Exclusive contracts
with imperfect rent extraction

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Competition policy

- Exclusive contracts are one of the most controversial areas of competition policy
- Since *Hoffman-La Roche*, discounts that reference rivals' output are nearly *per se* illegal in Europe
  - The only possible defence is "objective justification"
- In the US, policy is based on rule of reason
  - Exclusive contracts are more likely to be regarded as anticompetitive if
    - They are used only by the dominant firm
    - The duration of the contracts is long
    - The share of the market that is foreclosed is large

Exclusive contracts

- Excusive contracts
  - Firm i offers two different price schedules, $P_i^E(q_i)$ when $q_j = 0$, and $P_i^{NE}(q_i)$ when $q_j > 0$
    - The firm can enforce exclusive dealing by offering $P_i^{NE}(q_i) = \infty$

- Market-share discounts
  - Again two different price schedules, but now which one applies depends on whether the ratio $q_i/(q_i+q_j)$ exceeds a critical threshold chosen by the firm (e.g. 80%)
    - More generally, $P_i = P_i(q_i, q_j)$

Pro-competitive theories

- The Chicago School has developed several pro-efficiency explanations

- They all share the idea that exclusive contracts serve to protect some kind of relation-specific investment made by the firm

  - Marvel, JLaw&Ec 1982; Segal and Whinston, RAND 2000; De Meza and Selvaggi, RAND 2008 etc

- Tend to imply that all active firms should enter into exclusive arrangements with their customers

Anti-competitive theories

- In most anti-competitive theories, exclusive contracts entail a sacrifice of profits in the short run but create benefits in the long run
  - Most often the benefit is to deter or impede entry by a potential entrant
    - Aghion and Bolton (AER 1987)
    - Rasmusen, Ramseyer and Wiley (AER 1991)
    - Asker and Bar-Isaac (AER 2014)
  - In other cases, the aim is to weaken an already active competitor
    - Bernheim and Whinston (JPE 1998, Sect. IV)

Anti-competitive theories

- A more basic question (but one that is addressed less frequently) is whether exclusive contracts can be directly profitable in one-stage models of price competition
- Mathewson and Winter (AER 1987) showed that they can if
    - firms are restricted to linear pricing
    - one firm has a competitive advantage vis-a-vis its competitor

Neutrality

- However, it soon appeared that the MW analysis rests on firms bein restricted to linear pricing
- With non-linear pricing, exclusive or market share contracts are irrelevant
  - O'Brien and Shaffer, JEMS 1997; Bernheim and Whinston, JPE 1998
- In fact, two-part tariffs are already flexible enough for this

Intuition

- A firm can extract all of the buyer's surplus in excess of what the buyer may get by trading exclusively with rivals
- Hence, a firm will offer contracts that maximise that surplus
  - bilateral efficiency
  - firms price at cost and extract whatever surplus they can *via* the fixed fee
- Overall efficiency follows

Non neutrality

- Two routes have been explored to get rid of this neutrality result
  - One is to assume that buyers compete with each others
    - This creates contracting externalities which imply that not even a full set of bilateral efficiency conditions would necessarily translate into global efficiency
  - The other – which this paper focuses on – is based on the assumption that firms cannot fully extract the surplus *via* fixed fees

Competition among buyers

- Hart and Tirole (BP 1990) analyse a model with one upstream firm and two (or more) downstream firms, which compete with each other
- Issues arising in this literature
  - Buyers' beliefs
    - Mc Afee (AER 1994); Rey and Vergé (RAND 2008)
  - Menus of contracts
    - Rey and Verge (JIndE 2012); Ramezzana (2014); Rey and Whinston (RAND 2013)
- Nocke and Rey (2014) extend the analysis to the case of two upstream firms
  - They allow for both exclusive representation and exclusive distribution contracts
  - Exclusive distribution contracts are always profitable, exclusive representation contracts need not

Imperfect rent extraction

- If fixed fees do not allow firms to fully extract the buyers' surplus, firms enjoying market power will generally charge marginal prices that exceed marginal cost

- Under quite general conditions, this implies that firms that supply substitute products may have a unilateral incentive to offer exclusive contracts

