ESTIMATING CONSTANT ELASTICITY OF SUBSTITUTION PRODUCTION FUNCTION FOR AGRICULTURAL COMPANIES IN IRAQ

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ABSTRACT

This research aims to estimate production functions through which production relations, possibilities for production elements substitution, measurement of its substitution elasticity, and efficiency and distribution coefficients can be analyzed. This would be done through estimation of constant elasticity of substitution production function for agricultural companies in Iraq depending on data from Iraqi Stock Exchange reports of 2005-2016. The researcher had used panel data model and estimated its three models: the Pooled Regression Model (PRM), the Fixed Effect Model (FEM) and the Random Effect Model (REM). A comparison was made for theses three models using F, LM, Husman tests. Tests show that Fixed Effect Model (FEM) is the best estimated one and depended as the explanation of the constant elasticity of substitution production function. The results of this function referred that a 1% increase in capital stock and labor would increase the agriculture production of the agricultural companies with 0.73 and 0.48 % respectively. The capital stock helps in using the production technology. Also, there were no indications that the production technology effects on production value (i.e there is no increasing in efficiency value with the increasing of capital stock; note that the timeline of the study was 12 years in which supposed to show the applied production technology used by the agricultural companies and if it happened, it would be of no important. The elasticity substitution was 10, which is high and indicates that there are other substitutions available to the companies. The researcher recommends to put the scientific resources management, the changing of production and competence, the information technology, and the market changes into consideration so as to have a great competent.

Key words: company size, efficiency and distribution coefficient, Panel data.
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تقدير دالة انتاج ذات مرونة احلالية ثابتة للشركات الزراعية في العراق

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المستخلص

يهدف البحث الى تقدير دوال الانتاج والتي يمكن من خلالها تحليل علاقات الانتاج وامكانيات احلال عناصر الانتاج وقياس مرونتها الاحلالية وايجاد معاملات الكفاءة والتوزيع. وذلك من خلال تقدير دالة انتاج ذات مرونة احلالية ثابتة للشركات الزراعية المساهمة في العراق بالاعتماد على بياناتها المنشورة في دليل الشركات في سوق العراق للاوراق المالية للمدة 2005– 2016 ، لجا الباحث الى استخدام اسلوب الـ panel date وقدر نماذجه الثلاثة وهي الانموذج التجميعي ونموذج الاثار الثابتة ونموذج الاثار العشوائية وتم اجراء المقارنة بين هذه النماذج باستخدام الاختبارات F, LM , Husman. وتبن من خلال هذه الاختبارات ان انموذج الاثار الثابتة هو افضل النماذج المقدرة وهو الذي اعتمد في تفسير دالة الانتاج ذات المرونة الاحلالية الثابتة التي اشارت نتائجها ان زيادة راس المال والعمل بنسبة 1 % فان قيمة الانتاج الزراعي في الشركات الزراعية سيزداد بنسبة 0.73 و 0.48 % على الترتيب اذ يساعد راس المال في امكانية الاستفادة من التكنولوجيا المتطورة. كما لم يلاحظ هناك اثر للتقدم التكنلوجي على قيمة الانتاج بمعنى ان معلمة الكفاءة لاتزيد قيمتها مع زيادة حجم راس المال علما ان الفترة الزمنية للدراسة هي 12سنة والتي كان من الممكن ان تظهر التقدم التكنلوجي المطبق من قبل الشركات الزراعية لكن وان ضهر فهو ضعيف وغير معنوي. كما وبلغت مرونة الاحلال 10 و يتضح ان مرونة الاحلال هنا تعد عالية وهي تشير الى ان هناك خيارات للاحلال متاحة امام الشركات. واوصى البحث الاخذ بنظر الاعتبار الاسلوب العلمي لادارة الموارد والتغيرات على مستوى الانتاج والمنافسة. والتغيرات التكنلوجية والمعلومات والاسواق للحصول على قوة تنافسية كبيرة.

