

# Factors driving consumer response to information on the avian influenza

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## 1. Introduction

### Objectives

This paper suggests a framework for looking into behavioural differences in chicken consumption patterns, following information on the avian influenza. The complexity of factors influencing the way a consumer processes food safety information makes it difficult to provide a comprehensive understanding of consumer response in the aftermath of a food scare. The main objective of this study is to model consumer decisions made under risk and uncertainty, when psychological and cultural differences are a major source of heterogeneity in response behaviour.

The rationale for this study lies in the combination of economic and psychological modelling of consumer behaviour. In both areas, many studies have acknowledged the need for bridging the gap between the two disciplines to develop appropriate consumer behaviour models (see e.g. Arrow, 1958; Rabin, 1998 and references therein). The empirical aim of this work is a quantification of the relative weight of personal beliefs and economic factors in determining chicken purchasing decisions in different cultural and risk perception settings.

In the following paragraphs of this section, we provide an overview of the varied impacts of information on the avian flu in various countries. In section 2, a simple regression model for explaining country differences is developed and estimated using nationally representative data, collected in May 2004 in 5 European countries, as part of the research in the EU-funded Trust project\*. Finally, section 3 draws some conclusions.

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### The avian flu scare: some market data

A peculiar characteristic of the avian flu scare is that consumer reaction is largely based on subjective perceptions, since scientific evidence has denied a clear association between consumption or properly cooked poultry meat and the virus transmission. In October 2005, the EFSA issued a statement to consumers outlining the potential dangers of chicken consumption to human health:

Whilst it is unlikely that H5N1 could be passed on to humans by raw meat or eggs, cooking food properly would inactivate the virus and eliminate this potential risk. (EFSA, Press release, 26th October 2005).

A statement like the one above can obviously generate a varied response. On the one hand, it does not rule out transmission although deeming it as very unlikely. On the other hand, it reassures consumers that proper cooking would eliminate the potential risk. Nevertheless, the media coverage on the avian flu has strongly impacted the poultry market, at least in the short term. Similarly to the case of Bovine Spongiform Encephalopathy (BSE) in 1996 and 2001, the main effect was a sudden drop in consumption and prices. However, the distribution of these impacts has been quite uneven across EU countries.

The table below shows the differential impact on purchases, consumption and prices in two EU countries which show a stark difference in consumer reaction, Italy and the United Kingdom.

**Table 1. Reaction to the 2005 avian flu news in Italy and the United Kingdom**

	Italy		UK
	2005 vs 2004	2006 vs 2005*	2006 vs 2005***
Expenditure	-10.50%	-14.40%	+4.19%
Quantity	-12.50%	-15.30%	+5.74%
Price	-0.60%	-4.10%	-4.00%

Sources: AcNielsen-Ismea for Italian household consumption and Expenditure and Food Survey (UK household consumption) and the respective national statistical offices (ISTAT and HMSO) for consumer price changes.

\* January-September 2006 versus January-September 2005

\*\* April 2005-March 2006 versus April 2004-March 2005

A drop in prices is observed for both countries, but while consumption falls in Italy, for the UK an increase is observed for both purchased quantity and, to a lesser extent, household expenditure.

This surprising difference can be extended to other EU countries.

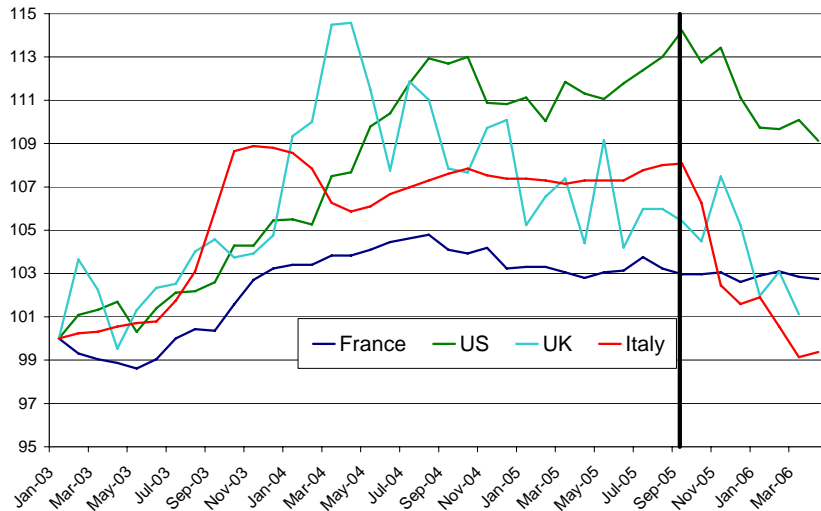
A USDA Gain Report (2006) provides some insight on the different reactions between Central, Western and Southern European Countries. According to this Report, Southern Europe is the region which suffered the highest consequences of the scare in terms of lost consumption. It was estimated that consumption more than halved shortly before the acute phase of media interest.

