

ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS DEPARTMENT OF ECONOMICS

Exclusivities In Vertically Linked Distribution Networks

by

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Abstract

Vertical relations, and more specifically vertical integrations, is an enduring topic for economics. From 1950's and the structure-conduct-performance perspective to more modern approaches, vertical integrations have always been a matter of research. The structure of the markets, the idiosyncrasies of each specific case as well as the different assumptions about firms' and consumers' behavior enrich the models presented. This study focuses on the presentation and the analysis of several papers of the field, from the "handbook" case of the problem of double-marginalization, where both the upstream and downstream markets are monopolistic ones, to the more interesting cases of oligopolistic markets with indefinite number of firms and models, where downstream firms share different beliefs about upper-market's firms incentives, as well as vertical contracting in dynamic games, several papers will be discussed. A chapter dedicated to study-cases of vertical integrations and a final one, where alternatives to vertical integration are presented, complete the structure of the thesis.

Chapter 1

Introduction

The aim of this thesis is twofold. In the first part, the reader may find a brief presentation of the definition of vertical integration, the problems it may cause to the market as well as the benefits the integrated firms might enjoy. While in the second part, a more concrete presentation of the phenomenon of exclusivity in vertically related firms is held, by the analysis of a series of papers on the topic. The analysis will include works that explain the reasons for which two or more firms will or will not eventually choose to be vertically integrated, depending on the particularities of each case, the terms of the contracts offered and a brief presentation of study cases of vertical integration in "real life".

The definition of vertical relations involves firms that operate at different yet complementary levels of distribution or production levels. For the needs of this work, we will state now and take it as given for the following chapters that all upstream(downstream) or input(output) relationships mentioned are vertical ones, unless the contrary is stated, and that any restriction that is imposed by one member of a vertical relationship on the other member(s) of that relationship is a vertical restraint. Vertical relations, and more specifically vertical integrations, interest that much the literature mainly because of the tendency firms have to develop themselves not by creating new production or distribution units, depending on the level of the market in which they perform, but by repurchasing other firms in different levels of the market- a strategy that enables the former to gain control over the existing structures. When a firm is vertically integrated, what it succeeds is to enable itself to grow faster- in comparison to the alternative of the internal growth- as it can simply benefit from an already operating firm rather than introduce a new one at a different level of the market. Although the reasons for which we observe vertical integrations are numerous, one could specify the most important of which to be the need of the firms to lower their costs, especially through the elimination of transaction costs among different levels of the production chain or elimination of opportunistic behavior from the side of a firm operating at a different level of it¹. Firms' desire to better coordinate their functions and their will to increase their market power, allowing themselves to set their prices way above their marginal cost are seen to be additional reasons for which vertical integration could be a desirable strategy. This increase of the market power, that consequently enables firms to raise their prices, could be attributed to either the reduction of the competition in another part of the market, through the integration, or to the facilitation of collusion among the firms of the market. Of course, vertical integration could be seen as a "defensive" mechanism as well. Firms might choose to get vertically integrated in order to protect themselves from the varying conditions of the market. Specific mention in nondiscrimination clauses and their effects will be made later in the thesis. Furthermore, the reduction of the cost mentioned above could be realized by 2 either exploitation of the complementarities (there could be complementarity in the variety of the different brands within the firm or in other assets it may hold) or exploitation of economies of scale -cost per unit of output generally decreases with increasing scale as fixed costs are spread out over more units of output (incremental production)- or even through the production in a unified network and/or reduction of the cost for research and development. Last but not least, it has been indicated that a reduction of the cost of the firms could be also attributed to an increase of the bargaining power of the firm³.

The questions that arise when it comes to the study of vertical relations are not constrained solely on the description of the structure and on the results of vertical integrations in the simple "textbook" cases. An extensive literature that studies the possible outcomes of an integration, taking into consideration the particularities of each scenario, has been established as well. Such works include the studies of Buccirossi et al. (2008), McAfee and Schwartz (1994), Lafontaine and Slade (2007) (2010), Lee (2007), Comanor and Rey (2000), Marx and Shaffer (2004) and others. The purpose of this thesis is to present the above literature, offering the reader a brief yet comprehensive outlook of the past, present and future issues on which researchers of vertical relations focus, as well as the rationale behind the various types of vertical restraints.

