E C O N O M I C S B U L L E T I N

Consumer responses to the H5N1 Avian Influenza: the case of Turkey

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Abstract

Using the case of the 2005-2006 Avian Influenza crisis also experienced in Turkey, we present its impacts on consumers' concerns on the pandemic. Based on our cross-sectional dataset derived from a household survey, results from our probit estimations imply that the negative impact of the pandemic on the poultry sector could have been alleviated by informing consumers about it. Frequent users, older consumers, and females are derived to be more concerned about the pandemic. Campaigns, especially through the efficient use of media channels, can target to minimize demand shocks and help poultry demand return to pre-outbreak levels. Using these results, policies can be designed to decrease the negative impacts of future food scares.

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1. Introduction

In recent years, there has been growing concern about food safety as a consequence of food scares, such as the outbreak of Bovine Spongiform Encephalopathy (BSE), commonly known as "mad-cow" disease, or the contamination of hamburgers and apple juice with the E. coli O157:H7 bacterium. One of these scares is the case of Avian Influenza (AI). AI, popularly known as bird flu, is a highly contagious viral disease of birds, caused by type A strains of the influenza virus. In general, human infection with these viruses has resulted in mild symptoms and very little severe illness, with one notable exception: the highly pathogenic H5N1 virus, which has caused by far the greatest number of fatalities in humans.

The first reported case of the H5N1 virus in Turkey was on October 2005. This first outbreak was quickly contained with no signs of transmission to humans. However, later in January 2006, a second widespread outbreak occurred, starting in Northeastern Turkey. In total, 21 human cases of AI with four deaths were reported by the WHO (WHO, 2006). On August 2006, it was announced that Turkey was cleared from the AI based on the OIE Animal Terrestrial Code classifications. However, this was not a complete end to the story, since at the beginning of 2007 further cases of AI were once more detected in poultry. Turkey is on the migratory routes of wild birds and the AI outbreak is likely to repeat itself.

The annual size of the Turkish poultry sector is estimated to be around three billion USD with an employment figure, including those in related sectors, of 500,000 people. Whereas in 2005 around 967,900 tons of poultry meat was consumed in Turkey, the production in 2006 amounted to almost one million tons. In 2005, the average per capita consumption of red meat (bovine, sheep and goat) in Turkey was 8.9 kg, and the fish per capita consumption in the same year was 6.9 kg. Regarding poultry consumption, in 2006, per capita poultry consumption in Turkey was equal to 13.8 kg (Besd-Bir, 2007). Within two weeks of the outbreak, the consumption of poultry in Turkey (roughly 1.2 kilogram per capita per month before the crisis) dropped by 50 percent. Retail poultry prices fell almost by 20 percent (EU, 2006; Sarnıç, 2006). As a result of the outbreak, the poultry and egg sectors incurred losses of roughly 0.9 million USD per day within the October-December 2005 period (Besd-Bir, 2006; EU, 2006). Regarding the impact of AI on poultry sales, in 2006, first quarter sales amounted to 174,310 tons, which was 55,000 tons lower than sales in 2005, and 25,000 tons fewer than sales in 2004 (Besd-Bir, 2007). In November 2005, real retail and wholesale poultry prices reached their lowest levels since the beginning of 2003. Only starting in March 2006, the sector started to observe signs of recovery.

2. Data and variables

The dataset used in this research comes from a household survey constructed for this study. The survey was conducted in November. The survey was carried out based on the regional statistical information provided by the Turkish Statistical Institute at NUTS1 (The Nomenclature of Territorial Units for Statistics) level. This information relies on the 2000 census of population for both rural and urban areas in Turkey. The surveys are done in 12 provinces selected representing the 12 regions of Turkey. In total, 994 surveys on randomly selected households were completed. We excluded those respondents who never eat chicken (for other reasons than AI) from our analysis. Therefore, the final sample size was 961 households.

Following variables are used in the regression below.

- *Concern*: An important question while dealing with consumer responses to food scare is their level of concern on it. Influencing demand over tastes and preferences, consumer's concern is one of the key determinants of consumption decisions (Schupp *et al*., 2003). Getting correct and complete information on food safety is crucial to prevent demand shocks. Rimal *et al*. (2001) report that consumers who are aware of causes of food scare and its precautions are not too concerned and less likely to take additional safety measures.

