The Benefit of Collective Reputation

joint with Zvika Neeman (Tel Aviv University), Jungju Yu (Yale)

Aniko Öry (Yale)

September 16, 2016

Agricultural Appellation

Figure: Cheese: Brie

Figure: Wine Bordeaux

Country of Origin

Figure: Country of Origin: Exclusive Technology

Country of Origin

BOSCH

Invented for life

Q&W HOME | SITEMAP | 中文版

Q&W 前卫自动化 VANGUARD ELECTRIC

About Us | News | Products | Certificates | Technical Note | Feedback | Contact Us

Established in 1998

We is one of the most professional sensor manufactures China.

Figure: Suppliers of manufacturing parts

Country of Origin Labelin: Regulation

- Most countries require products that are imported into their country to be marked with their country of origin (COO)
- Country of origin labeling (COOL) was a requirement signed into American law under Title X of the Farm Security and Rural Investment Act of 2002.

Country of Origin: Collective Brand

- One can think of the COO as a **collective brand**.
- Such a brand **creates value** for the firm and thus, can enforce **investment** into the production process of a product.
- Two fundamentally different industry types:
  1. Quality control
  2. Exclusive technology
- Research questions:
  1. What is the fundamental difference between individual and collective reputation?
  2. In which industries and countries is COOL socially optimal?
  3. In which industries and countries is COOL optimal for firms?

Reputation Models

- **Individual reputation:** each firm sells under its own brand name
  - customers know which firm produced output
  - less output produced by brand
- **Collective reputation:** firms produce separately but sell under a common name
  - customers are not sure/forget which firm's product they have bought, but they remember the collective brand name
    $\rightarrow$ **weaker signal**
  - more output produced by collective brand
    $\rightarrow$ **free-riding**

Reputation

- Focus of our work: **Moral hazard** problem in context of **brand reputation** alla Mailath and Samuelson (2001)
- **Quality investment is not observed**, but the quality of the actual product is
- **Reputation is an asset**, stock of reputation can be **managed** by firm

  $\rightarrow$ E.g., once reputation is high, the seller would like to shirk/milk its reputation
- an equilibrium in which the firm always wants to invest exists only for small investment costs

Moral Hazard and Reputation

- Firm lives for many periods
- Firm is Competent with probability μ and Incompetent otherwise
- C can invest at a cost $c > 0$ to increase probability of producing high quality from π_L to $\pi_H > \pi_L$
- I produces low quality with probability π_L
- Investment is **not observable/contractable**
- One customer with unit demand in each period who values good quality at 1 and bad quality 0.
- Investment is **socially optimal**:

$$\pi_H - \pi_L > c$$

Moral Hazard and Reputation

- Firm lives for many periods
- Firm is Competent with probability μ and Incompetent otherwise
- C can invest at a cost $c > 0$ to increase probability of producing high quality from π_L to $\pi_H > \pi_L$
- I produces low quality with probability π_L
- Investment is **not observable/contractable**
- One customer with unit demand in each period who values good quality at 1 and bad quality 0.
- Investment is **socially optimal**:

$$\pi_H - \pi_L > c$$

$\rightarrow$ In the last period, C does not have incentive to invest

$\rightarrow$ In the period before, C does not have incentive to invest because there is no value of reputation

$\Rightarrow$ **Moral hazard** leads to no investment $\rightarrow$ Inefficient!

Bottomline of Reputation Literature

- With a **long-lived firm** there is always a next period, there is always a next period
- However, there is a **discouragement effect**:
  1. after a stream of good realizations, the firm does not want to invest
  2. after a stream of bad realizations, the firm gives up
- Too good or too bad reputation is bad for incentives!
- **There is potential value in less precise signals of competence/noise**

(Moav, Neeman (2010), Mailath, Samuelson (2001), Bar-Isaac (2007))

Main results of this paper

1. Collective brands can serve as a **commitment device against Moral Hazard**
2. Collective brands can alleviate the Moral Hazard problem if
   - Exclusive technology ($\pi_L = 0$) and base reputation is ex-ante high
     Example: Car, watches in high-reputation countries
   - Quality control ($\pi_H = 1$) and base reputation is ex-ante low
     Example: Suppliers of parts in developing countries
3. A competent firm would like to collectively brand only if the **adverse selection problem** is not too severe, i.e., if μ is not too small
   $\rightarrow$ Regulation can improve welfare for industries in which quality control is the main issues for developing countries

Model

- Time: $t = \cdots, -1, 0, 1, \cdots$
- Two long-lived firms (she) that can produce one unit of a good at zero MC
- Good can be either of high quality (G) or bad quality (B)
- Firms are Competent with prob. μ and Incompetent otherwise
- **Quality realization is an imperfect signal** of a firm's investment decision in the last period:
  - A C-firm can invest $c > 0$ in quality to increase the probability of producing G to $\pi_H > \pi_L$
  - An I-firm produces G with probability π_L

Model

- New buyer in every period
- Buyers receive utility 1 from a G-product and 0 from a B-product.
- Buyer is randomly assigned to one of the firms
- buyers **observe the realized quality in previous two periods**
- firm makes a TIOLI price offer p to buyer
  $\Rightarrow$ Firm's optimal pricing is to charge buyer's willingness to pay
  (This assumption creates reputational concerns)
- **Payoffs of firm:** per-period profit of selling at a price p_t is given by

$$v_t = p_t - c \cdot \mathbf{1}(\text{invest})$$

and the expected continuation profit is given by

$$V_t = \mathbb{E}\left[\sum_{s=t}^{\infty} \delta^{s-t} v_s\right]$$

where $\delta \in (0, 1)$ is the discount factor.

