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Demand for Rice in Saudi Arabia: Weak Separability and Structural Change

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Abstract. The hypothesis of structural change in Saudi Arabia rice demand is tested and evaluated in a five-rice types almost ideal demand system with parameters following gradual switching regression model. Result derived from time-varying parameterization of this model provides strong evidence of very gradual structural change in Saudi Arabia rice demand. The structural change was accompanied with significant change in parameters of the model and in the resulting elasticities. The structural change took 10 years (1981-1990) to be completed and was biased in favor of Indian and Rest of the world at the expense of U.S.A and ROA rice types. It is concluded that habit persistence does not explain any changes in Saudi Arabia rice consumption patterns. Estimated elasticities show that U.S.A, PAK, and ROW rice types are portrayed as a luxury good while IND and ROA are characterized as necessities.

Introduction

Although rice is the stable food of the majority of the world's populations, it is of secondary importance in international trade. Most of rice production comes from Asia and U.S.A. Saudi Arabia imports all of its need for rice from these areas. Saudi Arabia imports rice mainly from U.S.A, Pakistan, India, Thailand, Australia and other sources. The first three countries are the major exporters of rice to K.S.A. During the period of 1971 – 1999, Saudi Arabia's imports were averaging 144.5, 66.5, 117.2 thousand tons from U.S.A, Pakistan and India respectively.

Although rice types have different tastes and different purposes according to the quality and the source of the rice, we evaluate these types of rice according to their origin. Therefore, there are five sources of imports (U.S.A., Pakistan, India, Rest of Asia, and Rest of the world). During the period of 1971 – 1999, per capita disappearance of rice averaged 15.17 kg, 6.60 kg, 8.54 kg, 6.41 kg and 1.97 kg for U.S.A., Pakistan, India,

and rest of Asia and rest of the world respectively. However, most of imported

rice from rest of Asia comes from Thailand, while Australia dominates Saudi markets for rice from rest of the world.

The most significant change is apparent per capita rice disappearance since the early 1970's have been the increase in Indian rice consumption. In 1971, Saudi per capita Indian rice consumption was 0.81 kg, increasing to 31.1 kg in 1999. It reached an all-time high of 33.5 kg in 1998. American rice disappearance has changed dramatically since 1971, increasing from 8.4 kg per capita in 1971, to a peak of 24.3 kg in 1983, then decreased to reach 5.8 kg per capita in 1999. On the other hand, Pakistani rice disappearance reached its peak in 1980 by 8.5 kg per capita and averaging 6.6 kg per capita over the period of 1971 to 1999.

Differences in cooking quality and taste limit the substitutability from one type of rice to another. Moreover, some rice type, known as Basmati rice, has a distinctive odor on cooking; its grains double in length, remaining completely separate. These factors caused rice types from central Pakistan and northern India to dominate the share of rice consumption in Saudi Arabia.

Therefore, habit persistence variables may suggest that this feature, as well as price and expenditure effects, has some influence on consumer's budget share allocations for rice types.

Although feature of modeling consumers' rice demand in Saudi Arabia is that consumers demanded products that produced and imported completely from other countries. Moreover, the data on consumption of rice are generally poorer than production or importation data. Therefore, consumer behavior toward rice demand limits our attempts to set and evaluate consumer behavior in retail demand sides. Consumer decision to allocate budget share among food products could also be taken and evaluated at the retail demand sides conditionally on expenditure on these products (rice type) as income variable or the decision could be taken and evaluated using expenditure on all goods and consider import demand for rice as the retail demand model for consumer decision in Saudi Arabia. The assumption of separability in the context of the retail demand for rice in Saudi Arabia is examined here.

Previous study [1] employed similar methods, but employed monthly data (1990-1993) and ignored the issue of separability, and assumed that consumers preferences were stable over the period under study. Moreover, a constant set of parameters can not be postulated to rationalize consumer behavior within the assumed model. The issues of weak separability and structural change become important issues in determining consumer demand especially in the area of international trade.

The principal objectives of this paper include:

1 A time-varying version of the Almost Ideal Demand System (AIDS) model,

which assumes unknown joint points (points in time associated with the beginning and ending of transition periods between regimes) and accommodates a gradual transition to a new regime is employed to test the hypothesis of no structural change in Saudi Arabia rice demand.