Intuition

- Assume that the Bertrand equilibrium prices, which would arise in the absence of exclusive contracts, are greater than marginal costs
- Then, at least one firm (i.e., the one which at the Bertrand prices is implicitly offering a higher surplus to the buyer) can enforce exclusivity without lowering its price but obtaining a larger demand, as the goods are substitutes
- Since Bertrand prices exceed marginal, this would improve the firm's profit
  - In fact, both firms might simultaneously have a unilateral incentive to offer exclusive contracts (e.g. if they are symmetric)

Problems

- This simple story raises two main issues:
  - What is the exact reason why firms charge marginal prices that exceed marginal costs?
  - Given that firms have unilateral incentives to offer exclusive contracts, what are the effects of such contracts *in equilibrium*?

Adverse selection

- In a series of papers, Calzolari and Denicolò have analysed the case of adverse selection
  - Suppose demand may be high or low
  - If seller does not know which state realises, it must distort the contract that applies in low-demand states in order to extract more surplus in high-demand states
  - As a result, marginal prices will exceed marginal cost for low volumes

Pro-competitive effect

- When firms compete in exclusive contracts, they compete in utility space rather than for each marginal unit of the buyer's demand

- Unlike competition for marginal units, competition in utility space is not softened by product differentiation

- When firms are symmetric, competition in utility space is more intense and so exclusive contracts are pro-competitive

Anti-competitive effect

- Suppose instead that one firm has a strong competitive advantage over rivals
- In this case, competition in utility space is actually less intense than competition for marginal units
  - The dominant firm can exploit its competitive advantage to induce buyers to sign exclusive contracts without having to compensate them
  - Without exclusive contracts, in contrast, exclusion would require limit pricing, which entails a sacrifice of profit
- Exclusive (and market-share) discounts are anticompetitive

Problems

- Asymmetry of information may not be pronounced in some industries in which exclusive contracts are used
- In the adverse selection model, equilibrium price schedules are very complex, whereas in practice simpler pricing schemes are often observed
- How robust is the theory?
  - Do results crucially depend on the adverse selection hypothesis?
  - Do they survive if firms, for some reasons, are restricted to simpler pricing strategies?

This paper

- We adapt and analyse the moral hazard model of Bernheim and Whinston (1998)
- They assume:
  - Demand uncertainty (in multiplicative form)
  - Symmetric information at the contracting stage
  - Risk-averse buyer, risk-neutral sellers
  - Sellers restricted to two-part tariffs
  - Constant absolute risk-aversion
- We replace the assumption of CARA with the assumption of *loss aversion*

Bernheim & Whinston

- Bernheim and Whinston (1998, Sect. V) focus on two special cases:
  - Perfect substitutes with symmetric costs
    - In this case, seller's profit vanish but exclusive dealing must prevail in equilibrium
    - the buyer does not benefit from product variety but common representation would impede the supply of insurance (which requires marginal price to exceed marginal cost so as to make room for a negative fixed fee, which stabilises the buyer's payoff)
  - Independent products
    - In this case, if exclusive contracts are permitted then in equilibrium common representation prevails. However, if exclusive contracts are banned then there is no pure strategy equilibrium

Risk aversion

- The provision of insurance is similar to the provision of other services that has been analysed by pro-competitive theories

- The assumption of buyer's risk aversion may be taken as a way to capture the fact that buyers dislike losses more than they like gains, not that they value big gains less than small gains

Loss aversion

- To abstract from these effects we assume that the buyer is loss averse
  - This specification of the risk aversion assumption implies that the use of the fixed fee is costly only to the extent that it creates the possibility of losses
  - As long as losses are avoided, the buyer does not care about the variability of profits
- The loss aversion specification allows us to make more progress, providing a fuller characterisation of equilibria

