Vertical Restraints

Christian W. Bach

University of Liverpool & EPICENTER

Introduction

- In vertical structures a good only reaches the consumer via different stages.
  - Multi-Stage Distribution System: producers (often) do not sell their goods directly to final consumers but via intermediaries, wholesalers, or retailers.
  - Multi-Stage Production System: Also, the final good is often produced in several stages: from raw material to intermediate good to final product.

- Typically, firms at different stages of the vertical structure sign contracts of various types in order to reduce transaction costs, guarantee supply stability, and better co-ordinate actions.
  - In fact, such agreements and contractual provisions between **vertically related firms** are called vertical restraints.

Introduction

- As an example consider a vertical structure between a **manufacturer (M)** and a **retailer (R)** distributing its products.
  - *(Or between upstream & downstream firms or between a producer & a distributor.)*
- Generally, an optimal action for one party is not necessarily optimal for the other party.
  - E.g. **M** would like **R** to make effort in marketing its products (advertising, shelves-placement, customer assistance, etc.), but such efforts and services are costly for **R**.
- **M** might then use contractual provisions – i.e. vertical restraints – to induce higher marketing effort from **R**.
- Examples: exclusive area of competence assigned to R, non-linear contracts incl. bulk discounts, minimum sale or non-competing goods obligation, take-over of **R** by **M**, etc.

Introduction

- The objective of such contracts and clauses is to restrain the choices of the vertical opponent and to induce an individually more favourable outcome.
- Alternatively put, each party's actions create an externality on the other: vertical restraints assist to control these externalities.
- The task for **competition policy**: when should vertical restraints be expected to show positive or negative effects on total welfare.

Introduction

- Vertical restraints can affect intra-brand competition as well as inter-brand competition.
- Intra-brand competition concerns the relationship between firms which produce and distribute the same brand.
- Inter-brand competition concerns the relationship between different vertical structures (distributing different brands).
- Here, the welfare effects are considered of vertical restraints that affect intra-brand competition, i.e. competition between several **R** that sell the same product or brand of a given **M**.
- The analysis thus abstracts from effects on competing brand producers or distributors.

Agenda

- Overview on Vertical Restraints
- Double Marginalization
- Underprovision of Services
- Other Efficiency Issues

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- **Overview on Vertical Restraints**
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Common Types of Vertical Restraints

- Non-Linear Pricing (also called Franchise Fee or Two-Part Tariff)
- Quantity Discounts (also called Progressive Rebates)
- Resale Price Maintenance (RPM)
- Quantity Fixing
- Exclusive Clauses
- Vertical Integration as an extreme case

Common Types of Vertical Restraints

- Non-linear pricing (also called franchise fee or two-part tariff) is a contract specifying a fixed amount independent of the number of units bought ("franchise fee") plus a variable component.
  - For example, to sell some fashion producer's brand, a shop might have to pay EUR 500 per year plus EUR 10 per item.
  - The effect is that the unit cost effectively paid by the shop decreases with the number of units bought from the same brand: the goal is to encourage **R** to buy more units.
- Quantity discounts (also called progressive rebates) are contracts with the same effect as non-linear pricing: the larger the quantity bought the cheaper the transaction on average.

Common Types of Vertical Restraints

- Resale price maintenance (RPM) fix the price at which the retailer has to sell the product.
  - Possible rationale: **M** might have different perceptions from **R** as to which price final consumers should be charged.
  - Hence, **M** might want to affect **R**'s price decision.
  - More moderate tools are retail price recommendation (RPR), price-floor (PF), or price-ceiling (PC).
- Quantity fixing specify the number of units that R should buy.
  - different forms such as quantity-forcing (QF) (**R** cannot buy less than a certain amount) or quantity-rationing (QR) (**R** cannot buy more than a certain amount).

