Risk perception and chicken consumption in the avian flu age – a consumer behaviour study on food safety information*

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Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Long Beach, California, July 23-26, 2006

* Supported by the European Commission, Quality of Life Programme, Key Action 1 - Food, Nutrition, and Health, Research Project "Food Risk Communication and Consumers' Trust in the Food Supply Chain - TRUST" (contract no. QLK1-CT-2002-02343).

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Abstract

As the avian flu pandemic threatens Europe, consumer awareness of the 'theoretical' possibility of contraction of the avian flu virus through consumption of chicken saw a decline in demand at the end of 2005, with peaks between 40% - 50% in Southern European countries such as Italy whilst having little impact on demand in Northern countries like the UK. Such food scares, coupled with an increasing awareness of food safety issues by the general public, highlight the importance of evaluating the perceived risks associated with food purchasing and consumption are paramount in order to provide effective policy communication in this area.

There is considerable empirical evidence that different consumers respond to food risk communication in different ways. This implies that policymakers and food firms cannot rely on a single public information strategy for emerging food risks. Furthermore, the impact of food safety information varies significantly according to the sources that provide it. Using data are from a nationally representative pan-European survey of 2 725 respondents from five EU countries (France, Germany, Italy, Netherlands and the United Kingdom), we show that in a situation of increased perceived risk – hence increased levels of involvement – households across the EU are likely to respond in culturally specific ways which suggest a need for country level policy design.

Keywords: *risk perception, food safety information, Theory of Planned Behaviour, chicken, consumer behaviour, trust.*

Introduction

Over the last decades the European market has been hit by multiple food scares which have led to the creation of the European Food Safety Authority (EFSA), with responsibility for establishing a rapid alert system and managing communication in event of a food crisis. A growing body of research investigating the factors that determine consumer response has been developed to provide some scientific basis to the EFSA tasks. However, issues surrounding households' information processing and subsequent food choice in a situation of increased perceived risk – hence increased levels of involvement - are likely to be culturally specific and hence too varied to be applied at an EU level.

The economic analysis of food safety issues, with respect to risk and trust, is a growing and varied body of literature (for a detailed review see Lobb, 2005). The public's increasing awareness of food safety issues and the importance of evaluating the perceived risks associated with food purchasing and consumption are paramount in order to provide effective policy communication in food safety. Previous work clearly suggests that country effects are important (Frewer et al, 1996) and the general lack of unequivocal evidence available for determining the role of socio-demographic characteristics in processing food safety information is apparent. Across the EU we see diverse social networks and distinct preferred sources of information and differing levels of trust that citizens from different countries have in institutions, the media, scientific bodies and other sources of food safety information. In this paper, attention shifts away from traditional economic analysis to investigate consumer behaviour with a view to examine the increasing inability of consumers' to make their own

assessment of the risks related to food hazards and their forced dependence on those in social/political spheres to provide appropriate information.

The aim of this paper is to explore the complex interactions between the determinants of chicken consumption, considering risk perception and trust within a cross-cultural EU case study. Chicken consumption choices are investigated in two scenarios: (a) a 'standard' purchasing situation; and (b) purchasing following hypothetical information on a food scare. The final objective is to explore means to target consumers with accurate food safety information through examining whether:

- Social networks are equally important sources of information across EU countries
- the level of trust that citizens have in institutions, the media, scientific bodies and other sources of food safety information differ across countries
- Consumers can be segmented and targeted according to demographic characteristics.

Data regarding consumer risk perception of bird flu was collected in May 2004, before the new wave of information which hit the market in 2005, this data helps sheds some light on consumer behaviour under the bird flu scare and providing interesting ideas for future research in this area.