2. Demand equations for five types of rice are estimated using two alternative income variables: expenditure on the rice type alone and expenditure on all goods to justify the use of these exogenous variables in our demand system as a necessary condition for weak separability.

3. The impact of structural change on the estimated parameters of the model and on the pattern of rice consumption in Saudi Arabia are examined.

4. Examine if consumption habits have any effect on rice demand.

Model Specification

Two commonly used functional forms are applied to estimate both of two alternative models of demand. The two alternative demand models are identical except for the specification of the income variable. Alston and Chalfant introduced two alternatives functional forms, which are identical in all aspects except the dependent variable [2]. The first specification corresponds broadly to the double-log specification of [3,4] as:

Model 1: Including expenditure on meat

$$\text{Ln}\, Q_i = \alpha_i + \sum_j \gamma_{ij} \text{Ln}\left(\frac{p_j}{CPI}\right) + \beta_i \text{Ln}\left(\frac{X_1}{P}\right) + \delta_i \text{Ln}T \qquad (1)$$

Model 2: Including expenditure on all good

$$\text{Ln}\, Q_i = \alpha_i + \sum_j \gamma_{ij} \text{Ln}\left(\frac{p_j}{CPI}\right) + \beta_i \text{Ln}\left(\frac{X_2}{P}\right) + \delta_i \text{Ln}T \qquad (2)$$

Where, Q_i is the retail quantity per person of rice i ; P_i price of rice i ; X_1: expenditure on the five rice types; P: stone's (1953) geometric index of these products' prices; X_2 expenditure on all goods; CPI: the consumer price index and T: a time trend variable.

The second specification corresponds to [5] and modified translog and the (AIDS) used by [6] as:

Model 3: Including expenditure on rice

$$S_i = \alpha_i + \sum_j \gamma_{ij} Ln(\frac{p_j}{CPI}) + \beta_i Ln(\frac{X_1}{P}) + \delta_i LnT \quad (3)$$

$$S_i = \alpha_i + \sum_j \gamma_{ij} Ln(\frac{p_j}{CPI}) + \beta_i Ln(\frac{X_2}{P}) + \delta_i LnT \quad (4)$$

Model 4: Including expenditure on all goods.

Where S_i is the share of rice i in total expenditure. Models 1-4 are homogenous of degree zero in prices and expenditure.

In model 3, which includes expenditure on the rice types as the income variable, the specification confirms to a single equation version of the AIDS [7] assuming the five rice types comprising a separable group. In the framework of multistage budgeting, it is assumed that consumers first allocate their expenditures to broad aggregate commodity groups. Subsequently, consumer's decisions are based on group expenditures and commodity prices within each group. Detail of AIDS in [7]. The resulting demand functions:

$$S_i = \alpha_i + \sum \gamma_{ij} Ln\, P_j + \beta_i (LnX - LnP) \quad (5)$$

Where S_i represents the expenditure share of the ith rice type, P_i denotes nominal prices for each commodity, X is total expenditures on the ith good, and P is approximated by stone's share weighted price index:

$$\log P = \sum_i S_i \log P_i \quad (6)$$

Parameter α_i can be interpreted as the basic budget share of rice type i (ignoring changes in relative prices and real expenditure); γ_{ij} measures the change in the ith budget share following a unit change in price P_j, with real expenditure held constant; B_i measures the effect on the ith budget share of change in real expenditure. By construction the demand system represented by eq. (5); the system should satisfy these restrictions:

$$\sum \alpha_i = 1, \sum \gamma_{ij} = \sum \beta_i = 0; \quad (7)$$

Homogeneity: $\Sigma \gamma_{ij} = 0$

and symmetry: $\gamma_{ij} = \gamma_{ji}$

The gradual switching AIDS model employed by [8] and adopted for the present study is specified in dynamic version by taking the first-difference form of (5) as:

$$\Delta S_{it} = \gamma_i \Delta tn_{it} + \sum_j [\gamma_{ij} \Delta \log P_j + S_{ij} \Delta (tn_{jt} \log P_{jt})]$$
$$+ \beta_i \Delta \log \chi_t / P + \varphi_i (\Delta tn_{it} \Delta \log \chi_t / P) \quad (8)$$

