

Reputational Economies of Scale

Dan Klerman
USC Law School

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Summary

- Most law & econ scholars have assumed reputational economies of scale
 - Large firms can more effectively bond themselves using reputation
 - Because large firms have more to lose if they are detected shirking
- Reputational economies of scale are important for many literatures
 - Law or accounting firm as gatekeepers (Kraakman 1984)
 - One-sided consumer contracts (Bebchuk & Posner 2006)
 - Product liability (Polinsky & Shavell 2010)
- Rasmusen (2016) and Iacobucci (2012) show that reputational economies of scale don't exist in the standard Klein & Leffler (1981) model of reputation
 - Large firms have more to lose from shirking, *but also more to gain*
- This paper shows that reputational economies of scale are consistent with models of reputation, ***if shirking is detected with probability less than one***
 - Shirking by large firm is more likely to be detected
 - Thus, small firm is more likely to get away with shirking than large firm
 - So large firm is more trustworthy
 - Analogy to Becker model of deterrence. High probability → low sanctions
- Reputational economics of scale also in finite horizon model (Kreps & Wilson 1982)

Basic Klein-Leffler model

- Infinitely repeated game
- Firms choose to produce high or low quality good
- Low quality is detected after sale, with probability 1; all consumers know
- High quality is costly to produce, but consumers are willing to pay more
 - Payoff to high quality is equilibrium price minus cost of high quality, p^*-c
 - Payoff to low quality is zero
- If firm i chooses to produce high quality in each period, it can collect profit, p^*-c , indefinitely. So its payoff is:

$\frac{q_i(p^*-c)}{r}$, where r is the discount rate and q_i is the quantity produced by firm i

- If firm chooses to produce low quality, it gets high payoff, p , in one period, but zero payoff thereafter. So its payoff is $\frac{q_i p^*}{1+r}$
- Payoff to high quality must be at least as high as payoff to low quality.
- So, with free entry/competition, equilibrium *quality-assuring* price is set by

$$\frac{q_i(p^*-c)}{r} = \frac{q_i p^*}{1+r} \quad \longrightarrow \quad p^* = (1+r)c$$

- Note irrelevance of quantity. No reputational economies of scale

Uncertain Detection of Low Quality

- Key assumption of the Klein/Leffler model was that low quality was detected with probability one after sale
 - Unrealistic in many contexts
 - Only some owners of Ford Pintos experienced exploding gas tanks
 - According to Consumer Reports, even unreliable brands usually work fine
- Let $\rho < 1$ be the probability that, for any one good, low quality will be detected
- Let s be the probability that low quality is detected ***in at least one good*** produced by a firm that produces q_i goods.

$$s = 1 - (1 - \rho)^{q_i}$$

- As quantity goes up, probability that low quality is detected goes up
 - Suppose the probability that any unit is defective is 1%
 - If a firm produces only one unit, probability that low quality *in one or more units* is detected is 1%
 - If a firm produces 1000 units, probability that low quality is detected *in one or more units* is 99.996%
 - Low quality by large firm is more likely to be detected than low quality by small firm
 - That makes the large firm more trustworthy

Equilibrium Price When Detection Uncertain

- Remember
 - $\rho < 1$ is the probability that, for any one good, low quality will be detected
 - $s = 1 - (1 - \rho)^{q_i}$ is the probability that low quality is detected **in at least one good** produced by a firm that produces q_i goods.
 - s is higher for larger firm

- As in basic model, equilibrium price, p^* , is determined by setting payoffs to high and low quality equal

$$\frac{q_i(p^* - c)}{r} = \frac{q_i p^*}{1+r} + (1 - s) \frac{q_i p^*}{(1+r)^2} + (1 - s)^2 \frac{q_i p^*}{(1+r)^3} + \dots$$
$$p^* = \frac{(r+s)c}{s}$$

- Since s is larger for large firm, quality-assuring price is lower for large firm
- So large firm can under-price small firm, even though both have same costs
 - If small firm matched large firm price, small firm would have no incentive to produce high quality, and rational consumers would avoid it
- So large firms drive small firms out of the market
- Analogy to standard model of deterrence
 - Higher probability of detection means sanctions can be lower
 - In sale of goods context, sanction is loss of profits from high quality sales
 - Since large firm has higher probability of detection, price can be lower

Extensions

- Umbrella branding
 - Firm that produces multiple goods under same brand name can more effectively bond quality than firm that produces just one good
 - Johnson & Johnson
 - Toyota
- Model assumes that all consumers know when any consumer detects low quality
 - Unrealistic
 - Media are more likely to publicize low quality by large firm (e.g. Toyota)
 - This reinforces reputational advantage of large firm
 - Consumers know that problems at large firm are more likely to be publicized, so absence of bad publicity is stronger signal of high quality
- Model assumes that if firm produces high quality, there are zero defects
 - Unrealistic
 - Even best firms sometimes produce defective goods
 - Relaxing this assumption again reinforces reputational advantage of large firm, because, with large numbers, consumers can more easily tell whether defects are endemic or idiosyncratic
- Finite horizon model of reputation (e.g. Kreps & Wilson 1982)

Conclusion

- Rasmusen and Iacobucci are correct that the standard model of reputation does not produce reputational economies of scale
 - That is important contribution
- Small, realistic modification to basic model restores reputational economies of scale
 - Need to relax the assumption that low quality detected with probability one
 - Even if large and small firm produce goods with identical reliability
 - Low quality by large firm is more likely to be detected, because it produces more units
- So, when firm is large, consumers can draw more secure inferences from the fact that low quality was not detected in the previous periods
- Quality assuring price is lower for large firm
 - So large firm can drive small firm out of market
 - Even though they have the same per unit costs.