Geographical Indications and Optimal Firm Labeling Strategy

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INRA-IDEI
Dec. 15-16 2011

Introduction

- Consumers have less information than producers about the **quality of agricultural goods** (e.g., experience goods, credence goods)
- Consumers attach some value to “authenticity,” local product or “**ethnocentrism**” (Lusk et al., 2006; Marette, 2005)
- Increasing interest in food products of **known geographical origin**
- But origin is not always known...
- Certifications (label, **Geographical Indications**,...) help consumers to be informed about **quality** and **origin**

Introduction

- **Geographical Indications (GIs)**
  - “specific link between the place of production and the product’s quality, characteristics or reputation” (TRIPs)
  - are used mostly in Europe
- **Characteristics of a GI**
  - belongs to a group of producers – collective right
  - communicates
    - the area of geographical origin
    - the quality of the good

Introduction

Our setting

- Quality and origin are **credence** attributes
- Consumers **perception of quality and origin**
- Consumer preferences differ
  - All consumers prefer high quality if quality is known and at identical prices
  - Some consumers value origin

Introduction

Research question

- What is the impact of consumers knowledge on labeling strategies?
- How consumers perception of the quality and origin of the good will impact label pricing?
- How consumers perception will have an impact on firms' profit?
- How the provision of label impacts welfare?

Introduction

Model setting and Findings

- Model of vertical differentiation (**quality**) with **location attribute**
- Two regions
  - inside region (I) – firms can obtain a GI
  - outside region (O) – firms cannot get a GI
- Firms and consumers are located in both regions
- Firms inside can use a GI or not
- Consumers inside and outside differ in their preferences

Introduction

Findings

- When there is uncertainty about quality
  - Labeled good price is not always higher than the non labeled good price
  - Firms do not necessarily benefit from labeling
- Producers may decide not to label if consumers who value authenticity have a good perception of quality
- However, depending on the uncertainty on quality, a firm might prefer to label if the label reveals both quality and origin, and not to label if it reveals only quality

Introduction

Literature

- GI – Marette (2005), Requillard (2007)
- GIs, high quality products – Moschini and al. (2008); Menapace and Moschini (2010); Langinier and Babcock (2008)
- Labeling good is not necessarily of high quality – Desquilbet and Monier-Dilhan (2009)
- Welfare implications of GI
  - not clear – Zago and Pick (2004)
  - welfare enhancing in a competitive market with free entry – Moschini and al. (2008)
  - private labeling scheme versus public labeling – Bouamra Mechemache and Chaaban (2010)
- Uncertainty about quality – Gabszewicz and Grilo (1993), Bonroy and Constantatos (2008)

Introduction

Outline

- Introduction
- General model
- Case with two firms
  - Uncertainty on quality
  - Uncertainty on quality and origin
- Case with 3 firms
- Some remarks

General Model

Producers side

- $m \geq 2$ firms
- each firm i produces a different quality s_i for $i = 1, \ldots, m$
- firms have different costs c_i

- Firms are located in two different regions
  - **region** I (inside) – firms can adopt a GI to signal the origin of their product to consumers
  - **region** O (outside) – firms cannot adopt the GI

General Model

Consumer side

- $N = 1$ consumers
- Each of them consumes either 0 or 1 unit of the good

- They are located in the two regions *I* and *O*
  - A fraction λ of consumers lives in region *I*
  - A fraction $(1 - \lambda)$ lives in region *O*

- Consumers not only differ in their taste parameter, but also in their locations
  - Consumers located in region *I* have a preference for inside goods
  - Consumers located outside do not

General Model

Consumer side

- Expected preferences of a consumer located in region k, $k = I, O$

$$U^k = \begin{cases} \theta E_k(s_i) + E_k(r_i) - p_i & \text{if he pays } p_i \\ 0 & \text{otherwise} \end{cases}$$

- θ – **taste parameter** distributed according to an uniform distribution between $\underline{\theta}$ and $\overline{\theta} = \underline{\theta} + 1$, where $F(\underline{\theta}) = 0$ and $F(+\infty) = 1$
- $E_k(s_i) = s_i^k$ – **expected quality** for a consumer located in region k, $k = I, O$ who buys the good from producer i, $i = 1, .., m$
- $E_k(r_i) = r_i^k$ – **expected origin**
  - $r_i^O = 0$
  - $r_i^I > 0$