¹Carlton and Perloff (2001)

 $^{^{2}}$ Cabral (2000)

³Vettas and Katsoulakos (2004)

Chapter 2

Vertical Relations, Vertical Integration

It is known that most firms do not sell their goods directly to the final consumer but, instead, they sell their goods (or services) to other firms, that operate in different levels of the production/distribution chain. There are significant differences between the choices and the behavior of the firms that operate in different levels of a production chain, the most important of which is the fact that the downstream firms- the firms that operate at the bottom level of the chain and sell their goods to the final consumer- have different "tools" e.g. prices, quantity, commercials compared to an upstream firm- a firm that operates at a higher level of the chain and that sells its goods to other firms operating at lower levels. Since it is evident that the choices of one firm seriously affect the choices of the other firms, even if the latter operate in different production levels, it is easily understood that the demand an upstream firm would face depends on the price it sets (wholesale price), as well as on many other factors, the majority of which are not under its control.

Vertical integration between firms is defined as the integration of firms operating in different levels of the production chain. The case when the integrated firms do not operate at the same chain- a firm operating at an upper level of a market might to choose to buy off a firm operating at a seemingly different market- is rare and it is not the subject of this thesis, although it could be briefly mentioned that these integrations, known as conglomerate mergers, include cases where firms that operate in uncorrelated markets choose to merge. The rationale behind this decision lies on the need firms have to differentiate their asset portfolio and subsequently to enter to another market, something that rarely affects competition¹. The general outcome from the analysis of markets of substitutes (homogeneous or heterogeneous) 2 , depending of course on the degree of substitution and the structure of the market, is that whenever the integration does not affect the efficiency, then the prices of all goods will rise, the total quantity of the integrated firms will be lower and that of the non-integrated ones will be higher. Assuming an integration between two firms that are "big" with respect to the size of the market in which they operate, will enable us to set the context of vertical integrations and observe their main results. Well, an integration between two firms (2 < n, where n)is the total number of firms) lessens the number of firms operating in the market and leads to a new equilibrium- something that justifies the results mentioned above. The succession of monopoly problem arises when an upstream monopolist sells an input to a downstream firm at a price above marginal $\cos t^3$. What happens to the integrated firms is that, after the integration, they have the incentive to lower their total production and, as a result, their total share, which will subsequently lead to a rise of the prices. However, because of the "disappearance" of the wholesale price- the price the upstream firm would charge to the downstream one- the profit p - MC, where MC stands for the marginal cost of the integrated firm, is now larger, something that will control the raise of the prices. It is easily seen that vertical integration's main benefits stem from the lower cost and the better organization within the firm. Farrell and Shapiro (1990) show in their model, taking into consideration the lower cost under which the integrated firm operates, that integration will eventually rise the total profit of the integrated firm, while Deneckere and Davidson (1985) and Levy and Reitzes (1992) prove that vertical integration has a lot more profitable outcome when it takes place in a market where firms compete in prices (a la Bertrand)- primarily because integrated firms will try to raise their price but a similar reaction by the other firms is their best response. For the consumers, it is evident that when there are multiple firms operating in the production chain, each setting its price above its marginal cost in order to gain profits. The price the final consumer will be called to pay will be higher compared to the case when there in only one (the integrated) firm in the market. A number of researchers such as Barron and Umbeck (1984), who study retails in gasoline markets in an empirical framework, or Slade and Margaret (1998), who study the effect on the prices of beers, discuss the potential effect of double marginalization on prices in the franchising market, assuming that the franchisor sells an input that is then resold by franchisees under a fixed-proportion technology⁴. Before proceeding to themes as externalities and vertical restraints, it should be wise to present in more details the "textbook" concept

 $^{^1\}mathrm{Vettas}$ and Katsoulakos (2004)

 $^{^2\}mathrm{Riordan}$ and Salop (1995)

 $^{{}^{3}}$ Greenhut and Ohta (1979)

 $^{^{4}}$ Lafontaine and Slade (2007)

of double-marginalization that was mentioned above.