Background and methodology

The model introduced in this paper is based on the Theory of Planned Behaviour (TPB) (Ajzen 1985; 1991), 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, e.g. Cook et al (2002) investigate consumer attitudes to GM foods, while Dennison and Shepherd (1995) explore adolescent food choice. In another study which looks closely at the impact of information on consumer choice, McEachern and Schröder (2004) investigate the effects of value-based meat labelling on purchasing intentions. The implications of applying the TPB model to different countries are discussed in Kalafatis et al. (1999).

The TPB framework, devised from the Theory of Reasoned Action (TRA), (Ajzen & Fishbein, 1980), defines human action as a combination of three dimensions, behavioural beliefs, normative beliefs, and control beliefs. Behavioural beliefs (i.e. beliefs about the outcome of the action), 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 (availability, price etc.). All these produce intentions to behave (Ajzen, 2002), a pre-determinant of behaviour.

Integrating risk perception and trust into the TPB framework and considering the influence of different individual (or household) characteristics leads to the development of a new modelling approach. The interaction between trust, risk perception, socio-demographics and traditional TPB components can be expressed pictorially in figure 1.

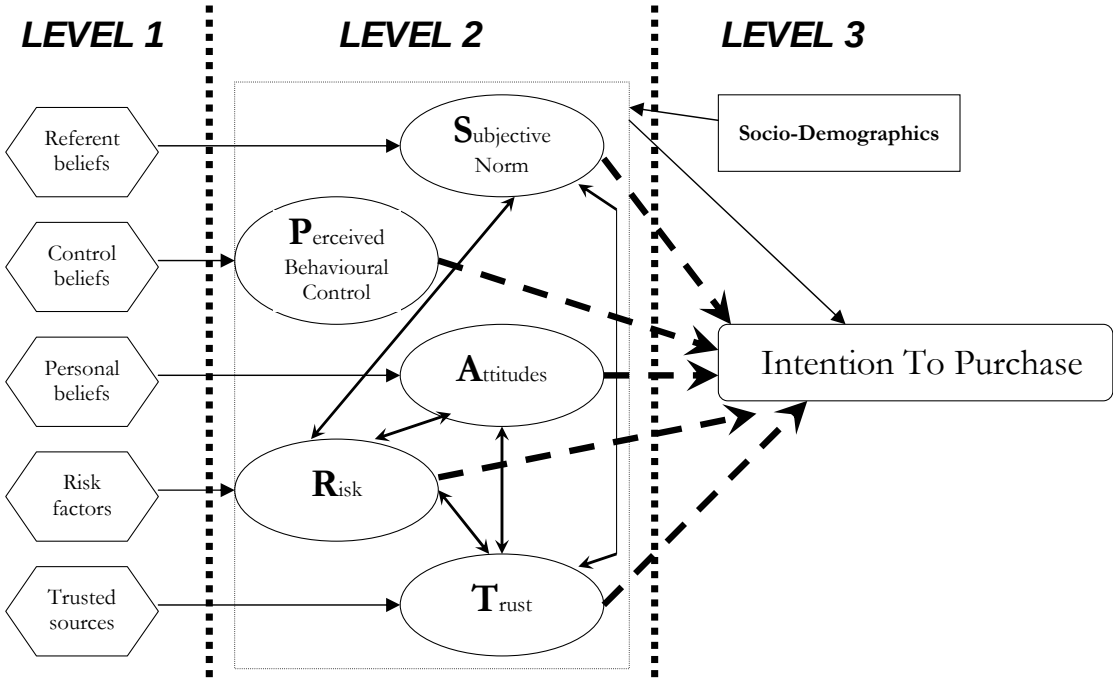

Figure 1. The modelling approach

The questionnaire was based on the TPB model specification and was designed following a set of four focus groups in each of five countries. The questions were built following the TACT (target, action, context, time) guidelines discussed in Ajzen (2002). The variables (figure 1) were built by aggregating the questionnaire items according to the expectancy-value formulation by Fishbein and Ajzen (1976).