Where Δ denotes that the variables are in different form, and tn represents a transition function expressing the transition or time path from one regime to the other, defined as:

$tn_t = 0$ for $t = 1, \ldots\ldots, t_1$

$tn_t = (t - t_1)/(t_2 - t_1)$ for $t = t_1 + 1, \ldots.., t_2 - 1$

$tn_t = 1$ for $t = t_2, \ldots\ldots., T$

$t_1 \leq T\text{-}m / (n - 1)$, $t_2 \geq m / (n - 1)$, $t_1 < t_2$ (9)

Where t_1 is the end point of the first regime, t_2 is the start point of the second regime, n represents the number of equations in the demand system, and m represents total number of free parameters to be estimated. Note that if $t_2 = t_1 + 1$, the shift in regime is abrupt. Note also that with $\gamma_i = \delta_{ij} = \phi_i = 0$, eq. (8) reduces to the basic AIDS model. Therefore, additional restriction need besides (7) as follows:

Adding-up requires: $\Sigma_i \gamma_i = \Sigma_i \delta_{ij} = \Sigma_i \phi_i = 0$

Homogeneity requires: $\Sigma_i \delta_{ij} = 0$; and

Symmetry requires: $\delta_{ij} = \delta_{ji}$ (11)

Marshallian elasticities under the assumption of structural change and weak separability discussed in [8] and given by:

$$e_{ii} = [(\gamma_{ii} + \delta_{ii}) / w_i] - (\beta_i + \phi_i) - 1; \quad (12)$$

$$e_{ix} = [(\beta_i + \phi_i) / w_i) + 1; \quad (13)$$

$$e_{ij} = [(\gamma_{ij} + \delta_{ij}) / w_i] - (\beta_i + \phi_i) - (w_j / w_i); \quad (14)$$

To incorporate consumption habit variables into the AIDS model, procedure proposed by [9] and [10] is adopted. Following this procedure, past consumption added to each equation in 5 and additional restriction should be added to modify the system in adding-up conditions as the parameters of these variables (habit persistence) should sum to zero. Habit formation model of 5 estimated to examine how habit effects rice consumption in Saudi Arabia are not reported. Meanwhile, a positive sing indicates habit persistence, a negative sing implies inventory depletion effects.

Data

The rice demand system to be estimated is on a per-capita basis, as mentioned before, since data in rice consumption are generally poorer than importation data, this paper used rice disappearance as consumption data. However, this is not unfamiliar with studies in food demand. The study uses annually data from 1971 to 1999. Rice disappearance data classified to five types (American rice, Pakistani rice, Indian rice, Rest of Asia rice, Rest of the world rice) are obtained from [11], while prices data are obtained from [11] and [12], while consumer price index and other data are obtained from [13].

Estimation and Results

To choose a suitably maintained framework within the issue of modeling consumer demand for rice in Saudi Arabia, the issues of the separability and structural change assumptions are examined.

Under the assumption of separability (the correct income measure in Saudi Arabia rice demand model is total expenditure on the items in the group rather than total expenditure on all goods), we compare between Model 1 and Model 2 and between Model 3 and Model 4. On the basis of R^2, the models using expenditure on rice explain a higher proportion of the variation in rice consumption than the models using total expenditure in all goods in 8 equations in Tables 1 and 2. Statistical properties of estimates were also to some points better with Models 1 and 3 compared to 2 and 4.

Table 1: Single equation estimates information for rice using Models 1 and 2

	Dependent variables: logarithms of quantities of									
	USA		PAK		IND		ROA		ROW	
	1	**2**	**1**	**2**	**1**	**2**	**1**	**2**		
	4 out of 8	6 out of 8	4 out of 8	1 out of 8	1 out of 8	3 out of 8	1 out of 8	6 out of 8	5 out of 8	
.87	0.53	0.76	0.56	0.48	0.48	0.44	0.33	0.73	0.65	
	0.44	0.163	0.301	2.40	2.33	0.50	0.61	0.34	0.433	
	1.20	1.43	1.4	1.87	1.93	2.20	2.27	1.3	1.1	
	49.60	68.21	35.70	4.7	5.0	21.1	17.07	8.3	5.8	

Notes: (1) Models labeled "1" correspond to Eq. 1 and models labeled "2" correspond to Eq.2.
(2) Parameters can be significant in either 5% or 10% significant level.
(3) USA (American rice), PAK (Pakistani rice), IND (Indian rice), ROA (Rice imported from the rest of Asia), and ROW (Rice imported from rest of the world).
(4) NSP: number of significant parameters; RMSE: residual mean of square error; and DW: Durban-Watson test.

