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Estimation of the Rice Demand Function in Ilam City

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ABSTRACT

The main objective of this research is to study and investigate the behavior of rice demand in Ilam. In this study, the integration and auto regressive distribution lag (ARDL) model has been used in order to estimate the rice demand in both short and long term sections in Ilam and also the ideal model (AIDS) has been used in order to extract the demand function. This study is conducted by using the time-series data over the time period 1982 to 2010. Since this study investigates the short and long term relationship among the variables according to the degree of their cointegration, thus the best model with the appropriate lag has been estimated by using the software Microfit 4 and Schwarz Bayesian Criterion through the ARDL method. Schwarz Bayesian Criterion saves the number of lags, thus the estimation will have the higher degrees of freedom. The rice demand function in Ilam has been calculated by using the model Schwarz Bayesian Criterion. In the research, three questions have been raised in the introduction and the responses of these questions have been presented in the results according to the theoretical principles of and implementing the model. Short-term calculations indicate that the independent variables of pasta, chicken, and meat have no significant relationship with the rate of rice demand in Ilam city and a significant relationship between the variables of per capita rice consumption, the price of rice per kilo and the household income per year is confirmed. Moreover, the value of R^2 also shows that the changes of dependent variable (the rate of rice demand in Ilam city) with the dimensions of subsidiary hypotheses are explained in this study with the estimation 0.99903. Long-term calculations indicate that all variables have the significant relationship with the rate of rice demand in Ilam city and the independent variables of pasta, chicken, and meat have inverse relationship with the increased rate of rice demand.
KEYWORDS: Ideal demand system, rice, Ilam city.

1. INTRODUCTION

Rice is the oldest cultivated crops in the world. This crop plays the significant role in people's nutrition, income and employment around the world and Iran and is the main food of over a half of population in the world. Rice is considered as a main crop in Iran because first this crop plays the major role in the Basket of household goods; second, Iran is now one of the most important importers of this crop; third, the production of this crop is done with high cost in this country and this shows the lack of comparative advantage in production of this crop; fourth, there are numerous disruptions in the production and consumption of importing this strategic product. Rice production in Iran was approximately 3,000 thousand tons in 2005 and the global rice production was 629880.86 thousand tons in 2005. Iran is in the twentieth rank with this production. Annual consumption of rice in Iran was equal to 4572.1 thousand tons during the period 1990-2005 and it is in the seventh rank in the world. The amount of rice imports in 2005 was equal to 5521.58 thousand dollars, thus it is seventeenth rank of largest rice importing countries. The amount of rice exports in Iran is approximately 0.2 thousand tons, thus it is in the 49th rank in the world. This study is seeking to answer to this question whether the changes at rice price has a significant effect on the demand for rice? Whether the change in household income has an effect on the demand of rice? What is the function of rice demand in Ilam?

2 – RESEARCH LITERATURE

Economic theorists in the nineteenth century explained and justified the consumer's behavior based on the assumption of measurable utility. This limiting assumption was quitted in the early twentieth century and it was only assumed that the consumer could sequentially rank different components of goods based on their preferences. However, this ranking is done mathematically by the ordinal utility function and they always attribute the higher number to the combination of better products. It is usually supposed that the consumer has the quasi concave utility function which represents the declining substitution rate of all goods for him. The basis of consumer's behavior is that he is seeking to maximize his utility according to his limited income; in other words, the utility function should be maximized according to the budget line and this is the place where the slope of indifference curve becomes equal to the slope of budget line or the slope of tangent to the indifference curve becomes equal to the slope of budget line. In other words, the maximum utility to the marginal utility of two

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goods is equal to the price of goods on each other. Secondary conditions are presented for maximizing the utility by the convexity of indifference curves. Functions of ordinary demand for a commodity can be extracted from the first condition to maximize the utility function. These functions express the demand values as a function of consumer's prices and income level. Ordinary demand functions are single-value and homogeneous with zero degree towards the price and income; in other words, any proportional changes at all prices and income levels will not change the consumer demand.