الكلمات المفتاحية : حجم الشركة . معامل الكفاءة والتوزيع . البيانات الطولية
***جزء من رسالة ماجستير للباحث الاول**

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INTRODUCTION

The efficiency and the way of measuring the economical values of the agricultural companies are considered to be an important target in development. The study of efficiency is useful in defining production problems and presenting recommendations based on practical results and economic theory (10). Many specialists and policy makers of the agricultural companies are interested in efficiency studies results. It is worth to mention the fact that the basic aspects for the successful management are to create a real balance between the production strategies plans and the available recourses capabilities of the company. Some agricultural companies were established in the 50s and 60s of the twentieth century. These companies were of private type rather than contribution and most of them were directed by the contributor or contributors. Generally speaking, we can say that most of the contribution agricultural companies were established in the late eighteens or the beginning of the nineties of the twentieth century. At then, there was a transfer in the state economical philosophy. Yet, most of these companies were affected by the sanctions that led to confusion in markets and increase in inflation and interest rates, which are having negative impact on investments. That was the reason to have only 18 contribution agricultural companies in 1996 as stated in the stock exchange' investor guide in 1996 with capital gross of (1219.250) Million Iraqi Dinars. The number increased to 20 contributed agricultural companies with capital gross of (5095) Million Iraqi Dinars. Then, we witnessed a decrease in the number of the contributed agricultural companies to 10 with capital gross of (5731) Million Iraqi Dinars in 31/12/2005 (6) and to 6 companies in 2016 with different capital gross, to be mentioned later on, for each company. When we notice the agricultural companies that facing changing come with goods production, services, requisites, and cost rising we would see that they are, the agricultural companies, ranking fifth among the other different economical companies, the industrial, the services, banking, and insurance companies, as far as capital is concerned (9). Thus, if we consider the compatibility of profit rates with the capital invested, as in the scientific application of the economical theory in case of good exploitation of resources with the efficiency in management, there will be a chance to have a balance based on the average invested capital in the companies and a profit share upon the ordinary distribution of the capital movement. Therefore, we have to see whether the companies' situations, past two decades, are in the right way. The problem of the research is clear. The development plans ensure the important of the agricultural companies in developing the agriculture sector. These companies could diverse the production base and developing and using of production technology. Still, the numbers of companies are not as much as the agriculture production in proportion. There are fears and uncertainty to work in such field due to that some should not be able to face challenges and unexpected events. The weakness in managing human and physical capital with efficiency has led to worse rather than optimal in using the recourses and to have variance in efficiency. In addition, the capabilities of the financial, technical, and administrative companies are not in proportion with the agriculture sector's requirements. Consequently, the profit rates were not as much as the enormous capital invested. As a result, this study has aimed to highlight the production economies and the efficiency of the agricultural companies. This research supposes that the agricultural companies are maintaining profits so as to be efficient though they are inefficient in exploiting the money invested in the origins. This situation should make the companies facing difficulties in managing their cost and in compromising between their targets and the developing of the agriculture sector. Therefore, the research aimed to estimate production functions through which it should achieve analysis for the production relations, the ability to substitute production elements, the substitution elasticity measurement, and to find efficiency and distribution coefficients.

MATERIALS AND METHODS

The data is taken from the research sample of the six agricultural companies registered in the Iraqi Stock Exchange as follows:

1- The Private company for agriculture production

2- The Iraqi company for production and marketing of agricultural products.
3- The Iraqi company for production and marketing meat and farm crops.
4- The Iraqi company for seeds production.
5- The modern company for the agriculture production.
6- Middle East company for fish production.
Other data related sources were taken for the period from 2005 to 2016.

RESULTS AND DISCUSSION

The first step in the econometrics in studying a relation among many variables is to formulate the relation mathematically so as to maintain a model through which we could study the economical phenomena practically. This step is called formulating confirmed hypotheses. This step needs to define the dependent variable and the independent variables. Upon our previous presentation, in the theoretical part to estimate a constant elasticity of substitution production function, and in this research we determined the dependent and the independent variables as follows: The dependent variable: represent agricultural companies production value (Iraqi Dinar). The independent variables: includes
The capital (k) = includes the agricultural companies' capital (thousand Dinar) .
Labor (L) = refers to the number of workers. There are other variables added to the function upon needed such as the imagined variables. One of the characteristics of the Cobb-Douglas Function is that its constant elasticity equal one integer, (i.e a constant of both distribution's parameters) . While in reality it is on the contrary in that there is no constant in $\boldsymbol{\beta} \cdot \propto$. This has led to widen the use of Cobb-Douglas Function, (i.e the Constant Elasticity Substitution CES (8)). This function is widely in use because it represents an advance in the growth and development science of the production functions. The production function of **Cobb-Douglas** had been replaced by this function in many economical researches and studies. The different is that its elasticity is constant but it is not exactly equal to one integer (13).