There is some signification effect of changing the income specification on parameters estimate. Parameters were more significant in Models 1 and 3 compared to Models 2 and 4, however, expenditure may effect the performance of the model due to the higher correlation in some cases. The most striking of these is the significance of trends in the model. Trends are highly significant in all models using expenditure on rice

(Models 1 and 3) compared with six of the ten models using expenditure on all goods. Once again, rice from U.S.A., Pakistan, and India are outstanding, having significant positive trends regardless of the specification of the dependent variable and regardless of which income measure is used. Even though the model using expenditure on rice group performs better than total expenditure on all groups, the significance of trend could be taken to be evidence of structural change or of model misspecification as argued by [2].

Table 2. Single equation estimates information for rice using models 3 and 4

	Dependent variables: share of									
	USA		PAK		IND		ROA		ROW	
	3	**4**	**3**	**4**	**3**	**4**	**3**	**4**		
	6 out of 8	5 out of 8	5 out of 8	6 out of 8	4 out of 8	6 out of 8	5 out of 8	4 out of 8	1 out of 8	
	0.75	0.71	0.55	0.57	0.82	0.77	0.82	0.80	0.23	0.22
	0.01	0.004	0.004	0.01	0.01	0.003	0.003	0.0001	0.001	
	1.2	1.8	1.8	1.1	1.1	1.6	1.3			
	47.8	39.4	42	35	35.8	42.1	37	15.9	15.6	

Notes: See notes in Table 1.

The outcome of comparing Models 1 and 3 with Models 2 and 4 indicates that using expenditure on rice group as income variable performs better than using expenditure on all goods. The outcome satisfies one of two necessary conditions for weak separability. The second necessary condition in the model used above is that the parameters on logarithms of prices (b_{ij}) sum to zero.

Under an assumption of separability, the consumer price index ought to be irrelevant [14]. If this is so, the consumer price index in Models 1 and 3 represents an irrelevant variable, and the demand will not be restricted to be homogenous of degree zero in the rice prices and expenditure terms. To eliminate the consumer price index and impose homogeneity in Models 1 and 3, the additional restrictions are required:

$$\Sigma_j b_{ij} = 0$$

Models with this restriction imposed are referred to as Models 5 and 6 respectively. This plus the use of expenditure on rice as the income variable in these models, is consistent with weak separability.

In Table 3, it can be seen that the restriction that the b_{ij}'s sum to zero, in order for weak separability to be held, is not rejected in nine of the ten cases. Moreover, these results supporting the use of expenditure on rice as income variable, could not be sufficient. The misspecification of functional from would effect such results. As is our goal in this paper, it is encouraging to use expenditure on rice consumption in Saudi

Arabia as income variable in the suggested LA/AIDS model. [1]

The first-difference LA/AIDS model in (8) was estimated using the iterative seemingly unrelated regressions procedure available in ZHAZAM 6.0, which converges to the maximum likelihood estimation. The estimation strategy followed entails searching over all possible pairs of t_1, and t_2 (such that $t_1 \leq 1994$, $t_2 \geq 1976$ and $t_1 < t_2$) for the pair that maximizes the log likelihood function. The search yields an optimum value of $t_1 = 1980$ and $t_2 = 1990$. Upon estimation, however, autocorrelation was detected in the system.

Table 3. Tests of the parametric restriction implied by separability on models that include expenditure on rice

	Error sum of spuares			
Dependent var.	**Rice types**	**Restricted model (SSE_r)**	**Unrestricted model (SSE_u)**	**(F)**
Ln Q_i	USA	2.84	2.57	3.05
	PAK	4.14	3.42	6.11
	IND	54.05	50.55	2.02
	ROA	10.58	10.56	0.055
	ROW	8.39	7.06	5.46
S_i	USA	0.292	0.276	1.68
	PAK	0.089	0.067	9.57
	IND	0.330	0.261	7.67
	ROA	0.063	0.060	1.43
	ROW	0.995	0.980	0.444

Notes: (1) The restriction imposed in Model 1 and 3 is the parameters on the logarithms of price sum to zero ($\sum_i b_{ij} = 0$).

