for the t-test. Having confirmed that there is no second-order problem, the new model can be interpreted as the value of the crop price parameter B_0 is about 30, which means that if the price of wheat changes by one unit when other factors are constant from the average, the profit The average cost parameter has a negative signal showing the inverse relationship. Increasing the average cost by one unit will reduce the profit by 25 units, while the output parameter is about 308,879, which shows the significant effect of the production quantity on profit. Increasing output by one unit would raise profits to 30 8,879 ID at constant price and average cost at average. The value of the coefficient of determination in the new model is about 69%, which reflects the quality of alignment of the regression line, as it is clear that 69% of the changes in profit are attributable to the price of wheat, quantity of output and average production costs. The validity of the model was tested using the Ramsey reset test, which is one of the most important tests of the validity of the model. The calculated value of F is about 1.5 with a significant level (0.21), which is greater than 5% table 7.

Table 4. Results of whit's general heteroscedasticity test

Heteroskedasticity Test: White				
F-statistic	13.34482	Prob. F(9,120)	0.0000	
Obs*R-squared	65.02798	Prob. Chi-Square(9)	0.0000	
Scaled explained SS	1007.660	Prob. Chi-Square(9)	0.0000	
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 10/12/19 Time: 18:39				
Sample: 1 130				
Included observations: 130				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.27E+15	2.09E+15	2.516182	0.0132
PY^2	13635.90	6426.495	2.121825	0.0359
PY*ATC	445.5846	3311.861	0.134542	0.8932
PY*Y	54925346	7195876.	7.632892	0.0000
PY	-1.71E+10	7.21E+09	-2.372971	0.0192
ATC^2	-62.23913	461.4956	-0.134864	0.8929
ATC*Y	7223896.	6626659.	1.090126	0.2778
ATC	-2.69E+08	2.15E+09	-0.124927	0.9008
Y^2	8.51E+09	2.26E+09	3.764609	0.0003
Y	-3.25E+13	5.33E+12	-6.107315	0.0000
R-squared	0.500215	Mean dependent var	6.34E+13	
Adjusted R-squared	0.462731	S.D. dependent var	3.66E+14	
S.E. of regression	2.68E+14	Akaike info criterion	69.35654	
Sum squared resid	8.63E+30	Schwarz criterion	69.57711	
Log likelihood	-4498.175	Hannan-Quinn criter.	69.44616	
F-statistic	13.34482	Durbin-Watson stat	1.746525	
Prob(F-statistic)	0.000000			

Source: Prepared by the researcher based on the results of the statistical program views 11

Table 5. Results of new wheat profit function

Dependent Variable: PROFIT				
Method: Robust Least Squares				
Date: 10/12/19 Time: 18:42				
Sample: 1 130				
Included observations: 130				
Method: S-estimation				
S settings: tuning=1.547645, breakdown=0.5, trials=200, subsmpl=4, refine=2, compare=5				
Random number generator: rng=kn, seed=1943984882				
Huber Type I Standard Errors & Covariance				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-9738886.	1173805.	-8.296854	0.0000
PY	30.00481	2.054413	14.60505	0.0000
ATC	-25.42581	0.582929	-43.61735	0.0000
Y	308879.4	1267.837	243.6272	0.0000
Robust Statistics				
R-squared	0.694512	Adjusted R-squared	0.687239	
Scale	1636152.	Deviance	2.68E+12	
Rn-squared statistic	69665.52	Prob(Rn-squared stat.)	0.000000	
Non-robust Statistics				
Mean dependent var	16431937	S.D. dependent var	32042907	
S.E. of regression	9141565.	Sum squared resid	1.05E+16	

Source: Prepared by the researcher based on the results of the statistical program views11

Table 6. Partial correlation matrix

		PY	Y	ATC
PY	Person Correlation	1	-0.047	-0.115
	Sig. (2-tailed)		0.596	0.191
	N	130	130	130
Y	Person Correlation	-0.047	1	-0.219*
	Sig. (2-tailed)	0.596		0.012
	N	130	130	130
ATC	Person Correlation	-0.115	-0.219*	1
	Sig. (2-tailed)	0.191	0.012	
	N	130	130	130

Source: Prepared by the researcher based on the results of the statistical program SPSS.

*.Correlation is significant at the 0.05 level (2-tailed).

Table 7. Results of Ramsey reset test

Ramsey RESET Test			
Equation: EQ01			
Specification: PROFIT C PY ATC Y			
Omitted Variables: Squares of fitted values			
	Value	df	Probability
t-statistic	1.428783	125	0.1556
F-statistic	2.041421	(1, 125)	0.1556
Likelihood ratio	2.105928	1	0.1467
F-test summary:			
	Sum of Sq.	df	Mean Squares
Test SSR	1.33E+14	1	1.33E+14
Restricted SSR	8.25E+15	126	6.55E+13
Unrestricted SSR	8.11E+15	125	6.49E+13
LR test summary:			
	Value	df	
Restricted LogL	-2250.233	126	
Unrestricted LogL	-2249.180	125	

Source: Prepared by the researcher based on the results of the statistical program eviews11

Conclusions and recommendations

Conclusions: The study proved through the descriptive analysis of the production cost structure that government support for production inputs, which include seeds, fertilizers and pesticides, is no longer sufficient as the cost of production inputs amounted to 73% of the total production costs, as well as the nature of some fertilizers that were not technically feasible. The profit function shows that the quantity of output has a significant impact on profit compared to other variables represented by price and average production costs. Recommendations: Increasing production and productivity growth rates through an organized agricultural economic policy that links the policy of subsidizing production inputs in terms of reducing prices or providing quantity and quality, especially fertilizers and seeds, in conjunction with the policy of supporting prices of output. Encouraging farmers to

expand wheat cultivation by increasing the cultivated areas because it is economically feasible, especially those optimal areas that were reached by the study that achieves economic efficiency in the optimal use of available resources, which reflects on improving the efficiency of wheat crop production on the one hand and reducing the average cost of production on the other hand. The need to develop and provide modern means and techniques that will raise the level of productivity and reduce costs to ensure the exploitation of productive resources optimization of economic efficiency. Focusing on the extension side in order to play its role in the transfer of information and the results of scientific research to farmers for adoption and raise their administrative capabilities and then raise the productive level in farm work, which is to achieve economic efficiency.

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