The general formula of this function is:

$$\boldsymbol{Y = \gamma[\delta K^{-p} + (1-\delta)L^{-p}]^{-\frac{v}{p}} U_i}$$

To estimate the function we have to convert to into a linear equation by taking the natural logarithm $\boldsymbol{ln}$ for both sides of the equation as follows:

$$\boldsymbol{ln\, Y = ln\gamma - \left(\frac{v}{p}\right) ln\,(\delta k^{-p} + (1-\delta)L^{-p}) + ln\, U_i}$$

Where
$\boldsymbol{v}$ = refers to capacity with positive value
$\boldsymbol{p}$ = refers to substitution
$\boldsymbol{\delta}$ = refers to distribution
By using Taylor chains of $\boldsymbol{p = 0}$ the equation would be :

$$\boldsymbol{lnY = ln\gamma + v\delta lnL + v(1-\delta)lnK - \frac{pv\delta(1-\delta)}{2}\,[lnK - lnL]^2 + U_i}$$

$\boldsymbol{\sigma_{l,k}}$ = substitution elasticity amongst resources.
$\boldsymbol{\gamma = B_1 == B_2 = \delta v}$ Labor Production Elasticity
$\boldsymbol{B_3 = v(1-\delta)}$ Capital Production Elasticity
Panel data model had been used which increases the economical analysis quality in such a way that may not be possible in case of using sectional data only or time series (11). The data obtained by using panel model help to recognize the production and efficiency economies of the agricultural companies, to improve researches, and to be more useful. As we referred, we have to depend on sectional time series data which represent a group of companies in a period of time (6). We had estimated the three models of the panel data, the Pooled Regression Model (PRM), the fixed effect model (FEM) and the random effect model (REM), to measure the relation and effect among research variables. This estimation was done by using program (Eview 9) as follows:

First: the pooled regression model (PRM)
It is called the classical model among the panel data models. whien is the simplest one, and neglects the effect of the time element. and regression coefficients are constant for all time periods. Its equation is formulated as in the following (4): $\boldsymbol{Y_{it} = \alpha_i + \beta x'_{it} + \varepsilon_{it}}$

i: represents the number of companies (its values are from 1-6)
t: represents the time (its values are from 1 to the periods of time (2005-2016).

a :fixed limit vector represents individual effect which supposed to be fixed across time t especially for each section unit which in turn to be the same through all section units

β: regression rates value

$x_{it}^{'}$**:** independent variables value for the company I in the period of time t

ε_{it} **:** the random error

This pooled model supposes harmony in random error limits among the companies under discussion. In addition, the expected value of the random error equal to zero and the self connection among the random error limits in the sense of variation have to be equal to zero. The data in our study had been arranged upon two dimensions. The first dimension represents the individual effect expressing units and the second is the time dimension i.e related to time. By using Ordinary Least Squares OLS method and E views program, the Constant elasticity of substitution production function had been estimated as in the following relation(18):

$$LNY = B_0 + B_1 LNL + B_2 LNK + B_3 (LNK - LNL)^2$$

Where :

Y : the dependent coefficient of production value, ***L*** : the number of labors, **K :** the capital (thousand dinars), The $(LNK - LNL)^2$ is coded as ***z*** after arranging the variables of the independent and the dependent values. We start from the first group of the sectional data as to show of an estimated (N*T) which is (12*6).

Table 1.Pooled Regression Model (PRM)

Dependent Variable: LNY
Method: Panel Least Squares
Date: 06/02/18 Time: 19:57
Sample: 2005 2016
Periods included: 12
Cross-sections included: 6
Total panel (unbalanced) observations: 71

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.311058	1.892610	0.164354	0.8699
LNK	0.646111	0.068520	9.429594	0.0000
LNL	0.799804	0.363725	2.198929	0.0313
Z	0.012085	0.003997	3.023971	0.0035

R-squared	0.841498	Mean dependent var	19.92986
Adjusted R-squared	0.834401	S.D. dependent var	1.785483
S.E. of regression	0.726581	Akaike info criterion	2.253756
Sum squared resid	35.37065	Schwarz criterion	2.381231
Log likelihood	-76.00832	Hannan-Quinn criter.	2.304448
F-statistic	118.5696	Durbin-Watson stat	1.005953
Prob(F-statistic)	0.000000		

Source: by the researcher with Eviews9 program

Second : The fixed effect model (FEM).