2.1 Double-marginalization

Perhaps the simplest way to illustrate the problem of double marginalization is to provide the example of two monopolies, each operating in one of the two different levels of production chain. Even if this scenario seems to be somehow restrictive, it is still suitable to illustrate the problem of double-marginalization. In this concept, the wholesaler will set the monopolistic price p_{M} - which is obtained by the maximization of its profit function, where the quantity it will sell will be the quantity the retailer will order- and will yield the monopolistic profits Π_M . At the lower level the retailer will also set its monopolistic price- which in this case will be obtained by the solution of its profit function, where the quantity sold will be the quantity the final consumers request and the cost will be the wholesale price p_M . It is evident that in this context, the price the final consumer will be called to pay has been augmented twice, incorporating the two profit maximizations the monopolists have set- the two mark-ups-, in comparison to the case of perfect competition, where firms are price receivers, setting $p = MC_i$, where MC_i is each firm's marginal cost. This vertical externality, often makes vertical integration a profitable choice for the firms. The above could be easily seen via a simple model:

Assume two firms, the producer, denoted as M and the retailer, R. The producer is assumed to face marginal cost equal to c (c < 1) and sets price equal to p_M , while the retailer sets its price equal to p_R . Last, the demand faced will be $D(p) = 1 - p^5$. Solving the above with backward induction, first dealing with the problem of profit maximization from the side of retailer, taking as given the actions of the producer and then dealing with the one of the producer, taking into account the choices of the producer. The profit maximization problem from the perspective of the retailer will be

$$max_{p_R}\pi_R = (p_R - p_M)(1 - p_R)$$

since the marginal cost will be equal to the price the wholesaler sets. The solution of the above yields the best response function of the retailer. The similar problem the wholesaler will be called to solve will be:

$$max_{p_M}\pi_M = (p_M - c)(1 - p_R(p_M))$$

 $^{^{5}}$ Motta (2004)

since the demand the wholesaler will face equals the input request of the retailer. Holding the same equations but assuming that the firms chose to get integrated, the problem is seriously simplified. In the case of the integrated firm the monopolist that would occur would face a demand equal to D(p) = 1 - p, and a marginal cost equal to c and the profit maximization problem it would be called to solve would be:

$$max_p\pi_{VI} = (p_{VI} - c)(1 - p_{VI})$$

from which the solution obtained would be: $p_{VI} = \frac{1+c}{2}$, it would as if only the first mark-up had taken place. When the profits the firms yield in both cases were calculated, it would be seen that the integration in this case is profitable for both the firms and the consumers (Pareto improving). Empirical works on the topic of double-marginalization have been presented in a number of papers such as Slade (1998) and Barron and Umbeck (1984) which conclusions will be presented in this thesis.

2.2 Alternative strategies

Except for the cases when vertical integration is the strategy implemented by the firms, for reasons of completeness it should be mentioned that an alternative strategy a firm could use to grow is that of imposing vertical restraints. Vertical restraints are terms imposed in deals between firms- usually they are imposed from the producer on the wholesaler- that operate in different levels of the production chain and constrain the choices available. This strategy is chosen by firms as an attempt to gain the benefits of vertical integration, without however incorporating its costs. Such vertical restraints are:

Non-linear pricing: Which is the form that most contracts presented in the literature have⁶. In non-liner pricing, one could find a retailer that is called to pay a fixed fee (usually called, franchise fee) in addition to the wholesale price the upstream firm will impose. The term "non-linear" is justified by the fact that the price per unit decreases non-linearly with respect to quantity.

Resale Price Maintenance: The producer sets a minimum or a maximum price at which the downstream firm can sell. Resale price maintenance prevents sellers from competing too fiercely on price, especially with regard to fungible goods. Opinions on the effect of resale price maintenance differ, as some argue that the manufacturer may do this because it wishes to keep sellers profitable, thus keeping itself profitable, while others contend that minimum resale price maintenance may be used to overcome a failure in the

⁶McAfee and Schwartz (1994)

market for distributional services by ensuring that distributors who invest in promoting the manufacturer's product are able to recoup the additional costs of such promotion in the price that they charge consumers.

Territorial restrictions: The location where the retailer will operate is specified. A similar restriction is that of selective distribution, where the number of retailers is selected by the upper-level firm.

Exclusive dealing: The downstream firm sells exclusively the good of one specific producer.

Fidelity Discounts: The retailer enjoys discounts that depend on the quantity bought by the wholesaler.

Tying and bundling: The wholesaler forces the retailer to buy larger variety of goods. In this case scenario buying only one type of goods produced by the upper level firm is not an option, since the goods are provided to the retailers only "in groups".