The question we asked the consumer was "Are you concerned that you or a family member may get infected by the AI virus if a scare occurs?" This dummy variable is equal to 1 if the respondent has a level of "high concern" about avian influenza, 0 in case of "low concern," where "high concern" includes "very concerned" and "concerned" responses, and "low concern" includes "somewhat concerned" and "no concern" responses.

- *Knowledge*: According to WHO (2007), it is not possible to catch AI from food cooked appropriately. By employing this variable, which is influential on demand for poultry during the times of food scare, we want to make inferences on the knowledge level of respondents about the relationship between eating poultry and the AI transmission. Our expectation is that consumers' awareness about transmission mechanisms of the AI virus might decrease their *concerns*.

This dummy variable takes the value 1 if the respondent answers the question "Can AI be transmitted through cooked poultry meat?" correctly.

- *Frequency*: Tastes and preferences of the consumers were represented by this variable, since it carries the behavioral decisions of the consumers. Related with consumption decisions, on the one hand, heavy eaters of poultry are expected to be less concerned due to being more informed or not regarding the incidents as significant (Schupp *et al*., 2003). On the other hand, consumers who do not buy poultry frequently are also more likely to decrease their consumption once the news on the virus reaches the market (Verbeke *et al*., 2000).

We asked three questions to analyze the frequency of poultry consumption of the consumers. *Freq1* takes the value 1 if the respondent eats poultry meat less than once a week, *Freq2* takes the value 1 if the respondent eats poultry once a week, and *Freq3* takes the value 1 if the respondent eats poultry more than once a week.

- *Income*: Income is another important determinant of consumption. Knight and Warland (2004) note that studies demonstrated that people with higher incomes are less concerned about food safety issues than those with lower incomes (such as Byrne *et al*., 1991; Nayga, 1996; and Pilisuk *et al*. 1987). This may be attributed to substitution effects, since it will be easier for high income consumers to switch to alternative meats from poultry.

We use the concept of equalized income calculated over the number of households for each observation. *Income1* is equal to 1 if the respondent's monthly equalized income is less than 240 YTL (equivalent of $166), *Income2* is equal to 1 if the respondent's monthly income ranges between 240-463 YTL ($166-$319), *Income3* is equal to 1 if the respondent's monthly income is greater than 463 YTL.

- *Age* is a continuous variable on the age of the respondent. This variable may have different effects based on the criteria measured. Younger consumers are expected to be more influenced by negative news in the media, but they are also more aware of food safety due to eating out often (Caswell and Joseph, 2006; Schupp *et al*., 2003). However, with increasing age, meat consumption is also expected to decrease (Verbeke *et al*., 2000), so we can anticipate that older consumers will be less concerned of getting infected.
- *Education* is the years of formal schooling attained by the respondent. We have differing results on this variable in the literature. Educated consumers may be more likely to be concerned about food safety, while at the same time it can be easier for them to access information on the food scare (Caswell and Joseph, 2006; Latouche *et al*., 1998). Whereas findings point out to decreasing meat consumption with increasing education (Verbeke *et al*.,

2000), recent research also shows evidence of no correlation between higher education and higher food safety knowledge (Schupp *et al*., 2003).

- *Location* is a binary variable equal to 1 if the respondent lives in an urban area, 0 if the respondent lives in a rural area. We classify the location as rural if the household lives in a village or town.
- *Gender* is a binary variable equal to 1 if the respondent is female. Research shows that females are expected to be more concerned with food safety problems than males (Altekruse *et al*., 1995; Herrman *et al*., 1997; Knight and Warland 2004).
- *Health* is another variable that we used to describe the respondents' health status. It is hypothesized that those consumers who are in good health are concerned about food safety and adjust their consumption patterns in a consistent way (Rimal *et al*., 2001). This binary variable is equal to 1 if the respondent reveals that he/she is in excellent or good health condition, equal to 0 otherwise.

Consumers' concerns and perceptions of safety may depend on the amount of confidence and trust they place on the opinions of institutions like the government, media, and doctors. Information received from different sources will influence consumption behavior and directly affect people's *concern* level on the food scare (Rimal *et al*., 2001).

- *Government agencies:* The government's role of regulating risk is closely related with communicating risks to consumers in an effective manner, and hence, it helps to decrease the level of information asymmetry that consumers may suffer from (Lobb, 2004; Loureiro and Umberger, 2007). Assigning such a role to the government is proposed to be true for both higher and lower income countries (Caswell and Joseph, 2006).