If there are clear differences and discord among data such as the management and site style, then the estimated values of the PRM coefficients, resulted from using the OLS method, will be incomplete(7). Yet, there are many substitutes as far as econometrics is concerned. The use of imagined variables in the FEM is one of the substitutions. This substitution is based on the assumption that the relation between the dependent variable and the independent ones are typical for all variables. The divergence or the constant limit is changing from one unit to another within the cross section of the sample in study(19). The difference in the constant limit from one sample to another could be related to the difference in the behavior pattern due to the independent variables effect on the dependent variable from one company to another inside the cross section(15). It is supposed that these coefficients have a constant change style. This is the reason to be called the fixed effect model (FEM). In this model the target is to determine the behavior of each group of cross section data. This could be done through making the B_0 coefficient is varying from one group to another with constant divergence coefficients for each group of sectional data. Thus, the Fixed Effect Model (FEM) is (1) :

$$\gamma_{it} = D\alpha_{it} + x\beta_{iT} + \varepsilon_{it} ==$$ **Where :**

D : Dummy variable of the companies i. The value of this variable is equal to one integer for the companies having a capital of more than 2 billion, otherwise it is equal to zero i.e for the companies having a capital of less than 2 billion.

i : represents the company (its values are from 1)

t: represents the time (its values are from 1 to the periods of time)

β: regression coefficients value . In this model it is assumed that the value of the coefficients are constant for all companies across time

$x_{it}^{'}$**:** independent variables value for the company i in the period of time t

ε_{it} **:** the random error

By reanalyzing using the fixed effect model among the production value of the companies under discussion and the previous independent variables as well as the dummy variable which we added to the analysis i.e the company expressed by the capital paid . The value of 1 is given to the companies having a capital of

more than 2 billion, The value of (0) is given to the companies having a capital of less than 2 billion. And by using the statistical program Eviews and the OLS the fixed effect model had been estimated.as shown in table(2).

Table 2. Fixed Effect Model (FEM)

Dependent Variable: LNY
Method: Panel Least Squares
Date: 06/02/18 Time: 01:57
Sample: 2005 2016
Periods included: 12
Cross-sections included: 6
Total panel (unbalanced) observations: 71

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.063195	2.669726	-0.023671	0.9812
LNK	0.769491	0.105169	7.316718	0.0000
LNL	0.395670	0.350867	1.127692	0.2639
Z	0.013179	0.006113	2.155784	0.0351
D1	-0.559389	0.411128	-1.360621	0.1786

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.920183	Mean dependent var	19.92986
Adjusted R-squared	0.908407	S.D. dependent var	1.785483
S.E. of regression	0.540365	Akaike info criterion	1.736739
Sum squared resid	17.81163	Schwarz criterion	2.055427
Log likelihood	-51.65424	Hannan-Quinn criter.	1.863471
F-statistic	78.13892	Durbin-Watson stat	2.055137
Prob(F-statistic)	0.000000		

Source: by the researcher with Eviews9 program.

Third : the random effect model (REM)

Although the fixed effect model or the LSDV model is easy to apply, but the returns will be expensive due to freedom degrees where we had many sectional unit (5). This is why we find that the (REM) is economizing in the freedom degree. There is no need for the N of parts taken from the y axis which are related to each unit of the sectional units. Rather, we need only to estimate the expected value of the part taken from the y axis (14). This model deals with the sectional and time effects as they are random parameters rather than fixed features. This assumption depends on that the sectional and time effects are independent random variables in amid equal to zero and definite contrast. They are added as random components in the random error limit. Therefore the REM model supposes that each company or each year differs in its random limit. There is an idea about the fixed effect which considers it as a special case within the random effect and is called error components model (ECM). The error differences are fixed and in accord if the sectional and time effects are available in the random effect model. There is no Auto correlation between each group of the sectional observed groups. It consideres the section coefficient B_0 as a random variable with a rate equal U and the REM is (11):

$$\beta_0 = \mu + Vi - \mu$$

$$\gamma_{it} = \mu + \sum_{j=1}^{k} \beta_j x_{j(it)} + vi + \varepsilon_{it}$$

Where :

Vi : represents the random error limit in the cross section data group i

This show the differences between the random effect and the fixed effect. Simply speaking this is due to that in the FEM each unit of the sectional units has its own section , while in the REM there is one section (let it be B1) which resemble the value for all sectional dada sectors . The error components represent the random divergence for each sector of the companies sections(12).

$$\Gamma_{it} = \alpha_{it} + x\beta_{iT} + \mu_i + \varepsilon_{it}$$

The error limit in this model is of two parts:

ε_{it}: the error limit in the sectional data.

