Food Policy 43 (2013) 267–277

Contents lists available at ScienceDirect

Food Policy

journal homepage: www.elsevier.com/locate/foodpol

Household food demand in Turkey: A two-step demand system approach

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ARTICLE INFO

Article history:
Received 3 October 2012
Received in revised form 23 August 2013
Accepted 3 September 2013

Keywords:
Bootstrap
Censoring
Food demand
LAIDS
Turkey

ABSTRACT

Demands for sixteen food products are investigated, using data from the Turkish Household Expenditure Survey. The linear approximate almost ideal demand system (LAIDS) is estimated with Shonkwiler and Yen's two-step procedure. All own-price elasticities are negative and expenditure elasticities positive. Bread, other cereals, bovine, mutton, giblets, and cheese have high expenditure elasticities. Mutton, bovine, and several other protein-rich products are price elastic. Results suggest a mix of gross substitutes and complements, while net substitution is the dominant pattern. Demographic characteristics also play important roles in shaping food demand. The elasticity estimates can inform policy deliberations.

Introduction

Household expenditures in Turkey have experienced significant structural changes in the last few decades. Statistics released by the Turkish Statistical Institute (TUIK) suggest consumption of staple food groups that previously was stable has been on a steady decline for decades (TUIK, 2011). As Turkey has experienced an impressive economic growth since 2002 with a 6.8% average annual rate of per-capita GDP growth (IMF, 2009), food expenditure including non-alcoholic beverages as a percentage of total household spending continued to shrink from 26.7% in 2002 to 21.7% in 2011. Percentage of expenditure on transportation has soared, while modest increases are seen in restaurant/hotels and entertainment/culture and modest decrease in health, over the last decade (TUIK, 2011). Despite these changes, the proportion of food expenditure remains nearly twice as large as that of the European Union (EU) countries (12.70%) (TUIK, 2011) (Table 1).

Between the periods of 1990–1992 and 2006–2008 in Turkey, daily dietary energy supplies (DES) declined slightly from 3590 kcal to 3500 kcal and per capita protein intake from 104.9 g to 99 g, while daily per capita animal protein and fat intakes became an indispensable part of Turkish diet, increasing from 25.7 g to 26.2 g and 89.4 g to 103.1 g, respectively (FAO, 2011). Average daily per capita DES intake fell even further to a hearty 3482 kcal and the average percentage of protein intake was 11% in 2011, while 12% of children suffered from malnourishment and stunts in their growth (FAO, 2011).

Annual per capita red meat consumption in Turkey fell from 8.19 kg in 2007, to 6.78 kg in 2008 and 5.73 kg in 2009 (TUIK, 2010). This decline was due mostly to the fact that price of meat more than doubled in the last three years and continued to rise despite government claims of no shortages. On a per capita basis, consumption of red meat in Turkey is about one-fifth of the EU average, while consumption of mutton (sheep) meat exceeds that of the EU level (Bilgic and Yen, 2013). On the other hand, consumption of poultry meat increased rapidly, by 171%, from 3.8 kg in 1990 to 14.1 kg per capita in 2005, with an average growth rate of 17.5% per year, exceeding that of red meat (Yalcin, 2006). In spite of the significant increase due mostly to increasing red meat prices, consumption of poultry has fallen behind the goals of the 27 EU member countries (EU27), averaging 15.8 kg per person. Also, annual per capita consumption of dairy products amounts to 121–125 kg which is very low compared to that in EU countries such as Finland (183.9 kg), Sweden (145.5 kg), and Ireland (129.8 kg) in 2006 (International Dairy Federation, 2007). Overall, meat, fish, fruit, and vegetable consumption was estimated to soar from 21.3, 7.0, 105.2 and 226.3 kg per head in 2004 to 24.6, 7.4, 114.0, and 233.2 kg per head in 2013, respectively, whilst milk consumption was estimated to increase from 126.6 l in 2004 to 140.8 l per head in 2013 (Deloitte, 2010). The main reasons for increasing consumption in foodstuffs are rising income and changing consumption patterns that have made the Turkish consumers increasingly demanding, driven by the vast array of product choices offered by mass grocery retail outlets throughout the

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0306-9192/$ - see front matter © 2013 Published by Elsevier Ltd.
http://dx.doi.org/10.1016/j.foodpol.2013.09.004

Table 1
Food and non-food expenditures as percentages of total household expenditure in Turkey, 1994–2011. *Source*: TUIK (2011) and EUROSTAT (2010).