General Model

Timing

1. The governmental agency offers a certification (GI)
2. Given the existence of a certification, producers decide whether or not to adopt the certification if they can
3. Producers observe what certification has been adopted and by how many firms. Then, all the firms compete in price

Case with two firms

- We assume
  - 1 firm in region *I* - firm 1
  - 1 firm in region *O* - firm 2
- 2 cases
  - Uncertainty on quality
  - Uncertainty on quality and origin
- For each case
  - no label
  - label

Uncertainty on quality

No label

- Inside consumers know the origin, not the quality
- Each consumer in region I has the following expected preferences

$$U^I = \begin{cases} \theta s_1^I + r - p_1 & \text{if he buys a local good at } p_1 \\ \theta s_2^I - p_2 & \text{if he buys an outside good at } p_2 \\ 0 & \text{otherwise} \end{cases}$$

- s_i^I – **expected quality** of the good bought from a local producer $i = 1$ or an outside producer $i = 2$
- r – parameter linked to **geographical origin** (same for all inside consumers)

No label

- Each consumer in region O has the following preferences

$$U^O = \begin{cases} \theta s^O - \min\{p_1, p_2\} & \text{if he buys a good at } p_2 \text{ or } p_1 \\ 0 & \text{otherwise} \end{cases}$$

- s^O – **expected quality** of the good

No label

- Demands are

$$D_1(p_1, p_2) = \lambda(\overline{\theta} - \frac{p_1 - r - p_2}{\triangle s^l})$$

- and

$$D_2(p_1, p_2) = \lambda(\frac{p_1 - r - p_2}{\triangle s^l} - \underline{\theta}) + (1 - \lambda)$$

- $\triangle s^l = s_1^l - s_2^l$

- **Assumptions**
  - $\mathbf{0} \leq \mathbf{r} \leq \mathbf{p}_1 - \mathbf{p}_2$
  - regional bias: $s_1^l \geq s_2^l$
  - $s^O \geq s_2^l$
  - market is covered ($\underline{\theta} \geq \frac{p_2}{s_2^l}$)

No label

- Each firm solves

$$\underset{p_i}{Max}(p_i - c_i)D_i(p_i, p_j)$$

- Equilibrium (p_1^*, p_2^*)

$$\begin{aligned} p_1^* &= \frac{1}{3}[r + 2c_1 + c_2 + (2 + \underline{\theta} + \tfrac{1-\lambda}{\lambda})\triangle s^l] \\ p_2^* &= \frac{1}{3}[-r + c_1 + 2c_2 + (1 - \underline{\theta} + 2\tfrac{1-\lambda}{\lambda})\triangle s^l] \end{aligned}$$

- for

$$r \in \Phi_1$$

- and

$$\lambda \geq \frac{1}{2}$$

No label

- Within this simple setting (2 firms and unknown qualities), in absence of any label
- The equilibrium prices (p_1^*, p_2^*) are such that
  - As r increases so does p_1^*, but p_2^* decreases
  - As $\triangle s^l$ increases, both prices increases
  - As λ increases, both prices decreases, but p_2^* decreases faster

No label

- Profits are

$$\Pi_1(p_1^*, p_2^*) = \frac{\lambda}{9\triangle s^l}[r - c_1 + c_2 + (2 + \underline{\theta} + \tfrac{1-\lambda}{\lambda})\triangle s^l]^2$$

$$\Pi_2(p_1^*, p_2^*) = \frac{\lambda}{9\triangle s^l}[-r - c_2 + c_1 + (1 - \underline{\theta} + 2\tfrac{1-\lambda}{\lambda})\triangle s^l]^2$$

- as $\triangle s^l$ increases, so does Π (classic finding)
- If $c_1 = c_2 = 0$

$$\Pi_1(p_1^*, p_2^*) > \Pi_2(p_1^*, p_2^*)$$

Label

- Label reveals quality of the labeled good
- Each consumer in region l has the following expected preferences

$$U^l = \begin{cases} \theta s_1 + r - p_g & \text{if he buys the labeled good at } p_g \\ \theta s_2^l - p_2 & \text{if he buys the outside good at } p_2 \\ 0 & \text{otherwise} \end{cases}$$