Chicken was chosen as the product to be investigated in the survey as it is a widely consumed food across Europe that is subject to a number of potential hazards but had not (at the time of the survey) been the subject of recent food scares. Hence chicken is expected to be representative of standard food safety issues and consumption behaviour. Conveniently, the use of chicken makes bird flu an obvious and interesting application.

Applied studies based on the TPB have used a variety of methods for estimating the relationship between behavioural intention and its determinants. Most articles (e.g. Conner et al., 2003; Kalafatis et al., 1999) rely on structural equation modelling (Povey et al., 2000; Shaw and Shiu, 2002; Tonglet, 2001) or tobit regression when the data are censored (Lynne et al, 1995). Cook et al. (2002) base their estimate of a TPB model on an ordered discrete choice model. In this paper, given that behavioural intentions are measured with a 7-point Likert scale, standard multiple regression is not applicable; as the dependent variable is discrete, nominal, ordered and non-continuous, the ordered probit model is appropriate (Liao, 1994). This model belongs to the class of discrete choice probability models widely used in the analysis of attitudes, behaviours and choices and the likelihood of their occurrence. The ordered probit model is estimated by the BFGS (Broyden-Fletcher-Goldfarb-Shannon) maximum likelihood algorithm in the LimDep package. Other statistical methods employed within the overall SPARTA modelling strategy include simultaneous principal components analysis (see e.g. Duntemann, 1989) for obtaining the latent determinants of Trust and a cluster analysis to examine different groups of consumers[1].

Results

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

[1] Previous work using a simultaneous equations model was used to examine the issue of endogeneity (feedbacks) among the dependent variables. A consistent and asymptotically efficient estimate for the coefficients in this model is provided by three-stage least squares (3SLS). The model satisfies the order and rank conditions that ensure proper identification. A detailed account of these and indeed all results relating to the SPARTA model is available from the authors on request.

interviewed in each country. 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.

It is important to note that the results presented below, although consistent, are a synthesis of results from a wider European Project and have been presented as such to help draw relevant policy conclusions[2].

Trust – a principal components and cluster analysis approach

The trust questions 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[3].

Measuring hypothetical information means that few assumptions can be made relating to the content of that information, as a result it is assumed that there is direct association between the source and the content of the information that a consumer would receive. For example, consumer and environmental groups concentrate on negative information, the National Food Standards Agency and University scientists

[2] A detailed account of all project results is available from the authors on request.
[3] Cronbach's Alpha for the trust questions was very high (0.91) indicating that trust in food safety information as a latent construct was consistently measured by these multiple items.

could be assumed to be objective while food producers, having a vested interest, concentrate on positive messages about the safety of food. These assumptions are corroborated by the results of the cluster analysis and the behavioural relationship with trust.

To aid potential policy relevance, a principal components analysis was used and suggests that there are five latent trust components, i.e. sources which tend to attract a similar level of trust (or distrust) across respondents. The rotated component matrix for these five components, all with Eigen values larger than 1, is seen in Table 1. Interestingly, all mass media sources group together in the first component, while in the second one are found all food chain actors and product labels. The third component emphasises those sources that are expected to provide more technical and independent information. Governments and consumer organisations are also relevant to this component, although with a lesser weight compared to other authorities and scientists. The fourth component includes consumer organisations as well as animal welfare and environmental groups, and organic shops to a lesser extent. These groups may be thought of as ‘alternative’ sources of information. The fifth component is mixed and includes processors, governments, political groups and television advertisements.