Common Types of Vertical Restraints

- Exlusive clauses are exclusive agreements between **M** and **R**.
  - Exclusive territory clause (ET): there is only one **R** who can sell a certain brand within a certain geographical area.
  - Exclusive dealing (ED): **R** agrees to carry only the brand of a certain **M**.
  - Selective distribution clauses: only a certain type of **R** is allowed to carry **M**'s brand (e.g. luxury goods only at high-street **R**).

Common Types of Vertical Restraints

- Vertical integration (also called vertical mergers) are mergers between **M** and **R** or take-overs of **R** by **M**, and can be seen as the extreme case of vertical restraints.
- When **M** find it difficult to use clauses that induce the behaviour they want from **R**, vertical integration might be attractive.
- **M** and **R** then belong to the same firm, so their objectives should be more easily reconciled ("agency problems could still arise").
- It is important to keep in mind that vertical mergers are often an alternative to vertical restraints.
- Thus, a firm stance against vertical restraints should be adopted, iff, vertical mergers are subject to an equally strict control.

Effectiveness of Vertical Constraints is Relative

- Note that in any market – due to the nature of the transactions or due to institutional constraints – some of these vertical restraints might be effective whereas others might not be.
  - E.g. if discounts on prices cannot be observed by **M**, RPM lose their power: quantiy fixing might be more appropriate.
- Arbitrage ("buy where the price is low to resell where the price is high") might also diminish the effectiveness of vertical restraints.
  - E.g. if consumers have low search and transport costs, it is unlikely that exclusive territorial clauses would be effectve.
- Also, non-linear pricing or quantity discounts might lose effectiveness, as one **R** could buy many units and then resell some of them to other **R** planning to sell low quantities.
  - Such vertical restraints are thus more effective when **M** can observe sales of **R**.

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- **Double Marginalization**
- Underprovision of Services
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Double-Marginalization

- If both **M** and **R** have market power, then both charge a mark-up, resulting in too high prices for the vertical structure.
- If vertical restraints were used – in the extreme case vertical integration occured – prices would decrease and both producer surplus as well as welfare would increase.
- This so-called double marginalization problem is the best known example of externalities affecting vertically separated firms.
- The double marginalization problem is due to Spengler (1950).

Double-Marginalization

- Suppose that **M** relies on **R** for selling to final customers.
- **M** sells to **R** according to a constant unit price ("linear pricing").
- For simplictiy sake, assume that **R** incurs no other cost than the wholesale price.
- Being profit maximizers both firms choose the monopolistic mark-up over their own cost: **M** chooses w given c and **R** chooses p given w.
- Due to both firms adding their margins consumers are paying too high a price and are thus buying too few units from the jointly optimal viewpoint (sum of upstream and downstream profits).

Double-Marginalization

- Indeed, if both firms were under the same management, the final price p would be chosen with only one mark-up (over the cost c).
- Thus, vertical integration (i.e. merger of **M** & **R**) is efficient, as it allows to internalize the externality they impose on each other.
- As a result, after the correction for this externality not only firms but also consumers gain from the merger.
- If vertical integration is not possible, different types of vertical restraints could still be used to control for this externality.
- Since double marginalization results in a too high market price a direct possibility to solve the problem is RPM (if p is observable).

Double-Marginalization

- Quanitity forcing would give the same outcome, obliging **R** to increase sales to the optimal level for the integrated structure.
- Another possibility would be non-linear pricing: **R** can be made "residual claimant" of all the profit generated in the market.
- By setting the variable component equal to **M**'s cost, i.e. $w = c$, **R** would effectively behave as a integrated structure, and choose the optimal final price by individual profit maximization.
- Yet, **M** can appropriate some (or even all) of **R**'s profits through the fixed component F: the distribution of the profits depends on the relative bargaining powers of the two firms.
- In the extreme case of **M** enjoying all bargaining power (or several **R** strongly competing to sell **M**'s product), **M** can make exactly the same profit as if it owned **R**.

