Industrial Economics

The vertical integration and foreclosure of markets

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Double Marginalisation

- The problem of "double marginalisation" points towards potential benefits of vertical structures.
- "What is worse for consumers and welfare than a monopoly? A chain of monopolies."
- for the wholesaler the profit function is

$$\Pi_w = (p_w - c)D(p_d)$$

- for the retailer/distributor

$$\Pi_d = (p_w - p_d)D(p_d)$$

- $p_d > p_w > c$ since the retailer optimizes its own price monopoly taking the wholesale price as its marginal cost.
- draw graph here

Example

- consider the following example
- D (pd) = 1 - pd
- For the retailer it holds that

$$\Pi_d = max(pd - p_w) * (1 - pd) = pd - p_w - pd2 + p_w * pd$$

- and hence

$$\frac{\partial \Pi_d}{\partial p_d} = 0 = 1 - 2p_d + p_w$$

$\Rightarrow$

$$p_d = \frac{1 + p_w}{2}$$

- with the quantity

$$q = 1 - p_d = \frac{1 - p_w}{2}$$

- and the profit

$$\Pi_d = \left(\frac{1 + p_w}{2} - p_w \right) \frac{1 - p_w}{2} = \left(\frac{1 - p_w}{2} \right)^2$$

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- For the wholesale it holds that

$$\Pi_w = (p_w - c)(1 - p_d)$$

- profit maximization means

$$\frac{\partial \Pi_w}{\partial p_w} = 0 = \frac{1}{2} - p_w - \frac{c}{2}$$

- so

$$p_w = \frac{1 + c}{2}$$

- therefore, demand is

$$q = ... = \frac{1 - c}{4}$$

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- the retailer's price is

$$p_d = ... = \frac{3 + c}{4}$$

- the profit of the retailer is

$$\Pi_d = ... = \frac{(1 - c)^2}{16}$$

- And the profit of the wholesaler is thus

$$\Pi_w = ... = \frac{(1-c)^2}{8}$$

- Their combined profit is

$$\Pi_d + \Pi_g = ... = \frac{3}{16}(1-c)^2$$

- consumer surplus is

$$CS(p_d) = ... = \frac{(1-c)^2}{32}$$

Integration

- In an integrated structure instead we would have

$$\Pi_m = (p_m - c)(1 - p_m)$$

- profit maximization implies

$$\frac{\partial \Pi_m}{\partial p_m} = 0 = 1 - 2p_m + c$$

which implies

$$p_m = \frac{1 + c}{2}$$

- profits are therefore

$$\Pi_m = \frac{(1 - c)^2}{4}$$

- The profit of the integrated structure is higher than the profit disintegrated structure.
- consumer surplus is

$$CS = \frac{(1 - p_m)}{2} = ... = \frac{(1 - c)^2}{8}$$

- The consumer surplus of the integrated structure is higher than the consumer surplus of the disintegrated structure.

Comparison

	p_d	q	Π	CS	TS
Non-Integrated	$(3+c)/4$	$(1-c)/4$	$\frac{3}{16}(1-c)^2$		$\frac{7}{32}(1-c)^2$
Integrated	$(1+c)/2$	$(1-c)/2$	$\frac{4}{16}(1-c)^2$	$(1/8)(1-c)^2$	$\frac{12}{32}(1-c)^2$
Perfect Competition	c	1-c	0	$(1-c)^2/2$	$\frac{(1-c)^2}{2}$
Franchise	$(1+c)/2$	$\frac{(1-c)}{2}$	$\frac{4}{16}(1-c)^2$	$(1/8)(1-c)^2$	$\frac{12}{32}(1-c)^2$

Franchise

- A franchise can be interpreted as the link between a wholesaler with monopoly power (his brand), the franchisor, and a series of franchisees, which are either in competition (which may include the assignment of a limited local monopoly). To maximize his profit, the franchisor has two possibilities:
  1. He sells his product at a price (1+c)/2, the price of the integrated monopoly, to the franchisees and requires them to resell the good to their final customers at the same price to avoid double marginalization. In this case his profit is $4/16 * (1 - c)^2$, the same as the profit of the integrated structure. This practice of "retail price maintenance" is however banned in some countries, including the United States.
  2. An alternative to achieve the same end would be to require franchisees to pay a fixed payment ("A") in order to acquire the franchise. Then the monopolist sells his good to the retailers at marginal cost. The franchisee will make every effort to sell the product to get his money back and sells the monopoly output. Thus double marginalization is also avoided. The maximum profit the monopolist can extract is again 4/16*(1-c)2, the profit of the integrated structure. This is the usual structure of a franchise contract.