Loss aversion
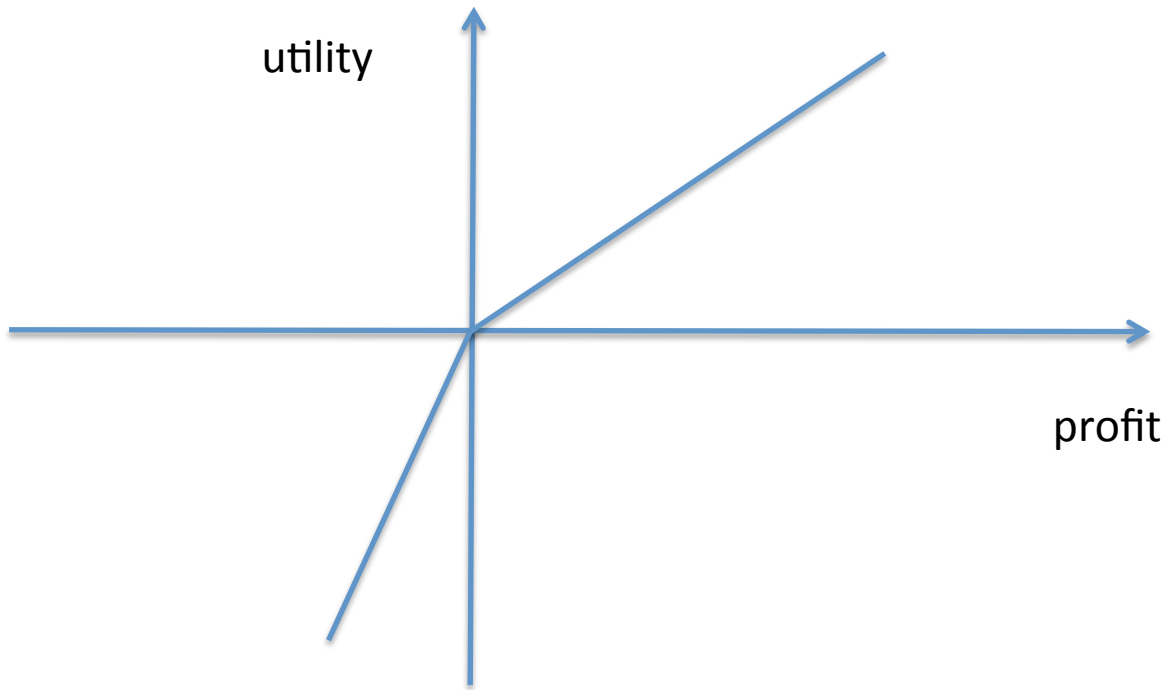
Model

- Two goods, *A* and *B*
- Good A of better quality, or less costly to produce
  - The unit cost of product *A* is normalised to 0, that of product *B* is denoted by c
- Good *A* supplied by firm *A*. Good *B* supplied either by a competitive fringe (the *competitive fringe model*) or by firm *B* (the *duopoly model*)
- Two-part tariffs:

$$P_i = p_i\, q_i + F_i$$

- One buyer with gross profit function $\Pi(q_A, q_B, \theta)$, with corresponding demand functions

$$q_i = \theta q_i(p_i, p_j)$$

- θ distributed with density $f(\theta)$

Uniform-quadratic case

- Although many results can be generalised, for simplicity the presentation focuses on the uniform-quadratic model in which the buyer's profit function is

$$\Pi = (q_A + q_B) - 1/2\theta\ (q_A^{\uparrow 2} + q_B^{\uparrow 2}) - 1/\theta\ \gamma q_A\ q_B$$

   and θ, which measures the level of demand, is uniformly distributed over (0,1]

- Demand functions are

$$q_i = \theta 1 - \gamma - p_i + \gamma p_j\ /1 - \gamma^{\uparrow 2}$$

- γ, ranging from 0 to 1, measures the degree of product differentiation
  - $\gamma = 1$ perfect substitutes
  - $\gamma = 0$ independent products

Timing

- Sellers simultaneously and independently offer contracts

- Buyer chooses which contract(s) to sign

- Uncertainty is realised

- Buyer makes purchases and payoffs are realised

Participation

- Buyer's net payoff is

$$\pi = \Pi - p{\downarrow}A\, q{\downarrow}A - p{\downarrow}B\, q{\downarrow}B - \text{fixed fees}$$

- *Ex ante* (at the contracting stage), the buyer assesses the possible outcomes according to the expected utility function

$$(1+\lambda)\int \pi(\theta) < 0{\uparrow}\boxed{\,}\pi(\theta)f(\theta)d\theta \downarrow + \int \pi(\theta) > 0{\uparrow}\boxed{\,}\pi(\theta)f(\theta)d\theta$$

