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:
  \[
  \frac{q_i(p^*-c)}{r}, \text{ where } r \text{ is the discount rate and } q_i \text{ is the quantity produced by firm } i
  \]
- If firm chooses to produce low quality, it gets high payoff, \( p \), in one period, but zero payoff thereafter. So its payoff is
  \[
  \frac{q_ip^*}{1+r}
  \]
- 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
  \[
  \frac{q_i(p^*-c)}{r} = \frac{q_ip^*}{1+r} \quad \Rightarrow \quad p^*=(1+r)c
  \]
- 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

\[
\frac{q_i(p^*-c)}{r} = \frac{q_ip^*}{1+r} + (1-S)\frac{q_ip^*}{(1+r)^2} + (1-S)^2\frac{q_ip^*}{(1+r)^3} + \cdots
\]

\[
p^* = \frac{(r+s)c}{s}
\]

• 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.