Table 1. Principal components loadings for trust in food safety information

Information source	*T1*	*T2*	*T3*	*T4*	*T5*
Shopkeepers	0.12	**0.81**	0.11	-0.05	0.15
Supermarkets	0.17	**0.74**	0.17	-0.06	0.31
Organic shop	0.11	**0.68**	0.10	**0.40**	-0.05
Specialty store	0.20	**0.74**	0.08	0.25	0.03
Farmers / breeders	0.10	**0.73**	0.11	0.11	0.07
Processors	0.11	**0.47**	0.18	-0.04	**0.59**
Doctors / health authority	0.18	0.23	**0.76**	-0.01	0.04
University scientists	0.18	0.13	**0.72**	0.10	0.07
National Food Authority	0.14	0.16	**0.79**	0.12	0.21
Government	0.21	0.06	**0.50**	0.10	**0.64**
Political groups	0.28	0.09	0.19	0.28	**0.74**
Environmental organisations	0.21	0.13	0.18	**0.83**	0.15
Animal welfare organisations	0.18	0.12	0.10	**0.84**	0.16
Consumer organisations	0.30	0.11	**0.52**	**0.51**	-0.09
European Food Safety Authority	0.26	0.05	**0.62**	0.23	0.24
Television documentary	**0.67**	0.12	0.22	0.13	0.10
Television news / current affairs	**0.73**	0.15	0.30	0.03	0.10
Television adverts	**0.40**	0.23	-0.02	0.06	**0.60**
Newspapers	**0.75**	0.15	0.16	0.13	0.13
Internet	**0.63**	0.04	0.13	0.17	0.25
Radio	**0.79**	0.16	0.18	0.15	0.07
Magazines	**0.71**	0.23	0.05	0.15	0.25
Product label	0.35	**0.43**	0.18	-0.03	0.12
Component label	*Media*	*Food chain*	*Expert*	*Organisations*	*Other*

A K-means cluster analysis (CA) on the principal component scores was deployed to identify homogeneous groups of consumers with respect to the level of trust in these sources. The number of clusters was previously identified by applying hierarchical (Ward) and non-parametric (density) methods and testing different partitions on the basis of the Pseudo-t^2 and Pseudo F statistics and the Cubic Clustering Criterion.

Table 2 reports the three identified clusters, together with some descriptive statistics for the socio-demographic variables and the distribution across the three clusters for each country. Since the principal component scores are standardised, a positive value

implies a degree of trust above the sample average. The first group, “trusters”, includes those more inclined to trust virtually everybody, as shown by an average value of 5.64 for the aggregated trust index. Members of this group have a level of trust above the average for all groups of sources with the exception of mass-media, which is exactly at the sample mean level. Trust in this cluster is especially high for information provided by food chain actors. The second cluster is labelled “distrusters”, even though the average level of trust is at the neutrality level (4.04). On average, members of this group show a much lower level of trust towards information provided by experts and scores are below the average for all sources. The last cluster is mixed – “mixed trusters”. Respondents in this group tend to trust the food chain actors less but they do trust mass media and specifically experts at a level above the sample average.

Table 2. Cluster of sampled units according to their level of trust in food safety information (aggregate)

	Trusters	*Distrusters*	*Mixed trusters*	*Total*
	Trust in information sources			
Mass Media	0.00	-0.36	0.30	0.00
Food Chain	0.60	-0.06	-0.83	0.00
Experts	0.33	-1.26	0.58	0.00
Alternative sources	0.32	-0.22	-0.28	0.00
Fiducia info soggetti interessati	0.36	-0.14	-0.41	0.00
Average trust	*5.46*	*4.04*	*4.64*	*4.85*
	Socio-demographics			
Average age	42.71	44.43	41.88	42.90
Median income (€)	30k-50k	30k-50k	30k-50k	30k-50k
Median food expenditure (€)	75-120	75-120	75-120	75-120
Households with children below 16	38%	38%	37%	38%
Median education level	Higher sec.	Higher sec.	Higher sec.	Higher sec.
Median town size	<10,000 inhab	<10,000 inhab	<10,000 inhab	<10,000 inhab
	Distribution by country (%)			
UK	47.8	33.3	18.8	100.0
Italy	42.1	29.9	28.0	100.0
Germany	43.2	20.6	36.2	100.0
Netherlands	44.1	15.3	40.6	100.0
France	45.9	29.2	24.9	100.0
Total	*44.4*	*25.6*	*30.0*	*100.0*

Using these trust clusters, one result is particularly striking: the three clusters are practically identical in terms of demographic characteristics. In other words, no links emerge between the level of trust in food safety information and socio-demographic variables. Instead, some difference emerges when looking at the cluster distribution across the five countries. The UK has the highest percentage of trusters and distrusters and the lowest of mixed trusters. The distrusters group is also relevant in Italy and France, and Italy has also the lowest portion of trusters. Germany and the Netherlands have high percentages of mixed trusters.