The above strategies are choices the upstream firm could make, instead of being vertically integrated, enjoying however similar results.

Chapter 3

Exclusive Contracts and Vertical Restraints: Empirical Evidence and Public Policy

In the previous chapter, several assumptions under which the upstream firm might offer different contracts to the retailers, depending on the beliefs of the latter were presented. In this chapter, the reader may find empirical evidence- which results will be discussedas well as extensive analysis of issues of public policy. As it was presented in the second chapter, there are numerous reasons for which firms might choose to get integrated, but also, as it was noted, vertical integration very often might be proven to be a controversial issue. Indeed, theorists have introduced models that lead one to either praise the virtues or rue the consequences of vertical agreements and to argue over their legality or illegality. As presented in previous chapters, the main problem firms are called to solve is that of double-marginalization. As it was discussed previously and will be empirically shown in a while, when double marginalization is an issue, the imposition of vertical restraints by agents different from the government will not only increase the overall efficiency of the vertical structure but it will also lead to lower prices for the customers. Thus, restraints are usually welfare enhancing when used to solve the successive-monopoly problem. For the needs of this analysis, we will use the work of Lafontaine and Slade¹ who emphasize on empirical methods that have been used to assess the consequences of vertical restraints and a presentation of the public policy on the topic. In the first section of the chapter there will be held a short discussion of the economic rationale behind vertical restraints that are voluntarily undertaken. These include efficiency as well as anti-competitive motives. For the following sections, it is worth noticing that Lafontaine

¹Lafontaine and Slade (2007)

and Slade base their analysis on franchise distribution examples. The emphasis of the work will be given on how each argument, stated theoretically, could be applied to the specific framework of a downstream retailer.

3.1 Dealer Services, Free-Riding Issues and Ex-ante Investment Incentives

A problem upstream firms might often face is that of free-riding from the side of the retailers. It could often be the case that the downstream firm uses the investment offered by the wholesaler (machinery or brand-name in the case of franchising) to promote and sell competitive goods in the place of the ones it is agreed to sell- harming the wholesaler and disrespecting the initial deal. In the context described, exclusive dealing could be seen as a mechanism that enables manufacturers to protect their investment against potential dealer opportunism. Moreover, in its absence, potentially profitable manufacturers' investments might not be undertaken. Lafontaine and Slade illustrate the above problem using the example of Dunkin Donuts that has a policy that requires franchisees to discard donuts that are no longer fresh. In the example described, some of the franchisees do not fully internalize the benefit from Dunkin Donuts' decision and tend to provide a lower quality product, free-riding on the value of the brand, causing both a vertical and a horizontal (to the other dealers) externality- a detailed presentation of this case is not however matter of this thesis and the reader is addressed to the paper of Lafontaine and Slade (2007). In any case, if service is crucial to the sale of manufacturers' product, they will surely attempt to ensure that dealers provide it regularly. A seemingly related but different dealer-incentive issue might arise in cases when the producer demands the dealer to invest ex ante in specific facilities. Such investments could be investments in the machinery or specific concept in the decoration of the store- if the transaction with the final consumer takes place in a shop- or in human capital- such as training sessions employees will be called to go through, in order to provide better service to consumers- thus the final consumer will be bettered off from this investment². If service is characterized as an important factor to the sale of a producer's product, the latter will be called to ensure that dealers provide it. In the framework presented above, except for the case when the retailer can be assured that this investment is fully protected, it will choose to under-invest or even not invest at all. Telser (1960) argued that minimum price restraints could solve this incentive problem by leading them to compete in the sections of quality or customer service instead. A vertical restraint such

 $^{^{2}}$ Marvel and McCafferty (1984)

as an exclusive territory or minimum resale price, as presented in previous chapters, can provide the guarantee that the retailer needs. Such rent, in combination with the threat of termination of the deal and service monitoring will entice the dealers to provide the desired level of quality or service. While the exclusivity of the territory might give the dealer some market power, consumers would benefit from the resulting investment and thus the restraint can result in positive welfare effects.

