NOTE

CONSUMER BEHAVIOR IN RURAL AREAS OF IRAN: AN ALMOST IDEAL DEMAND SYSTEM ANALYSIS

M. BAKHSHOODEH AND A. AKBARI

Agricultural Economics Department, Shahid Bahonar University of Kerman, Kerman, Iran.

ABSTRACT

During the past decade, the consumer price index (CP) has been increasing in the rural areas of Iran. This has led consumers who live in villages to alter the food expenditure share. Changes in consumer's behavior have been analyzed by using the linear approximate almost ideal demand system (LA/AIDS) which has been recently used by agricultural economists. Eight food groups in form of aggregate commodity groups, over a period of 14 years (1978-91) were applied in this study. The results indicate, *Cet. par.*, with an increase in the price of meat or bread and flour, consumers will use them as substitute for each other.

---

1. Instructor and Associate Professor, respectively.

بررسی رفتار مصرف کنندگان در مناطق روستائی ایـران بـا اسـتفاده از سیستم تقاضای به نسبت ایده آل

محمد بخشوده و احمد اکبری

به ترتیب مربی و دانشیار بخش اقتصاد کشاورزی دانشگاه شهید بـا هـنر کرمـان ، کرمـان ، ایران .

چکیده

شاخص قیمت کالاهای مصرفی در دهه گذشته در مناطق روستائی کشور ایران در حال افزایش بوده است . از این رو مصرف کنندگان روستائی اقـدام بـه تعدیـل نسـبت هزینـه غذایـی خـود نموده اند. رفتار مصرف کننده با استفاده از مدل سیستم تقاضای بـه نسبت ایـده آل کـه بـه تـازگی موارد استفاده زیادی توسط اقتصاد دانان کشاورزی پیدا کرده ، مورد بررسی و تجزیه و تحلیل قـرار گرفته است . هشت گروه غذائی برای مدت ۱۴ سال (۱۳۵۷-۱۳۷۰) در مناطق گوناگون در ایـن مطالعه بررسی شده است . یافته های تحقیق نشان می دهـد کـه افزایـش قیمـت گوشـت در شـرایط ثابت، باعث جایگزینی کالاهای دیگری مثل گروه نان و آرد و کالاهای وابسته بـه آن مـی شـود .

90

هم چنین افزایش قیمت گروه نان و آرد و فرآورده های مربوطه در شرایط ثابت، موجب جانشینی کالاهائی مانند انواع گوشت می شود.

INTRODUCTION

Because of rapid growth in prices level, per capita expenditures on all commodity groups have increased over the two decades. This has been followed by population growth rate of 3.2%. Consumers have been supported by governmental subsidies programs on some necessary commodities, such as bread, rice, shortening and sugar during the past few years. Despite continuing such policy, household expenditure on food groups has been increasing. For example total expenditure on bread group, has increased from 32000 Rials in 1978 to 250000 Rials in 1991. Considering constant prices (1982=100), this has been changed from 58000 rials to 75000 rials, but the budget share of this goup which was 0.33 in average has declined to 0.31 over the period of study. On the other hand, the budget share of some other aggregate commodity groups, such as fruits, vegetables, dairy products, sugar, and tea groups has increased. Also, the growth rate of constant expenditure on food groups has changed as 29.3% in dairy products, 52.4% in meat group, 29.6% in dried fruit group, 87.5% in oils, 26.1% in fresh fruit group, but 10% in sugar and tea group.

The main objective of the study was to estimate demand system for food groups in the rural areas of Iran. More specifically, elasticities of demand were estimated and the relationship between the commodity groups was determined.

The hypothesis tested was that rural consumers will substitute bread group for some aggregate commodities, such as meat products, or sugar and tea group which have the same popular use among rural-living people.