Prior to estimating the TPB relationships using the ordered probit model, two important stages took place, however, for the sake of brevity are not reported here: (1) global variables (*subjective norm, attitudes, perceived behavioural control, risk*

and trust) are related to their specific determinants (beliefs, risk factors and trust in sources of information); (2) the level of interaction between the global variables is quantified.

The ordered probit model – an examination of intentions to purchase

The final phase of analysis consists of estimating the ordered probit equations relating purchasing intentions to the model determinants. The model was estimated separately for the three clusters of respondents, previously identified, allowing for a country-specific intercept.

The behaviour of interest is purchasing fresh or frozen chicken in the week following the interview. Since the survey does not allow a check on actual behaviour, the intention to do so was measured on a 7-point Likert scale, from extremely unlikely (1) to extremely likely (7). 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 (following previous research e.g. East, 1997; Cook et al, 2002). Questions measuring perceived risk were adaptations of previously used questions (e.g. Slovic, 1992), again posed as 7-point Likert scales. The indirect measure of risk perception was computed as a weighted average of perception of individual risk factors and stated knowledge of the risk factors. An evaluation of risk factors was requested for both short-term health consequences (E-coli, salmonella, listeria, allergy from food additives) and long-term risk factors (cholesterol, health problems from pesticides, health problems from antibiotics, health problems from growth hormones, chicken flu).

A second behavioural intention was included in the questionnaire to check for the impact of a food scare. The respondents were asked to state their purchasing intentions (again on a 7-point Likert scale) assuming that they had just discovered, by reading an article in the newspaper, that high rates of salmonella in chicken had been found in their area, leading to the hospitalisation of several people.

Both behaviours of interest were investigated, the standard likelihood of purchase and the likelihood of purchase conditional on news about a salmonella incident. Results are shown in Table 3.

Table 3. Determinants of purchasing intentions by aggregate trust segments

		Standard situation			**Salmonella scare**		
	Determinants	*Non-trusters*	*Mixed trusters*	*Trusters*	*Non-trusters*	*Mixed trusters*	*Trusters*
C	UK	-0.97***	-0.39	-0.78*	-1.08***	-0.32	-0.37
	Italy	-1.22***	-0.97**	-1.16***	-1.49***	-1.03**	-0.67*
	Germany	-1.40***	-0.86*	-1.15***	-1.16***	-0.61	-0.30
	Netherlands	-1.36***	-0.71	-0.89**	-1.20***	-0.36	-0.61*
	France	-1.46***	-0.97**	-1.47***	-1.14***	-0.85**	-0.66*
S	Subjective norm	0.02	0.03	0.02	0.09***	-0.01	0.02
P	Perceived behavioural control	0.11***	0.07	0.07*	0.11***	-0.02	-0.03
A	Attitude	0.36***	0.32***	0.40***	0.13***	0.20***	0.20***
R	Risk perception	-0.01	0.06	0.00	-0.03	-0.09**	-0.12***
Chi-square		142.45***	45.30***	94.71***	67.42***	54.49***	51.39***
Correct predictions.		0.32	0.27	0.33	0.43	0.44	0.36
Correct predictions. (three categories)		0.60	0.59	0.72	0.61	0.66	0.62

*** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level

In a standard situation, and holding other determinants constant, attitude is the main determinant for all groups and has a stronger effect on trusters. Perceived behavioural control has a lower impact, while subjective norm is not significant in any of the clusters.

