Using Minimum Quality Standards as a Food Safety Tool

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Background and Motivation

Food safety is a growing and unavoidable concern in developing nations. Many molds, including the mycotoxin aflatoxin, are still prevalent in staple crops such as maize, peanuts and chills. Aflatoxin is detrimental to the health of those living in certain Asian and African countries that find themselves at higher risk of liver cancer and stunted growth (Grace et al. 2015). As globalization becomes an indelible part to markets everywhere, the policies and requirements of trade partners play a crucial role in the advancements of the home country.

Developing countries are adopting food safety regulations of those trade-partner countries with stricter policies on toxins and bacteria (Reardon 2009). However, while goods that eventually find themselves being traded overseas feel the positive effects of these adaptations (Unnevehr, 2015), local staple products do not garner the same benefits.

Recent literature has shown that consumers in growing urban areas in Latin America are adjusting their food safety expectations (Balsevich 2003). Vietnam is also showing trends of demanding food safety assurances as income and modern grocery store market penetration increases (Mergenthaler 2009). However, these changes are unevenly distributed between urban and rural populations and move slowly and uncertainly. There is still a high percentage of the population that chooses its food on visible characteristics that have no bearing on the safety of the good.

Objectives

The purpose of this study is to model the impact of food safety regulations in developing countries. Two main research objectives are:

- To develop a model that illustrates the potential effects of Minimum Quality Standards on the unobservable attribute, that is independent from the consumer preference, by adapting the model of Saitone and Sexton (2010) to reflect unique characteristics in food markets in developing countries.
- To highlight the market conditions under which the implementation of food safety regulations, used in developed countries, is effective and welfare-improving.

Model Set-Up

- Assuming consumer preferences are not aligned with food safety recommendations and practices of developed countries that have lower rates of food related illnesses. The discounted product in developing country markets tend to be graded on observable characteristics such as color or smell (Kadjo 2016).
- Assume, as Mussa and Rosen (1976) and Saitone and Sexton (2010) did that consumers are uniform in their distribution over a single taste parameter.

Variables:

- \( X \) = Total output
- \( y_1 = \) ante share that grows low quality color
- \( y_2 = \) ante share that would grow moldy
- \( L_C = \) Quantity of high quality good on market = \( 1 - y_1 \)X
- \( L_M = \) Quantity of low quality good on market = \( y_1 \)X
- \( a = \) Relative quality level of the \( H_x \) to the \( L_x \) good in the eyes of the consumer
- \( \gamma \) = Quantity of moldy good on the market.
- \( \beta = \) Cost per unit transformed
- \( p = \) price of \( L_C \)
- \( T = \) amount of \( X \) transformed

No Minimum Quality Standards

- Price: \( p^* = (1 - X(1 - y_1) - ax)(y_1) \)
- Price: \( p^* = (1 - X(1 - y_2) - Xy_2)(y_1)X + (1 - X) \)
- Profits: \( 1 - X - y_1cX + \alpha y_1X^2 - y_2(1 - a)(1 - y_1)X^2 \)

Minimum Quality Standards Implemented

- Quantity: \( Q_{MC}^* = (1 - y_1)X \)
- Quantity: \( Q_{MC}^* = (1 - y_1)X + T \)

- \( T = (1 - X(1 - y_1) - ax)(y_1)X + (1 - X) \)
- \( 1 - X - y_1cX + \alpha y_1X^2 - y_2(1 - a)(1 - y_1)X^2 \)
- \( (1 - y_1)(X + Xy_2)(1 - y_1)(y_1X^2 + a - 2aX(1 - y_1)(1 - y_1)X^2) \)
- \( (1 - y_1)(X + Xy_2)(1 - y_1)(y_1X^2 + a - 2aX(1 - y_1)(1 - y_1)X^2) \)

Profits and Consumer Welfare with Low Transformation Costs

- With a low enough \( \beta \), higher profits for producers would provide incentives for producers to adopt and enforce the MOS policy.
- Consumers would lose surplus with the adoption of the MOS, however immeasurable health benefits that are not measured by the consumer in their welfare are realized.
- Potential to reduce reliance consumer education and count on producers being profit maximizers if transformation costs are appropriately low.

Discussion

- Want to be able to assume color is not an indicator for mold so both the high quality and low quality color goods would have infected portions. This would lead to quantities of both being transformed and effecting price changes.
- Developing countries have a good deal of sustenance farming, so would the rise of market prices push consumers to produce more themselves?
- The difference in household valuations of homegrown and market purchased staple goods (Hoffman, 2014) may indicate that there is some willingness to pay for food safety or reliability.

Future Research

- Willingness to pay for food quality or reliability.

References