μ_i **:** the error limit resulted from joining the sectional data with the time series and consequently all the error components would

be gathered in one component as in the following:

$$w_{it} = \mu_{i,} + \varepsilon_{it}$$

This model (the divergence components model or error components model) is going to be estimated by using the General Least Seqares GLS method. So, if we suppose we knew the difference of error limit, the divergence matrix, the estimated value of the coefficient β would be got by GLS method. This model could never be estimated by using OLS method because it would give inefficient estimations and it has wrong slandered errors. The GLS method is usually used because this method gives the best unbiased linear estimation(16). And by using the same variables in the previous model, the REM had been estimated in Table 3.

. Table 3.Random Effect Model (REM)

Dependent Variable: LNY
Method: Panel EGLS (Cross-section random effects)
Date: 06/02/18 Time: 01:57
Sample: 2005 2016
Periods included: 12
Cross-sections included: 6
Total panel (unbalanced) observations: 71
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.057712	2.567077	0.022482	0.9821
LNK	0.733338	0.084312	8.697859	0.0000
LNL	0.484468	0.338134	1.432769	0.1566
Z	0.013490	0.005775	2.335901	0.0225
D1	-0.448759	0.389451	-1.152286	0.2534

Effects Specification	S.D.	Rho
Cross-section random	0.373402	0.3232
Idiosyncratic random	0.540365	0.6768

Weighted Statistics

R-squared	0.740430	Mean dependent var	7.723489
Adjusted R-squared	0.724699	S.D. dependent var	1.047800
S.E. of regression	0.560900	Sum squared resid	20.76414
F-statistic	47.06672	Durbin-Watson stat	1.735169
Prob(F-statistic)	0.000000		

Source: by the researcher with Eviews9 program

Differentiation between the Models :

Deciding which model to be used from the estimated models is an important issue so as to use the best model in analysis. This depends on a set of tests in addition to the assumptions put by the researcher concerning the possible connection between the sectional units, the error amount, and the independent variables (14). Here we could apply three tests. The F-test is to differentiate between the PRM model and the FEM model. The Lagrange multipliers test (LM) is to differentiate between the PRM model and the REM model. Finally, the HAUSMAN test is to differentiate between the REM and the FEM models. All these tests had been applied as in the following:

1- Differentiation between the Pooled Regression Model (PRM) and the Fixed Effects Model (FEM) **.** This is between PRM and FEM models by using F-Test with the following formula (13):-

$$F(N-1, NT-N-k) = \frac{(R_{FEM}^2 - R_{PM}^2)/(N-1)}{(1-R_{FEM}^2)/(NT-N-k)}$$

K : number of estimated features

R^2_{FEM} :Defining Fixed Effects Model coefficient

R^2_{PM} :Defining Pooled Regression Model coefficient

The null hypothesis says that the sections for all the companies are equal. When this is true the the pooled regression model PRM would be the efficient estimation. The test is based on a comparison between the F calculated from the last equation with F value in the table with freedom degree for the numerator equal to N-1 and with freedom degree for the denominator equal to NT-N-K. If p-value is less than or equal to 0.05 then the fixed effects model is the suitable model for the data of the study(3). We could also take into consideration whether it is possible to depend on the FEM model and the PRM model from the N numbers (the number of the sectional units) and from the T

number (the number of time series data). This is possible as long as N is large and T is small and the companies had not been drawn randomly. This is what was agreed on the F-test which shows priority to depend on the FEM model. When we had applied the test, it showed the priority to the Fixed Effects Model (FEM) (10) table (4).

2-**The selection between the Pooled Regression Model and The Random Effects Model**.Differentiation between the PRM model and the REM model is made by using lagrange multipliers test. In this test, the random effect is have been done (the case of cross section data model) to test whether we have the random effect or not. The test of the two hypotheses, the null and the alternative, are made as in the following (1)(17):

$$LM = \frac{nT}{2(T-1)}\left(\frac{\sum_{i=1}^{n}\left(\sum_{t=1}^{T}\hat{u}_{it}\right)^2}{\sum_{i=1}^{n}\sum_{t=1}^{T}\hat{u}_{it}^2}-1\right)^2 \mapsto \chi_1^2$$

As it is shown in the above formula, this test is following the Kai distribution to the power square with one degree of freedom. But in the case of the random effect test (the case of time model) to test whether the random effect is exist or not, we follow the same previous steps. The Null and the alternative hypotheses test should be as in the following (9) :-

$$\boldsymbol{H0 = \sigma_Y^2 = 0}$$

$$\boldsymbol{H1 = \sigma_U^2 \neq 0}$$

In the case of lagrange multipliers (LM) equation, if the calculated value of the test was less than the value in the table when we have one degree of freedom, then this would mean that we can not reject the null hypothesis. It is clear that the application of the lagrange multipliers (LM) test to compare between the PRM model and the REM model would suggest the priority to the latter test (the REM). Table (4).