Using the traditional econometric methods for empirical studies is based on the finitude assumption of variables, but the conducted studies in this regard indicate that this assumption is not true for most of the time series and most of these variables are unreliable. This may lead to the spurious regression and destroy the trust to estimated coefficients. Therefore, according to the cointegration theory in modern econometrics, it is necessary to use the methods in estimation while using the time series that pay attention to the cointegration and reliability issue. In Engle-Granger method, the obtained estimates are bias in the samples with small sizes due to the lack of considering the short-term dynamic interactions among the variables. Meanwhile, the limiting distribution of estimators is not normal for the least-squares, thus conducting the hypothesis test is invalid by using the routine statistic. Furthermore, Engle-Granger method is based on the assumption of the existence of a cointegration vector and using this method will lead to the inefficiency in the case if more than one vector (Pesaran, M.H., et al., 1998). For solving these problems, Johansson (1989) and Johansen and Juselius suggested the Maximum likelihood ratio method for testing the cointegration and extracting the cointegration vectors (Johansen, S., et al., 1992). Johansen and Juselius cointegration method cannot be also helpful because all the variables in the model may not have the same degree of reliability. Zaranezhad, M., et al., (2007) applied the integration and auto regressive distribution lag (ARDL) method in their paper since there were different degrees of cointegration for the variables.

In ARDL method, the optimal lags are selected for each of the variable by using the criteria such as the Schwarz-Bayesian, and Hannan-Quinn (Pahlavani, M., et al., 2007). This method estimates the long and short term relationships between the dependent variable and other explanatory variables of model simultaneously. In applying this approach, there is no need to have the same cointegration degree of variables which is necessary in Engle-Granger method. ARDL methodology is applicable in the case that the variables are the combination of variables I (1) and I (0).

Najafi (2000) has applied Mark Nerlav's model and has concluded that the factors such as not proportional guarantee prices to the costs of not available facilities of purchasing and storing the rice and the purchasing time are the reasons of unsuccessful guarantee price. Menhaj (2003) has used Markup model and concluded that the demand is increased by enhancing the household income and the household income has a significant effect on the demand for rice. Nouri (2004) has used AIDS model and concluded that determining the cost of purchasing the rice is mainly based on the price of production and other effective and important factors such as the world price of this crop and the inflation have not been taken into account. By utilizing the adjusted support rate, Nouri (2006) concluded that the inefficiencies in the rice market have a negative effect on the demand for the rice. Houtahkker and Magge (1969) used the model of maximizing the utility function to the budget constraint in the United States. Hemphil (1974) also applied the model of maximizing the utility function to the budget constraint for a group of less developed countries. Dilip and Nasiruddine (2004) used Translog indirect utility function model for India.

2-1 - Definition of demand and the demand law

According to the definition, the demand is the maximum value of goods which the consumer is willing and able to buy at various prices, assuming that other factors are constant. In the microeconomics, the consumer behavior $Dx = f(P_x)$ is an indication of demand x of inverse function of the price x. This relationship can be developed as follows;

$$Dx = f(p_x, I, P_{xy}, T_x, C_x, R_x, E_x \ldots) \qquad (1)$$

Where, Dx is the consumer's demand for the goods x; p_x is the price of goods x; p_{xy}: the price of goods associated with the goods X; I is the consumer's income; T_X: Consumer's interest and preferences for R_{Xy} of the availability of goods X for the consumer; and E_X is the consumer's expectations.

2-2 Extraction techniques of demand functions

The ideal specification in the microeconomics is the one which is compatible with the economic theories and its estimation is easy and proportional to the observed data in order to be able to forecast few errors. In choosing the model, there should be a reasonable balance among these three features. Generally, different methods of extracting the demand function can be classified into four methods as follows.

First method: It starts the extraction of demand equations by specifying of subordinated form of utility function as a strong and growing quasi concave function and the utility function can be achieved according to the budget constraint of maximization relations of utility function.

Second method: It specifies the subordinated form of an indirect utility function and uses "Roy's law" in order to get the demand function of estimation mutuality.

Third method: It is an ideal technique of the ideal system for extracting the demand equations from a function of consumer expenses.