3.2 Anti-competitive Reasons for Vertical Restraints

Vertical integration might often be suspicious of manipulating competition. To be more specific, when a firm controls all the levels of the production and distribution of a good, then it would be reasonable to assume that it would be difficult for, say, another retailer to enter the market and compete at the lower level of the chain with the already existing firm. However, competitive harm can also result for reasons that will be analyzed below. Dealer Cartels and Monopolization: As shown by Ornstein³, a producer that imposes a minimum price for the goods it produces can help a dealer cartel enforce the monopoly price. Which solves the "mystery" of how and why vertical integration could be accused for anti-competitive behavior. Alternatively, territorial boundaries could play a similar role, insulating retailers from competition through the elimination of nearby competition. The idea that summarizes the above is rather simple: If the up-stream firm does not have market power, it will be indifferent between imposing such restraints or not. It might even agree to adopt them only to satisfy the downstream ones. However, through brand differentiation and the use of trademarks, firms usually enjoy some market power. Rev and Stiglitz^4 note that another reason for which vertical integration might be suspect for anti-competitive behavior is that of reduction or even elimination of intrabrand competition.

Strategic Delegation: In their 1995 paper, Rey and Stiglitz prove that prices are lower when the upstream firms compete directly with each other (i.e. in the case they set retail s price themselves), in comparison to the higher prices in the case retailers have some market power themselves, while manufacturers delegate the pricing decision to their retailers. A softening of competition, that justifies the difference in prices, occurs because prices are normally strategic complements. Thus, an increase in a wholesaler price is associated with higher own-dealer prices and also with higher competitor retail prices. This idea is premised on the assumption that the down-market firms have market power. A way of ensuring that this is so is the assignment of exclusive territories.

³Ornstein (1985)

⁴Rey and Stiglitz (1995)

The idea expressed also relies on the assumption that retailers compete on prices- an assumption that is apt to be valid in the current context. However, if downstream firms engage in quantity competition, delegation will not benefit the vertical chain.

Foreclosure and Raising Rival's Costs: Foreclosure in vertical relations is the idea presented above, where the integrated firm tries to exclude competition from the market by blocking potential rivals. A more concrete example of this is would be a manufacturer that establishes an exclusive retail network that involves most retailers who might prevent the competitors from gaining access to customers at a reasonable cost, or not at all⁵. An example of the above is the announcement of Coca-Cola Co in the "New York Times" in 1998, where it stated that offering their product to the retailers, automatically makes the latter middlemen of their product. Having that as an excuse Coca Cola Co stated that the retailers could not "serve two masters" and demanded from them not to sell competitive products. In response to exclusive dealing are foreclosure arguments most frequently made.

Aftermarkets: A last anti-competitive motive for setting vertical restraints includes the creation of monopoly power in a related market rather than that of the wholesaler. As noted by MacKie-Mason (2004) a possible strategy that firms could implement would be to offer the "initial" product (the reader may assume the example of a copier) in a competitive price, but force the consumer (through let's say technology constraints) to purchase the service package offered exclusively from the former to fix any potential problem. This rationale, although somehow inconsistent in a world of forward-looking consumers, may lead to consumers who are locked-in ex post. The monopoly power, created by the firms could be exploited in the aftermarket. Although the remark in the case of forward-looking consumers does hold, in a world of imperfect consumer information, this anti-competitive motive for tying persists.

3.3 Public Policy Towards Vertical Restraints

Historically, the law towards vertical integration has been significantly altered, both in USA and Europe. From the maintenance of most integrations, under the explanation they are lawful, in 1940' s to the aggressive stance and the suspicious behavior towards them in 1960' s, where many deals were announced illegal, vertical integration has always been a debatable issue. One could say however that both price nad non-price vertical restraints can in some circumstances enhance efficiency and distort competition

⁵Krattenmaker and Salop (1986), Aghion and Bolton (1987), Comanor and Rey (2000)