- Reservation payoff normalised to 0
- With $F=0$, the region of losses is empty
- With $F>0$, the buyer makes losses if demand is sufficiently low

Reduced form

- Loss aversion implies that fixed fees are costly as they may push the buyer's profit into the region of losses

- However, the cost of the fixed fee is endogenous, depending on prices and realisation of demand

- This complicates the analysis

Reduced form

- We also study a reduced form model which simply attaches a constant cost λ to the fixed fee
  - This simplifies the analysis
  - It also highlights that results do not depend on the specific reason why using fixed fees is costly
- In the reduced form model, the buyer's payoff is $E_\theta(\pi)$ where

$$\pi = \Pi - p_A\, q_A - p_B\, q_B - (1+\lambda) \text{ fixed fees}$$

- The reservation payoff is again set at 0

Limiting case

- In both the loss aversion model and the reduced form model, as $\lambda \to_T \infty$ fixed fees become so costly that they are not used in equilibrium
- The equilibrium converges to the equilibrium that would obtain if firms were restricted to linear pricing

Cases

- Summarising, we have four models:
  - Competitive fringe or duopoly
  - Loss aversion or reduced form
    - both tend to linear pricing as $\lambda \to \infty$
- Road map:
  1. Fringe, linear pricing
  2. Fringe, reduced form
  3. Fringe, loss aversion
 4. Duopoly, linear pricing

Fringe, linear pricing
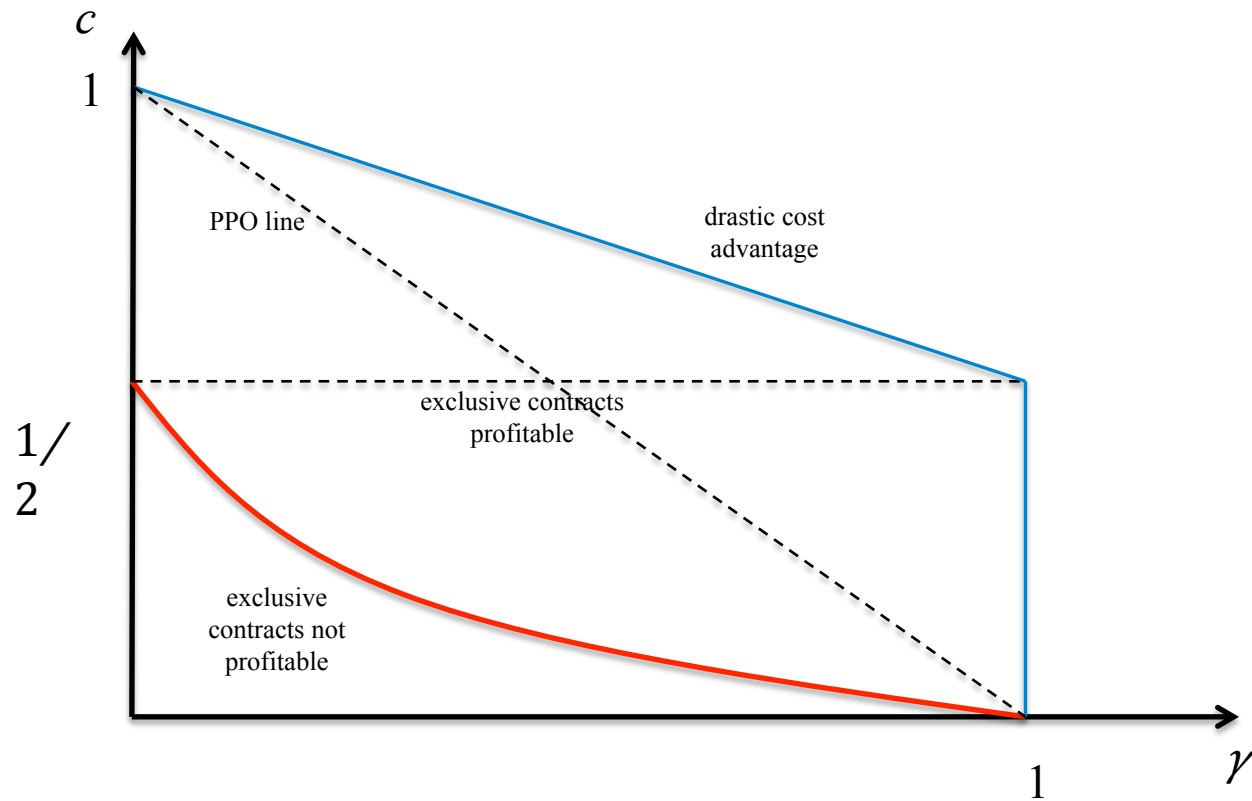
Fringe, linear pricing