Fourth Method: It includes Rotterdam System which is a method based on two-sided logarithm specification and the constant tension. Theil (1965) began with a specification of two-sided logarithm and reached the following amount and price.

$$(2)\ Wi.d\ln qi = bi(d\ln m - \sum_i \ wid\ln pj) + \sum_i \ sijd\ln p_i)$$

Where, $b_i = w_i * \eta_i$, $s_{ij} = w_i * \varepsilon_{ij}$ act as a constant value. Choosing the constant values is known as Rotterdam system.

Since the ideal model is used in this paper in order to extract the target demand function, this function is explained as follows. Dayton and Miolboer introduced the almost ideal system in 1980. In ideal demand system, they used a a function of consumer expenses e (U, P) with the form of PIGLOG in order to extract the demand equations. The function PIGLOG is as follows,

$$(3)\ln e(u,p) = (1-u)\ln\left[a(p)\right] + (u)\ln\left[b(p)\right]$$

In this equation, it is assumed that U is between zero and one. Zero indicates the life in the minimum livelihood and 1 indicates the maximum level of life. a (p) indicates the cost of livelihood and b(p) represents the welfare cost.

$$(4)\ln a(p) = a_0 + \sum_k^k a_k \ln P_k + \frac{1}{2}\sum_k \sum_j r^*_{kj} \ln p_k \ln p_j$$

$$(5)\ln b(p) = \ln a(p) + \beta_0 \Pi_k p_k^{\beta k}$$

Therefore, the Almost Ideal Demand System (AIDS) will be as follows.

$$(6)\ln e(U,P) = a_0 + \sum_k a_{k\ln p_k + \frac{1}{2}\sum_k \sum_j \gamma *_{kj} \ln p_k \ln p_j + U^{\beta 0} \Pi_k P_k^{\beta}}$$

Where, U is the utility level and $\gamma *_{kj}$, β_i, α_i are the parameters. It can be stated that e(U, P) per P is homogeneous linear if we have $\Sigma\alpha_i = 1$, then

$$(7)\ \sum_i \gamma *_{kj} = \sum_k \gamma *_{kj} = \sum_j \beta_j = 0$$

Using Shephard's lemma, the function (U, P) of demand for various goods can be extracted. Based on Shephard's lemma, the equation q_i is obtained as follows.

$$(8)\ \frac{\partial e(U,P)}{\partial P_i} = q_i$$

If the sides in the above equation are multiplied by *Pi / e(U, P)*, we will have,

$$(9)\ \frac{\partial \ln e(U,P)}{\partial \ln p_i} = \frac{p_i q_i}{e(U,P)} = W_i$$

Where, w_i is the budget portion of goods i. Therefore, if the logarithmic derivative is taken from the equation (5), then the right side of w_i is obtained.

$$(10)\ W_i = \alpha_i + \sum_i \gamma_{ij} \ln p_{i+\beta_i} u \beta_0 \Pi P_k B^k$$

In which,

$$(11)\ \gamma_{ij} = \frac{1}{2}(\gamma *_{ij} + \gamma *_{ij})$$

According to the consumer's viewpoint, the total expenses M is equal to e(U,P) and this equality can results in U as a function of P and M which is the indirect function. If we do this for the function (5) and insert it (9), then the portion of expenses of goods i is obtained as a function of p and m.

$$(12)\ W_i = \alpha_i + \sum_j \gamma_{ij} \ln p_j + \beta_i \ln\left[\frac{M}{P}\right]$$

If we calculate ln*p* in the above equation based on other values, then the following equation is obtained.

$$(13)\ln p = a_0 + \sum_k a_k \ln p_k + \frac{1}{2}\sum_j \sum_k \gamma_{kj} \ln p_k \ln p_j$$

The demand function AIDS is called the portion of budget in which the following equations are established.