in others- something that, at least partially, justifies the volatility of $laws^6$. In addition to the inconsistencies in overall policy toward vertical restraints, one could observe differences in the legal treatment of the different types of restraints as well. In most countries vertical price restraints are treated much more harshly (especially in comparison to the impunity vertically integrated firms might enjoy⁷)than non-price restraints, despite the fact they are two methods used to achieve the same goal⁸. This harsh treatment of vertical price restraints is also said to occur because it is falsely associated with the per se illegal horizontal price fixing. Indeed the two factors that are emphasized in assessing the potential anti-competitive effects are collusion and exclusion at one level or another of the vertical chain. On the former, for example, it is claimed that upstream collusion is facilitated when exclusive dealing arrangements are widespread downstream, as their presence eliminates buyer competition. This in turn reduces the incentives of sellers to undercut one another to try to entice buyers to switch. As for exclusion, it can also result from exclusive dealing arrangements, since new upstream competitors can face difficulties in reaching customers when most retailers are involved in exclusive deals with upstream firms. Similarly new downstream competitors can have difficulty obtaining supplies under such circumstances. This in turn makes entry at either level less likely. In particular, resale price maintenance (see Chapter two) is in more jurisdictions per se illegal, whereas most non-price restraints are governed by a rule-of-reason standard. Last, so far it has been taken as granted that vertical restraints have been voluntarily undertaken by the parties and that the law's role is to monitor the terms and try to predict the effects of these contracts. However, not all vertical restraints come from within vertical relationships. Unfortunately for the economists, the majority of the decisions of the authorities might stem from pressures by groups such as associations of dealers. Indeed it is usual for jurisdictions, particularly the USA, to enact laws that restrict either downstream or upstream behavior.

3.4 Findings of Empirical Evaluation of the Effects of Vertical Restraints

Several studies have taken place and through the implementation of methods such as cross-sectional analysis, panel data on firms or regions estimations (some of the latter employ vertical restraints) or natural experiments, the effects of several vertical integrations on prices and public welfare have been measured. Most of these studies, ranging

⁶Pitofsky (1999)

 $^{^{7}}$ Katz (1989)

⁸Blair and Kaserman (1983), Mathewson and Winter (1994)

from descriptive to more rigorous econometric analyses, were held in competitive markets where upstream firms face several problems in providing their retailers with appropriate incentives. Furthermore, many of the studies view changes in the legal environment, these changes allow applied researchers to assess the consequences of regulations and laws through the examinations of differential responses of two groups of firms, a treatment group that is affected by the change and a control group that is not. Although, in the case these studies are carried out using cross-sectional analysis, the attention is given on the coefficient of a dummy variable that signifies whether the restraint is employed and the regression typically includes a number of supply, demand, and policy variables that might also affect prices. Similarly, in time series approach, datasets that include periods before and after a legally mandated change such as the banning of a restraint are used in order to carry out results. The problem with this approach, however, is that there would be many changes over time, and although it is tempting to attribute any significant price movement to the legal change, this attribution might not be eventually valid. Currently, literature is focused on ways to assess the consequences of current practice and proposed changes, the structural models presented so far involve vertical contracts and restraints on manufacturer/retailer interactions.

The results in which Lafontaine and Slade concluded in their analysis are that although the majority of the approaches proposed could generate insights into the effects of both privately agreed-upon and legally mandated restraints, only few could be used to forecast the effects of changes that have not yet occurred. Briefly, it has been demonstrated that despite different theoretical models might frequently yield opposed predictions when it comes to the welfare effects of vertical restraints, it is proved that with manufacturerretailer or franchisor-franchisee relationships the empirical evidence concerning the effects of vertical restraints on consumer well-being is very consistent. In most cases, it has been shown that privately imposed vertical restraints do not harm consumers and, in fact, in many cases consumers are benefited, especially in terms of quality products and of service provision. Additionally, it has been showed that, if we ignore price effects, voluntarily adopted restraints are associated with lower costs, greater consumption and better chances of firm survival. The outcome seems rational as upper-market firms have the incentive to develop lean and efficient distribution networks in order to reach ultimate consumers, which entails imposing vertical restraints on retailers and encouraging retailer competition by eschewing restraints when such competition yields lower distribution and sales costs. On the contrary, when restraints are imposed by the authorities, they systematically reduce consumer welfare. It was empirically showed that when dealers or consumer groups convince the government to alter the unfair treatment from which they claim to be suffering, the consequences are higher prices, higher costs, shorter

hours of operation, and lower consumption as well as lower upstream profits. An easy conclusion made is that the more the government intervenes the worse the consumers will be. Consumer well-being tends to be proportional to the wholesaler's profits, at least with respect to the voluntary adoption of vertical restraints. The validity of these conclusions stems from their robustness.

To sum up, it seems that when wholesalers choose to impose vertical restraints, they make themselves better off and additionally they allow consumers to benefit from higher quality products and better service provision. In contrast, as mentioned above, when the restraints are imposed on wholesalers via government intervention the effect is typically to reduce consumer welfare as prices increase and service level decreases. Although more empirical studies should be carried out for safe results to come⁹, the present empirical evidence suggests that a fairly relaxed antitrust attitude toward restraints is warranted, especially in comparison to the proposal that the authorities should impose restraints on producers in order to protect both their dealers and consumers.

