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Inspection, testing errors and trade in tainted products

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ABSTRACT

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This paper examines international trade and inspection involving tainted products in a model of quality choice, facing fears that globalization is the cause of numerous food incidents. Particularly, we ask the following questions: (i) What are the conditions under which foreign firms choose to produce tainted goods? (ii) Does globalization via freer trade lower product safety? (iii) Why are goods imported even though they are known to be harmful? We show the existence of a free trade Nash equilibrium characterized by production and trade of high-quality non-tainted products. However, free trade cannot prevent the export of tainted goods, because the foreign firm may deviate under different combinations of parameters. We identify self-correcting mechanisms such as nationalism and a political-economy re-allocation of public resources in favor of customs authorities. Nevertheless, we also uncover activities that exacerbate tainted production like errors of testing and sabotage by rival firms. *J. Japanese Int. Economies* **35** (2015) 99–116. Erasmus University Rotterdam, Tinbergen Institute, The Netherlands; CESifo, Germany; Research Institute of Economics & Business, Kobe University, Kobe 657-8501, Japan.

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1. Introduction

Media around the world abound with examples of malpractices in the daily running of food production, especially when it comes to food imports. A simple search on the internet will turn out hundreds of infamous cases. For example, a couple of years ago, it was revealed that some unscrupulous companies in China have added melamine to milk to artificially boost protein readings in quality tests and exported some of these products to Japan.[2] Several Chinese firms have exported frozen catfish laden with banned antibiotics.[3] Furthermore, firms from other developing and emerging economies have also been found guilty of using dangerous ingredients. For instance, during the first half of 2007, U.S. inspectors rejected more than 1700 and 1500 shipments from Mexico and India respectively.[4] In 2011 the Center for Disease Control and Prevention estimated that about 48 million people got sick, 127,839 were hospitalized and 3037 died from food contamination in the U.S.[5] Of these illnesses 80% were caused by unspecified sources and data show no clear evidence of progress in reducing food borne infections. Given this, many claim the numbers are linked to a greater dependence on cheap imports. Thus, faced with a security challenge, public health authorities and consumer advocates have repeatedly asked to fend off globalization and insisted that local production be increased and government oversight be strengthened (Kimball, 2006).

This paper examines the theoretical premises of such conjecture in a model of quality choice, with international trade involving tainted products and inspection. Especially we are interested in uncovering the conditions under which foreign firms choose to produce tainted goods. We ask questions such as: (i) Does globalization via freer trade lower product safety? (ii) Why are foreign goods still imported though notorious for their harmfulness? (iii) How is export quality affected by errors of testing and rival strategies such as sabotage? As more goods from distant locations are imported, these issues assume considerable importance. To our knowledge, the present paper is the first attempt at addressing them in a unified setting.

We study an international trade game between a foreign firm and a domestic government. The former has access to two technologies, producing either a high-quality good or a tainted product, while the latter implements a trade policy that either promotes free trade or bans imports (a tariff policy will replace the ban in the Appendix). Conditional on the government's policy choice, there is a continuation game where the foreign (F) firm competes with a home (H) firm in the home market. A domestic health authority oversees import quality but is only able to inspect a fraction of total shipments.[6] The inspection ratio is known to consumers before consumption decision is made and to firms before their choices of output and quality. Given the above, our setup is a sequence of market structures that span over an infinite horizon. For each trade policy, firm F chooses its quality strategy by comparing the expected discounted value of the infinite stream of profits across qualities. And which quality is selected is private information of the firm only. Note that as firm F does not want to signal cheating when its product is tainted, it sells a quantity similar to that under high quality at the high-quality price.

In contrast home consumers are unable to recognize tainting before they actually use imported goods. They are boundedly rational in that tainting is outside any of their priors regarding possible states of the world. Thus in the basic model we adopt the experience goods approach that allows consumers to learn about the product.[7] The foreign firm's quality becomes observable to consumers only

[2] On melamine see The Japan Times Online (September 27, 2008) and the informative Wikipedia entry.

[3] The U.S. Food and Drug Administration intercepted more than a hundred food imports from China at U.S. ports together with more than 1000 shipments of tainted dietary supplements and counterfeit medicines (Washington Post; May 20, 2007).

[4] The Associated Press (July 20, 2007).

[5] http://www.cdc.gov/foodsafety/outbreaks/multistate-outbreaks/index.html.

[6] In reality, the U.S. Food and Drug Administration checks only 1% of all shipments bound for the U.S. market. In contrast, Japan inspects 11% of imported goods and in the case of meat the inspection rate is 100% (The Japan Times Online; November 26, 2008).

[7] Nelson (1970) systematically analyzes the differences between experience goods and search goods. Chen (1991) shows that an R&D subsidy characterizes optimal infant industry intervention, and it can also help individual firms to appropriate the benefits of quality-enhancing investments. Bergès-Sennou and Waterson (2005) focus on product labeling issues.