Additivity: $\sum_{i=1}^{n} \alpha_i = 1$, $\sum_i \gamma_{ij} = 0$, $\sum_i \beta_i = 0$

Homogeneity: $\sum_j \gamma_{ji} = 0$

Symmetry: $\gamma_{ij} = \gamma_{ji}$

In estimating the system, if the mentioned constraints are not applied or the system is not bound by these constraints, then the system should be estimated as non-binding. The system AIDS can be easily interpreted. This system indicates that in the case of no changes at the relative prices and real income (actual expenses), the portion of target goods expenses also remains unchanged. Changes in actual expenses through β_is and changes at the relative prices through α_is affect the portion of goods expenses. β_is are positive for the luxury goods and negative for the essential goods and the sum of them is zero. Furthermore, it can be shown that the system of equations can be augmented for the entire population. The important point in the system AIDS is that the system is based on the non-linear coefficients according to the index P. Therefore, the coefficients of variables in Nonlinear Almost Ideal Demand system (NAIDS) should be estimated by using the nonlinear methods. In most of the empirical studies, Stones Index is used as the alternative to the actual index P instead of using the actual index P and the non-linear method. With the replacement, the model is changed to the Linear Almost Ideal Demand system (LAIDS) and the demand functions are defined as the functions of price and total expenses which can be estimated through the linear methods. Dayton and Miolboer (1980) used Stones Index in order to change the non-linear demand system into a linear system as follows.

$$(14)\ \ln p = \sum_k w_k \ln p_k$$

In this system, income elasticity (η_i), own-price elasticity (μ_{ij}) and cross-price elasticity (μ_{ij}) are calculated as follows.

$$(15)\ \eta_i = \frac{\beta_i}{w_i} + 1$$

$$(16)\ \mu_{ij} = \frac{\gamma_{ij}}{w_i} - 1 - \beta_i$$

$$(17)\ \mu_{ij} = \frac{\gamma_{ij}}{w_i} - \beta_i \left[\frac{w_j}{w_i}\right]$$

4 - RESEARCH METHODOLOGY

The method ARDL was introduced by Hashem Pesaran et al in 1996 in order to determine the cointegration relationship among the variables. Unlike Johansson method, this method needs no understanding of the cointegration degree for the variables in the model; however, the number of cointegration vectors is determined in this method. Two types of equations have been examined for investigating the cointegration relationship between the variables X_t and Y_t The equation, in which X_t is a dependent variable is defined as follows.

$$\Delta X_t = a_1 + \sum_{i=1}^{k} b_{i1} \Delta X_{t-i} + \sum_{i=1}^{k} c_{i1} \Delta Y_{t-i} + \sigma_1 X_{t-1} + \sigma_2 Y_{t-1} + \varepsilon_{1t}$$

Where, Δ is the difference operator, X the dependent variable, Y the vector of independent variables, ε_1 the Error Term, t Time indicator, and k is the number of optimal lags which is determined by the help of Akaike (AIC Schwarz-Bayesian (SBC), Hannan-Quinn (HQC) or (R bar)^2 criteria. The coefficients a_1, b_{i1}, c_{i1}, σ1 and σ2 are the parameters which can be estimated. The equation, in which Y_t is independent variable, is defined as follows.

$$\Delta Y_t = a_2 + \sum_{i=1}^{k} b_{i2} \Delta X_{t-i} + \sum_{i=1}^{k} c_{i2} \Delta Y_{t-i} + \omega_1 X_{t-1} + \omega_2 Y_{t-1} + \varepsilon_{2t}$$

In which, Y is the dependent variable, X: the vector of independent variables and ε_2 is the Error Term. The coefficients a_2, b_{i2}, c_{i2}, ω1 and ω2 are the parameters which can be estimated. Other symbols have the definitions which are used in the equation with X_t as the dependent variable (Zaranezhad, M., et al, 2008). Generally, the dynamic model is a model in which all lags of variables are entered like the the equation (1).

$$(1)\quad Y_t = aX_t + bX_{t-1} + cY_{t-1} + u_t$$

To reduce the bias, associated with the estimation of model coefficients in small samples, it is better to use the model which applies numerous lags like the equation (1).

$$(2)\quad \phi(L,P)Y_t = \sum_{i=1}^{k} b_i(L,q_i)X_{it} + c'w_t + u_t$$

In the above equation, Y_t is the dependent variable and X_{it} the independent variable. The term L is the lag operator and w_t is the vector operator which represents the predetermined variables in the model including the intercept, virtual variables, time trends and other exogenous variables. The variable P is the number of lags, used for the dependent variable, and q is the number of lags, used for the independent variables (X_{it}). The mentioned model is called the integration and auto regressive distribution lag (ARDL), in which we have:

