

**EE 325 Take home quiz 4 ☺ (Total 10 points) Answer**

1. The demand for chicken in the United States, 1960-1982. To study the per capita consumption of chicken in the United States, you are given the data in **Table 7.9**, Where  $Y_t$  = per capita consumption of chickens, lb

$X_{2t}$  = real disposable income per capita, \$

$X_{3t}$  = real retail price of chicken per lb, cents

$X_{4t}$  = real retail price of pork per lb, cents

$X_{5t}$  = real retail price of beef per lb, cents

$X_{6t}$  = composite real price of chicken substitutes per lb, cents, which is a weighted average of the real retail prices per lb of pork and beef, the weights being the relative consumptions of beef and pork in total beef and pork consumption

Now consider the following demand functions:

$$(1) \ln Y_t = \alpha_1 + \alpha_2 \ln X_{2t} + \alpha_3 \ln X_{3t} + u_t$$

$$(2) \ln Y_t = \gamma_1 + \gamma_2 \ln X_{2t} + \gamma_3 \ln X_{3t} + \gamma_4 \ln X_{4t} + u_t$$

$$(3) \ln Y_t = \lambda_1 + \lambda_2 \ln X_{2t} + \lambda_3 \ln X_{3t} + \lambda_4 \ln X_{5t} + u_t$$

$$(4) \ln Y_t = \theta_1 + \theta_2 \ln X_{2t} + \theta_3 \ln X_{3t} + \theta_4 \ln X_{4t} + \theta_5 \ln X_{5t} + u_t$$

$$(5) \ln Y_t = \beta_1 + \beta_2 \ln X_{2t} + \beta_3 \ln X_{3t} + \beta_4 \ln X_{6t} + u_t$$

From the microeconomic theory it is known that the demand for a commodity generally depends on the real income of the consumer, the real price of the commodity, and the real prices of competing or complementary commodities. In view of these considerations, answer the following questions.

- a. (2 points) Which demand function among the ones gives here would you choose and why?

**Model (5) seems to be the best as it includes all the economically relevant variables, including the composite real price of chicken substitutes, which should help alleviate the multicollinearity problem that may exist in model (4) between the price of beef and price of pork. Model (1) contains no substitute good information, and models (2) and (3) have limited substitute good information.**

- b. (2 points) How would you interpret the coefficients of  $\ln X_{2t}$  and  $\ln X_{3t}$  in these model?

**The coefficient of  $\ln X_2$  represents income elasticity; the coefficient of  $\ln X_3$  represents own-price elasticity.**

c. (2 points) Are pork and/or beef competing or substitute products to chicken?

How do you know?

They should be substitute goods because they compete with chicken as a food consumption product.

d. (4 points) Assume function (5) is the “correct” demand function. Estimate the parameters of this model, obtain their standard error, and  $R^2$ , and  $\bar{R}^2$ . Interpret your results.

Source	SS	df	MS			
Model	.759492836	3	.253164279	Number of obs =	23	
Residual	.015260254	19	.000803171	F( 3, 19) =	315.21	
Total	.77475309	22	.03521605	Prob > F =	0.0000	
				R-squared =	0.9803	
				Adj R-squared =	0.9772	
				Root MSE =	.02834	

  

ln y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln x2	.4812864	.0681879	7.06	0.000	.3385675	.6240053
ln x3	-.3506282	.0793939	-4.42	0.000	-.5168016	-.1844548
ln x6	-.0610352	.1299604	-0.47	0.644	-.3330454	.2109751
_cons	2.029865	.1186822	17.10	0.000	1.78146	2.27827

The income elasticity and own-price elasticity have the correct signs.

The coefficient of ln X<sub>2</sub> represents income elasticity; the coefficient of ln X<sub>3</sub> represents own-price elasticity.