(2) The standard F test for parametric restriction is applied and the test statistic is computed as:

$$F = \frac{SSE_r - SSE_u}{SSE_u / 29} \approx F_{1.29} = (9.18)$$

The maximum likelihood estimates, conditional the optimum value of t_1 and t_2 weak separability assumption, and accounting for first-order autocorrelation using methods of [15], are given in Table 4 along with some summary statistics. The R^2 values indicate that the fit of the model is satisfactory. About 75% of the non-varying parameters and about 10% of the time-varying parameters are significant at either the 95% or 90% level.

The issue of structural change was tested using likelihood ratio test statistics. These computed values along with associated degrees of freedom and critical values at the 0.01 and 0.05 probability levels are given in Table 5. The hypothesis of no structural change in the complete parameters, price parameters, expenditure parameters or intercept parameters are all rejected at the 0.01 probability level. The above tests provide strong

[1] For further examination, an alternative test of the assumpiton of separability is to use (P) and (C) tests to compare these models.

indications of structural change in Saudi Arabia rice demand, and the estimated joint points suggest that the change began in 1981 and was completed in the end of 1990 (a transition period of almost 10 years) implying a very gradual structural change adjustment.

Thus, a constant set of parameters, as noted by [16], cannot be postulated to rationalize consumer behavior within the assumed model, which suggests some degree of structural change. Moreover, structural change effects demand in two ways. First, structural change effects quantity demand given that prices and expenditure are held constant. These affects can be measured by the bias of structural change and its effect on consumption patterns.

Table 4. Gradual switching LA/AIDS model of rice demand

	Equations				
Variable	**USA**	**PAK**	**IND**	**ROA**	**ROW**
Price of rice from	Non-varying				
USA	0.206 (3.79)				
PAK	-0.108 (-3.60)	0.050 (1.97)			
IND	-0.072 (-3.77)	0.0001 (0.16)	0.001(0.667)		
ROA	-0.302 (-7.81)	0.062 (2.76)	0.057 (4.24)	0.111 (2.29)	
ROW	0.276 (6.46)	-0.004 (-0.107)	0.006 (1.32)	0.072 (1.95)	-0.35 (1.98)
Exependiture	0.146 (5.98)	0.017 (1.96)	-0.024 (-1.92)	0.072 (4.51	-0.207 (-1.05)
Time-Varying					
Tn	0.160 (2.21)	-0.006 (-0.117)	0.009 (1.87)	-0.031 (-1.65)	0.132 (1.92)
Tn-USA	0.191 (2.92)				
Tn-PAK	0.092 (3.47)	-0.01 (-0.422)			
Tn-IND	-0.157 (-3.77)	-0.006 (-0.28)	0.093 (2.51)		
Tn-ROA	0.024 (1.06)	-0.043 (-3.03)	0.036 (2.10)	0.023 (1.21)	
Tn-ROW	-0.150 (-2.67)	-0.034 (-1.82)	0.034 (1.99)	-0.026 (-0.66)	0.176 (0.95)
Tn-Exependiture	-0.045 (-1.96)	-0.008 (-1.5)	-0.002 (-0.13)	0.015 (1.91)	0.04 (-2.73)
Budget share:					
Before 1981	0.49984	0.20639	0.04054	0.22096	0.03227
After 1990	0.18403	0.12275	0.58546	0.07336	0.03440
R^*	0.76	0.67	0.74	0.82	0.76
Log likelihood	177.4				

To illustrate this effect, suppose β_i measure the bias and can be calculated by subtracting budget share before structural change from budget share after structural change. Structural change will be biased against this good which would be implied by $\beta_i < 0$. At the bottom of Table 4, it can be seen that structural change was biased against U.S.A, and ROA rice and significantly in favor of rice demanded from IND, and ROW and neutral for rice from PAK.