Double-Marginalization

- However, vertical restraints are not equivalent, if there is some uncertainty in the market (e.g. consumer demand or costs) and **R** is risk averse.
- A non-linear contract $F + cq$ would expose **R** to risk due to demand uncertainty, since **R** as residual claimant is not protected against demand shocks.
- RPM gives perfect insurance under demand uncertainty, as the final price is guaranteed independently of the level of demand.
- Yet, RPM fares poorly under cost uncertainty as a shock on **R**'s costs affect **R**'s profits, since the price cannot be adjusted.
- Consequently, with a risk averse **R** RPM is better under demand uncertainty, wereas non-linear pricing under cost uncertainty.

Double-Marginalization

- For simplicity it is convenient to consider double-marginalization with a monopoly both upstream and downstream.
- Yet, note that the issue of double marginalization also arises whenever only some market power exists at both levels.
- The vertical externality pushes prices above what would be optimal for the vertical structure.
- In additon to internalization via vertical merger, RPM, quantity fixing, etc. – with the positive total welfare effects – **M** can tackle the problem at its root and eliminate market power downstream.
- The higher downstream competition the lower the mark-up on top of the upstream mark-up and thus the weaker the externality. *("e.g. Bertrand downstream competition: to* $p = w$ *and* $w = w^M$ *")*
- In fact, by reducing downstream competition – e.g. by assigning exclusive territories to **R** – the double-marginalization problem is aggravated and welfare is reduced.

Modelling Double-Marginalization

- Consider a vertical structure with **M** and **R** enjoying monopolies.
- Assume that **M** has all the bargaining power and makes a take-it-or-leave-it offer to **R** *(The ensuing result is robust to different distributions of the bargaining power though)*.
- Consumers' demand is given by $q = a - p$ where $a > 0$.
- **M** has unit production cost $c < a$ and **R** has unit cost of the whole sale price w plus a unit cost of resale (assumed 0 for simplicity).

Separation and Linear Pricing

- The game structure is as follows:
  1. **M** chooses the wholesale price w.
  2. **R** chooses the final price p.

- Via "backward induction" consider **R**'s decision problem first

$$\max_p \pi_R = (p - w)(a - p)$$

- First-order conditions $\frac{\partial \pi_R}{\partial p} \stackrel{!}{=} 0$ induce

$$p^* = \frac{a + w}{2} \qquad q^* = \frac{a - w}{2} \qquad \pi_R^* = \frac{(a - w)^2}{4}$$

Separation and Linear Pricing

- **M** anticpiates the optimal decisions p^* and q^* of **R**.
- Hence, **M**'s decision problem reads as

$$\max_w \pi_M = (w-c)q^* = (w-c)\frac{a-w}{2}$$

- First-order conditions $\frac{\partial \pi_M}{\partial w} \stackrel{!}{=} 0$ induce $w^* = \frac{a+c}{2}$
- As market outcomes of the vertical structure it follows that

$$w^* = \frac{a+c}{2} \qquad p^* = \frac{3a+c}{4} \qquad \pi_M^* = \frac{(a-c)^2}{8} \qquad \pi_R^* = \frac{(a-c)^2}{16}$$

- The industry profits are $\pi_{M+R}^* = \frac{3(a-c)^2}{16}$ at equilibrium.

Vertical Integration

- Suppose now a vertical merger of **M** and **R**.
- The merged entity can both produce and sell to the consumers.
- The firm's decision problem is the standard monopoly one:

$$\max_p \pi_{integ} = (p-c)(a-p)$$

- First-order conditions $\frac{\partial \pi_{integ}}{\partial p} \stackrel{!}{=} 0$ induce

$$p^*_{integ} = \frac{a+c}{2} \qquad q^*_{integ} = \frac{a-c}{2} \qquad \pi^*_{integ} = \frac{(a-c)^2}{4}$$

Comparison

- As $a > c$ it follows that $p^*_{integ} < p^*$ and thus $q^*_{integ} > q^*$.
- Hence, consumer surplus increases due to the vertical merger.
- It also holds that $\pi^*_{integ} > \pi^*_{M+R}$.
- **M** can thus always pay **R** at least π^*_R to convince **R** to take part in the merger (or **R** can give **M** at least π^*_M).
- Both firms stand to gain from merging the two vertical stages.
- Since both consumer surplus and producer surplus increase, total welfare unambiguously rises from a vertical merger.