Model

- **Reputation:** Belief of customers about the firm being C
  $\rightarrow$ different for individual and collective brand
- **Trade-off:**

  long-run benefit of reputation $\Leftrightarrow$ cost of investment today
- An equilibrium without any investment always exists
- **Reputational equilibrium (RE)**: Competent firm's optimal strategy is to always invest in quality.
  $\rightarrow$ can only be achieved by replacement of firms to bound beliefs!

Individual Reputation

- Customer knows whether past realizations are generated by assigned firm or not
- Set of payoff-relevant histories for buyers:

$$\mathcal{H}_b^{\text{ind}} = \{G, B, \emptyset\}^2$$

- **Stationary equilibrium**: strategies map those histories to actions.
- **Buyers' belief about the firm being C after history $h \in \mathcal{H}_b$**:

$$\hat{\mu}^{\text{ind}}(h) \text{ (firm's reputation)}$$

- **Price in RE**:

$$p^{\text{ind}}(h) = \hat{\mu}^{\text{ind}}(h)\pi_H + (1 - \hat{\mu}^{\text{ind}}(h))\pi_L$$

Individual Reputation

- **RE** exists iff

$$c \leq \hat{c}^{\text{ind}} \equiv \hat{c}^{\text{ind}}(\mu, \pi_H, \pi_L) \equiv \delta \cdot \frac{\pi_H - \pi_L}{2} \cdot \left(\min_{h_1 \in \{G, B, \emptyset\}} \hat{d}^{\text{ind}}(h_1) \right)$$

- It is hard to sustain reputation after **"extreme histories"** which lead to **"extreme beliefs"** if **signals are strong**:
  <u>**Case 1: High priors:**</u>
  - Firm has little incentive to invest following good history because it wants to **"rest on its laurels"**
  - After $h = GG$, the firm cannot lose much even if it shirks once.
  - In particular, if it producing a good quality product is a very strong signal, i.e., $\pi_L \approx 0 \rightarrow$ **Exclusive techonolgy**
  - Reason: even after shirking once, one can recover easily.

Individual Reputation

It is hard to sustain reputation after "**extreme histories**" which lead to "**extreme beliefs**" if **signals are strong**:

<u>**Case 2: Low priors:**</u>

- Firm has little incentive to invest following bad history because it is **discouraged**
- After $h = BB$, the firm needs to be lucky to convince customers that she is C
- In particular, if it is hard to convince customers, i.e., if $\pi_H \approx 1 \rightarrow$ **Quality control**
- Short-run incentives to invest very low

Collective Reputation

- Two firms sell an experience good under the same brand name.
- Each firm's type is drawn independently where a firm is C with probability μ
- Firms know the type of each other.
- In every period, a customer is matched with each firm with probability $\frac{1}{2}$ **without knowing the firm's identity**
- **More states:** buyer has beliefs over 3 levels of brand's competency: Highest (CC), mixed (CI, IC), and lowest (II)

Main Results

	Exclusive technology $\pi_L \approx 0$	Quality control $\pi_H \approx 1$
High base reputation $\mu \approx 1$	collective reputation has commitment value	individual reputation always easier to sustain
Low base reputation $\mu \approx 0$	individual reputation always easier to sustain	collective reputation has commitment value

What are the incentives to brand of a firm?

- Even if it is efficient to brand with another firm and if a **RE** exists, a competent firm might now want to brand collectively!
- Reason: Adverse selection/lemon's problem:
  - buyers do not know the competency of a firm and are only willing to pay $\hat{\mu}\pi_H + (1 - \hat{\mu})\pi_L$ in a **RE**
  - if their average willingness to pay is lower than the cost of investment c, then the firm does not want to play the **RE** - even if it exists
    $\Rightarrow$ Commitment value of collective brand is not internalized
  - this problem is particularly severe for small prior μ that a firm is competent

Take-aways

1. Collective brands such as COO can serve as a commitment device for firms to keep investing - in particular for:
   - **Exclusive technology** ($\pi_L = 0$) and base reputation is ex-ante high
     Example: Car, watches in high-reputation countries
   - **Quality control** ($\pi_H = 1$) and base reputation is ex-ante low
     Example: Suppliers of parts in developing countries
2. If the baseline reputation is low, firms do not internalize these benefits well and there is scope for regulation.
3. But regulation to enforce COOL is not good if there is no commitment value of a collective brand.

Thank you!