- Exclusive contracts are profitable if the dominant firm's competitive advantage c is sufficiently large

- When c is small, in order to compete with the fringe for exclusivity the dominant firm would have to cut its price by too much for the move to be profitable

  - At the Bertrand equilibrium prices, the buyer would get higher surplus by trading exclusively with the fringe than with the dominant firm
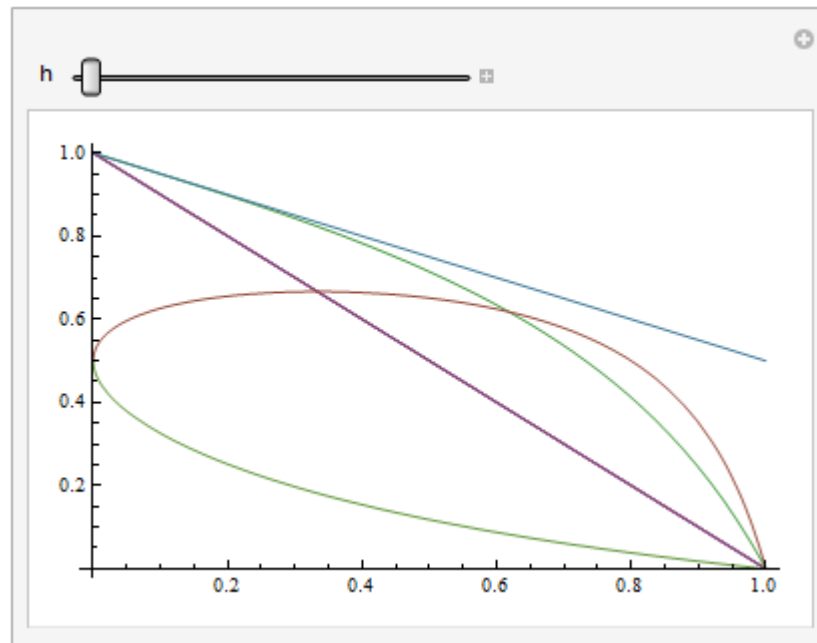
Fringe, reduced form
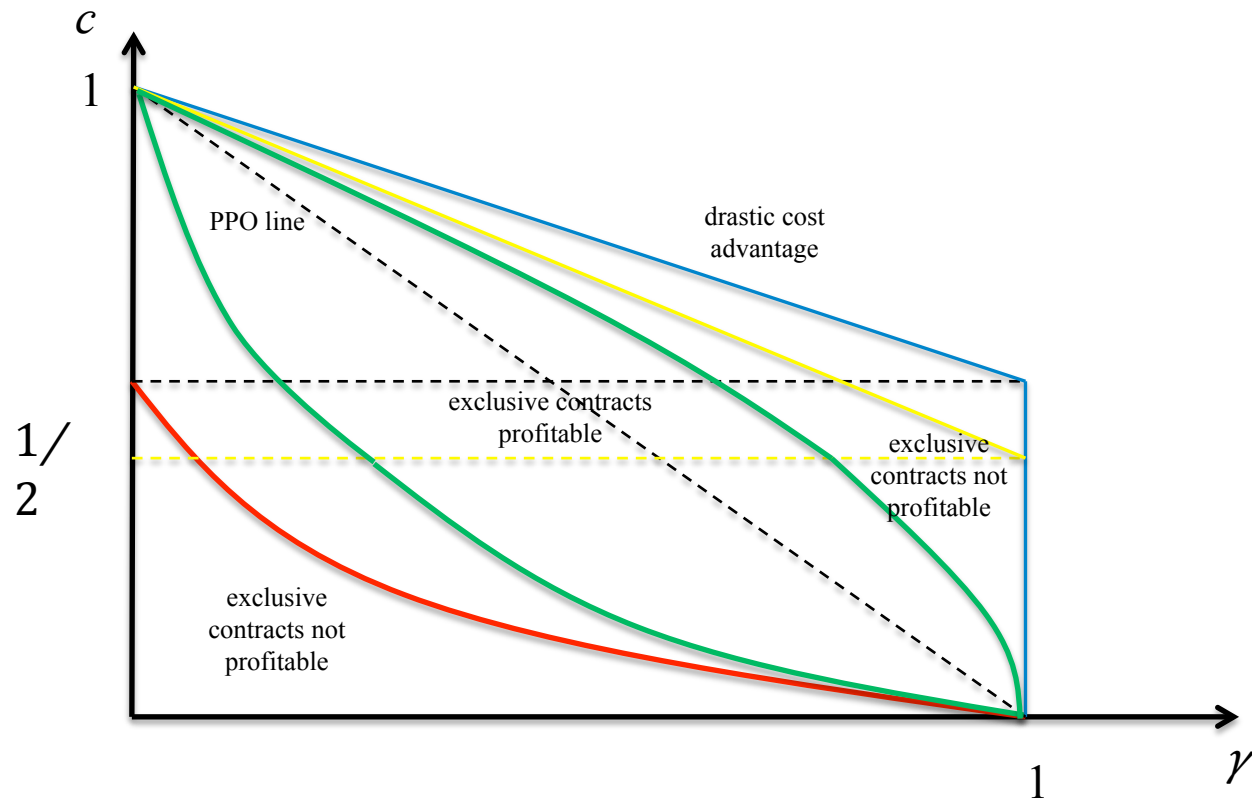
Fringe, reduced form