MATERIALS AND METHODS

The almost ideal demand system (AIDS) model developed by Deaton and Muellbauer (3) is obtained by differentiating the particular cost function. After appropriate substitutions, the AIDS is obtained in budget share from:

$$w_i = \alpha_i + \sum_j \gamma_{ij} log p_j + \beta_i log(x/p)$$

Where ω_i is the j_{th} budget share, χ is total per capita expenditure (which is equivalent to income in this model).

$$log p = \alpha_0 \sum log p_k + 1/2 \sum_k \sum_j \gamma_{kj}^* log p_k log p_j$$

As a linear approximation to this demand system and by use of Stone's index, linear approximate almost ideal demand system (LA/AIDS) is defined as:

$$w_i = \alpha_i^* + \sum_j \gamma_{ij} log p_j + \beta_i log(x/p^*)$$

Based on Deaton and Muelbauer,s suggestion (3), $p*$ is calculated as:

$$p^* = \sum_k w_k log p_k$$

In this paper LA/AIDS was used and the Slutsky symmetry was imposed (1, 5), thus: the elasticities are computed from the estimated parameters of the LA/AIDS model as follows (6, 9):

92

$$E_{ii} = -1 + \gamma_{ij}/w_i - \beta_i$$

$$E_{ij} = \gamma_{ij}/w_i - \beta_i(w_j/w_i)$$

$$\phi_i = 1 + \beta_i/w_i$$

where E_{ii} and E_{ij} are price and cross elasticities coefficients of i_{th} commodity or Marshallian demand elasticities and ϕ_i is income or expenditure elasticity. The model and elasticities were estimated using the SUR program within TSP.

Annual time series data covering 1978-91 were used in the estimation. Current personal consumption and prices were obtained from Plan and Budget Organization (11). The following calculations were done before analysing the data.

1- Total expenditure was computed by summing current expenditure on every commodity group (2).

2- To make sure that price times quantity equal expenditure, prices were implicitly created for each category by dividing the current expenditure series to its constant (1982) Rial counterpart. (2, 7).

3- Jth budget share is computed by dividing current rial expenditure on Jth item to total expenditure.

The commidity groups which were analyzed are as follows:

a) Bread, flour and their related goods which are named bread group. This category includes all kinds of bread, flour, corn and other products that may be produced from them.

b) Meat group, including red meat such as, beef and mutton and white meat such as chicken and fish.

c) Dairy products, include milk and other products of milk plus egg.

d) Oils category which includes vegetable oil and animal fat.

e) Fruit and vegetable group which include all kinds of ripe fruits and vegetables.

f) Dried fruits group which consist of cereals grains and dried fruits.

g) Sugar and tea category contains sugar, hard sugar, tea, and all kind of sweets.

h) Others, including spices, drinks, food away from home, tobacco products and so on.

After computing p^*, ω_i, p and χ/p^* as new variables, for each group an equation was constructed, such that ω_i was the dependent variable, and log $\bar{p}_i$ (I=1,.......,n) and log ($\bar{\chi}/p^*$) were independent variables. All eight demand equations were estimated simultaneously by using system estimation method,

After estimating the parameters of demand system E_{ii} or price elasticities, E_{ij} or cross elasticity and ϕ_i or income elasticity for each of eight groups were computed.

RESULTS AND DISCUSSION

Table 1 presents the estimated coefficients for the demand system. All of the own-price coefficients (γ_{ii}) have the expected positive sign and six of them are statistically significant at %5 level. Six of the eight cross-price coefficients (γ_{ii}) are also significant. These direct and cross-price coefficients measure 100 times the effect on the i_{th} budget share of a %1 increase in the j_{th} real price with real expenditure held constant. The γ_{ii} is equivalent to the change in the i_{th} budget share with respect to %1 change in the j_{th} price with real expenditures or income hold constant (2). Only two of the eight expenditure coefficients were significant. These coefficients measure 100 times the effect on the ith budget share of a %1 increase in the

94

real expenditure. The β_i represents the change in the ith budget share with respect to %1 change in real income or expenditures with price held constant (2).

The sign of these coefficients was positive for luxuries and negative for necessities. Table 2 presents the elasticity coefficients of demand which have been evaluated at mean levels of the independent variables. All of the eight own-price elasticities have the expected negative sign. When the sign of the cross price elasticity coefficients are negative the two commodity groups are complement. Also positive sign of these coefficients indicate that the commodities are substitutes (10).