Vertical Restraints: RPM

- Double marginalization results in too high final prices.
- Imposing $p^{RPM} = p^*_{integ} = \frac{a+c}{2}$ on the downstream firm will maximize the surplus of the vertical structure.
- The way in which **M** and **R** share the surplus will then be determined by the wholesale price w.
- If **M** has all the bargaining power, then it will fix $w = p^*_{integ} = \frac{a+c}{2}$ and get all the producer surplus.
- In general, the higher w – where $w \in [c; p^*_{integ}]$ – the higher the share of the surplus going to the upstream firm.

Vertical Restraints: Price-Ceiling

- An identical outcome to the one with RPM would be achieved if the upstream firm sets a PC $\overline{p} = p^*_{integ} = \frac{a+c}{2}$.
- This obliges the downstream firm to sell at a price $p \leq \overline{p}$.
- For any wholesale price $w \in [c; p^*_{integ}]$ the downstream firm would then choose precisely $p = \overline{p}$ and the actual w would – like in the case of RPM – determine the division of the surplus.

Vertical Restraints: Quantity Fixing

- The mirror image of too high a price is that there is too little a quantity sold to final consumers.
- Therefore, **M** can also restore efficiency via Quantity-Fixing by obliging **R** to buy the number of units $q^*_{integ} = \frac{a-c}{2}$.
- Equivalently, Quantity-Forcing (QF) can be used establishing that **R** should buy at least $q \geq \overline{q} = q^*_{integ}$: **R** would then also choose precisely the efficient output $q = q^*_{integ}$.
- As before, the level of the wholesale price $w \in [c; p^*_{integ}]$ determines the distribution of the producer surplus.
- If **M** has all the bargaining power, it will choose $w = p^*_{integ}$ and appropriate all the profits of the vertical structure.

Vertical Restraints: Non-Linear Pricing

- **M** can make **R** the residual claimant of all the profits generated in the market with the non-linear price scheme $F + wq$ with $w = c$.
- **R**'s decision problem is then given by

$$\max_p \pi_R^{FF} = (p - c)(a - p) - F$$

- The first-order conditions induce the same solution as under vertical integration, i.e. $p_{FF}^* = \frac{a+c}{2}$ and $q_{FF}^* = \frac{a-c}{2}$.
- The distribution of the profits (equal ot the vertically integrated profits) will then be determined by the amount of the franchise fee F, as $\pi_M^{FF} = F$ and $\pi_R^{FF} = \frac{(a-c)^2}{4} - F$.
- Note that if **M** has all the bargaining power, then $F = \frac{(a-c)^2}{4}$ and **M** appropriates all the profits generated by the vertical structure.

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- **Underprovision of Services**
- Other Efficiency Issues

Underprovision of Services

- The vertical structure is now assumed to consist of one **M** and several **R**.
- Besides the vertical externalities between **M** & **R** there often exist horizontal externalities among the **R** that determine an inefficient outcome from the viewpoint of the vertical structure as a whole.
- An important example of such externalities concern the level (and quality) of services provided by the **R**.
- If such services cannot be perfectly appropriated by one **R** (i.e. spillovers benefiting other **R** with the same brand), then services become a public good on which the **R** will free-ride.
- Thus an underprovision results which reduces **M**'s profits.
- Again vertical integration as well as certain vertical restraints might help **M** to solve this externality problem.

Underprovision of Services: An Example

- Consider several shops selling a brand of dishwashers in a city.
- There are many activities that the shops might carry out to increase consumers' appeal for the product.
  - Advertising of the brand in the shop or hiring assistants answering potential customers' questions, illustrate the characteristics of the product, etc. are such activities.
- Such activities may make the potential customers more willing to buy the brand, but not necessarily at the shop with the activities.
- Also suppose that the **R** are located very close to each other, so that transportation costs and search costs can be neglected.