- As soon as $\lambda > 0$, there is a region (around the Positive Primary Output curve) where exclusive contracts are profitable

- Exclusive contracts are not profitable when c is small, for the same reason as above

- Exclusive contracts are neither profitable when c is large
  - Intuition?

Fringe, reduced form

Convergence

- As $\lambda \to +\infty$, the region where exclusive contracts are not profitable for c large disappears

- At the same time, the region where exclusive contracts are not profitable for c small converges to the region found under linear pricing

- In a sense, the linear pricing model delivers robust result which survive as long as $\lambda > 0$ and disappear only when $\lambda = 0$

Fringe, loss aversion
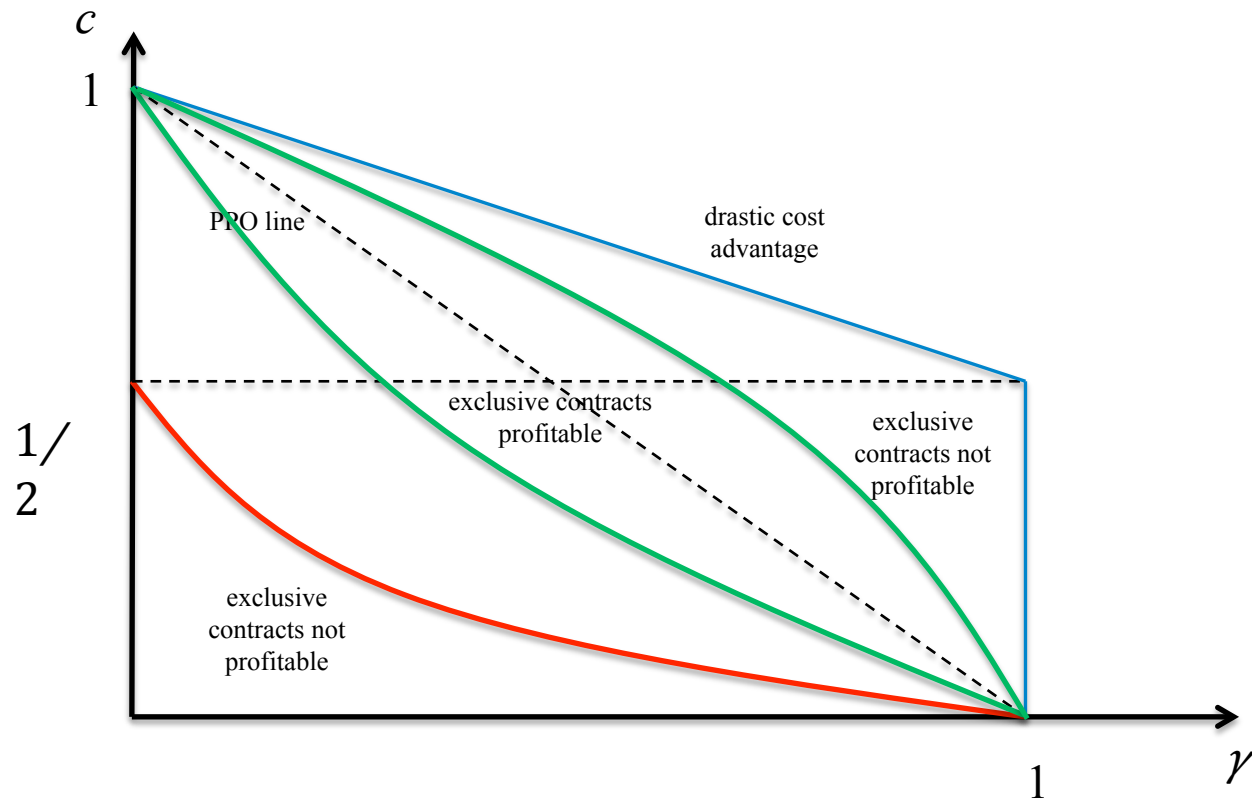
Fringe, loss aversion