Chapter 4

Opportunism in Multilateral Vertical Contracting

It would be both sensible and fair to commence our approach with the study of a wellknown paper of the field, that of McAfee and Schwartz. In their paper, McAfee and Schwartz analyze the consequences for the monopolist that sells to competing firms of a downstream market under no commitment to any firm regarding the terms offered to others. For the purposes of the thesis, the emphasis will be given to the part of the paper that presents explanations for potential exclusivity in vertical integration. However, a presentation of the main ideas presented will precede. The environment in which McAfee and Schwartz analyze their ideas is the classical environment of one firm (monopolist) that operates on the upstream part of the market and that sells its good (input) to numerous competing downstream firms, while the assumptions made are also pretty standard- they assume the input demand of the firms operating in the lower part of the market to be interdependent- each firm is supposed to care about the terms of the contract the monopolist proposes not only to itself but to the other firms too. It is known that efficient commitment would require complete contracts- a seemingly utopian idea due to difficulties of predicting all possibilities and spelling out suitable performance- of verifying performance or the state. Most contracts in real life are highly incomplete.

As it has been presented by other authors, ¹ a solution proposed to the problem the downstream firms face would be the "public commitment" of the monopolist to offer identical contracts to all of them. This idea, accompanied with the condition of infinite periods of new contracts between the monopolist and the competing firms, guarantees that the monopolist is unwilling to respect its commitment. However, the environment

¹Mathewson and Winter (1994) Perry and Porter (1990)

presented by McAfee and Schwartz captures the idea that the monopolist's incentives can be altered. To be more precise, the paper acknowledges the fact that since the monopolist has set conditions to all competing firms, then it could renegotiate with one setting new terms based on the existing conditions. In practice, many of the terms the monopolist sets could be unobservable even to insiders, involving discounts or different fixed fees. The theme presented is that fear of multilateral opportunism, caused by the tendency of the monopolist to renegotiate the terms of the contracts offered, might in the end harm the monopolist and even if one could guarantee that at least the insiders could all that is relevant, the usual costs of writing and enforcing compete contracts could be higher in multilateral compared to bilateral contracting, as a result of the universe of items to be specified and verified that rises proportionally to the number of parties.

4.1 Commitment Benchmark and Opportunism Incentive

For the analysis of the model, which is presented as a four-stage game, where the monopolist makes take-it-or-leave-it offers to the competing firms (firms), the authors implement one of the most basic pricing themes, two-part tariff. Two-part tariff, a constant marginal price and a fixed fee, is used in the literature of the vertical-control as a powerful instrument for aligning incentives. The analysis commence with the presentation of the model. An input monopolist facing $n \ge 2$ potential downstream firms is assumed. The competing downstream firms are left to produce either perfect or imperfect substitute products. The cost of the monopolist is the z > 0 marginal cost while the contract it offers is a two-part tariff (r_i, f_i) contract, where i is the script for the i-th downstream firm. The fixed cost is represented by f_i , while r_i shows the marginal price per unit the monopolist charges to the firms. The benchmark solution is the equilibrium of the following four-stage game:

stage 1: The monopolist makes known a set of offers, one corresponding to each firm $(r_i, f_i)_i$, i=1,..,n

stage 2: Downstream firm (firms) accept- acknowledging in this case their obligation to pay the fee f_i - or reject the offers made simultaneously.

stage 3: Accepted contacts are publicly announced; firms learn their rivals' marginal costs.

stage 4: Firms simultaneously set their downstream instruments, prices (in the case of a la Bertrand competition) or quantities/outputs (in the scenario of a la Cournot competition) and purchase their inputs from the monopolist It is assumed that for any given vector of n input prices $r = (r_1, ..., r_n)$, accepted in the second stage of the game, and then learned in the third, there is a unique non-cooperative equilibrium-profit function denoted $\pi_i(r)^2$. A firm's input- demand function is denoted $q_i(r)$. It is easily seen that in stage 2, if $f_i \leq \pi_i(r)$ then it is a weakly dominant strategy for firm i to accept the contract offered. In stage one, the monopolist has the incentive to set $f_i = \pi_i(r)$. The above lead to the conclusion that the monopolist seeks to maximize, with respect to r, the overall profit equation,

