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## Offsetting Behavior: Consumers' Response to Food Safety Policies

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JEL Classifications: Q18, I18

Offsetting behavior occurs when policies implemented to reduce risk exposure of potential victims change consumers' behavior in such a manner that they become lax and increase the likelihood of an accident. Literature on offsetting behavior has dealt primarily with policies relating to improved transportation safety and a resulting increase in automobile accidents (Peltzman 1975). A more general theoretical framework of offsetting behavior applicable to a variety of industries was developed by Hause (2006).

Food safety policies are designed to reduce/minimize the amount of foodborne pathogens in the food supply chain. Consumers' response to these food safety policy measures points to the presence of offsetting behavior in food consumption (Miljkovic, Nganje and Onyango 2008).

Food safety uncertainties are present at all levels of the food supply chain and in food consumption, sometimes leading to foodborne diseases caused by bacteria, viruses, parasites, toxins, and heavy metals. These food safety uncertainties and events influence consumers' perception and are the main reason for the development and implementation of various food safety policies.

Due to *E. coli* O157:H7 and *Salmonella* outbreaks witnessed in the U.S food supply chain, the Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA) in 1996 introduced mandatory food safety regulations in the meat and poultry sectors. Named the Pathogen Reduction/ Hazard Analysis and Critical Control Points (PR/HACCP), the act was intended to ensure the safety and well-being of consumers in the meat and poultry sectors. Increases in contamination linked to the consumption of domestic and imported fresh fruits and vegetables and the government's effort to develop nationwide safety measures for fresh fruits and vegetables, led the Food and Drug Administration (FDA) to develop guidelines addressing food-safety hazards and good agricultural

practices common to the growing, harvesting, packing, and transportation of the majority of fresh fruits and vegetables which are characteristically sold and consumed in a minimally processed manner.

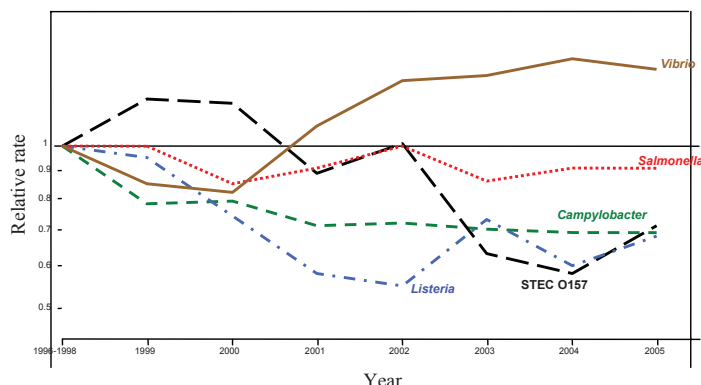
Despite these measures which are mandatory in some sectors (such as meat and poultry), and voluntary in other sectors (such as fruits and vegetables), the Centers for Disease Control (CDC) recorded an increase of foodborne disease outbreaks from 1983 to 2004, with a sharp increase in the years following the implementation of PR/HACCP. Figure 1 represents a general trend in foodborne disease outbreaks for this period observed by the CDC. CDC data should be treated with caution. Although it is clear from the graph there was an increase in foodborne disease over time, the implementation of PR/HACCP at the processing level saw a significant decrease in the level of certain foodborne pathogens. Figure 2 shows this trend as documented by CDC. The difference between pathogen mitigation as a result of instituted policies and the increase in the number of foodborne disease outbreaks observed, suggest the possible presence of offsetting behavior by consumers regarding food-safety.

Figure 1. Trends: Foodborne Disease Outbreak Surveillance System



Source: Centers for Disease Control FoodNet (2006).

**Figure 2.** Trends: Relative rates compared with 1996–1998 baseline period of laboratory–diagnosed cases with *Campylobacter*, STEC O157, *Listeria*, *Salmonella* and *Vibrio*, by year.



Source: Centers for Disease Control FoodNet, (2006).

Hence the expected effect of food safety policy implementation in terms of reduced foodborne illness, mortality, and food-associated disease, may be less than expected due to the change in consumers' risk attitude and behavior. Consumers may exhibit riskier behavior in the face of implemented food safety policies.

Recent research using experimental economics found that offsetting behaviors exist in food safety (Miljkovic, Nganje and Onyango 2008). Their experimental design involved a representative sample of more than 2,556 individuals nationwide. Food safety related questions associated with consumers' perception of risk and consumption preferences for hamburgers were asked and analyzed. Consumers had a strong preference for rare over well done hamburgers before any information on food safety, potential presence of *E. coli* O157:H7 in meat, and its impact on human health was provided. Once negative information on the impact of *E. coli* O157:H7 on human health was supplied, these same consumers switched their preferences towards well done burgers. Finally, when consumers were presented with information on the positive impact of PR/HACCP, their risk perception for

the safety of the meat changed in such a way that they dropped their guard and increased their preference for rare meat to a level even higher than before any food safety information was provided. To them, the implementation of PR/HACCP nullified the food-safety risk due to *E. coli* O157:H7 in their beef burgers.

Given recent food safety outbreaks, regulators may come under pressure to introduce mandatory food-safety measures such as the one in the meat and poultry sector for fresh fruits and vegetables. The hypothetical scenario of introducing mandatory PR/HACCP in the fruit and vegetable sector and its impact on consumer behavior was experimentally tested. Vegetables were preferred because of certain attributes they possess. These include health benefits associated with regular consumption, consumption in minimally processed form, and increased food safety outbreaks in recent years. Outbreaks include the 2003 green onion Hepatitis A outbreak, 2006 spinach and lettuce *E. coli* O157:H7 and *Salmonella* outbreaks. Results indicate consumers exhibit offsetting behavior when positive information is provided to them about the potential impact PR/HACCP would have in the vegetable sector.