Updated USDA forecasts for 2006 foresee a 7% decrease in poultry consumption of Southern Europe. In Italy, the ACNielsen-ISMEA panel survey (ISMEA, 2006) showed that home purchases of poultry meat decreased by 10.5% in quantities and 12.5% in values between 2004 and 2005. The quantities purchased in January 2006 were more than one quarter (25.6%) lower than the corresponding 2005 value. By the end of 2006, consumption was recovering and consumption in September was 4.4% higher than September 2005, although cumulated consumption in the period January-September 2006 was still 14.4% lower than the corresponding 2005 period. The peak of the crisis was registered in October 2005 (the period of highest media interest), with a fall in consumption estimated in 30.6% of October 2004 consumption.

Instead, in the UK, a survey of 1 000 British shoppers conducted in January 2006 by the Institute for Grocery Distribution, highlighted that the vast majority (82%) had not changed their consumption habits following the scare, while 12% declared to consume less and 6% that they had consumed more poultry afterwards. Further, an FAO report estimates consumption shocks ranging from a peak of 70% in Italy to 20% in France and 10% in Northern Europe, where the crisis was less prominent.

Noticeable country differences also emerge from price trends (see Figure 1 and Table 2). The overall downward trend is consistent with consumer behaviour following a food scare. Although the stark country differences suggest that consumers in different countries respond in different ways. Italy registers the largest price changes in 2006, followed by the UK and the USA and finally France (see Table 2).

**Figure 1. Poultry price trends in selected countries**



**Table 2. Changes in consumer/retail price indices**

Country	March 2006	2005-March	September 2006	2005-March
USA		-1.6		-3.6
Italy		-7.5		-8.3
France		-0.2		-0.2
United Kingdom		-5.8		-4.1

Source: National Statistical Offices (2006)