ConfGov is a variable equal to 1 if the respondent trusts the accuracy of AI information provided by government agencies.

- *Health professionals: ConfHealth* is equal to 1 if the respondent trusts the accuracy of AI information provided by health professionals.
- *Media:* It is hypothesized that media tends to sensationalize food safety hazards, hence, inclusion of this variable will control for potential impacts and especially volume and speed of coverage of the incidents in the media on consumption behavior. Following a food scare, especially the short-term decreases in demand are attributed to excess media coverage (Lobb, 2004, Böcker and Hanf, 2000; Verbeke *et al*., 2000).

ConfMedia is equal to 1 if the respondent trusts the accuracy of AI information provided by the media (for the variables *ConfGov, ConfHealth,* and *ConfMedia*; the variable is equal to 1 if the respondent gives "trust completely" and "trust somewhat" responses, while the variable is equal to 0 if the respondent answers "low trust" and "no trust").

The summary statistics presented in Table 1 show that the respondents in our sample are on average 39 years old, 51 percent of them are female, and they have on average 7.6 years of schooling with four household members. Thirty-eight percent of the respondents have a monthly equalized income less than 240 YTL ($166), 32 percent between 240-463 YTL ($166-$319), and 31 percent more than 463 YTL ($319). Among the respondents, 25 percent say they eat poultry less than once a week, 45 percent once a week, and 30 percent more than once a week. Sixty-eight percent of the respondents live in an urban area. Among the consumers, 76 percent trust information revealed by government agencies, while 52 percent trust media outlets and 94 percent trust health professionals. Sixty percent state that they are in excellent or good health conditions. Sixty-two percent of respondents said they know that the AI would not be transmitted if poultry meat was appropriately cooked. Regarding the consumers' concern on the AI, 68 percent reveal that they were either concerned or very concerned with the epidemic.

3. Model used and results

To understand consumer behavior during the times of the food scare, we investigate the factors that may have an effect on the consumers' concerns about the AI. The model with a binary dependent variable formulated below can be estimated with a probit or logit estimation. The *Concern* equation is formed as:

$$Concern = f(Knowledge, Age, Gender, Education, Income2, Income3, Freq2, Freq3, Location, ConfGov, ConfHealth, ConfMedia, Health) + \varepsilon_1. \quad (1)$$

After running the regression, by looking at the marginal effects presented in Table 2, we see that several factors significantly affect consumers' *concerns* about the AI virus and its possible consequences on their health. Based on the estimate of *knowledge* we observe that (consistent with our expectation) consumers, who were aware of the fact that the AI virus was not transmitted through appropriately cooked food, are less likely to be concerned that they might be affected by the virus. This implies that poultry consumers who learn about the way the virus is transmitted know that, once they take the precautions, they will not be infected by the virus.

We also derive that frequent poultry eaters are more likely to be concerned. Even though we expected that frequent consumers would have collected information on the virus transmission mechanism, they are still concerned about being infected.

Estimated coefficients also point out that those respondents who have confidence on the comments and coverage of the AI in the media are more concerned. On this point, one explanation might be that people learn from media sources, but excess exposure to the news on the issue in the media also raises their level of concern. When a food scare occurs, trust in information provided by the media amplifies the negative effects (Mazzochi *et al*., 2004). Similarly, previous research also indicates that especially negative news had more impact on the consumers than positive news (Böcker and Hanf, 2000). On the other hand, confidence on government agencies and health professionals do not have a significant effect on *concern*.

We also observe that older consumers are less concerned about the AI. Expecting that younger people consume meat more and follow media more frequently, they would be more likely to be concerned about infection. Our estimation also shows that females are more concerned compared to males, which is another expected result, since females are more involved in cooking and preparing food.

Regarding the statistically insignificant estimates on *income* and *location*, an explanation is that following the news on the pandemic, panic hit all Turkish consumers with differing income levels and residential locations in a rather undiversified way (see also Corsi, 2005). The estimates for variables *education* and *health* are also statistically insignificant.[1]

4. Conclusions

In this paper, we have addressed consumer responses to the recent AI outbreak that affected the Turkish consumers and the poultry sector between October 2005 and April 2006. Using a household survey that was conducted in November 2006, our objective was to make an attempt to understand the consumer behaviour during the food scare, in Turkey.