- Although the analysis is more complex and analytical results (even for the uniform-quadratic model) extremely cumbersome, qualitatively we have the same pattern as in the reduced form model

- As soon as $\lambda > 0$, there is a region (around the Positive Primary Output curve) where exclusive contracts become profitable

Limitations of the fringe model

- The competitive fringe model is simple but suffer from two main limitations
  - The competitive fringe just breaks even anyway (that is, both with and without exclusive contracts), which means that exclsuive contracts by assumption cannot harm competitors
  - The buyer's expected payoff is driven to what the buyer could get by trading exclusively with the fringe. But this does not depend on the dominant firm's startegy. Hence, exclusive contracts cannot harm the buyer either

Duopoly, linear pricing

- Things are different under duopoly, where exclusive contracts can harm both the buyer and the dominant firm competitor

- As in the fringe model, both the loss aversion and the reduced form model's equilibria converge to the equilibrium with linear pricing as $\lambda \to_T \infty$

- We therefore focus on the duopoly equilibrium with linear pricing

Duopoly, linear pricing
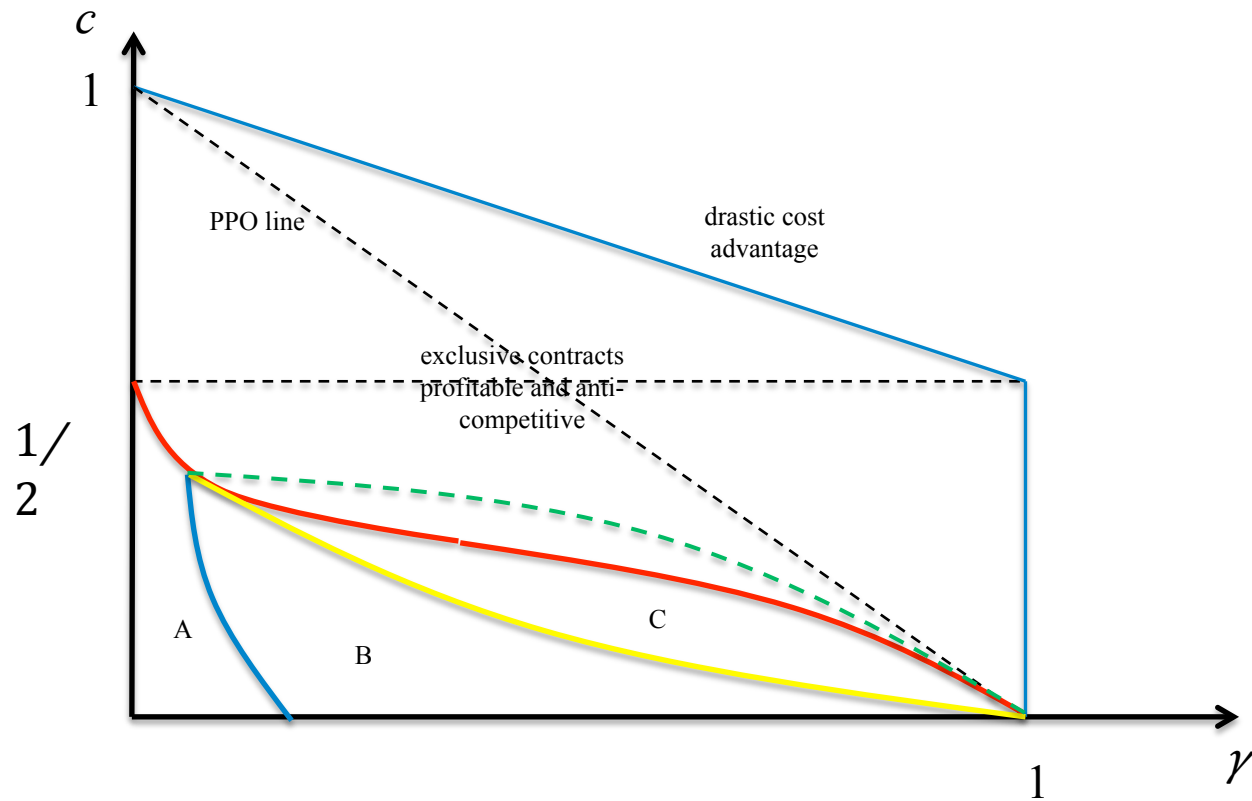
Large competitive advantage