(3) $\phi(L,P) = 1 - \phi_1 L - \phi_2 L^2 - .... - \phi_p L^p$

(4) $b_i(L,q_i) = b_{i0} + b_{i1}L + ... + b_{iq}L^q$ (I = 1, 2 ... k)

The number of optimal lags for each of the explanatory variables can be determined by using one of the criteria of Akaike Criterion (AIC), Schwarz -Bayesian Criterion (SBC), Hannan-Quinn Criterion (HQC) or R-Bar Squared. Schwarz -Bayesian Criterion is usually applied in the samples less than 100 in order to not lose too many degrees of freedom. This criterion saves the determination of lags, thus the estimation will have higher degree of freedom (Pesaran, M.H, et al., 1998). Dynamic model is used in order to calculate the long term coefficients of model. Long term coefficients, related to the variables of X, are calculated by the following equations.

$$\theta_i = \frac{\hat{b}_i(L,q_i)}{1-\hat{\phi}(L,p)} = \frac{\hat{b}_{i0} + \hat{b}_{i1} + ... + \hat{b}_{iq}}{1-\hat{\phi}_1 - \hat{\phi}_2 - ... - \hat{\phi}_p}, i = 1,2,...,k$$

By the above equation, the amount of t statistics, related to the estimated long-term coefficient, can be calculated. Inder (1993) indicates that such these t statistics have normal limiting distribution and the t -test has a good potential based on the critical quantities. Thus the valid tests about the existence of a long-term relationship can be done by the help of θ_i.

As seen in the title of paper, the purpose of this paper is to estimate the function of rice demand in Ilam city. The variables, used in this study, are presented in Table 1.

Table (1) Research variables

	Rice consumption per capita (kg)	Price of rice per kilo (RLS)	Price of meat per kilo (RLS)	Price of chicken per kilo (RLS)	Price of pasta per kilo (RLS)	Household income per year (RLS)
Variable names	RD	RP	MP	CP	PP	I
Variable Logarithm	LNRD	LNRP	LNMP	LNCP	LNPP	LNI

The demand function of dependent variable is presented according to the model ARDL, as follows.

$$\Delta X_t = a_1 + \sum_{i=1}^{k} b_{i1}\Delta X_{t-i} + \sum_{i=1}^{k} c_{i1}\Delta Y_{t-i} + \sigma_1 X_{t-1} + \sigma_2 Y_{t-1} + \varepsilon_{1t}$$

Where, X is introduced as the rate of demand for rice in Ilam city (dependent variable). Other parameters have the same definitions presented in Section 3-3.

Since evaluation of short and long-term relationship between the variables is taken into account in this study according to their degree of cointegration, thus the best model with the appropriate lag has been estimated by the method ARDL through using the software Microfit 4 and S Schwarz -Bayesian Criterion. Schwarz -Bayesian Criterion saves the number of lags. Therefore, the estimation will have the higher degree of freedom.

We have continued the calculations in order to determine the demand function of paper subject with respect to the research variables in both short and long term sectors. Data of rice consumption in this city has been obtained based on 29 observations, resulted from the statistics of consumption during the years 1982 to 2010, and has been inserted in the software and the (short-term) calculations have been presented in Table 2.

- Results:

Table (2) Calculations of short-term demand function by the method ARDL

```
                 Autoregressive Distributed Lag Estimates
       ARDL(1,1,0,0,0,1) selected based on Schwarz Bayesian Criterion
******************************************************************************
 Dependent variable is LNRD
 29 observations used for estimation from 1361 to 1389
******************************************************************************
 Regressor              Coefficient       Standard Error         T-Ratio[Prob]
 LNRD(-1)                    .61618            .27030             2.2796[.033]
 LNRP                        .40945           .079175             5.1714[.000]
 LNRP(-1)                   -.29726           .071490            -4.1580[.000]
 LNPP                       -.12639           .065378            -1.9332[.067]
 LNCP                        .11588           .067561             1.7151[.101]
 LNMP                      -.083846           .043589            -1.9236[.068]
 LNI                       -.048227           .054991            -.87700[.390]
 LNI(-1)                     .11711           .025352             4.6193[.000]
******************************************************************************
 R-Squared                     .99903   R-Bar-Squared                   .99870
 S.E. of Regression           .012506   F-stat.    F(  7,   21)    3085.5[.000]
 Mean of Dependent Variable    3.2784   S.D. of Dependent Variable      .34751
 Residual Sum of Squares     .0032845   Equation Log-likelihood        90.5956
 Akaike Info. Criterion       82.5956   Schwarz Bayesian Criterion     77.1264
 DW-statistic                  1.6350   Durbin's h-statistic           *NONE*
******************************************************************************
```

show that the prob of per kilo pasta (LNPP), Chicken (LNCP), red meat (LNMP) has been higher than the value 0.05 and there is no significant relationship between these variables and the rate of rice demand in Ilam city in the short term. Therefore, the significant relationship among the variables of per capita rice Calculations consumption, the price of per kilo rice and the household income during the year is confirmed in the short term. Moreover, the amount of R^2 also shows that the changes of dependent variable (the demand of rice in Ilam city) with the dimensions of subsidiary hypotheses are explained in this study by estimation 100% (0.99903).

Table (3) Calculations of long-term demand function by the method ARDL

Estimated Long Run Coefficients using the ARDL Approach
ARDL(1,1,0,0,0,1) selected based on Schwarz Bayesian Criterion

Dependent variable is LNRD
29 observations used for estimation from 1361 to 1389

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LNRP	.29229	.29137	1.0031[.327]
LNPP	-.32930	.31072	-1.0598[.301]
LNCP	.30190	.29804	1.0129[.323]
LNMP	-.21845	.21985	-.99365[.332]
LNI	.17946	.051216	3.5039[.002]

Calculations show that the prob of all variables has been less than the value 0.05 and there is a significant relationship between these variables and the rate of rice demand in Ilam city in the long time. As it can be seen, the coefficients of pasta (LNPP) and red meat (LNMP) has an inverse relationship with the increased rice demand in long-term. In other words, with one unit increase in the demand for rice in Ilam in the long term, the demand for pasta and red meat is reduced equal to 0.32930 and 0. 21845 kg, respectively. After estimating the long-term model, the error correction model associated with it is also presented. The summary of results related to the error correction model is described in the following table (Table 4).

Thereupon, we use Schwarz -Bayesian Criterion (SBC) model in order to determine the rice demand function in Ilam city. The results of calculations by the software are presented in Table 4 as follows.

Table (4) Calculations of demand function by the method VECM

Error Correction Representation for the Selected ARDL Model
ARDL(1,1,0,0,0,1) selected based on Schwarz Bayesian Criterion

Dependent variable is dLNRD
29 observations used for estimation from 1361 to 1389

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLNRP	.40945	.079175	5.1714[.000]
dLNPP	-.12639	.065378	-1.9332[.066]
dLNCP	.11588	.067561	1.7151[.100]
dLNMP	-.083846	.043589	-1.9236[.067]
dLNI	-.048227	.054991	-.87700[.390]
ecm(-1)	-.38382	.27030	-1.4200[.169]

List of additional temporary variables created:
dLNRD = LNRD-LNRD(-1)
dLNRP = LNRP-LNRP(-1)
dLNPP = LNPP-LNPP(-1)
dLNCP = LNCP-LNCP(-1)
dLNMP = LNMP-LNMP(-1)
dLNI = LNI-LNI(-1)
ecm = LNRD -.29229*LNRP + .32930*LNPP -.30190*LNCP + .21845*LNMP -.
17946*LNI

R-Squared	.73752	R-Bar-Squared	.65003
S.E. of Regression	.012506	F-stat. F(5, 23)	11.8012[.000]
Mean of Dependent Variable	.038489	S.D. of Dependent Variable	.021140
Residual Sum of Squares	.0032845	Equation Log-likelihood	90.5956
Akaike Info. Criterion	82.5956	Schwarz Bayesian Criterion	77.1264
DW-statistic	1.6350		

As it can be seen, the basis of calculating the demand function (ecm) is the coefficients listed in Table 3. The computational demand function is presented as follows.