Underprovision of Services: An Example

- In these circumstances it is not attractive for a given shop to exert much effort to sell the brand.
- The rival shops would have an incentive to avoid effort costs, just free-ride on the provision of services and offer a better price.
- A consumer would first visit the shop providing the services, but then buy at a shop offering the same product at the best price.
- Each shop will anticipate this and refrain from offering services that have a public good characteristic.
- Indeed, services by **R** only contribute to the brand of **M** and cannot be appropriated by the providing shop.
- The situation will be sub-optimal for M, as the brand will not be supported by services, but also for consumers, who do not receive information they value.

Underprovision of Services: An Example

- Vertical restraints might restore incentives for **R** to do services.
- For instance, **M** could divide the city in different areas with exclusive **R** as distributors in each area (exclusive territories).
  - This makes it more costly for consumers to visit other shops, thus reduce the risk of undercutting by a free-rider.
  - Hence, each **R** would have a higher incentive to provide brand-supporting services.
- Alternatively, RPM or price-ceiling: all **R** in the city can be maintained by **M**, yet the problem of undercutting is blocked.

Underprovision of Services: An Example

- Vertical integration would also solve the problem.
  - If **M** owned the **R**, then **M** would take into account the externality they impose on each other.
  - **M** would then simply prevent its shop managers from undercutting each other and reducing the level of services.
- To sum up, vertical restraints and vertical integration avoid or reduce the free-riding problem to the benefit of producer surplus and (usually also) consumer surplus.

Underprovision of Services: Reality Check

- Note that generally there are also many sales activities which can be appropriated by the respective shop.
  - Examples: credit to consumers, post-sales service by the shop, physical appearance of the shop.
  - In such cases the free-riding problem will not arise.
- In reality services of distinct types can co-exist yet the free-riding problem may affect investment decisions of a **R** to some degree.

Modelling Underprovision of Services

- Consider a vertical structure with an upstream monopolist M and two downstream duopolists R_1 and R_2.
- The **R** choose their efforts ("services") and compete in prices.
- Services are assumed to increase the perceived quality of the brand but cannot be appropriated by the **R** providing them.
- The perceived quality is given by $u = \overline{u} + e$, where $e = e_1 + e_2$ is the sum of the efforts (services) provided by the two **R**, and $\overline{u}$ is the basic quality level perceived by the consumers.
- The costs are $c(q, e) = wq + \frac{\mu e_i^2}{2}$ with $\mu > 1$ for the **R** i.e. for $i \in \{1, 2\}$ *("fixed service costs e.g. advertising outlays / fixed in terms of output")*.
- Consumers' demand is $q = (v + e) - p$.

Modelling Underprovision of Services

- Double marginalization is avoided by downstream price competition: the only externality in this model is thus the free-riding problem.
- This is because **R** cannot differentiate themselves via services, and are thus perceived as perfect substitutes by the consumers.
- The benchmark case of upstream and downstream separation is considered first.
- Then, the effects of vertical integration and of some vertical restriants is looked at.

Separation

- In line with "backward induction" consider the downstream interaction between R_1 and R_2 first.
- By contradiction it can be shown that $p_1 = p_2 = w$ and $e_1 = e_2 = 0$.
- Consider R_1 and suppose that $e_1 > 0$.
- Because of the fixed cost of service R_1 could then only avoid losses, if $p_1 > w$.
- However, by undercutting R_2 would then get all the demand.
- It follows that $e_1 = 0$ and (by analogous reasoning) that $e_2 = 0$.
- The usual Bertrand logic yields marginal cost pricing $p_1 = p_2 = w$.