- Above the red curve, the equilibrium outcome is unique
  - Firm A undercuts firm B in the competition for exclusives pricing at $p\uparrow E=c$ or $p\uparrow E=1/2$ (whichever is lower)
  - Firm A gains, firm B loses, and the buyer loses above the dotted curve but gains in the region between the gree dotted curve and the red curve

Small competitive advantage

- Above the red curve, there is always one equilibrium in which firm A undercuts firm B in the competition for exclusives pricing at $p\widehat{}E = c$ and the non-exclusive prices are so large that the buyer chooses the exclusive contract

- However, firm A's profit is lower than in the common representation Bertrand equilibrium
  - Firms are trapped in a prisoners' dilemma

- However, the equilibrium is not unique
  - Firms can try and coordinate their non-exclusive prices so as to induce the buyer to opt for common representation, by exploiting the buyer's preference for variety

Region C

- In region C, firm A offers an exclusive contract at B's cost (minus a tiny discount to break indifference)
- However, both firms price non-exclusive contracts so as to leave the buyer indifferent and obtain larger profits
- Even allowing for firms' coordination, the final outcome is pro-competitive
  - The non-exclusive prices are lower than the Bertrand prices
  - The buyer is still better off than with exclusive contracts
  - Both firms lose

Region B

- In region B, firms can raise even the exclusive prices (as exclusive contracts are offered but are not accepted in equilibrium)
- Again, both firms price non-exclusive contracts so as to leave the buyer indifferent between exclusive dealing and common representation, and gain extra profits by extracting the buyer's preference for variety
- Still, even allowing for the maximum possible level of coordination in a non-coopertaive equilibrium, the final outcome is pro-competitive
  - The non-exclusive prices are lower than the Bertrand prices
  - The buyer is still better off than with exclusive contracts
  - Both firms lose

Region A

- In region A, the scope for coordination is so wide that firms manage to reproduce the Bertrand equilibrium with common representation
- In this region, exclusive contracts are neutral
  - If no exclusive contracts were offered, firms would have have a unilateral incentive to offer exclusive contracts
  - However, firms make barrage exclusive offers at prices which are sufficiently low that the deviation to exclusivity is unprofitable
  - These barrage bids allow the Bertrand equilibrium to be sustained

Conclusion

- The basic message that emerges is the same as in the adverse selection model
- When the competitive advantage is large, equilibrium is unique and exclusive contracts are anti-competitive
- When the competitive advantage is small, there is a multiplicity of equilibria
  - Firms are trapped in a prisoners' dilemma but can try to coordinate their exclusive and non-exclusive prices so as to improve matters
- Nevertheless, even in the most cooperative equilibrium exclusive contracts tend to be pro-competitive, or at best are neutral