Private, National, and International Food-Safety Standards

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Just as international food and agricultural trade has increased over time, food safety has become increasingly important. This paper discusses the economic framework of food safety and international food trade. Both the private and public sectors within individual countries have incentives to improve food safety, and as a result they have taken many actions to reduce food-safety risks, often in the form of private, national, and international standards that they impose on firms. The first half of this article discusses these issues.

Differences in standards across borders can lead to trade conflicts whose resolutions depend on the distribution of costs and benefits from the manufacture, trade, and consumption of safe food. The second half of this article presents a framework of three main types of international outcomes arising from differing food-safety standards, with examples from both the public and private sectors.

Private Standards

Incentives

There is a growing demand for food safety, which provides incentives for firms to produce safer food. If consumers associate certain branded products with safety and buy these products, then those food producers with good reputations may see increased market share and value and may be better positioned to export to emerging overseas markets. Conversely, companies—particularly larger companies—wish to avoid product-liability lawsuits, recalls, and bad publicity to protect their market share and brand-name equity (Buzby, Frenzen, and Rasco 2001).

When food suppliers consistently provide safe food to major buyers, they may receive price premiums or guaranteed sales in annual or multi-year contracts. Additionally, there may also be financial rewards for food-safety innovation if companies can successfully invent and market a new food-safety technology or creatively fill a food-safety niche market—for instance, by becoming a third-party certifier.

Actions

With heightened awareness of food-safety concerns, the private sector is taking many actions to improve food safety. One of the most visible changes has been the introduction of food-safety control systems like Hazard Analysis and Critical Control Point systems (HACCP). Many firms are implementing HACCP, which identifies, monitors, and controls hazards at critical control points in food production and processing. One main feature of HACCP is that it allows firms to select their own methods of dealing with food-safety issues to reach a desired level of safety and quality.

The private sector is also increasingly using stricter supply-chain management to ensure the use of safe inputs. Management techniques such as vertical coordination and contracting increasingly incorporate private standards to ensure that input suppliers provide inputs with high quality and safety levels and to ensure that the firm's output also meet high standards.

Firms commonly use a mix of approaches, such as HACCP and standardized-sampling procedures to reject or accept lots to reach a desired level of quality or safety (Buzby and Roberts 1999). These efforts are often in cooperation with or with guidance from the public sector and/or international standard-setting bodies (e.g., Codex HACCP standards). Private firms are also increasingly having a third party certify that they meet certain safety or quality standards.

Public Sector

Incentives

Market failures in the provision of food safety often mean that the private sector does not provide the

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optimum level of food safety. These market failures provide incentives for the public sector to get involved, often by implementing standards.

These market failures can occur for several reasons. Consumers generally can't determine if food is safe before buying it because food safety is not observable. Additionally, food prices and transactions do not fully take into account all of the social costs of food safety—such as medical costs and lost work time that occurs from eating unsafe food—and so these social costs are not considered by individuals when they are making their food-purchasing decisions (Buzby et al. 1996; Buzby and Roberts 1997; Golan et al. 2001). As a result, there are reduced incentives for firms to supply the optimal amount of safety and for consumers to demand the optimal amount of safety. Finally, product reputation is often a public good. For example, if consumers can't tell which of many strawberry farmers produced bad strawberries, consumers might avoid strawberries altogether, thus affecting all of the farmers in that industry. This would reduce the incentives for any individual farmer to make food-safety improvements and makes it more necessary for public-sector oversight to ensure food safety (Segerson 1999).

Actions

Public-sector agencies, particularly in industrialized nations, have taken several approaches to food-safety regulation since the 1990s (Roberts and Unnevehr 2003). Many nations have implemented overarching measures, such as consolidating food-safety functions into one agency that focuses on food safety, and have implemented more focused measures on particular regulations, such as increasing the stringency of existing standards or adding new and more extensive regulations to handle newly-identified hazards. Public-sector actions also include the growing use of risk analysis to design regulation, HACCP systems to serve as a basis for new regulations, and the farm-to-table approach to address food-safety hazards. Regulatory agencies are also providing more food-safety information to consumers, such as safe food-handling labels.

To a lesser extent, regulatory agencies in developing countries are also following some of these trends. The appropriate level of government regulation is a fine balance because in addition to the societal benefits of regulation, regulation also imposes costs on firms.

International Trade Outcomes

The market failure issue can be even more acute when it comes to internationally traded food. Countries can't regulate food-safety practices across borders as they can with domestic producers, and information on the food-safety practices of foreign suppliers is even harder to obtain. Additionally, many developing countries can't afford to develop and maintain a comprehensive food-safety system, so importers may have even less information on the safety of foods from those countries. In response, country governments or importing firms often require exporting firms to meet the importers' food-safety standards.