Separation

- The downstream **M** anticipates $p = w$ and $e_1 = e_2 = 0$.
- Consumers' demand will thus be $q = v - w$.
- **M**'s decision problem thus reads as follows:

$$\max_w \pi_M = (w - c)(v - w)$$

- First-order conditions imply that

$$w^* = \frac{v + c}{2} \quad q^* = \frac{v - c}{2} \quad \pi_M^* = \frac{(v - c)^2}{4} \quad p^* = \frac{v + c}{2} \quad e_1^* = e_2^* = 0$$

and thus

$$PS_{sep}^* = \pi_M^* = \frac{(v - c)^2}{4} \quad CS_{sep}^* = \frac{(v - c)^2}{8} \quad WEL_{sep}^* = \frac{3(v - c)^2}{8}$$

Vertical Integration

- Suppose that the upstream and downstream firms merge, e.g. M takes over R_1 and R_2.
- The integrated firm's decision problem reads as follows:

$$\max_{p,e_1,e_2} \pi_{int} = (p-c)(v+e_1+e_2-p) - \mu\frac{e_1^2}{2} - \mu\frac{e_2^2}{2}$$

- First-order conditions imply that

$$e_1^* = e_2^* = e_{int,i}^* = \frac{v-c}{2(\mu-1)} \qquad p_{int}^* = \frac{\mu(v+c)-2c}{2(\mu-1)} \qquad q_{int}^* = \frac{\mu(v-c)}{2(\mu-1)}$$

and thus

$$PS_{int}^* = \frac{\mu(v-c)^2}{4(\mu-1)} \qquad CS_{int}^* = \frac{\mu^2(v-c)^2}{8(\mu-1)^2} \qquad WEL_{int}^* = \frac{\mu(3\mu-2)(v-c)^2}{8(\mu-1)^2}$$

Vertical Integration

- It can be seen that $WEL^*_{int} > WEL^*_{sep}$ as $\mu > 1$ and

$$WEL^*_{int} > WEL^*_{sep} = \frac{(4\mu - 3)(v - c)^2}{8(\mu - 1)^2} > 0$$

- In this model vertical integration allows control for the horizontal externality among **R** that induces an underprovision of services relative to what would be optimal for the integrated structure.

- Besides, note that it is optimal for the vertically integrated structure to have both R_1 and R_2 selling the good.

- This due to the convexity of service costs: to produce a given level of services, costs are lower if the provision is split among the two **R** rather than concentrated in one.

Vertical Restraints

- The problem under a separated structure is one of free-riding among the **R**, who are pushed to undercut each other.
- Thereby the **R** lose incentives to provide services.
- To restore incentives **M** has to relax competition downstream.
- In particular, a non-linear contract would not solve the problem unless accompanied by some measure reducing competition.

Exclusive Territories and Non-Linear Pricing

- Suppose that each **R** receives a territory or exclusive competence for a certain type of customer plus a non-linear contract of the type $T = wq + F$ with $w = c$.
- For simplicity it is assumed that each **R** can sell to half of the total number of consumers.
- Yet the overall perceived quality level of the good is determined by the sum of the **R**'s efforts.
- Each R_i for $i \in \{1, 2\}$ faces the following decision problem:

$$\max_{p_i, e_i} \pi_{R_i} = (p_i - c)\frac{v + e_1 + e_2 - p_i}{2} - \mu\frac{e_i^2}{2} - F$$

Exclusive Territories and Non-Linear Pricing

- The first-order conditions are

$$\frac{p_i - c}{2} - \mu e_i \stackrel{!}{=} 0$$

$$v + e_1 + e_2 - 2p_i + c \stackrel{!}{=} 0$$

- Note that given efforts the chosen price is equivalent to the vertically integrated solution.
- However, effort is not optimal, since marginal profit from effort is lower compared to full internalization of the effort externality.
- Each **R** knows that its effort will increase sales in a market which is half the size of the one of a vertically integrated structure.
- Hence, exclusive territories improve the incentives for services and bring **M** closer to the optimum, but do not restore first-best.