Thus, offsetting behavior was found to be exhibited by consumers both in consumption and preparation of vegetables, and in consumption of burgers. In both cases, positive information from food safety policies altered consumers' perception of risk in such a way that they developed a false sense of safety, which might increase the possibility of a food contamination event occurring. Lui, Huang and Brown (1998) illustrated a relationship between trust, risk, and food safety concerns given media and other associated information. The risk perceived by consumers is based on information about the quality and safety of a product that can be acquired from a variety of sources. It is therefore likely consumers can acquire new information and change their perception of risk. For example, information about a contamination incident causes consumers' perceived risk  $R^p$  to increase relative to their original risk perception. New and favorable information about food safety provisions help consumers slowly adjust their risk perception back toward a more objective level.

Consumers' perception of foodborne risk can be affected by several factors. These include measures taken to reduce the risk of contamination from production to consumption, experience an individual has with a foodborne poisoning event in the past, fear of the unknown, and demographic characteristics such as age, sex, income, race, and educational background. Following the 2006 nationwide spinach recall, research found trust in private and public institutions in charge of ensuring food safety have a substantial influence on consumers' food safety perception (Onyango et al. 2007). This influence is exhibited by consumers' trust of regulatory agencies such as the U.S. Department of Agriculture (USDA), Centers for Disease Control (CDC), and the Food and Drug Administration (FDA). Consumers' implied

trust can reduce their concern in response to positive information about the impact of potential policies aimed at alleviating the risk of a foodborne incident.

### **Potential Rationale for the Existence of Offsetting Behavior in Food Safety**

The absence of a mandatory policy approach at farm and retail levels hampers the mitigating effect for which the food safety strategy is implemented. Food undergoes different forms of processing and handling from the time it is harvested to when it is consumed. Some food substances are delicate and perishable and need to be processed and distributed rapidly. However, the mere fact that different agencies are responsible for different aspects of food safety in the food production chain opens the situation to ongoing inconsistencies and inefficiencies. Hence, food might be contaminated along the production chain due to these nontransparent and nonuniform regulations.

There exists a dichotomy between pathogen levels at the farm, processing, and retail levels, including the consumption level. For example, cross contamination occurring at the kitchen level and restaurants during food preparation, might undermine the impact and effectiveness of food safety risk reduction strategies. *Salmonella* and *E. coli O157: H7* are known to thrive at all levels of the food supply chain. A significant number of foodborne disease outbreaks have been witnessed at the processing level although PR/HACCP in the United States is mandatory. Given the optional nature of the PR/HACCP at the farm and retail levels, and the voluntary nature of regulations in the fruit and vegetable sectors, the state of California, from where the 2006 nationwide spinach outbreak started, is pushing for regulations to upgrade existing policies which have been found deficient in protecting the wellbeing

of consumers. Some authorities have suggested present agricultural practices in the produce industry have not been effective in providing the necessary protection against pathogen contamination.

The mix of food safety strategies undertaken by firms in the different food sectors is complex and cumbersome. For example, it is known that some firms employ voluntary PR/HACCP while others employ a different blend of testing involving standard operating procedures (SOP), good agricultural practices (GAP), third party checks, and varying degrees of testing by the U.S. Department of Agriculture. The mix of strategies utilized might confuse consumers and cause them to not fully understand the nature of the actions employed to improve food-safety standards. Therefore, consumers might develop a false sense of security or trust in food-safety regulations and become negligent (reduction in avoidance expenditure) about their preparation and consumption behaviors. The expected outcomes of these food safety actions can be mitigated due to the reduction in consumers' preventive actions. A common example that can be advanced here is consumers' consumption of ground beef. Even though it is generally recognized that undercooked ground beef has a higher risk of contamination from a lethal bacteria like *E. coli O157: H7*, beef burgers not cooked to recommended levels are still one of the more widely consumed foods in the United States.

### **Further Reflection**

Given the rationale for offsetting behavior in food safety, consumers' food expenditure decisions can be affected by the availability of food safety information, the nature of the supply chain to produce a final product, and consumers' timing of decision making. The motivation behind implementing food safety policies in the food sector

is to guarantee the well-being of consumers. These food safety regulations (PR/HACCP in meat processing) are structured and implemented at points where the probability of adulteration is high, such as critical control points (CCPs).

The effectiveness of these food safety policies is evaluated at these points, though each might be a single control in the network from farm to fork. In the case of meat, meat at the processing plant might be free of contamination, but that does not guarantee meat is safe for final consumption since it could have been contaminated in transport or at retail stores or restaurants. Therefore, when food safety information about processing plants is given to the public, consumers could assume this safety level is relevant to what they buy at the retail outlet. Assuming information is fully transmitted, consumers may exhibit offsetting behavior and the net benefit of food safety policies would be overstated.

Positive food safety information following policy implementation was found to affect consumers' attitude and behavior to the point where they become lax and negligent about the way they prepare and consume food. In the case of meat, they increased the likelihood of contamination due to the consumption of undercooked meat. In the case of vegetables, the likelihood of contamination increases due to consumers' diminished effort to wash vegetables well. The welfare consequence of offsetting behavior depends on the reduction in potential victims' accident avoidance expenditure.

Offsetting behaviors should be taken into account to correctly state the net benefits of proposed food safety regulations. These include possible mandatory regulations in the fresh fruit and vegetable sector and better and more efficient food safety regulations in the meat and poultry sector as well as seafood and fruit juice sec-

tors. Failure in this regard may lead to overstating food safety policy's positive impact, which may in turn mislead consumers, potentially further jeopardizing their health.

### **For More Information**

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