

# Vertical Exclusion with Competition Externalities

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# Vertical foreclosure

- Input foreclosure: long-standing debate on why and when it may take place and whether it could be anticompetitive
- One of the few rationales for (welfare-detrimental) vertical foreclosure is Hart-Tirole (1990):
  - When contracts between the "manufacturer" ( $M$ ) and each "retailer" ( $R_i$ ) are unobservable or privately renegotiable,  $M$  cannot commit not to flood the market
  - Exclusivity becomes a commitment device to avoid this problem and restore monopoly profit
- Our project moves from HT: is it possible to have foreclosure when the contractual arrangements are public information?
- More generally, Chicago School assumes perfect information for  $M$  and its ability to extract all rents from  $R$ 's. But what happens when there is asymmetric information?

# Our Story

- When downstream firms compete, they impose externalities on each other (when facing a more efficient rival, own profits are lower)
- When downstream firms have private information on their costs:
  - ① The size of this externality is unknown *ex ante*
  - ② It depends *endogenously* on the contracts offered by upstream firm
- If downstream firms are risk averse (or subject to limited liability), the uncertainty implies that the upstream firm  $M$  must pay out risk premia (or rents) when retailers compete
- Which implications?...

# Main Results

- 1 When downstream firms are sufficiently risk averse, or cannot lose money (i.e., there is limited liability), it is optimal to have only one of them (even if - other things being equal - the upstream firm benefits from having more retailers)
- 2 For intermediate cases of risk aversion, optimal contracts are asymmetric (and sometimes starkly so)

# Structure of Presentation

- Model and main results (risk-neutral v. extremely risk-averse agents)
- Robustness: Intermediate risk aversion
- Rey and Tirole (1986)'s "The logic of vertical restraints", revisited
- Welfare
- Vertical integration: towards a new approach
- Empirical predictions

# Model

## Preferences and Technology

- There is an upstream supplier  $M$  that controls access to a market with well-behaved inverse demand function  $P(Q)$
- Retailer  $i$  ( $i = 1, 2$ ) has marginal cost  $c_i$  which is low,  $c_L = 0$ , with prob.  $r$ ; or high,  $c_H = c$ , with prob.  $1 - r$ .  $c_i$  is iid across firms
  - Focus on  $r$  not 'too high' (else,  $M$  trivially wants only low cost firms)
  - (Results do not change with finite  $n$  retailers and  $m$  cost types)
  - (Also, iid shock may be on demand  $v_i = 1 + k_i$  rather than on costs)
- Downstream firms earn 0 profit if they do not produce
- $M$  is risk neutral, downstream firms are potentially risk averse

## Information

- $c_i$  is private information for firm  $i$  (difference with Rey-Tirole, 1986)

# Timeline

- 1  $M$  publicly offers each downstream firm  $i$  contract menus of the type  $[Q_i, T_i(Q_i)]$  where  $Q_i$  is an amount of input and  $T_i$  is a payment.
  - $M$  can discriminate between retailers
  - different pairs  $(Q_i, T_i)$  will target different cost types.
- 2 Downstream firm  $i$  learns  $c_i$  (which is private information).
- 3 Firms simultaneously choose an element from the posted contracts. (Neither firm observes the other's action.) We focus on BNE in pure strategies, with outcomes  $\{[Q_i(0), T_i(0)], [Q_i(c), T_i(c)]\}_{i=1,2}$ .
- 4 Input  $Q_i$  is transformed into output in a one-to-one relationship, the market clears, and  $T_i$  is paid (but could also be paid in stage 3).

# Interpretation of Contracting Assumptions

- Our setting is similar to Segal (1999, 2003): public bilateral offers, no contingent contracts, discrimination, negative externalities among agents. But we add (un-communicated) private information.
- If we allowed general mechanisms with messages, as in Laffont and Tirole (1987) and McAfee and McMillan (1987), then the optimal contract features one firm producing after an “auction” takes place. (But under sufficient risk aversion,  $M$  may want to restrict the number of firms taking part in the auction)
- Our assumptions are appropriate when  $M$  cannot organize an auction, and simply posts terms of trade. Or with iid shocks in every period: auction would be very costly. Or when contracts contingent on messages of other retailers are prohibited (e.g. because of risk of collusion).



# Risk Neutrality: Results

Under risk neutrality, downstream firm's utility is simply expected profits  
In equilibrium, low cost firm  $i$  receives an information rent  $cQ_i^H$

## Proposition

*In the optimal contract, the manufacturer will treat retailers symmetrically (low cost output is perfectly split between them)*

## Corollary

*In the optimal contract, neither firm is excluded.*

# Comments

- Constant returns to scale means allocation of output between firms is irrelevant for aggregate production costs and information rents
- But contracting with more firms is useful because it insures the upstream firm against output volatility
- To study the effect of downstream revenue uncertainty we now assume downstream firms are infinitely risk averse

# Infinite Risk Aversion

A retailer's expected utility equals her worst payoff realisation (when meeting low cost rival)

## Proposition

*Exclusive contracts are always optimal: all output to one retailer, no output to the other*

The presence of a competitor increases uncertainty, which must be compensated. To save the payment of this risk premium, better to eliminate competition

**Basic message:** even when the Principal can fully commit to contracts, it may simply be too costly to include both Agents.