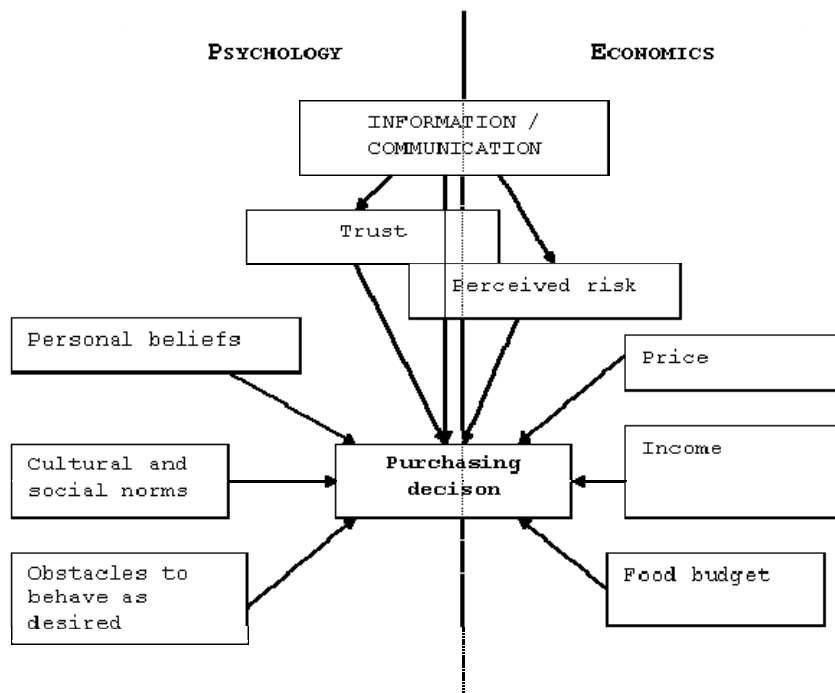
## 2. Methods

### Conceptual model

To look into the multitude of factors which led to the variety of outcomes described in Section 2, we propose a behavioural model which takes into account both the basic economic determinants usually included in demand models (namely prices, income and total food expenditure) and the wider spectrum of psychological factors that influence food choice. More specifically, for this latter part of work, we adopt the framework of the Theory of Planned Behaviour, a successful analysis tool for a range of behaviours, often associated with risky or health-related actions such as smoking, risky driving, physical activities and exercise, or contraception (see Conner et al., 2003 for an extensive list of applications). The TPB framework has also been applied to food choices under risk (see e.g. Cook et al, 2002). The TPB framework (Ajzen 1985; 1991), defines human action as a combination of three dimensions, behavioural beliefs, normative beliefs, and control beliefs. Behavioural beliefs produce either a positive or a negative attitude towards behaviour; normative beliefs refer to subjective norms or perceived social forces (expectations of family members, colleagues and friends, doctors, religious organisations etc.); and control beliefs lead to perceived behavioural control (i.e. facing obstacles and constraints in performing the desired action). For a more detailed discussion of the TPB determinants and their application to chicken purchasing choices see Lobb et al. (2007).

Besides economic and TPB determinants, we explicitly include in the analysis risk perception and trust in food safety information. The overall model is expressed pictorially in figure 2.

**Figure 2. An economic psychology model for chicken purchasing behaviour under risk**



On the left of the vertical line, there are the three global components of the TPB, on the right side, the neoclassic economic determinants, while trust in food safety information and perceived risk are cross-concepts deemed as relevant in both disciplines, although definitions and formalisation can be quite different.

### Sample and field work

A nationally representative survey based on probabilistic area sampling was conducted in five countries (UK, Italy, Germany, the Netherlands and France) in May 2004 on a total of 2725 respondents via face-to-face, in-home interviews. A range of between 451 (Dutch) to 622 (French) consumers (depending on country size) were interviewed in each country. The adopted sampling method was Random Location Sampling, which provides a country-representative subdivision into locations; the locations are selected randomly across potential locations to give national representativeness (i.e. probability of extraction proportional to population). The sampling unit was the household and the respondent the person responsible for the actual purchase of food. The questionnaire took approximately 30 minutes to complete with 'prompts' on certain questions from the interviewer when required by the respondent. Data were subject to a 10% validation.

### Psychologic variables

The TPB section of the questionnaire was built following the TACT (target, action, context, time) guidelines for the Theory of Planned Behaviour, discussed in Ajzen (2002). Global variables such as attitudes, subjective norm and perceived behavioural control were elicited (a) directly through a seven-point Likert Scale anchored at the end-points with corresponding statements and, (b) indirectly through a set of specific questions to identify their sub-determinants. The Expectancy-Value (E-V) formulation (Fishbein and Ajzen, 1976) was adopted for obtaining indirect estimates.

The attitude variable was derived from a set of 11 beliefs, by asking on a 7-point scale how much the respondent agrees on the fact that the decision to buy chicken in the week following the interview was based on an evaluation of: (a) taste; (b) value for money; (c) ease of preparation; (d) safety; (e) chicken being liked by everyone in the household; (f) potential for variety in cooking; (g) fat content; (h) cholesterol content; (i) local community livelihood; (j) ethical food production methods; (k) animal welfare. For the same items, belief strengths were measured (*In general, how important are each of the following to your household?*).

Direct measurement for the subjective norm (cultural and social influences) was obtained by asking about the importance of other's opinions about buying chicken. Referent beliefs were measured a 7-point scale by asking *Other people suggest chicken in the diet is very bad/very good*, while a motivation to comply measure was given by the agreement with the sentence *I take others' opinions into account when making decisions about whether or not to buy chicken*, again on a 7-point scale. Perceived Behavioural control posed several measurement problems, as there are not many control factors in relation to buying chicken. After a thorough exploration in the pilot survey, two E-V items were chosen, one on freezer storage (if chicken is already in the freezer this could prevent the respondent from buying more) and the other on the possibility that the overall inclination to buy could be offset by an abundant consumption in the survey week.