There is no universal approach to food safety. Countries may have different desired levels of safety, different approaches to regulation, and different costs of compliance. Countries have good reasons for these differences because they have different food-safety experiences and food-safety risks in domestic food supplies. Risk levels vary internationally due to differences in available technology, plant and livestock host factors (e.g., plants with different levels of contamination or herds with varying infection rates), food-production practices (e.g., use of veterinary drugs), cultural differences (e.g., routine consumption of raw seafood), and geographic or climatic conditions. Countries also differ both in their ability and willingness to pay for reductions in food-safety risks.

Because countries vary so much across these factors, some countries may perceive a certain food-safety risk as totally unacceptable while others may place a low priority on addressing that same risk. In short, the food-safety level in imports acceptable to one country may not be acceptable to another. Differences in standards may cause trade conflicts.

When countries experience a conflict over food-safety regulations, the conflict is usually resolved in one of three major ways: trade stops or ceases, one or both countries alters existing standards, or one or both countries adopt international standards. Which of these outcomes occurs depends on the relative distribution of costs and benefits.

Importers receive benefits both from trade (usually the consumption of cheaper food) and from consuming safe food, and incur costs from consuming unsafe food. Importing standards may be imposed either by governments on firms that wish to export to their country, or they may be imposed

by private firms who put standards in place all along their supply chain. Importing governments often take into account the social costs of food-safety problems in determining their costs and benefits, while importing private firms only consider their private costs.

Exporters receive benefits from trade (usually higher prices and access to larger markets than are available domestically), and incur costs from producing food to a particular standard of safety (see Segerson [1999] for a complete discussion of the cost-benefit analysis of food producers). Exporters are usually private firms, but they may be aided by their national governments in settling a dispute over standards. The rest of this section discusses the three possible outcomes in detail and provides examples of what happens when standards differ between a pair of trading countries or firms.

Outcome 1: Trade May Cease

International food trade of a particular product between two countries can simply stop for a number of reasons. These situations may be temporary, such as when one country discovers that its trading partner's shrimp exports are infected with *Salmonella* and further investigation is needed. Alternatively, these situations may be may be longer lasting, such as European Union (EU) bans of chicken exports treated with chlorine.

Importers usually import from companies abroad that produce at a lower cost than domestic firms. If an importer enacts a more stringent food-safety standard, the exporting-country firms might be unable to produce goods that meet this new standard more cheaply than the country's domestic firms (Mitchell 2003; Jaffee and Henson 2004). For exporting-country firms, the benefits of exporting the safer version of the food (e.g., higher prices) are not large enough to compensate them for the additional cost of producing the safer version of the food, so they may decide not to produce the safer version (Henson, Brouder, and Mitullah 2000). The importing country's consumers may decide that the benefits of buying the cheaper but less-safe version of the good from abroad are outweighed by the benefits of buying the safer but more expensive domestically produced food. In this case, ending trade can actually improve welfare.

In other cases, however, the exporting-country firms might be able to provide low-cost and safe food at a price that the importing country's consumers are willing to pay, but trade may cease because their regulations don't match. Here, trade would give the exporters the benefits of added markets, and the importing country's consumers would get the safe food they wanted at a reasonable price. Since both sides would gain from this trade, a trade ban decreases welfare.

In the case of a sudden food-safety crisis, the exporting country firm's costs of providing safe food suddenly rise astronomically. In this case, the benefits of trade are reduced, as the exporting country can no longer provide safe food at a reasonable price. Sudden food-safety shocks can alter trade flows, and governments may step in with temporary bans and information dissemination. The importing-country government will try to determine the potential health costs of the imported good and the length of time that production costs of safe food will remain high in order to determine whether future trade will increase or reduce welfare.

One set of trade bans took place in January 1999 when dioxin-contaminated feed was fed to chicken, swine, and other food animals in Belgium, subsequently affecting a large array of agricultural industries. This temporarily interrupted trade with more than 30 countries, some of which explicitly banned the import of these products (Buzby and Chandran 2003; Lok and Powell 2000). The combination of slaughter bans, large price concessions, and reduced markets posed an economic burden on consumers, food producers, and food exporters. The Belgian government estimates that the dioxin crisis cost €465 million.[1]

Private standards may also disrupt commerce. In Brazil during the 1990s, the 12 largest dairy companies stopped using milk from 61,000 milk suppliers due to the modernization of the sector and upgrading of standards (Farina 2002). In particular, the dairy companies required the milk to be cooled on the farm to improve milk quality.