Based on the these considerations, *Cet. par.* other important results were as follow:

1- Bread group is substituted for meat group and so for sugar and tea category.
2- Bread group is complement to dairy products, oil, fruit and vegetables and dried fruit.
3- Meat is substitute for bread, dairy products, fruit, dried fruit, but complement to oil, sugar and tea.
4- Dairy products are substitute for meat, sugar and tea but complement with bread, oils, vegetable, fruit and dried fruits.
5- Oil is substitute for fruit, dried fruit, sugar and tea but complement with bread, meat and dairy products.

According to the income elastcity coefficients (Table 2-last column), bread, oil, dried fruit and sugar and tea are classified as necessary whereas meat, dairy products, and fruit are luxury commodities.

95

Table 1. Estimated coefficients of the LA/AIDS MODEL.

Commodity group	a_i	γ_{i1}	γ_{i2}	γ_{i3}	γ_{i4}	γ_{i5}	γ_{i6}	γ_{i7}	γ_{i8}	β_i	ω_i¶	D.W.	R^2
Bread	0.152*§ (0.054)	0.089* (0.16)	0.037* (0.009)	-0.12* (0.007)	-0.0279* (0.0046)	-0.066* (0.0099)	-0.018* (0.005)	0.024* (0.0098)	0.008 (0.006)	-0.003 (0.004)	0.325	2.3	0.984
Meat	-0.624 (0.083)	0.037* (0.009)	0.084* (0.011)	0.0246* (0.0065)	-0.006* (0.0031)	0.007 (0.0097)	0.0126* (0.0042)	-0.0347* (0.0064)	-0.048* (0.0046)	0.009 (0.0062)	0.23	1.74	0.841
Dairy products	0.075 (0.051)	-0.112 (0.007)	0.0246 (0.011)	0.051 (0.006)	-0.0085* (0.0031)	-0.003 (0.006)	-0.015* (0.0033)	0.031* (0.0052)	0.0194* (0.0046)	0.0098* (0.0039)	0.129	1.98	0.952
Oil and fat	0.12* (0.0222)	-0.0279* (0.0046)	-0.006* (0.0065)	0.0085* (0.0023)	0.0249* (0.0024)	0.0039 (0.006)	0.0011 (0.002)	0.0129* (0.0031)	0.0027 (0.0042)	-0.0009 (0.0017)	0.0299	1.86	0.988
Fruit	0.104* (0.0599)	-0.066* (0.009)	0.007 (0.0031)	-0.003 (0.006)	-0.004 (0.0037)	0.0137 (0.0133)	0.004 (0.004)	-0.028* (0.0075)	-0.0046 (0.0024)	0.0049 (0.0044)	0.108	1.77	0.752
Dried fruit	0.133* (0.025)	-0.018* (0.005)	0.0128* (0.0042)	0.0153* (0.0033)	0.001 (0.002)	0.0036 (0.004)	-0.0076* (0.0035)	0.0052 (0.0039)	0.0008 (0.0052)	-0.0002 (0.002)	0.032	1.7	0.887
Sugar and tea	0.335* (0.0486)	0.024* (0.0098)	-0.347* (0.0064)	0.0309* (0.0052)	0.013* (0.0031)	-0.028* (0.0075)	0.0052 (0.0039)	0.0004 (0.009)	-0.0044* (0.0055)	-0.0176* (0.0041)	0.066	1.93	0.929
Others	0.076 (0.031)	0.008 (0.006)	-0.048* (0.0046)	0.0194* (0.0042)	0.0027 (0.0024)	-0.0046 (0.0052)	0.0008 (0.0026)	0.044* (0.0055)	0.046* (0.0054)	-0.003 (0.003)	0.08	2.37	0.961

† Single asterisk indicates significant at a 5% level.
§ Figures in parentheses are standard errors.
¶ ω_i shows the in budget share in average term.

Table 2. Direct, cross-price and expenditure elasticities coefficient.