Table 4.equation LM,F

Redundant Fixed Effects Tests
Equation: EQ02
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	12.021798	(5,61)	0.0000
Cross-section Chi-square	48.693007	5	0.0000

Source: by the researcher with Eviews9 program

The results shows(5) that the calculated F value, as long as it makes sense, is larger from the F value in statistical table. This means that the FEM model is better than the PRM model. The second test, the lagrange multipliers (LM) test, which follow the kai distribution to the power square with one degree of freedom, considering the $\boldsymbol{x^2}$ value makes sense. Upon the lagrange multipliers (LM) test, this means that the random effects model (REM) is the best test, because its calculated value is less than the value in the table. Accordingly, this means accepting the hypothesis.

3-**Differentiation between Fixed Effects Model and Random Effects Model**

To determine the model, we have to select and apply it in the analysis. Husman suggested this tet. This test is used in case of essential difference between the fixed and the random effects (7). This difference is the range that connecting the individual effect of the independent variables. We use X^2 to apply the H test. It depends on the statistical table of wald . the statistical calculated value. Thus, the statistical calculated value X^2 of the H test could be found from the following equation (8)(20).

$$H = \chi^2(K) = (\hat{\beta}_{FEM} - \hat{\beta}_{REM})'[Var(\hat{\beta}_{FEM}) - Var(\hat{\beta}_{REM})]^{-1}(\hat{\beta}_{FE} - \hat{\beta}_{RE})$$

Where:

$\boldsymbol{VAR(\hat{B}_{FEM})}$: contrast vector of the Fixed effects model parameters

$\boldsymbol{VAR(\hat{B}_{REM})}$: contrast vector of the random effects model parameters

$\hat{B}_{FEM} - \hat{B}_{REM}$: rotation of matrix for the estimated coefficients of FEM, REM

$VAR(\hat{B}_{FEM})^{-1}\hat{B}_{FEM} - \hat{B}_{REM}$: the inverse of contrast matrix multiply by the coefficients matrix.

This statistics has the Kai distribution square with a degree of freedom K-1; the number of independent variables except the fixed limit. The H test had been applied on the research models which have the Kai distribution square based on the WALD statistics . This had established the priority of the Random Effects Model, the acceptance of the Null hypothesis. Results referred to a sense. This means that there is no connection between the fixed effects model and the Independent Variables and that the REM model is the most efficient. thus, tests show that the best model is the random effects model. We can also put into consideration whether it is possible to depend on the FEM model and REM model through the N number (the number of the sectional units) and the T number (the number of the time series data) As long as the N value is large and T value is the small , then the estimations obbenined has sigmificant difference a sense differences. The research sample has been collected in a non-random way. The REM model is better. This is what has agreed with HUSMAN. From the mentioned above we can conelud that suitable model to interpret the results.

Table 5. Differentiation between REM,FEM

Correlated Random Effects - Hausman Test
Equation: EQ03
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	9.111544	4	0.0584

Source: by the researcher with Eviews9 program.

Through the previous tests we noticed that the random effects model, which is suitable in case of a deficiency in one of the assumptions in the fixed effects model that treats the section coefficient as a random variable, has a u rate. This is the best estimated models. So, this is what we would depend on to interpret the results and to find constant elasticity of substitution production function. Results showed that the B_0 value , which represents the efficiency coefficient, is 0,05, This value is weak and makes no sense. It is assumed that it refers to the technical progress as a random variable belongs to the indifferent distribution (zero) and a constant contrast. The result implied an indication to the average of zero for the constant or for the section. Accordingly, we do not notice that there is an effect of the advance technology upon the production value. In other word, the value of efficiency parameter does not increase against the increasing of the capital. It is worth to mention that the time duration for the study is 12 years. This duration supposed that there should be a progress in the technological application which is applied by the agricultural companies. But, even there might be a progress, still it is weak and does not make any sense. The parameter of the capital was positive and represents the elasticity for the element of the capital. This is in agreement with the literature of the economical theory. The parameter was equal to 0.73. This means in the 1% increase in the capital, the production value in the agricultural companies under discussion would increase with 73%. This is the most effective element in the agriculture production value. The capital should help in benefiting from the developed technology. This advantage is related with the economical and social aspects. As a result, there should be a production technique development. The use of State of the art in a suitable environment would maintain increasing in the production as much as the diversity in production activities for such environment. In the end we could have increasing in the agriculture production of the agricultural companies. The parameter of the labor was positive and in agreement with the literature of the economical theory. This is because there is a positive relation between the labor and the agriculture production value. This value maintains % 0.48 and it confirms