More indications can be found by comparing the standard situation models with those assuming a salmonella food scare. If one considers the group of non-trusters, while most of the determinants (including intercepts) change only marginally, attitudes lose a major part of their weight, while the subjective norm becomes significant and almost as relevant as attitudes. This could suggest that in the case of a food scare, such as avian flu, non-trusters, who rely on referent beliefs, are less likely to reduce consumption, emphasising the relevance of social networks, specifically for this group. For mixed trusters and trusters, the loss of relevance of attitudes is slightly less prominent, but risk perception has an increased impact. In fact, trusters and mixed trusters are on average less affected by the scare as compared to their non-trusting counterparts, especially if they have positive attitudes. The impact is more relevant for those who declare higher perceived risks even in the standard situation.

The fit of the models is acceptable and becomes relatively good if behaviours are classified into three categories (unlikely to buy, neutral, likely to buy) reaching values between 59% and 72% of correct predictions.

For the purpose of this paper and an assessment of the impact of the bird flu, it is relevant to notice that risk perception becomes a significant determinant for mixed trusters and trusters in the aftermath of a food scare.

Bird flu – an application

A clear application to the issues of consumer risk perception and trust is the recent bird flu scare and its potential effects on consumption. The reality of the H5N1 variant of bird flu hit European shores with discoveries of the virus in Greece in October 2005. Prior to this, and reinforced 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 meet or eggs, cooking food properly would inactivate the virus and elimate this potential risk.

(EFSA, Press release, 26th October 2005).

Although it is still too early to have precise estimates of the bird flu scare on consumption, it is very clear that there have been some substantial, albeit uneven, impacts on poultry consumption and prices across Europe.

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, 2005) 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. In February 2006 there was a slight recover, but household purchases were still 21.3% below those of February 2005 (25.5% in terms of values). 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.

Consumer surveys, such as one conducted in January 2006 of 1 000 British shoppers by the Institute for Grocery Distribution,[4] 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[5] 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.

A more precise comparison of the effects of the avian flu scare on consumers can be obtained by looking at prices rather than consumption, considering that supply is rigid

[4] IGD (2006). "Most Shoppers Unconcerned about Bird Flu".
http://www.igd.com/cir.asp?cirid=1875&search=1
[5] FAO (2006). "Poultry trade prospects for 2006 jeopardized by escalating AI outbreaks".
http://www.fao.org/ag/againfo/subjects/en/economics/facts/poultry_trade_jeopardised_ai.pdf

in the short term and demand shocks are translated into price shocks (see figure 2 and table 4).