Exclusive Territories and Non-Linear Pricing

- Giving exclusive territories for the whole market to only one **R** does not restore first-best either, since effort will be provided by only one **R** *("diseconomies of scale from effort provision")*.
- The only **R**'s (WLOG suppose it is R_1) decision problem is

$$\max_{p_1,e_1} \pi_{R_1} = (p_1 - c)(v + e_1 - p_1) - \mu\frac{e_1^2}{2} - F$$

- The first-order conditions are

$$p_1 - c - \mu e_1 \stackrel{!}{=} 0$$

$$v + e_1 - 2p_i + c \stackrel{!}{=} 0$$

  thus $e_1^* = \frac{v-c}{\mu-1}$.
- At equilibrium **R** thus indeed provides lower effort than first-best.
- To sum up, exclusive territories reduce the externality problem and increase the provision of effort but do not restore first-best.

RPM and Non-Linear Pricing

- Another vertical restraint to be used to give more incentives to produce services is RPM plus a non-linear contract $(w < c; F)$.
- If M fixes the price $p_{RPM} = p^*_{int} = \frac{\mu(v+c)-2c}{2(\mu-1)}$, then the **R** will not price so aggressively that incentives to provide effort are eliminated (as in the Bertrand case).
- Each R_i for $i \in \{1,2\}$ faces the following decision problem:

$$\max_{e_i} \pi_{RPM} = (p^*_{int} - w)\frac{v + e_1 + e_2 - p^*_{int}}{2} - \mu\frac{e_i^2}{2} - F$$

- The first-order conditions imply that for $i \in \{1,2\}$

$$e_i = \frac{p^*_{int} - w}{2\mu}$$

RPM and Non-Linear Pricing

- In order for a **R** to choose the optimal level of effort $e_i = e^*_{int}$, the following conditions must be satisfied for $i \in \{1, 2\}$

$$e_1 = \frac{p^*_{int} - w}{2\mu} \stackrel{!}{=} \frac{v - c}{2(\mu - 1)} = e^*_{int}$$

- Hence, the wholesale price must be set to $w_{RPM} = p^*_{int} - \frac{\mu(v-c)}{\mu-1}$ which simplifies to $w_{RPM} = \frac{3\mu c - 2c - \mu v}{2(\mu-1)} < c$.
- Note that if $w = c$, then RPM would not reproduce the vertically integrated level of effort.
- This is because each **R** – when choosing effort – takes into account the marginal impact of effort only on its own profit.
- Since each **R** knows that it will sell to only half the market *("undifferentiated product and prices fixed by **M**")* it will have insufficient incentives.

RPM and Non-Linear Pricing

- RPM alone does not restore first-best: the **R** must be given additional incentives to make effort.
- Indeed, this can be achieved by **M** selling them the input at a wholesale price below its own marginal cost.
- As a result the contract induces the same level of price and effort as the vertically integrated structure.
- Thus, the total profit generated under this contract is the same as under vertical integration.
- The franchise fee F can then be used to redistribute the profit from each **R** to the **M**: if $F = \frac{\pi^*_{int}}{2} + (c-w)\frac{q^*_{int}}{2}$, then **M** will replicate the profit made under vertical integration (recall $PS^*_{int} = \frac{\mu(v-c)^2}{4(\mu-1)}$).

RPM and Quantity Forcing

- RPM can also be used in combination with quantity forcing.
- To ensure that the **R** are selling at the optimal price, **M** sets the retail price to $p_{RPM} = p^*_{int}$.
- As seen above, RPM alone would not suffice to restore the vertically integrated solution: the **R** would make insufficient effort and sell too few units of the good.
- As an alternative to the non-linear contract (w_{RPM}, F), specified above, **M** can simply impose a minimum sales level equal to q^*_{int}.
- This would push the **R** to choose the optimal effort level.
- Since price is fixed by RPM and optimal effort is induced by Q-F, the vertically integrated outcome would be reproduced.
- **M** could then choose the wholesale price – which given RPM and Q-F does not modify the **R**-incentives – as the channel to redistribute rents away from the **R**.