Table 5. Results of likelihood-ratio tests for structural change

Hypothesis	LR-like test statistics	Degrees of freedom	$\chi^2_{0.01}$	$\chi^2_{0.05}$
No structural change in:				
1- All parameters	98.34	18	33.41	27.59
2- Price parameters	52.94	10	23.21	18.31
3-Expenditure parameters	25.18	4	11.34	7.81
4- Intercepts	24.68	4	11.34	7.81

Secondly, structural change has significantly effected demand elasticities. Tables 6 and 7 present demand elasticities for Saudi Arabia rice demand conditional on rice expenditure. The estimated price and expenditure elasticities with time transition paths are presented in Table 6. Except ROW, all the price elasticities are less than 1 in absolute value. ROW and PAK rice types are more price elastic demand than others. All own-price elasticities are of the expected sign except U.S.A, which is not significant. The own-price elasticities are relatively more elastic than the cross-price elasticities. Among the cross-price elasticities, only the price elasticities of substitution between Indian rice and Pakistani rice, and between Pakistani rice and American rice, are not significant. The signs of cross-price elasticities suggests U.S.A. and IND rice types and U.S.A. and ROA rice types and U.S.A. and ROA rice types are complementary relationships, while the resulting elasticities suggest substitution relationships between U.S.A. and ROW, IND and ROA, and ROW and IND rice types.

Table 6. Conditional eleasticiries with time transition path (time-varying)

Elasticities of Rice	Prices of USA	PAK	IND	ROA	ROW
USA	0.012	-0.103	-0.796*	-2.23*	4.20*
PAK	-0.098	-0.776*	-0.001	0.020	-0.155*
IND	-0.719*	-0.045	-0.591*	0.406*	1.94*
ROA	-0.819*	-0.206*	0.354*	-0.128*	1.56*
ROW	5.34*	0.083	0.242*	-0.179	-1.35*
Expenditure	1.28*	1.05*	0.891*	1.63*	0.660*

Note: (1) Calculated from Table 4 and Eqs.12, 13,and14.
(2) Stars indicate that the values are significant at either 90% or 95% significant level.
(3) In computing the standard errors, Chalfant [5] methods used by treating expenditure shares as constant

With regards to expenditure elasticities, all expenditure elasticities in time-varying model are significant. IND and ROW rice types portrayed as necessities goods while U.S.A, PAK and ROW rice types are characterized as luxury. Therefore, structural change has changed the magnitude of rice elasticities as given in Tables 6 and 7. While most rice types became less elastic demand, expenditure elasticities without structural change are larger than, except for ROA, these elasticities when structural changes are considered. Habit persistence found to be irrelevant and was not significant.

Table 7. Conditional eleasticiries without time transition path (non-varying)

Elasticities of Rice	Prices of USA	PAK	IND	ROA	ROW
USA	-0.569*	-0.612*	-0.226*	2.37*	7.92*
PAK	-0.379*	-0.749*	0.019	0.351*	0.783*
IND	-0.314*	-0.024	-0.932*	0.269*	1.42*
ROA	-0.904*	0.319*	0.222*	-0.269*	2.28*
ROW	5.06*	-0.360*	0.005	-0.026	-1.55*
Expenditure	1.41*	1.09*	0.90*	1.52*	0.86*

Note: (1) Calculated from Table 4 and Eqs.12, 13,and14.
(2) See notes in the bottom of Table 6.

Therefore, habit persistence variable suggests that this feature has no influence on consumer's budget share allocation for rice types. Compared with previous findings [1], on rice demand in Saudi Arabia (only IND, PAK, and USA can be compared) the estimated own-price Marshallian elasticities in the present study are smaller for all rice types before or after the 1990s. Accordingly, the expenditure elasticities are greater compared to the finding of [1] for all rice types considered in this study except for IND. These differences may be due to different aggregation schemes, time periods covered, model specification and econometric estimation techniques.