Outcome 2: One or Both Countries May Alter Their Standards to Meet Those of Their Trading Partners

A second potential outcome occurs when a country or food firm alters its food-safety practices or

[1]Equal to $493 million, where 1999 €1.00 = US$ 1.06 (FAS 2001, pp. 18, 19).

standards to match those of the public or private sector in their trading-partner countries. An importer will alter its regulations to match that of its trading partner if the benefits of continuing to consume the good at a low price outweigh the added food-safety benefits. An exporter will raise its standards to match those of its trading partner if the benefit of keeping the export market outweighs the added cost of producing the safer good (Baldwin 2002). There might also be a compromise point between two sets of regulations such that these cost-and-benefit relationships would hold if both countries altered their regulations to move them closer together (Hooker 1999). Additionally, if the exporter enhances its own food-safety practices, its consumers may benefit if they can afford the new, safer food (Donovan, Caswell, and Salay 2001; Vogel 1995).

The public sector altered its standards in response to a food-safety issue in Kenya's Nile perch industry. The EU initially required testing for, and then banned, Nile perch imports from Kenya due to Salmonella, cholera, and pesticide residues. The Kenyan government altered its regulations, and private firms established HACCP plans. Some smaller firms weren't able to comply. Eventually, the Kenyan industry was certified for imports by the EU (Henson, Brouder, and Mitullah 2000).

Private sectors can also alter the standards of business partners. For example, some supermarket chains in some countries, such as in Latin America and Asia, enforce standards specifically for food safety (Reardon, Timmer, and Berdegué 2003). These higher private food-safety standards provide opportunities for those farmers, wholesalers, and others who can adapt to these changes and upgrade their own standards. Meanwhile, this upgrading creates difficult challenges for others.

Outcome 3: One or Both Countries May Adopt International Standards

In addition to private and public standards, firms interested in participating in international food trade may also adopt or contend with others who have adopted standards set by international standard-setting bodies. This option is most attractive when, as in Outcome 2, exporting countries find that producing to the international standard gives them access to markets that will pay prices high enough to cover the additional cost of producing to that standard (Holleran, Bredahl, and Zaibet 1999). Meanwhile, importers might adopt these standards if they find that adopting them enables them to import goods at a satisfactory safety level at reasonable prices.

International standards for food safety can be set by organizations like the Codex Alimentarius Commission, known as Codex for short. Codex was created by the World Health Organization and by the Food and Agriculture Organization of the United Nations to develop food standards, guidelines, and related texts to protect consumer health, ensure fair-trade practices, and promote coordination of work on food standards by governments and non-governmental organizations. Codex has committees that set standards for specific commodities, like meat or fresh vegetables, and general-subject committees that focus on specific areas, like food import and export inspection and certification systems. If there is a trade dispute, the World Trade Organization uses Codex as a legal reference.

Another standard-setting body is the International Organization for Standardization (ISO), which is a non-governmental organization made up of the national standards institutes from over 150 countries (ISO 2005). ISO standards facilitate trade across a wide range of fields. Examples include the size and thickness of bank cards and the dimensions of freight containers. ISO recently released its ISO 22000 series of standards which focus on food-safety-management systems all along the food chain. This series has over 600 standards that address specific aspects of food safety and quality. Earlier standards series for food production focused primarily on quality-management standards. Both Codex and ISO standards are voluntary, and both entities lack enforcement mechanisms to ensure that their standards are followed.

The incentives to adopt international standards vary among countries. Most agricultural trade takes place among developed countries with decades of food-safety laws on the books. International standards may be more popular and effective with countries that are starting more or less from scratch (Post 2003). Developing countries that wish to build export programs are often challenged to meet numerous standards and requirements set by importing countries, so many developing countries feel that adopting international standards would help strengthen the safety of their food products and facilitate and promote their participation in international food trade (Post 2003). For example, public-sector bodies in developing countries may

adopt Codex standards for maximum residue levels of pesticides, fungicides, and veterinary drugs (EPA 2005).

Additionally, private-food companies may voluntarily adopt international standards for their production practices in anticipation that doing so may improve their market access and share and to assure potential buyers that their product is safe. For example, companies may adopt ISO 6579, which involves a common laboratory method to detect the presence of Salmonella in food and animal feed before they are marketed for human and animal consumption (ISO 2004).

Conclusion

Public- and private-sector initiatives are actively improving food safety. The private sector acts to improve food safety because there are market incentives to do so. Market failures, however, can prevent the market from providing the optimal level of food safety, so the public sector also has incentives to regulate food safety through the use of standards, regulations, and cooperative activities. When facing different food-safety standards, countries or firms may stop trading, alter their standards, and/or adopt international standards. The ultimate outcome of an individual food-safety dispute depends on the cost-benefit calculus.

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