the relation. If the labor increases 1% , there will be 0.48% increase in the production value. The labors in the agricultural companies should have proficient efficiency. This may be acquired from the professional expertise and from expanding in the technical use. This is true for some specialized companies which there certain products are in need for certain skills. There another important coefficient in the increasing of production. It is the labor share in the capital. There is an exchanging relation between the two variables (i.e labor and capital). The increase of the labor share in the capital effects in the increase of production, accordingly increasing the labor share in the agriculture production value (the dependent labor). In contrast, in the increasing of labor share in the production might lead to increase the labor share in the capital (the independent variable). If we reuse investing this increase in expanding capitals in the production process, there will be increase in the labor production. This is the reason beyond the importance of the labor quality in the agriculture companies. If the labor quality is well-educated, this will be part of solving the problems and facing the challenging. The labor would be able to use the modern scientific methodologies with efficiency as well. To decide whether the estimated function (CES) convert into Cobb-Douglas function, it is possible to refer to the fourth limit of the estimated function i.e the parameter $(LNK - LNL)^2$ (expressed by Z). This is possible if there is prove about being different in making sense.This means that the calculated T value is within the rejection area for the null hypothesis, in which $B_3 = 0$ i.e B_3 does not equal zero. Then, the two estimated functions do not convert into Cobb-Douglas function rather they represent the constant elasticity of substitution production function. Here, the elasticity of substitution does not equal to the one integer. The D variable, which represents the company capacity, is an illusion variable. Its parameter was negative and in contrast with the economical theory literature. The increase in the company capacity supposed that there is increase in the production value. But here it is different. The company capacity effect is negative, so the production value of the company will be affected by 36%. There may be two reasons for this**. First**, there is no distinctive and enough difference in capital to make a distinction in the large and small agricultural companies. The large company was with a capital of more than 2 billion ID and the small company with a capital of less than 2 billion ID. The difference is not arge enough to distinguish the large companies. This means that the capacity of companies has no effect and that was the reason for not having any statistical function. **Second** : The companies could not get benefit from the from the relation between the company capacity and efficiency which occurred as a result of the capacity economies or relatively low prices. We could also say that the increase of the company capacity to a certain limit will lead to some administrative difficulties.The efficiency of the management goes low as far as organizing and connecting resources with each other in the production process. There will be decrease in the management at different levels. This is also happened in case of extending the range of the company to a certain limit that may cost some additional expenses which in turn lead to decrease the efficiency in some production departments. On the statistical level, the capital variable make sense at 1% level and z was sensible too but at the 5% level. This confirms that the constant production function does not follow Cobb-Douglas Function.While the labor and the capacity variables of the company were insensible. This might be related to the different between the sectional data N and the time series T or to the labor nature employed in these companies. The labor does not have proficiency on the one hand. On the other hand, there is no actual numbers of those who are employed in these companies. The model was sensible in all by the 47.06 value of F on the 1% sensible level. This refers to the importance of the function on one hand, and on the other hand to the real representation of the variables under discussion. The limitation coefficient R^2 value was 0.74. This means that the clarified variables could interpret 74% of the contrast in the production value of the agricultural companies. 26% of them are belonged to other variables, which did not benefit the targets of the research. Its effects had been absorbed by the random variables.

The original parameters of the Cobb-Douglas Constant elasticity of substitution production function. The aim is to introspect the role of the technological and the efficiency changing of the agricultural companies. Then, to estimate the original parameters of the function as follows(6):

First : Substitution coefficient P

It is the substitution coefficient among production elements in the production function which supposed to be negative and could be estimated from the following formula:

$$p = \frac{-2B3(B1+B2)}{B1B2}$$

$$= \frac{-2(0.013490)(0.733338+0.484468)}{(0.733338*0.484468)} \quad p = -0.9$$

The substitution parameter reflects the ability of the company to substitute the production elements between each other. It is with the parameter of **p > - 1** and does not equal zero, $\boldsymbol{p \neq 0}$, otherwise it will be Cobb-Douglas production function. This is because the elasticity becomes one integer and the normalcy curve is having the dish shape towards the original point. This is in contrast with the normal. In normal situation the convexity shape should be towards the original point. Here we see that all the agricultural companies, to add an extra unit from one of the resources, must abandon the o.9 unit from the other resource. The negative signal of the substitution parameter refers to the direction. This means the substitution parameter between the two resources is always negative.