RPM and Quantity Forcing

- Formally, given RPM $p_{RPM} = p^*_{int}$ and Q-F the decision problem of each R_i for $i \in \{1, 2\}$ is as follows

$$\max_{e_i} \pi_{R_i} = \frac{(p^*_{int} - w)(v + e_1 + e_2 - p^*_{int})}{2} - \mu \frac{e_i^2}{2}$$

subject to

$$\frac{v + e_1 + e_2 - p^*_{int}}{2} \geq \frac{q^*_{int}}{2}$$

- As unconstrained optimization leads the **R** to insufficient effort, the problem is solved by minimum effort satisfying the constraint.
- By symmetry effort is thus given by $\frac{q^*_{int} + p^*_{int} - v}{2}$ which is in fact e^*_{int}.
- Since this contract already implements the optimal p^*_{int} and e^*_{int}, the wholesale price becomes incentive-neutral: **M** can use it to appropriate rents.

RPM and Quantity Forcing

- Accordingly, **M** chooses the wholesale price w so as to leave the **R** with zero net profit.

- The optimal $\hat{w}$ then solves the following condition

$$\frac{(p^*_{int} - \hat{w})(v + 2e^*_{int} - p^*_{int})}{2} - \mu \frac{(e^*_{int})^2}{2} = 0$$

whence

$$\hat{w} = \frac{v + c}{2}$$

- The total profit made by **M** is then given by $(\hat{w} - c)q^*_{int}$ which after substitution is in fact equal to π^*_{int}.

Final Remark on the Model

- In this model there are two externalities.
- The first consists of too-strong competition, which eliminates incentives to exert effort.
- The second is the spillover in effort.
- Therefore, a necessary condition for **M** to achieve first-best is to have two instruments.

Agenda

- Overview on Vertical Restraints
- Double Marginalization
- Underprovision of Services
- **Other Efficiency Issues**

Other Efficiency Reasons for Vertical Restraints and Vertical Mergers

- Two efficiency motives behind vertical restraints and vertical mergers have been considered so far: double marginalization and underprovision of services.
- There are further such efficiency motives, some of which will be considered now.

Quality Certification

- **R** provide customers with an – implicit or explicit – quality certification service.
- Note that such an activity involves some costs and presents a public good characteristics: other shops might benefit and attract away consumers with lower prices due to their lower costs.
- This might justify again vertical restraints such as RPM or selective distribution (e.g. only luxury shops in posh districts).
- Note that not allowing **M** to protect the image of its good by selective distribution might be harmful not only to **M** but also to consumers who value the luxury features of the good.

Free-Riding among Producers

- Although restrictive by definition in that they oblige a **R** not to carry products of competing producers, exclusive contracts might be efficient.
- For instance, they can stimulate investments in **R**'s services by **M**: technical support, promotion, training, equipment, financing.
- To the extent that such investments favour not a particular brand but the retail outlet in general, other **M** would also benefit.
- This induces a free-riding problem among **M** that may be solved via exclusive dealing (*"**R** cannot stock products from other **M**"*).
- Exclusive dealing might also push a **R** to sell a brand more aggressively than if it devoted is marketing effort among different brands, thereby raising competition.

Restraints which remove Opportunistic Behaviour and promote Specific Investments

- Long-term contracts between **M** and **R** (or a fortiori vertical integration) might also have positive effects on the specific investments both parties have to make in their relationships.
- There are many investments which lose most of their value outside a particular relationship, as they are tailored and dedicated to a particular partner.
- In such cases, the danger that the relationship is broken or discontinued will generally lead to an underinvestment problem.
- If **R** fears that his promotion effort to establish a brand's image might next year benefit a rival shop, **R** may not promote after all.
- Likewise **M** will be deterred from investing in assets which might improve **R**'s performance if **R** is likely to switch to other brands.

Restraints which remove Opportunistic Behaviour and promote Specific Investments

- To avoid such opportunistic behaviour – a firm getting out of a relationship after specific investments of the partner – clauses such as exclusive territories or exclusive dealing are helpful.
- By reducing or eliminating the underinvestment problem, such clauses increase efficiency.
- Of course, the same holds for vertical mergers.
- In this case, the interests of **M** and **R** are aligned , and they will coordinate so as to attain the same objective.