### **Risk and trust variables**

Questions measuring perceived risk were adaptations of previously used schemes (e.g. Slovic, 1992), again posed as 7-point Likert scales. Respondents were asked to rate the risk from a set of activities (e.g. smoking, swimming, etc.) and among these *"Eating chicken"*. In a separate section, an evaluation of specific risks potentially associable to chicken consumption was requested, including some non-relevant risks, considering both short-term health consequences (E-coli, salmonella, listeria, allergy from food additives, avian influenza) and long-term risk factors (cholesterol, health problems from pesticides, health problems from antibiotics, health problems from growth hormones).

The trust variables were measured as 7-point Likert scales based on a set of 23 food safety information sources (based on Frewer et al, 1996), in relation to the risks of salmonella in food. The level of confidence in the information provided by different sources was measured by the following question: *"Suppose that each of the following has provided information about potential risks associated with salmonella in food. Please indicate to what extent you would trust that information"* and the answer was measured on a 7-point Likert scale from "completely distrust" to "completely trust", where 4 is the neutrality point and explicit non-responses were allowed. The 23 measures were summarised into 5 general trust factors using Principal Component Analysis (see Lobb et al., 2007), under a VariMax rotation and discarding those components with an eigenvalue below one. The five components could be clearly identified as "Trust in mass media information" (TV, newspapers, etc.), "Trust in information provided by the food chain" (producer, processors, retailers, etc.), "Trust in independent sources" (e.g. doctor and scientists, food safety authorities, etc.), "Trust in alternative sources of information" (e.g. consumer associations, environmental associations, etc.) and "Trust in interested parties" (e.g. political parties, TV adverts, etc.)

### **Economic variables**

The amount of fresh or frozen chicken purchased by the household each week was recorded through two direct question, one recording quantities and the other expenditure. Only domestic consumption was considered. The price was measured through a unit value measurement, simply dividing expenditure by quantity. This measure has the shortcoming of reflecting a "quality choice" by the household, but is generally accepted as a valid proxy for price. Food expenditure and income were measured in a separate section, using brackets to reduce non-response.

### **Statistical modelling**

The amount of chicken purchased in a typical week was related to the set of factors described in Figure 2 using a log-log functional form, so that coefficients represent elasticities. The model is the following:

$$Q = \alpha + \gamma_1 P + \gamma_2 F + \gamma_3 I + \beta_1 ATD + \beta_2 SNO + \beta_3 PCO + \rho_1 RBF + \tau_1 TMD + \tau_2 TFC + \tau_3 TIN + \tau_4 TAL + \tau_5 TIT + \varepsilon$$

Where all variables are in logarithms and

$P$  is the price of chicken

$F$  is the food budget

$I$  is income

$ATD$  is the individual attitude

$SNO$  is the subjective norm (social and cultural factors)

$PCO$  is the perceived behavioural control (constraining factors)

$RK$  is the overall risk associated with chicken

$TMD$  is the trust in information provided by mass media

$TFC$  is the trust in information provided by food chain actors

$TIN$  is the trust in information provided by independent sources

$TAL$  is the trust in information provided by alternative sources

$TIT$  is the trust in information provided by interested sources

To get further insight about the link between the perceptions of the bird flu scare and the overall risk perception for chicken, a second equation is defined as follows:

$$RK = \delta + \lambda_1 RBF + \lambda_2 RSL + \nu$$

Where the explanatory variables represent the perceived risks from avian influenza ( $RBF$ ) and from salmonella ( $RSL$ ).

## Results

The above model was estimated for the whole sample and for each of the countries, after listwise deletion of missing data. All coefficients represent elasticities (e.g. the % change in consumption induced in a % change of the explanatory factors) and are cross-comparable since all variables were scaled to the mean to avoid measurement unit problems. Estimates are summarised in Table 3.