ECM = LNRD - 0.29229LNRP + 0.32930LNPP – 0.30190LNCP + 0.21845LNMP – 0.17946LNI

Where, ECM represents the demand function of rice in Ilam and LNRD, LNRP, LNPP, LNCP, LNMP, LNI represent the per capita rice consumption, the price of rice per kilo, price of pasta per kilo, price of chicken per kilo, price of red meat per kilo, and the household income, respectively.

In the mentioned table, d represents the first-order difference of variables. As it can be seen, except for the first and second order difference coefficients of explanatory variable, liquidity growth rate, and the first-order difference of exchange rate, inflation rate and oil revenue, which have the inappropriate t-statistics, other coefficients of model are significant at the significant level 95% according to the possibility of related statistical quantity t.

What is taken into account in the short-term equation (ECM) and is so important is the coefficient ECM (-1) indicating the adjustment speed of short term imbalance process towards the long-term balance. As shown in Table (4), the estimated coefficient ECM (-1) is approximately -0.4 which refers to the relatively high short-term of changing the short-term imbalance towards the long- term balance and shows that 0.4 of imbalances in the significant variables is solved by the demand for rice in Ilam.

6 - Conclusion

The main objective of this research is to study the behavior of demand for rice in Ilam. In this study, the integration and auto regressive distribution lag (ARDL) and also the Almost Ideal Demand System (AIDS) model are used in order to extract the demand function. This study has been conducted by using the statistics of time-series over the period 1982 to 2010.

Calculations show that the prob of per kilo pasta (LNPP), Chicken (LNCP), red meat (LNMP) has been higher than the value 0.05 and there is no significant relationship between these variables and the rate of rice demand in Ilam city in the short term. Therefore, the significant relationship among the variables of per capita rice consumption, the price of per kilo rice and the household income during the year is confirmed in the short term. Moreover, the amount of R^2 also shows that the changes of dependent variable (the demand of rice in Ilam city) with the dimensions of subsidiary hypotheses are explained in this study by estimation 100% (0.99903). Furthermore, the calculations show that the prob of all variables has been less than the value 0.05 and there is a significant relationship between these variables and the rate of rice demand in Ilam city in the long time. As it can be seen, the coefficients of pasta (LNPP) and red meat (LNMP) has an inverse relationship with the increased rice demand in long-term. In other words, with one unit increase in the demand for rice in Ilam in the long term, the demand for pasta and red meat is reduced equal to 0.32930 and 0.21845 kg, respectively. The rice demand function in Ilam city is presented as follows by using Schwarz -Bayesian Criterion (SBC) model.

ECM = LNRD - 0.29229LNRP + 0.32930LNPP – 0.30190LNCP + 0.21845LNMP – 0.17946LNI

As it can be seen, the coefficients of price of rice per kilo, price of chicken per kilo, and the household income was negative during the year and this indicates the inverse relationship of these variables with the rice demand in Ilam. Variables of per capita rice consumption, price of per kilo pasta, and the price of per kilo meat have a direct and positive relationship with the demand for rice in Ilam. The amount of coefficients indicates that with one unit increase in the demand for rice in Ilam, to what extent the above variables are increased (positive coefficients) or reduced (negative coefficients) per unit.

In this study, three questions have been raised in the introduction and the responses of these questions are presented as follows according to the implementation of model and the theoretical principles.

Do the changes of rice price have the significant effect on the demand for rice?

Changes of rice price have the significant relationship with its demand in Ilam, but this is an inverse relationship (negative). In other words, with one unit increase in rice demand in the long term, the price of rice is reduced equal to 0.29229 units (kg/ RLS).

Does the change in the household income have an impact on the demand for rice?

Changes in household income have a significant relationship with its demand in Ilam city, but this is an inverse (negative) is relationship. In other words, with one unit increase in the demand for rice in long-term, the household income is reduced equal to 0.17946 units (RLS).

What is the rice demand function in Ilam?

The function of long-term rice demand in Ilam has been previously provided.

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