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- profits

$$\Pi_{fe} = (p_{fe} - c)(1 - p_{fe}) - A$$

- profit maximization

$$\frac{\partial \Pi_{fe}}{\partial p_{fe}} = 0$$

- This implies

$$p_{fe} = \frac{1+c}{2}$$

and

$$q_{fe} = 1 - \frac{c+1}{2} = \frac{1-c}{2}$$

- The franchiser captures the entire surplus then

$$A = \frac{(1-c)^2}{4}$$

and $\Pi_{fe} = 0$ and $\Pi_{fr} = A = \frac{(1-c)^2}{4}$

Externalities in franchising and surplus sharing

- The defining characteristic of a franchise is that all franchisees offer the same product and work under the same brand name. Even if the parent company establishes and enforces strict rules about performance, presentation, product and service quality, it cannot control everything. In particular, the parent company does not have precise knowledge of the local market and its demand function. This the franchisee knows far better. We are thus in a situation characterised by information asymmetries and uncertainty.
- There also exist **reputational externalities** between franchisees and between each franchisee and the franchisor. A failure of any single one of them will affect all the others as well as the parent firm (imagine a sanitary or health problem for a food franchise). Conversely, a special effort in terms of marketing or service by any single team will tend to benefit the brand as a whole.
- The **informational asymmetries** also imply that the parent company would benefit from a special effort of each franchisee to find the optimal price adapted to local demand
- Finally, the franchisees are very much exposed to **uncertainty**, since they have a large upfront payment to make and in the simple model above cannot count on any surplus profits. A bad year may see them go bankrupt, which again would be bad for the brand as a whole.

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- These three considerations induce the franchisor to share a portion of the total monopoly rent with franchisees in the form of

$$A < \frac{(1-c)^2}{4}$$

- This possibility ot gain an excess profit will motivate franchisees to make a particular effort to reduce negative externalities (as they would lose their share of the rent), to maximize the positive externalities, including the study of the local market (as they can keep part of the results of their extra effort). They will also be able to better withstand inevitable market fluctuations. In reality, there exist of course very complex contracts that seek to maximize the surplus of the monopoly franchisor taking into account the motivation, skills and specific circumstances of their franchisees.

Market Foreclosure

- Definition (Tirole, p. 193): market foreclosure means blocking the access of a competitor to a supplier ("upstream foreclosure") or access of a supplier to customers ("downstream foreclosure"). Foreclosure can be complete or partial. It always requires a monopoly element at some point of the value chain. If all stages are perfectly competitive, there can be no foreclosure, which is basically the transfer of monopoly power from one market to another. There exist three principal manners to achieve such foreclosure:
    1. Technical links
    2. Vertical integration with a monopoly supplier (upstream) or distributor (downstream)
    3. Long-term contracts

1. Market foreclosure and the transfer of monopoly power by technical link

- A firm with monopoly power in one market seeks to monopolise another market by transferring its monopoly power through technical "tie-ins" between complementary products (operating systems and computer programs such as Windows and Office, mobile phone operating systems and applications, "triple or quadruple plays", Gillette razors and blades, automobile brands and service provision, airline tickets and rental cars etc.). The technical incompatibility of a monopolist?s products is an alternative technique to direct integration.
- These are all examples of "bottlenecks", like the following example. Imagine a railway company that has a monopoly on the line AB, but competes with other railways on the line BC. In this case, the monopoly will sell exclusively tickets from A to C force competitors out of the market.

draw figure here

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- A variation on this theme is a firm that serves two downstream markets, one with elastic demand, the other with inelastic demand. At first, he asks the same price in both. This means he is undercut in the market with elastic demand. In order to differentiate between the two markets, while avoiding that goods are shipped from one market to the other, he will integrate with the distributor in the market with elastic demand and will continue to demand a high price in the market with inelastic demand.
- One can also imagine an alternative strategy, in which the integrated monopolist charges such a high price to competing distributors that they can no longer compete. He will charge a lower internal price to his own downstream division. This is called a “price squeeze”.

2. Vertical integration and long-term contracts (Aghion and Bolton)

- A long term contract may substitute for vertical integration. For example, a large provider (or a large customer) may demand exclusive contracts prohibiting dealing with alternative suppliers (customers) alternative and thus foreclose the market to its competitors.
- The Chicago School maintains that there is nothing to criticise as those who sign the contract would not do so, if it was not in their own interest. Exclusive contracts thus maximise the combined surplus of both sides.

2. Vertical integration and long-term contracts (Aghion and Bolton)

- To counter this idea, Aghion and Bolton develop a model in which such **exclusive contracts** are indeed optimal from a private point of view but **suboptimal from a social point of view**. In fact, they impose negative externalities on potential entrants.
- In their example of upstream foreclosure, a monopoly producer ("M") concludes a long-term contract with a, in principle, competitive distributor ("D") in order to foreclose entry to a potential new entrant threat to enter. The key question is how the monopoly can prevent the defection of his client in cases where the new entrant is more efficient? Their highly stylised model is both elegant and instructive.

- Marginal utility of a sale to the distributor (A):

$$1$$

- Production cost (certain) of the monopoly (M):

$$c_M = 1/2$$

- Production cost (uncertain) of the entrant (E):

$$c_E \in [0, 1]$$

the probability of cost is linearly distributed; its precise value is known only to the entrant.