**Table 3. Estimates from the behavioural model**

Factor		Consumption elasticities		
		ALL	UK	Italy
$\alpha$	Intercept	<b>-0.45</b>	-0.04	<b>-0.42</b>
$P$	Price of chicken	<b>-0.61</b>	<b>-0.59</b>	<b>-0.70</b>
$F$	Food budget	<b>0.38</b>	<b>0.50</b>	<b>0.53</b>
$I$	Income	<b>-0.13</b>	<b>-0.20</b>	0.12
$ATD$	Attitude	<b>0.61</b>	0.30	-0.01
$SNO$	Subjective norm (social and cultural factors)	0.11	-0.09	-0.16
$PCO$	Perceived behavioural control (constraining factors)	<b>-0.17</b>	0.18	-0.12
$RK$	Overall risk associated with chicken	<b>-0.11</b>	-0.10	-0.09
$TMD$	Trust in information provided by mass media	<b>-0.14</b>	0.14	<b>-0.27</b>
$TFC$	Trust in information provided by food chain actors	0.13	-0.13	0.24
$TIN$	Trust in information provided by independent sources	<b>-0.13</b>	<b>-0.25</b>	0.00
$TAL$	Trust in information provided by alternative sources	-0.01	0.02	0.06
$TIT$	Trust in information provided by interested sources	-0.06	0.08	0.05
	Adjusted R-square	0.36	0.49	0.37

		<b>Risk elasticities</b>		
$\delta$	Intercept	<b>-0.13</b>	0.02	<b>-0.16</b>
<i>RBF</i>	Risk from bird flu	<b>0.11</b>	<i>0.17</i>	<i>0.09</i>
<i>RSL</i>	Risk from salmonella	<b>0.14</b>	<i>0.15</i>	0.03
Adjusted R-square		0.06	0.06	0.01

Note: Values in bold (italics) show 1% (5%) significance level

The large amount of information provided in Table 3 can be summarised in a few relevant points:

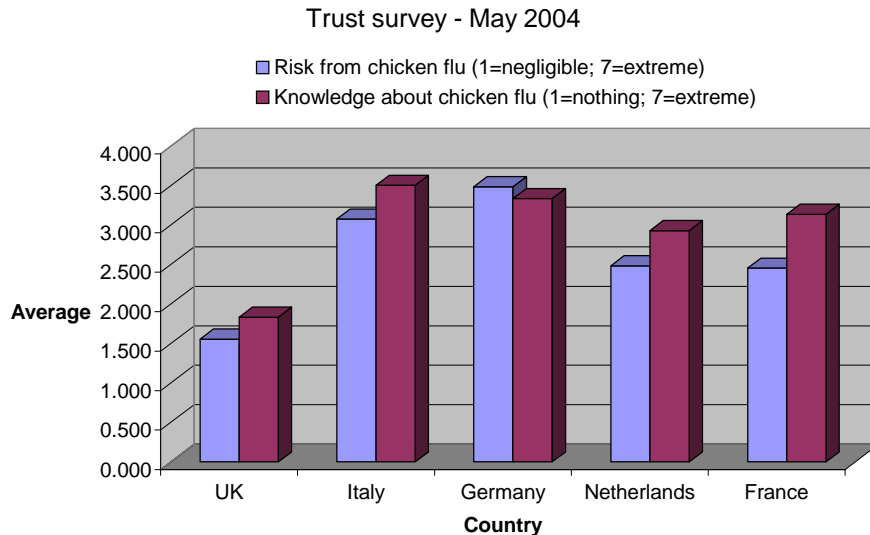
- 1) All other factors being equal, UK households has stronger preferences towards chicken
- 2) Italian consumers are more responsive to price changes than British consumers
- 3) When the food budget increases, the increase in chicken consumption is slightly higher in Italy
- 4) Chicken is an inferior good for the UK and a superior good in Italy
- 5) Attitudes to chicken have no impact on Italian chicken consumption
- 6) Social and cultural norms have little relevance in both countries (and negatively affect chicken consumption)
- 7) Control factors also are non-significant
- 8) Risk perception has (slightly) more impact in the UK and Italy
- 9) Results for trust are non univocal. Trust in mass media seems to generate a significant reduction in consumption in Italy versus a (non-significant) increase in the UK; trust in the food chain is directly related to consumption in Italy; independent information adversely influence consumption in the UK; the effect of other information sources are negligible
- 10) After eliminating the effects of avian flu perception and salmonella perception, perceived risks are higher in the UK; avian flu risk perception seems to have a stronger impact on overall risk perception in the UK