Label

- Each consumer in region O has the following preferences

$$U^O = \begin{cases} \theta s_1 - p_g & \text{if he buys the labeled good at price } p_g \\ \theta s^O - p_2 & \text{if he buys the outside good at price } p_2 \\ 0 & \text{otherwise} \end{cases}$$

- s^O – **expected quality** of the good

Label

- Demands are

$$D_g(p_g, p_2) = \lambda(\overline{\theta} - \widetilde{\theta}_g^I) + (1-\lambda)(\overline{\theta} - \widetilde{\theta}_g^O)$$

$$= \overline{\theta} - \frac{p_g - p_2 - \lambda r}{\triangle s}$$

-

$$D_2(p_g, p_2) = \lambda(\widetilde{\theta}_g^I - \underline{\theta}) + (1-\lambda)(\widetilde{\theta}_g^O - \underline{\theta})$$

$$= \frac{p_g - p_2 - \lambda r}{\triangle s} - \underline{\theta}$$

- where $\triangle s = s_1 - s_2^I = s_1 - s_2^O > 0$

Label

- In presence of a label, equilibrium prices (p_1^g, p_2^g)

$$p_1^g = \frac{1}{3}[\lambda r + 2c_g + c_2 + (2 + \underline{\theta})\triangle s]$$

$$p_2^g = \frac{1}{3}[-\lambda r + 2c_2 + c_g + (1 - \underline{\theta})\triangle s]$$

- for $r \in \Phi_2 \subset \Phi_1$

Label

- Profits are

$$\Pi_1^g(p_1^g, p_2^g) = \frac{1}{9\triangle s}(\lambda r - c_g + c_2 + (2 + \underline{\theta})\triangle s)^2 - C_g$$

$$\Pi_2^g(p_1^g, p_2^g) = \frac{1}{9\triangle s}(-\lambda r - c_2 + c_g + (1 - \underline{\theta})\triangle s)^2$$

Non label versus label

- When the expected quality s_1^l is slightly lower or higher than the true quality s_1

$$p_i^* > p_i^g \text{ for } i = 1, 2$$

- *Intuition*
  - Demands in the non label case

$$\begin{aligned} D_1 &= \lambda(\overline{\theta} - \widetilde{\theta}^l) \\ D_2 &= \lambda(\widetilde{\theta}^l - \underline{\theta}) + (1 - \lambda) \end{aligned}$$

  - Demands in the label case

$$\begin{aligned} D_1 &= \lambda(\overline{\theta} - \widetilde{\theta}_g^l) + (1 - \lambda)(\overline{\theta} - \widetilde{\theta}_g^O) \\ D_2 &= \lambda(\widetilde{\theta}_g^l - \underline{\theta}) + (1 - \lambda)(\widetilde{\theta}_g^O - \underline{\theta}) \end{aligned}$$

Non label versus label

- For relatively high values of s_1^I, profits are

$$\Pi_1^g < \Pi_1^*$$

- Labeling strategy might be interesting for the inside firm if inside consumers **do not have a good expectation** about quality
- Trade-off
  - benefit from informing consumers (inside consumers who have a positive bias, and outside consumers)
  - cost of tough price competition with outside producer

Non label versus label

- Total welfare?
- No label

$$W_{NL} = \Pi_1^* + \Pi_2^* + CS_{NL}$$

- Label

$$W_L = \Pi_1^g + \Pi_2^g + CS_L$$

Non label versus label

- No label

$$CS_{NL} = \lambda \int_{\underline{\theta}}^{\widetilde{\theta}^{I}} (\theta s_2^I - p_2^*) d\theta + \lambda \int_{\widetilde{\theta}^{I}}^{\overline{\theta}} (\theta s_1^I + r - p_1^*) d\theta$$
$$+(1-\lambda) \int_{\underline{\theta}}^{\overline{\theta}} (\theta s^O - p_2^*) d\theta$$