Conclusion

This paper has applied a method to investigate structural change in Saudi Arabia rice demand. Consumption of five rice types (American, Pakistani, Indian, Rest of Asia and Rest of the world rice) is analyzed using a modified linear approximate almost ideal demand system that includes separate time transition paths. The study strongly rejects the hypothesis of no structural change in Saudi Arabia rice demand. Instead, results suggest that a gradual change, starting in 1981 and completed in 1990, took place in the structure of Saudi Arabia rice demand. The structural change is found to have had a significant impact on estimated parameters and the resulting elasticities. The test of structural change shows that during the eighties consumer preference shift from U.S.A. and ROA, rice types to IND rice type. The shift was neutral towards PAK rice type. This suggests that consumers shift to more expensive and higher quality products. Furthermore, structural change has effect elasticities especially own-price elasticities. Rice types become less responsive to their own price if factors of structural change were considered. Estimated elasticities show that rice from USA, and ROA are strong complements while there are substitution relationships between U.S.A. and ROW, IND and ROA and ROW and IND rice types. U.S.A, PAK, and ROW rice types are portrayed as luxury goods while IND and ROA rice types are characterized as necessities. Evidence of a changing structure of rice demand has important implications for econometric policy analysis and forecasting. Therefore dealing with time series data in demand analysis may not be accurate unless structural change be examined. Parameters, therefore, describing consumption of rice before 1981 and between 1981

and 1990 may not describe consumer behavior after 1990 the demand of rice in Saudi Arabia.

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الطلب على الأرز في المملكة العربية السعودية: الانفصالية والتغير الهيكلي

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لخص البحث. يستهدف هذا البحث دراسة الطلب على الأرز في المملكة العربية السعودية باستخدام نموذج التغير التدريجي في المعادلة الخطية من نظام (الإيدز) حيث تم تحديد طبيعة العوامل المؤثرة في الطلب على الأرز خلال الفترة من ١٩٧١-١٩٩٩م. المعادلات المقدرة أثبتت وجود تغير تركيبي تدريجي في الطلب على الأرز استغرق عشرة سنوات (١٩٨١-١٩٩٠م). هذا التغير في تركيبة الطلب أثر على القيم المقدرة في معادلة الطلب وكذلك المرونات المشتقة بحيث أصبحت معظم أنواع الأرز المستهلكة ذات طلب أقل مرونة واستجابة للتغير في السعر رغم عدم ثبوت معنوية العادة المتأصلة في الطلب على هذه الأنواع من الأرز في السوق السعودية. التغير التركيبي والتدريجي في الطلب على أنواع الأرز المطلوبة أثر على الكميات المستوردة من بعض الأنواع المتاحة، حيث كان هذا التغير منحازاً ضد الأرز الأمريكي والأرز المستورد من بعض الدول الأسيوية وطبيعي تجاه الأرز المستورد من باكستان وفي مصلحة الأرز المستورد من الهند وبقية دول العالم كاستراليا ومصر وغيرها.

وأخيراً في ظل المعاملات المقدرة والمرونات المشتقة وجد أن الأرز المستورد من بقية دول العالم يتميز بطلب مرن بوجود التغير الهيكلي التدريجي في الطلب كما أنه يتميز بمرونة إنفاق منخفضة نسبيا مقارنة بالأنواع الأخرى من

الأرز في السوق السعودية وبالتالي فإن حدوث أي ارتفاع في أسعار واردات هذا النوع سوف يكون مردودة سلبياً في الطلب الاستهلاكي مما يجعل المستهلك يتجه نحو الطلب على الأرز الهندي الذى وجد أنه سلعة منافسة لهذا النوع. أنواع الأرز المتوفرة في السوق السعودية وجد أنها تتمتع بمرونة إنفاق عالية نسبياً مما يدل على أنها سلع كمالية عدا الأرز الهندي والأرز المستورد من بقية دول العالم حيث تصنف بأنها سلع ضرورية.

وجود التغير الهيكلي التدريجي في الطلب على الأرز في المملكة العربية السعودية وكذلك اختلاف المعاملات المقدرة خلال الفترة الزمنية التي تسبق هذا التغير (١٩٧١-١٩٨٠م) مقارنة بقيمة هذه المعاملات والمرونات المشتقة منها بعد اكتمال التغير الهيكلي في الطلب على الأرز (١٩٩١-١٩٩٩م) يفرض على الباحثين خصوصاً فيما يتعلق بالتنبؤات السوقية والأمن الغذائي مراعاة هذا التغير والفترات الزمنية التي تتميز بطلب ثابت وكذلك مراعاة خصائص ومميزات كل فترة على حدة وذلك بغرض الوصول إلى تقديرات صحيحة وبالتالي بناء سياسات تجارية أو اجتماعية رشيدة.