Estimation of Supply and Demand Models for Chicken Meat in Turkey

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Abstract

*Chicken meat supply and demand models were estimated to determine the factors affecting the quantities supplied and demanded by using the time series data of **1983-1998** period, when Turkey's economy was in transition to free market. According to supply and demand models that were estimated, it has been determined that producer price of beef and chicken meat affect chicken meat production. On the other hand, the population growth and consumer price for mutton affected the consumption of chicken meat. Supply elasticity was determined to be greater than that of demand. It is concluded that chicken meat producers are more responsive to the price changes than consumers.*

Key words:Chicken meat, estimation of demand and supply models, Turkey

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Introduction

In Turkey especially after 1980, the developments in the area of poultry production has been more than in other areas of agriculture (Bayaner, 1999; Kızıloğlu at al., 2000). Accordingly, chicken meat production which was 72.7 thousand tons in 1980 has risen to 486.0 thousand tons in 1998. Chicken meat consumption which was 70.3 thousand tons in 1980 has risen to 479.5 thousand tons in 1998 (Anonymous, 2002). It is possible to attribute this development to structural changes in productivity, production techniques and marketing organization. The increase in the consumption, on the other hand, can be attributed to relative changes in the price, increase in the income, increase in the consumption of food outside the house (restaurants, cafeteria), the change of the taste and preference of the army and other institutions (under the influence of the advertisements) (Koç, 1998). But this development can not be made use of to the fullest extent because of the limitations in the internal and external demand and production potential and other reasons (Anonymous, 2001). This condition prevents the efficient use of production resources and further developments in the sector. Therefore it is important to determine why the producers can not benefit fully from these developments.

The objective of this study is to determine the important factors that effect the chicken meat production and consumption in 16 years between 1983 when market economy was implemented, and 1998 and thus provide data for policy makers.

Material and Method

The data covering the years 1983-1998 were considered (Anonymous a, 1983; 1998 - Anonymous b, 1983; 1998). The reason why 1983 was chosen as a starting year is that from that year on a liberal economic system was adopted. The main material of the study came from Internet Web Page of FAO (Anonymous, 2002) and computer records of the State Instituted of Statistic (Anonymous, 1999).

The developments over the years regarding chicken meat were indicated by using the least X^2 method. Shazam Computer program was used.

The series were tried separately on linear, double logarithmic and half logarithmic models. In the analysis double logarithmic models have the largest correlation coefficient and smallest standard deviation, as well as the highest reliability were used. Durbin-Watson test was used to determine if there is a problem autocorrelation and corrections were made accordingly.

Estimated model for chicken meat supply function was as follows:

$$\text{LogCP} = \alpha + \beta_1 \text{logCPP} + \beta_2 \text{logBPP} + \beta_3 \text{logMPP} + \in$$

α : Constant

CP : Chicken meat production (mt)

CPP : Chicken meat producer's price ($/mt)

BPP : Beef producer's price ($/mt)

MPP : Mutton producer's price ($/mt)

$\in$: Error term

The effects of independent variables on supply function have been taken into consideration while formulating the models related to supply function. The number of chicken slaughtered and productive variables are the functions of chicken meat and do not show fluctuations over the years. Therefore these were not included as independent variables in the model.

Estimated model for chicken meat demand function was as follows:

$$\text{LogCC} = \alpha + \beta_1 \text{logCCP} + \beta_2 \text{logBCP} + \beta_3 \text{logMCP} + \beta_4 \text{logI} + \beta_5 \text{logP} + \beta_6 \text{D1} + \in$$

α : Constant

CC : Chicken meat consumption (mt) (production + import – export).

CCP : Chicken meat consumer's price ($/mt)

BCP : Beef consumer's price ($/mt)

MCP : Mutton consumer's price ($/mt)

I : Annual income ($ /per capita)

P : Population (per) (population has been taken into consideration).

D1 : Dummy variable

$\in$: Error term

The effects of independent variables on demand function have been taken into consideration while formulating the models related to demand function. It was assumed that the production was turned into consumption because there was no stock. In double logarithmic model, logarithms of both sides are taken. In this case, β (independent variable) coefficients are elasticity value at the same time (Yavuz, 2001).

Results and Discussions

The statistical results of estimated model for supply function related to chicken meat has been given in Table 1.

Table 1. Results of regression analysis related to chicken meat supply function

	r^2: 0.93	n:16	t_t :2.18	F_t : 3.49	SD : 0.07
Variable	α	CPP		BPP	MPP
Estimated Coefficient	-14.706	0.377		– 0.489	2.594
SD	2.855	0.154		0.166	0.329
t_c	-	2.45*		2.94*	7.88*
F_c			54.219*		

t_c : calculated value of t t_t : table value of t F_c: calculated value of F F_t: table value of F
SD: standard deviation

According to the results of the estimated supply model, the direction of the independent variables of producer's prices for chicken meat and beef have been as expected. The direction of the producer price for mutton as an independent variable has been contrary to expectation. There for this result has been in contradiction to the theory. The use of time series data may sometimes result in a conclusion that is contrary to economic theory (Yavuz, 2001).

According to the F test ($F_c>F_t$) the model estimated for supply function, has been found to be significant at 5% level. All of the independent variables were found to be significant ($t_c>t_t$) at 5% level. According to the results, it can be said that the producer price of chicken meat and beef had an effect on the production of chicken meat.

Since chicken meat is produced intensively, the prices affected on production substantially. In production for the market, the decision to produce or not should be given according to market prices. Thus, it can be said that the results from the model are satisfying.

The statistical results of estimated model for demand function of chicken meat has been given in Table 2.

Table 2. Results of regression analysis related to chicken meat demand function

	r^2: 0.93	n:16	t_t :2.26	F_t : 3.37	SD : 0.08		
Variable	α	CCP	BCP	MCP	I	P	D1
Estimated Coefficient	10.722	-0.030	0.001	0.000002	-0.023	0.305	0.018
SD	3.230	0.023	0.024	0.000007	1.107	0.115	0.031
t_c	-	1.33	0.05	2.42*	0.02	2.67*	0.58
F_c	12.916*						

t_c : calculated value of t t_t : table value of t F_c: calculated value of F F_t: table value of F
SD: standard deviation

According to the results of the estimated demand function, the direction of independent variables of D1 (advertisement), population, consumer price for mutton, consumer price for beef and consumer price for chicken meat have been as expected. The sign of the independent variable of per capita income has not been in the expected direction. In this condition, it has been observed that, as the income rises, people are inclined towards buying more expensive and luxurious kinds of meat.

According to the F test ($F_c>F_t$) the model estimated for demand function, has been found to be significant at 5% level. The asterisks (*) of the independent variables were found to be significant ($t_c>t_t$) at 5% level. According to the results, it can be said that the consumer price of mutton and population had an effect on the consumption of chicken meat.

Chicken meat consumption has been in line with the increase of production. According to the data, population of Turkey increased by 32.6 percent in the period of 1983-1998, While chicken meat consumption increased by 54.6 percent (Anonymous, 2002). This figures suggest that preferences has changed toward chicken meat consumption. Increase in the prices of substitute meats contributed this change in preferences. Therefore, it can be said that the results from the model are satisfying.

According to the supply and demand functions for chicken meat, supply elasticity is 0.377 and demand elasticity is 0.030. At this point, it can be said that chicken meat producers are more responsive than consumers to the changes in the prices.

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