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- The two questions that Aghion and Bolton are asking are:
  1. What is price the integrated structure (monopolist ? distributor) will offer the entrant to minimize its own costs (maximise its profits)? Remember its final revenue is always 1 and it can always produce itself at the price $c_M = 1/2$.
  2. Is this integration profitable for both and can it be replicated by a long-term contract?
- The integrated structure will offer the price pE that minimises its own costs of procurement. Once pE has been offered there are two possibilities:
  1. The entrant accepts pE and the cost will be pE (in this case it holds that $c_E \leq p_E$).
  2. The entrant does not accept because $c_E < p_E$. In this case the cost of production will be 1/2.

- The problem thus becomes

$$\min_{p_E} C = p_E \text{Prob}(c_E \leq p_E) + \frac{1}{2}\text{Prob}(c_E > p_E) = ...$$

- and hence

$$\frac{\partial C}{\partial p_E} = 0 = 2p_E - 1/2$$

- therefore $p_E^* = 1/4$
- The social optimum would of course be $p_E = 1/2$

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- What explains the difference? The objective of the integrated structure is (a) to keep a larger portion of the rent in the case when $\frac{1}{4} < c_E < \frac{1}{2}$ (if the integrated structure had offered $p_E = \frac{1}{2}$, the entrant would have benefited from all the cases in which $cE < \frac{1}{2}$). Its second objective (b) is to participate in the efficiency gains when $cE < \frac{1}{4}$. At $c_E = \frac{1}{4}$, the two considerations balance.

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- Let us look at the benefit of the integrated structure, the benefit of the entrant and the total surplus in both cases:
- The benefit of the integrated structure:
  - with $p_E = 1/4$: $\Pi_I = 1 - c = 1 - p_E^2 - 1/2 + p_E/2 = 18/32$ **(maximum gain of the integrated structure)**
  - with $p_E = 1/2$: $\Pi_I = 1 - c = 1 - p_E^2 - 1/2 + p_E/2 = 16/32$
  - in autarchy: $\Pi_I = 1 - C = 16/32$
- The expected gain of a new entrant
  - with $p_E = 1/4$: $\Pi_E = 1/4(1/4 - E(c_E)) = 1/32$
  - with $p_E = 1/2$: $\Pi_E = 1/2(1/2 - E(c_E) = 4/32)$ **(maximum gain of the new entrant)**
  - in autarchy: $\Pi_E = 0$
- Total surplus
  - with $p_E = 1/4$: $\Pi_I + \Pi_E = 19/32$
  - with $p_E = 1/2$: $\Pi_I + \Pi_E = 20/32)$ **(maximum total gain)**
  - in autarchy: $\Pi_I + \Pi_E = 16/32$

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- The strategy of partial foreclosure thus works for the integrated structure although it is not optimal from a social point of view. From a social point of view, a division of labour work employing the most efficient firm in all cases would have been preferable.
- The central question is whether the same result could have been achieved by a long-term contract between the monopoly producer and the distributor. Yes! The monopoly producer ("M") makes the following offer to the distributor ("D"):
  1. D buys from M at $P_M = 1/4$ in which case $\Pi_D = 1/4$.
  2. The penalty for breach of contract will be $1/2$.
  3. The entrant E must thus offer $p_E \leq 1/4$ as D will only accept only if his gain $\Pi_D = 1 - 1/2 - pE \geq 1/4$. He will thus only accept if $p_E = c_E \leq 1/4$. This corresponds precisely to the previous situation.

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- However, why would D accept such a contract? We must respond to criticism of the Chicago school that it is not in private companies? interest to sign socially harmful contracts. [The underlying assumption of the Chicago School is that there are no transaction costs. If this is true, private and social value are always equal. In the present case, it would just mean that entrant would pay the integrated structure its share of the rent in order to let it produce.]

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- The distributor D, in fact, has two possibilities:
  1. Accept the contract. In this case it holds that:

$$\Pi_D = ... = 1/4$$
$$\Pi_M = ... = 5/16$$
$$\Pi_E = ... = 1/32$$

     The total surplus would be equal to 19/32
  2. Reject the contract, In this case it holds that:
     If $c_E \leq 1/2$, will offer a price of $p_M > p_E = 1/2 - \epsilon$. If $c_E > 1/2$, E will out of the market, and D will face p_M with a monopoly price $p_M = 1$.
     The expected cost of D is therefore:

$$C_D = 1/2\text{Prob}(c_E \leq 1/2) + 1\text{Prob}(c_E > 1/2) = 3/4$$

     Hence

$$\Pi_D = ... = 8/32$$
$$\Pi_M = ... = 8/32$$
$$\Pi_E = ... = 4/32$$
$$\Pi_A + \Pi_M + \Pi_E = ... = 20/32$$

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- M can thus induce D to conclude the long-term contract by offering a price just slightly below the monopoly price of $p_M = 1 - \epsilon$. This will guarantee a profit for D equal to $\Pi_D = 1/4 + \epsilon$, in which case E will remain excluded from the market through this long-term contract for the case that $1/4 < c_E < 1/2$.