Survey year	Food and non-alcoholic beverages	Alcoholic beverages, cigarette and tobacco	Clothing and footwear	Housing and rent	Furniture, houses, appliances and home care services	Health	Transportation	Communication	Entertainment and culture	Educational services	Restaurant and hotels	Various goods and services
1994	31.10	–	9.70	25.80	9.40	2.80	9.30	–	3.00	1.62	3.10	4.40
2002	26.67	4.06	6.27	27.33	7.29	2.33	8.70	4.53	2.47	1.33	4.44	4.60
2003	27.48	4.14	6.25	28.29	5.73	2.23	9.76	4.30	2.20	1.96	4.14	3.53
2004	26.42	4.33	6.52	26.99	6.62	2.24	9.46	4.48	2.46	2.09	4.49	3.91
2005	24.88	4.14	6.21	25.91	6.78	2.24	12.61	4.32	2.54	1.87	4.38	4.12
2006	24.79	4.07	5.87	27.17	6.20	2.18	13.09	4.18	2.18	2.13	4.15	3.99
2007	23.64	4.33	5.90	28.91	5.88	2.37	11.11	4.52	2.09	2.51	4.53	4.21
2008	22.64	3.84	5.40	29.06	5.79	1.90	14.07	4.37	2.50	1.96	4.38	4.10
2009	23.00	4.09	5.07	28.24	6.16	1.91	13.59	4.23	2.62	1.88	5.16	4.05
2010	21.85	4.49	5.05	27.12	6.25	2.12	15.07	4.09	2.77	2.04	5.42	3.74
2011	21.72	4.14	5.17	25.81	6.35	1.89	17.24	4.01	2.70	1.99	5.71	4.26
EU 2010	12.70	3.50	5.70	21.90	6.20	3.40	13.60	2.70	9.40	1.00	9.00	10.80

country, with 40% retail share or $47.9 million in sales, which will continue to remain a center of attraction for domestic and foreign investors (Bilgic and Yen, 2013). Contrary to common expectation that more nutritious foods are demanded as the economy develops, grains (primarily wheat) still dominate daily energy intake in Turkish diet. The main staples of Turkish diet are bread, macaroni, and bulgur (parboiled pounded wheat), with about 48% and 58% of daily energy coming from bread or bread with other cereals, respectively (FAO, 2001). In parallel, the recommended daily intakes of energy and other nutrients are fulfilled with average diet in Turkey, while failing to meet key daily nutritional intake requirements such as animal protein, calcium, vitamins A, B6, E, and riboflavin (Pekcan, 2006). Although Food Balance Sheets of the United Nations' Food and Agriculture Organization (FAO) show that the Turkish people appeared to be well nourished and meeting the recommended daily allowances, misdistribution of food and quality are not reflected in food balance sheets among people across the country (FAO, 2001; Pekcan, 2006).

Exploring the structure of food demand in Turkey and the major changes taking place is an important task domestically, as a solid understanding of food demand derived from the compound effects of economic and demographic factors allow food manufacturers, various intermediaries, farmers, and government agencies to understand a more organized pattern of production and respond to needs timely.[1] Understanding food demand in Turkey is also important internationally, given Turkey's EU accession. In this context, it is important to compare estimates with those of EU and the world to form more robust food policies for the country (Lambert et al., 2006).[2] Estimates of demand elasticities for staple foods also allow prediction of future demand for food products under different scenarios of prices and income changes and can inform food policy deliberation (Kumar et al., 2011), such as design of commodity-specific taxation and subsidy schemes to achieve desirable welfare impacts (Alfonzo and Peterson, 2006; Menezes et al., 2008) and to reduce the nutritional gap between the poor and the rich.

Recent studies have estimated price and income elasticities in Turkey, for groups of staple food products such as cereals, pulses, meats, dairy, animal fats, oils, vegetables and fruits, and tea (Sengul and Tuncer, 2005; Akbay et al., 2007; Tekgüç, 2012). Additional studies have estimated elasticities for narrowly defined commodity groups such as packed and unpacked milk, and red, white, and fish meat products (Pazarlioğlu et al., 2007; Akbay and Tiryaki, 2008; Armagan and Akbay, 2008; Günden et al., 2011). Microdata were used in all these studies and many of these analyses were based on a two-step estimation procedure to address censoring (i.e., observed zeros) in expenditures. As is well known, two-step estimation complicates statistical inference because standard errors of empirical estimates derived from conventional procedure are incorrect.

This study differs from earlier studies of Turkish food demand in a few aspects. First, we consider a large system of 16 food products at a very disaggregate level—the first of its kind for Turkey. These disaggregate elasticities provide policymakers with the information to stabilize adequate responses at local, regional and international levels as new food driving forces have undergone rapid and

[1] A vast array of shopping centers, supermarkets, hypermarkets and restaurants including fast-food markets has emerged, generating approximately one fourth of total sales in the Turkish food distribution sector of approximately €65.8 million. The number of food service establishments has also increased substantially as the economy grows and per-capita income increases in the country. In parallel, along with rapid urbanization women's increasing participation in the labor force have started diverting the dietary patterns across the nation toward more processed and prepared foods due to long working hours and less physical activity similar to those encountered in Western countries.

[2] Turkey has recently undergone a supply problem of bovine meat production that causes an incredible increase in prices which needs special attention pertaining to investment, inventory and policy decisions.