Second : Distribution coefficient $\boldsymbol{\delta}$

The distribution parameter $\boldsymbol{\delta}$ between the production elements which shows the share of each resource of the production that have the value of $\mathbf{0} < \delta < 1$. and was estimated upon the following formula:-

The general formula of the distribution coefficient shows the labor share from the production value and it was:

$$\boldsymbol{\delta_L} = \frac{\boldsymbol{B_2}}{\boldsymbol{B_1 + B_2}}$$

$$\boldsymbol{\delta_L} = \frac{0.484468}{(0.733338+0.484468)} == \boldsymbol{\delta_L} = 0.3978$$

The capital share from the production value was :

$$\boldsymbol{\delta_K} = \frac{\boldsymbol{B_1}}{\boldsymbol{B_1 + B_2}}$$

$$\boldsymbol{\delta_K} = \frac{\mathbf{0.733}}{\mathbf{0.733 + 0.484}}$$

$$\delta_K = 0.602$$

The distribution coefficient shows the production distribution between the labor and the capital. In other word, it shows the labor and capital shares from the production. It also shows that the contribution of capital was greater than the labor.

Third : the income on capacity V

The income on capacity can be calculated by addition of the parameters of the labor and the capital.

V=$\boldsymbol{B_1 + B_2}$

V= 0.73+0.48

V= 1.21

The income to the capacity is larger than the one integer. This refers that the production is completed in the first stage of production stages. This means that the function is subjected to growing incomes. Then, the two quantities if labor and capital would lead to increase in the production with a rate of 1.21%. This may not be maintained due to inconvenient between the project capacity and the efficiency. It is expressed by D . The increase of the capacity of the companies may be come with an increase in the cost average. The reason is the weakness in the administrative capabilities on the one hand and the absent of financial abilities for this expanding.on the other hand.

Fourth: the elasticity of substitution between the labor and the capital.

The elasticity of substitution depends on the substitution coefficient value p. The smaller p is the greater elasticity of substitution. It is as in the following formula:

$\boldsymbol{\sigma}$ **= 1 / (1+** $\boldsymbol{p}$**)**

$\boldsymbol{\sigma}$ **= 1 / (1 -0.9)**

$\boldsymbol{\sigma}$ = 10

It is possible to say that the production function CES dose not approach the production function C-D because the elasticity of substitution in the CES does not equal to one integer. The value of the elasticity of

substitution refers that the increase of the labor wage rate to the price of capital is 1%. This rate lead to increase the rate of labor element to the capital element with about 10%. The greater degree of substitution among resources is the greater ability of the product to substitute an element instead of another. It is clear that the elasticity of substitution here is considerably high and it refers that there are many alternatives for the substitution available to the companies.

Table 6 . The original parameters value by using the Random Effects Model REM for the agricultural companies.

Y	δ	V	p	σ
0.05	0.60 ، 0.39	1.21	-0.9	10

sources: the researcher work according to the Random Model results

The research concludes that the Random Effects Model was the best among the estimated Panel data models. REM has given the best unbiased linear estimation. It is an example of the constant elasticity of substitution production function which shows that the capital is more effective than labor in the agriculture production value. It also shows instability in the two parameters of distribution. This function comes with reality which supposed variation of β،α . The estimated function does not interpret into Cobb-Douglas production function. It represents the constant elasticity of substitution production function. There is difficulty in recognizing the accurate definition for the companies depending on their capacity as a small, middle, or large. This is because of different economical and social circumstances for each company. Recognizing the companies must be based on the number of labors, customers, properties, capital stock. This is why there was no clear effect for the company capacity on the agriculture production value. It is not enough to distinguish between the companies. In addition, the companies could not benefit from the relation between the company capacity and the efficiency. It is also noticed that there is no effect of the technological progress on the production value. This means that the efficiency parameter value does not increase with the increase of the capital. According to these findings the research recommends to provide scientific cadres or professional administrative with acquired scientific skills to manage these companies. These cadres should take into consideration the scientific policy and planning to direct the resources and control the changing on the production, competence, technology progress, information, and markets levels so as to have great ability against other competent companies. The companies should put successful agricultural policy and study all reasons of failure in the profits and suggest clear solutions even by incorporation of some companies and termination of others.

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