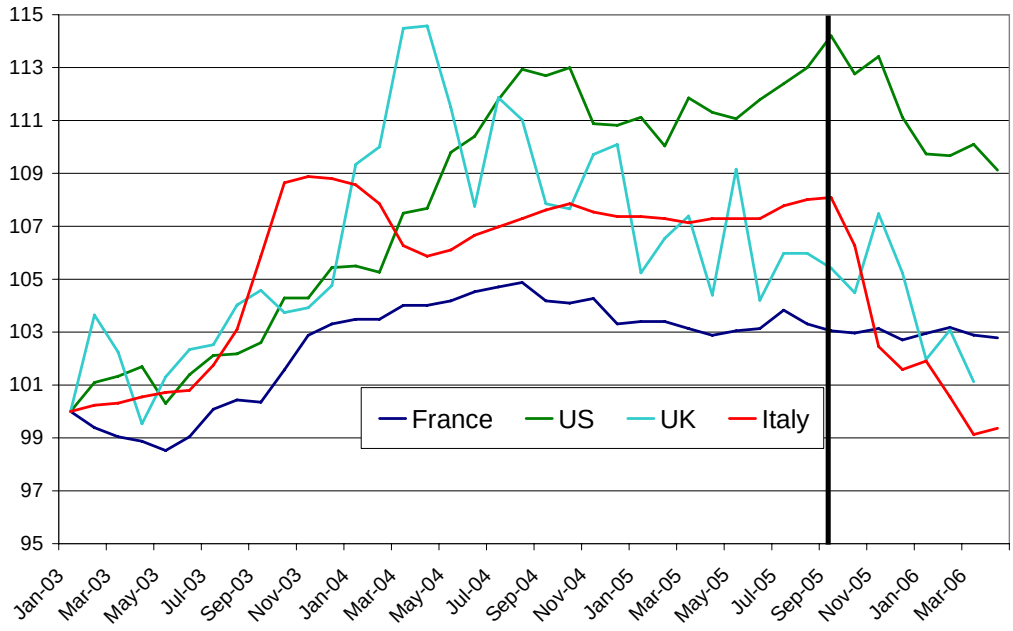

Figure 2. Poultry price trends in selected countries (Retail/Consumer Price Indices, 2003=100)

Source: National Statistical Offices (2006)

The overall downward price 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 2006/6, followed by the UK and the USA and finally France (see Table 4).

Table 4. Changes in consumer/retail price indices

Country	March 2005-March 2006	September 2005-March 2006
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)

By focusing on the data collected in the consumer survey some interesting descriptive analysis. Table 5 suggests that, the French may have a higher level of trust in their food chain actors, in line with their tendency to purchase higher quality chicken, perhaps indicative of their 'label rouge' quality scheme.

Table 5. Quality of chicken purchased by country

In a typical week, what type of fresh or frozen chicken do you buy for your household's home consumption?	Country					Total
	UK	Italy	Germany	Netherlands	France	Col %
I don't know	5.1%	4.0%	14.2%	12.7%	8.7%	8.6%
'Value' chicken	11.9%	5.1%	23.4%	2.1%	7.2%	9.3%
'Standard' chicken	73.1%	67.2%	31.6%	70.4%	27.2%	54.1%
'Organic' chicken	4.6%	7.3%	10.0%	9.6%	11.5%	8.6%
'Luxury' chicken	5.3%	16.4%	20.9%	5.2%	45.4%	19.4%

However, this fails to explain why the UK impact is much smaller than the Italian one, given that the share of people purchasing high quality poultry is larger in the Mediterranean country. The table 6 below shows some measures of risk perception related to poultry consumption in the two countries.

Table 6. Risk perceptions by country

	Country					Total
	UK	Italy	Germany	Netherlands	France	
	Perceived risk (1=negligible; 7=extremely high)					
	Associated to chicken consumption					
E-coli	1.85	1.88	3.00	2.39	1.57	2.06
Salmonella	2.15	2.36	3.80	3.46	1.96	2.72
Listeria	1.80	1.93	2.93	2.27	1.73	2.03
Allergy from food additives	1.69	2.49	3.34	2.11	2.11	2.35
Cholesterol	1.52	1.90	2.94	1.96	1.99	2.05
Health problems from pesticides	1.59	2.57	3.16	2.27	2.52	2.45
Health problems from antibiotics	1.75	3.07	3.68	2.72	2.68	2.81
Health problems from growth hormones	1.79	3.36	3.57	2.95	2.84	2.94
Chicken flu	1.55	3.08	3.49	2.48	2.45	2.65
Eating chicken (general)	2.67	2.87	2.90	2.77	2.34	2.69
	General risk perception					
Driving	3.72	3.79	3.40	3.70	3.85	3.71
Swimming	2.54	2.75	2.26	2.13	2.10	2.36
Smoking cigarettes	6.58	6.39	5.06	6.35	6.30	6.18
Risk aversion (1=risk taker, 4=risk neutral, 7=risk averse)	4.81	5.35	3.98	4.26	4.86	4.69
Stated knowledge of chicken flu (1=not at all knowledgeable, 7=extremely knowledgeable)	1.83	3.50	3.33	2.93	3.14	2.95

Keeping in mind that the above consumer survey was run in May 2004, when the bird flu crisis had already been brought to public attention, but had not yet exploded, if the Italian figures are compared with those from the UK, it is clear that the Italians have a much higher 'initial' risk perception for all items in the questionnaire and especially for chicken flu, where risk perception is twice as high as in the UK.