Commodity group	Bread	Meat	Dairy products	Oil and fats	Fruit	Dried fruit	Sugar and tea	Others	Expenditure
Bread	0.718 (0.027)†	0.117 (0.0115)	-0.344 (0.033)	-0.86 (0.008)	-0.204 (0.0197)	-0.054 (0.006)	0.076 (0.007)	0.027 (0.0026)	0.991 (0.0009)
Meat	0.114 (0.011)	-0.0627 (0.056)	0.11 (0.0166)	-0.026 (0.004)	0.031 (0.005)	0.057 (0.009)	-0.155 (0.023)	-0.213 (0.032)	1.004 (0.0006)
Dairy products	-0.922 (0.18)	0.18 (0.037)	-0.604 (0.079)	-0.071 (0.014)	-0.036 (0.007)	-0.126 (0.025)	0.243 (0.046)	0.15 (0.029)	1.079 (0.0152)
Oil and fats	-1.03 (0.18)	-0.209 (0.044)	-0.31 (0.110)	0.067 (0.327)	0.15 (0.053)	0.042 (0.025)	0.485 (0.046)	0.104 (0.029)	0.966 (0.0118)
Fruit	-0.65 (0.036)	0.056 (0.009)	0.039 (0.007)	0.036 (0.006)	-0.874 (0.053)	0.033 (0.015)	-0.274 (0.17)	-0.47 (0.036)	1.047 (0.0118)
Dried fruit	-0.587 (0.113)	0.427 (0.147)	0.508 (0.174)	0.037 (0.013)	0.12 (0.041)	-1.25 (0.006)	0.173 (0.047)	0.027 (0.008)	0.993 (0.0081)
Sugar and tea	0.517 (0.201)	-0.529 (0.137)	0.574 (0.154)	0.23 (0.058)	-0.456 (0.117)	0.1 (0.086)	-0.975 (0.059)	-0.73 (0.009)	0.696 (0.0023)
Others	0.16 (0.133)	-0.8 (0.215)	0.34 (0.088)	0.018 (0.012)	-0.075 (0.021)	0.015 (0.026)	-0.752 (0.0021)	-0.35 (0.191)	0.558 (0.0797)

† Figures in parentheses are standard errors.

97

CONCLUSION

The study showed that budget share of all aggregate commodity group, except the dried fruit category should increase, if only %1 increase occured on their corresponding price by holding the expenditure constant. Also, if the price of meat group or sugar and tea category changes individually by 1 percent, then the budget share of bread group will increase by 0.037 and 0.024, respectively. In other words, both the meat and sugar and tea are substitute for bread group. Based on the results and considering *Cet. par.* condition, an increase in price of any food group will increase budget share of others. Furthermore, meat group and dairy products are substitute, and the same relation exists between meat and dried fruits. Thus, consumers may use more bread, dairy products, and dried fruit instead of meat group when price of the latter commodoties increases.

LITERATURE CITED

1. Alston, J.M., C.A. Carter, R. Green and D. Pick. 1993. Whither Armington Trade Models? Amer. J. Agric. Econ. 75: 304-313.

2. Blanciforti, L.A., R. Green and G.A. King. 1986. U.S. Consumer behavior over the postwar period: an almost ideal demand system analysis. Giannini Foundation Monograph, University of California, No.40, 66 p.

3. Deaton A. and J. Muelbauer. 1980. An almost ideal demand system. Amer. Econ. Rev. 70:312-326.

4. Eales, J.S. and L.J. Unnevehr. 1988. Demand for beef and chicken products: separability and structural change. Amer. J. Agric. Econ. 70:521-532.

98

5. Gould, B.W., T.L. Cox and F. Perali. 1990. The demand for fluid milk products in the U.S.A.demand system approach. Western J. Agric. Econ.15:1-12.

6. Green, R. and J.M. Alston.1990. Elasticities in AIDS Models. Amer. J. Agric. Econ. 76:442-446.

7. Honma, M.1993. Growth in horticultural trade: Japan; market for developing countries. Agric. Econ. 9:37-51.

8. Huang. J. and C.C. David. 1993. Demand for cereal grains in Asia: the effect of urbanization. Agric. Econ. 8:107-124.

9. Mdafri, A. and B.W. Brorsen. 1993. Demand for red meat, poultry, and fish in Morocco: an almost ideal demand system. Agric. Econ 9:155-163.

10. Philips L. 1974. Applied Cousumption Analysis. Advanced Textbooks in Economics. North-Holland Publishing Company, Amesterdam, The Netherlands. 279 p.

11. Plan and Budget Organization. 1993. Income and Consumption Trend for Urban and Rural Areas of Iran. 1971. Center for Statistics of Iran. 694 p.