- Label

$$CS_L = \lambda \int_{\underline{\theta}}^{\widetilde{\theta}} (\theta s_2^I - p_2^g) d\theta + \lambda \int_{\widetilde{\theta}}^{\overline{\theta}} (\theta s_1 + r - p_1^g) d\theta$$
$$+(1-\lambda) \int_{\underline{\theta}}^{\overline{\theta}^o} (\theta s_2^I - p_2^g) d\theta + (1-\lambda) \int_{\overline{\theta}^o}^{\overline{\theta}} (\theta s_1 - p_1^g) d\theta$$

Non label versus label

- For relatively high values of s_1^I and relatively high values of $\underline{\theta}$

$$W_{NL} > W_L$$

Uncertainty on origin and quality

No label

- Inside consumers do not know quality or origin
- Each consumer in region *l* has the following expected preferences

$$U^l = \begin{cases} \theta s_1^l + \rho r - p_1 & \text{if he pays } p_1 \\ \theta s_2^l + (1-\rho) r - p_2 & \text{if he pays } p_2 \\ 0 & \text{otherwise} \end{cases}$$

- inside consumers believe that firm 1 provides the inside good with probability ρ

No label

- Each consumer in region O has the following expected preferences

$$U^O = \begin{cases} \theta s^O - \min\{p_1, p_2\} & \text{if he buys the good at } p_1 \text{ or } p_2 \\ 0 & \text{otherwise} \end{cases}$$

No label

- Optimal prices are

$$p_1^{**} = \frac{1}{3}[(2\rho - 1)r + 2c_1 + c_2 + (2 + \underline{\theta} + \frac{1-\lambda}{\lambda})\triangle s^l]$$

$$p_2^{**} = \frac{1}{3}[-(2\rho - 1)r + c_1 + 2c_2 + (1 - \underline{\theta} + 2\frac{1-\lambda}{\lambda})\triangle s^l]$$

Label

- label reveals both origin and quality
- Optimal prices are

$$p_1^g = \frac{1}{3}[\lambda r + 2c_g + c_2 + (2 + \underline{\theta})\triangle s]$$
$$p_2^g = \frac{1}{3}[-\lambda r + 2c_2 + c_g + (1 - \underline{\theta})\triangle s]$$

Non Label versus Label

- When the expected quality s_1^l is slightly lower or higher than the true quality s_1 and when the probability that firm 1 provides the inside good is high enough ($\rho > (1+\lambda)/2$)

$$p_i^{**} > p_i^g \text{ for } i = 1, 2$$

- However, for some values of s_1^l

$$p_1^{**} < p_1^g < p_1^*$$

- For some intermediate values of s_1^l, a label will make firm 1 better off if it does reveal both quality and origin. If it only reveals quality (and origin is known), the label is not worth it for firm 1.

Case with three firms

No label

- Each consumer in region *I* has the following expected preferences

$$U^I = \begin{cases} \theta s_0^I + r - p_0 & \text{if he pays } p_0 \\ \theta s_1^I + r - p_1 & \text{if he pays } p_1 \\ \theta s_2^I - p_2 & \text{if he pays } p_2 \\ 0 & \text{otherwise} \end{cases}$$

- Each consumer in region *O* has the following preferences

$$U^O = \begin{cases} \theta s^O - \min\{p_0, p_1, p_2\} & \text{if he pays } \min\{p_0, p_1, p_2\} \\ 0 & \text{otherwise} \end{cases}$$

Case with three firms

Label

- Each consumer in region I has the following expected preferences

$$U^I = \begin{cases} \theta s_1 + r - p_g & \text{if he buys the labeled good at } p_g \\ \theta s_1^I + r - p_1 & \text{if he buys a local good at } p_1 \\ \theta s_2^I - p_2 & \text{if he buys an outside good at } p_2 \\ 0 & \text{otherwise} \end{cases}$$

Case with three firms

Label

- Each consumer in the region O has the following preferences

$$U^O = \begin{cases} \theta s_1 - p_g & \text{if he buys the labeled good at } p_g \\ \theta s^O - \min\{p_1, p_2\} & \text{if he pays } p_2 \text{ or } p_1 \\ 0 & \text{otherwise} \end{cases}$$

- s^O – **expected quality** of the good

Remarks

- Work in progress
- Welfare analysis
- Case with three firms
- Case with perfect competition in the outside region
- Cournot Competition
- Compare GI with trademark