This difference does not emerge when one looks at generic perceptions of non-chicken related risk sources (driving, swimming or smoking), even though Italians describe themselves as risk avoiders to a larger extent than all other countries in the sample, including their British counterparts. Interestingly, Italians also regard themselves as more knowledgeable on chicken flu than respondents from other countries, which could be a consequence of higher media attention and exposure.

Parallels can be drawn from this preliminary (descriptive) investigation of the bird flu scare and help to provide a sound explanation of the larger consumption effects experienced in Italy with the resurgence of the bird flu crisis in autumn 2005. The novel TPB model, conditional on food safety information, shows the relevance of the different risk perception levels in determining the reaction to a food scares. Assuming that the response and the shift in risk perception are the same in the two countries, a higher initial level of risk perception leads to a larger decrease in consumption.

Discussion and conclusions

The complexity of factors influencing the way a consumer processes food safety information makes it difficult to develop adequate risk communication strategies. Given the frequency of food scares, such as the current bird flu pandemic, developing effective means of communication is a priority for current European policy and for the actors in the European food chain. This paper tries to answer some key questions: (1) can the consumer be segmented into socio-demographic groups in relation to their trust in food safety information? (2) are country and cultural differences relevant in the way food safety information is processed? (3) do risk perception and trust in food safety information influence food choice in relation to other determinants? (4) does a food scare alter the weight of these determinants? (5) do information sources differ in terms of how they impact on consumers' risk perception and behaviours?

A first major result is that no relationship emerges between socio-demographics variables and the trust placed by a consumer in food safety information. This finding appears to be robust as it manifests from both the segmentation analysis (consumer that differ in terms of sources they trust do not show relevant differences in terms of

demographics) and the behavioural modelling (only a few socio-demographic variables are statistically significant and they are not consistent across countries). There are major implications for this outcome, as it would suggest that the impact of food safety information depends on the source and its reliability, rather than the individual socio-demographic characteristics of the consumer processing it. That is to say it is not possible for policy makers to target specific socio-economic groups within the community e.g. single mothers or people from disadvantaged backgrounds. It indirectly suggests the need to understand the psychological characteristics of different segments of consumers and to target them with different communication messages.

On the other hand, the survey results and the subsequent modelling efforts place emphasis on the relevant country differences within Europe. Germans place more trust in mass media and alternative sources than other countries, while Italians are the least predisposed to trust these same sources. The British trust the European Food Safety Authority and other scientists to a lesser extent and the French and British place a higher degree of trust in information provided by food chain actors. Furthermore, trust in food safety information does not necessarily influence risk perception in the same direction. In all countries, except Italy, those who trust alternative sources tend to have a higher risk perception. This suggests that risk communication strategies should be country-specific and take into account the cultural differences rather than socio-economic and demographic characteristics of the households.

Risk perception is directly affected by trust in information provided by the food chain, by experts and by alternative sources such as consumer, environmental and animal welfare organisations. In general, information from experts and food chain actors reduces risk perception, while information provided by alternative sources tends to increase it. This however depends on the (positive or negative) content issued by these sources. Hence, a successful risk communication strategy should start from the consideration that people significantly differ in terms of the sources they trust but that this is unrelated to characteristics such as age, education, income, etc.

An examination of the recent bird flu scare, although a limited, suggests that the application of the novel TPB model developed in this paper on a hypothetical salmonella scare in chicken, can be used to draw parallels with bird flu and provide an interesting platform for future research. Further, this application highlights the need for the acknowledgement of consumers' differences in risk perception being dependent on their cultural background and emphasising the need for risk perception and trust in information to be key components in the development of effective food safety policy communication.

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