The above discussion focuses on the “marginal” effects of the explanatory factors, i.e. departure from the status quo. The 10 explanations are not very helpful in explaining why Italian households showed a stronger reaction to avian flu information than their British counterpart. There are two aspects that should be noticed: (a) positive attitudes towards chicken are non-relevant in Italy; (b) (trusted) information through mass-media reduces consumption in Italy, but not in the UK.

These might be relevant factors, since attitudes towards chicken are generally positive in all countries, but their mediating effect is negligible in Italy and information about the avian influenza was largely conveyed through mass media.

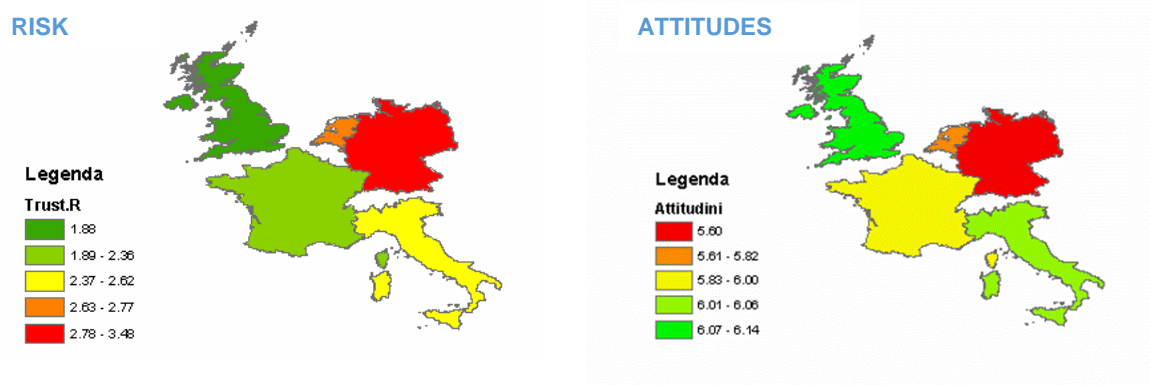
To have a more complete picture of the “status quo” before the last wave of the avian flu scare, it might be useful to look at the absolute values of some of the explanatory factors.

### Figure 3. Risk perception from avian influenza



The graph shows how risk perceptions (and stated knowledge) are much higher in Italy than the UK, thus – even if the marginal impact of risk perception is more or less the same in the two countries – consumption is likely to suffer more in Italy.

**Figure 4. General risk perception and attitudes towards chicken consumption**



Similar considerations can be drawn by looking at risk perception in general, as risk perception for chicken (Figure 4) is sensibly higher in Italy than the UK. Attitudes are very positive both in Italy and the UK, but – as estimated through our model – they are less influential in Italy.

### 3. Summary and conclusion

This study looks into the heterogeneous response to the avian flu crisis, by comparing reaction in the UK and Italy. While chicken prices decreased in both countries, consumption figures show a sharp reduction in Italy and a noticeable increase in the UK.

By exploiting economic and psychological information collected in a nationally representative survey prior to the October 2005 wave of the Avian flu crisis, we model consumption behaviour as a function of a variety of factors. We find three main explanations to the differential response of consumption behaviour:

- 1) The adverse impact of food safety information released by mass-media is much stronger in Italy
- 2) The mitigating role of positive attitudes towards chicken (observed in both countries) is negligible in Italy
- 3) The starting level of risk perception is much higher in Italy than the UK

Many other potential explanations (differential impact of price changes, social and cultural differences) seem to be much less relevant. These results suggest potential measures to reduce the adverse effects on consumption of avian flu information. Communication should be targeted at encouraging more complete and balanced information through the media and to the reduction of risk perception from foodborne disease in general (and not specifically to chicken consumption), while communication aimed at reinforcing positive attitudes towards chicken seem to be less effective according to the evidence presented in this study.

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