# Intermediate preferences

- We analyse rank-dependent utility and CARA utility functions, and find that exclusion is not a knife-edge result happening only with infinitely risk averse agents:
- Above a certain risk aversion threshold, exclusion becomes optimal
- Even arbitrarily small risk aversion leads to asymmetry in the contracts (to deal with the competition externality, and reduce the risk premium,  $M$  gives more input to a firm and less to the other)

# Limited Liability

Limited liability (or wealth constraints) leads to a similar problem as risk aversion. If downstream firms cannot lose money when meeting a low cost competitor, they must receive a rent when meeting a high cost competitor.

## Proposition

*There exists an  $r^*$  such that for all  $r < r^*$  only exclusive contracts are optimal with limited liability.*

# Rey-Tirole: The logic of vertical restraints

Rey-Tirole (1986) first introduced asymmetric information between manufacturer and retailers. Three new results:

- 1 Depending on the nature of uncertainty and degree of risk aversion, vertical restraints as ET and RPM may or not be optimal
- 2 Vertical restraints are not necessarily substitutes
- 3 They are not necessarily welfare-improving

## Rey-Tirole, II: the role of competition

- When retailers are sufficiently risk-averse, manufacturer wants them to **compete**; when they are risk neutral, it prefers to offer them an exclusive territory clause (ET)
- But Rey-Tirole assume that retailers are fully informed, it is just the manufacturer who is not
- In their context, (perfect) competition determines downstream market outcome, and therefore eliminates uncertainty for retailers (who always get zero profits)

# The logic of vertical restraints, revisited

- Like above, assume retailers' costs are private information (thus departing from Rey-Tirole)
- But now consider (like Rey-Tirole) uniform two-part tariff contracts: retailers are offered  $A + wq$ ,  $w$  being wholesale price. (Surprisingly, evidence on franchise contracts finds uniformity widespread.)
- Like Rey-Tirole we consider Competition (COMP), Exclusive Territories (ET), and Resale Price Maintenance (RPM), but reverse their findings:
- Under extreme risk aversion,  $M$  ranks:  $ET > RPM > COMP$
- Under risk neutrality, it ranks  $COMP > ET > RPM$ .



# Welfare results

- With undifferentiated retailers, the social planner's rankings coincide with the manufacturer's (i.e., vertical restraints are efficient), but this need not be a general result
- Consider e.g. differentiated retailers. Here ET implies that consumers' choice - and market size - is reduced. Even under extreme risk aversion, ET may not be optimal for the manufacturer.
- Also, its choices of vertical restraints may be welfare detrimental:
  - 1 With strong differentiation,  $M$  chooses COMP, and social planner agrees
  - 2 With weak differentiation,  $M$  chooses ET, and social planner agrees
  - 3 There exists an intermediate range of parameters where firm  $M$  chooses ET but social planner would choose COMP.

# "Vertical integration"

- Consider "Vertical integration":  $M$  pays a fixed wage  $F$  to  $Ri$ 's, and owns output.  $M$  chooses number of units to sell, gives them to  $Ri$ 's, who adds retail services and put them on the market on behalf of  $M$ , and sends back revenue to  $M$ .
- Note that "vertical integration" does **not** eliminate asymmetric information:  $M$  chooses  $(F, q)$  without knowing the retailers' costs (so, if high cost  $Ri$  is to sell,  $F > cq$ , which leaves a rent to low-cost  $Ri$ ).
- "Vertical integration" turns out to be inferior to ET for the manufacturer.
- **Note:** Usual IO models **assume** that vertical integration eliminates informational asymmetries and agents' rents. Important to look at what happens within the firm and how this affects vertical relationships.

## Next step: refusal to supply a downstream rival?

- Suppose manufacturer  $M$  and retailer  $R_1$  are "vertically integrated" ( $M$  pays a fixed wage to  $R_1$  - like above), and that  $R_2$  is independent rival retailer
- Would  $M$  want to exclude  $R_2$ ?
- Preliminary work (usual assumptions: undifferentiated retailers, private information and iid shocks) shows that full exclusion is not optimal, but...
- $M$  would discriminate against  $R_2$  to save the risk premium: at equilibrium own affiliate (which is fully insured) produces more than downstream rival  $R_2$
- The lower the information rent that  $M$  has to pay to the low cost "employee"  $R_1$  the stronger discrimination against  $R_2$ .

# Empirical evidence

Our model suggests that retailers' risk aversion is associated with exclusive territories. No direct evidence on franchisees. However, to the extent that retailers' risk is higher when the franchise is new and less established, we do find some evidence:

- ET adopted when franchisor is small and newly established (McDonald's case)
- In movie industry when exhibitors adopted multiplexes and could diversify across movies, exclusivities disappeared
- Azoulay-Shane (2001): new franchisors are more likely to use ET than large established franchisors (for whom you would expect less product uncertainty and more renegeing temptation, which is the Hart-Tirole's motive for ET)