[1] Use of index variables for socio-economic development level of the provinces did not affect the estimation results; hence, we decided to use *location* to control for differences between urban and rural areas.

Our results reveal that consumers who have *knowledge* on the transmission mechanisms of the virus are less concerned than those who lack such knowledge. This implies that the negative impact of the pandemic on the poultry sector can be alleviated by informing consumers about it. Hence, the recommendation to the policy makers or any interested party is that, through decreasing peoples' *concern* about the virus, the impact of the pandemic during the crisis period can be reduced.

We find that the media has a strong influence on consumers, but excess exposure to the news on the outbreak in the media also raises consumers' level of *concern* on getting infected by the virus. Recent food scares in Europe and USA showed that governments could have communicated with consumers more effectively. Such effectiveness should also accentuate the power of media outlets while dealing with future scares.

Frequent eaters are found to be more likely to be concerned about the pandemic. Considering the impact of the pandemic on demand for poultry products, campaigns in particular can target these consumers to help poultry demand return to pre-outbreak levels.

Regarding caveats, we have used the self-reported responses of consumers rather than actual, and this may present a bias. Future research may also analyze the impacts of the pandemic on consumers using a demand side approach. Using household budget surveys, structural analysis on elasticities and preference-taste relationships can be performed. Measuring consumers' willingness-to-pay for poultry meat during times of food scares would also provide information on hypotheses tested in this research. Even though not covered in our research, determining the source of food safety risk is another significant issue.

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Table 1
Summary Statistics on Variables Used

Variable	Explanation	N	Mean	Std.Dev.	Min.	Max.
Concern	Dummy for Concern	957	0.679	0.467	0	1
Knowledge	Dummy for Knowledge	961	0.616	0.487	0	1
Age	Age of respondent	961	38.873	15.010	18	87
Gender	Dummy equals 1 when the respondent is female	961	0.507	0.500	0	1
Education	Years of schooling	961	7.583	3.983	0	17
Income1	Monthly equivalized income less than 240 YTL	924	0.378	0.485	0	1
Income2	Monthly equivalized income between 240 to 463 YTL	924	0.315	0.465	0	1
Income3	Monthly equivalized income more than 463 YTL	924	0.307	0.462	0	1
Freq1	Consumes poultry less than once a week	961	0.247	0.431	0	1
Freq2	Consumes poultry once a week	961	0.448	0.498	0	1
Freq3	Consumes poultry more than once a week	961	0.303	0.460	0	1
Location	Dummy taking 1 if the location is urban	961	0.678	0.467	0	1
ConfGov	Dummy that the respondent trusts the government agencies	928	0.761	0.427	0	1
ConfHealth	Dummy that the respondent trusts health professionals	950	0.936	0.245	0	1
ConfMedia	Dummy that the respondent trusts the media	924	0.518	0.500	0	1
Health	Dummy equal to 1 if the respondent reveals that he/she is in excellent or good health condition	956	0.599	0.490	0	1

Table 2
Probit Estimates for CONCERN

	Coef.	Std.Err.		Marg.Eff.	Std.Err.	
Knowledge	-0.3290	0.0957	***	-0.1126	0.0319	***
Age	-0.0063	0.0035	*	-0.0022	0.0012	*
Gender	0.1810	0.0939	*	0.0632	0.0327	*
Education	-0.0062	0.0146		-0.0022	0.0051	
Income2	-0.0499	0.1132		-0.0176	0.0400	
Income3	0.1100	0.1271		0.0381	0.0435	
Freq2	0.2887	0.1132	**	0.1002	0.0388	**
Freq3	0.2843	0.1258	**	0.0962	0.0410	**
Location	-0.1384	0.1025		-0.0478	0.0349	
ConfGov	0.0206	0.1090		0.0072	0.0384	
ConfHealth	0.1656	0.1793		0.0599	0.0668	
ConfMedia	0.2737	0.0940	***	0.0958	0.0328	*
Health	0.0533	0.0997		0.0187	0.0351	
Constant	0.4284	0.3140				

N = 863
Log-likelihood: -513.92, LR chi2(13) = 43.06,
Prob>chi2 = 0.0000, Pseudo R2 = 0.0402
Note: *** Significant at 1%, ** significant at 5%, * significant at 10%.