 $G(r) = \sum_{i=1}^{n} (r_i - z)q_i(r) + \sum_{i=1}^{n} \pi_i(r)$, note that in this case the sum is from i = 1 to i = n. Let G^* denote the maximum profit and r^* any maximizing vector. Thus in the commitment game, the monopolist's profit is $V = G^*$. If the monopolist chose to cut the price to one firm, then automatically the maximum fee the other firms would be called to pay would be reduced. Hence the monopolist chooses prices to induce the maximum overall profit, G^* . G^* will serve as the benchmark against which to compare outcomes under various no-commitment regimes.

In order to see clearly the opportunism incentive, a safe idea would be to consider an alternative sequential game, in which the monopolist does not commit at the outset of all contracts. In stage one, the monopolist might offer the contracts to the n firms sequentially, approaching one after the other all firms. In this game, firm have the choice to either accept or reject the contracts offered, after having observed all prior offers and decisions. The monopolist's net revenue from input sales, plus the profit of firm i is given by the expression:

 $u_i(r) = \sum_{i=1}^n (r_j - z)q_j(r) + \pi_i(r)$ but by the equation for the overall profit:

 $u_i(r) = G(r) - \sum_{k \neq i} \pi_k(r)$

Thus, if attaining G^* in the commitment game requires more than one firm to be active, then in the sequential game the monopolist's profit is $V < G^*$, which leads to the easy conclusion that the monopolist, after having collected fixed fees from all but one firms, it is optimal to set the last price to maximize joint profit with the last mover. The monopolist ignores the reduction in the others' profits, caused by the the choice to cut the price to the last firm, an effect internalized when computing r^* . The externality presented will be observed whenever firms earn quasi-rents in equilibrium; thus, under the assumptions made about the downstream competition, the monopolist seeks to cut price to the last firm in exchange for a higher fixed fee. Overall profit will be less than G^* .

²equilibrium-profit functions are assumed to display the normal properties

A similar idea is presented by Bizer and DeMarzo (1992) who assume there is a citizen/borrower who approaches different banks sequentially. The result drawn in their paper is that the borrower might have enjoyed larger surplus if he could commit to borrow from only one bank. Banks, in the scenario of sequential borrowing, taking into consideration the risk to get bankrupt because of increased borrowing, charge rates that do not incorporate the externality on prior loans. The result in which Bizer and De-Marzo have concluded is that with sequential borrowing there is more debt than under commitment.

4.2 Nondiscrimination clauses

McAfee and Schwartz include in their analysis a nondiscrimination game to capture and "respond" to the drawback of the incompleteness of contracts. They implement in their analysis the notion pairwise-proof contracts³. The question that arises is whether the flexibility of the contracts the monopolist might offer, in order to describe all the possibilities, will be used for efficient changes rather than for opportunistic negotiation with future buyers.

The game described by McAfee and Schwartz is similar to the game presented in the section before, with the important difference that before downstream competition begins, there is now a re-contracting stage. To be more concrete, the contracts offered and accepted in the first stage of the game are now objects of another negotiation between the monopolist and each firm independently. The monopolist is assumed to approach all firms, that have in the previous stage of the game accepted the offers made, in reverse order allowing them to alter the terms of their contract. In the end, firms will have to cope with a contract of the form (r_0, f_0) . Under the assumption of symmetry among firms and the condition that in the commitment game attaining G^* requires the presence of two or more firms, McAfee and Schwartz draw the conclusion that r_0 is pairwise-proof and the monopolist' profit in the discrimination game will be $V < G^*$.

Firms are rationally assumed to ask for both low fees and prices- in the context of twopart tariff. However, the monopolist has the opportunity to exploit the contracts it owns and to obtain higher profit, charging higher fees in contracts with low prices and

³A set of contacts $[r_k, f_k]_k$ is pairwise-proof if $u_i(r_i, r_{-1}) \ge u_i(r'_i, r_{-1})$ for any r'_i and every firm i, where the first entry denotes the input price to firm i, r_{-1} denotes the vector input prices charged to other firms and last u_i is the known monopolist's net revenue

significantly on the contract offered to its rivals- the value to the firm of a difference in its marginal cost is less the lower are competitors' costs. The analysis McAfee and Schwartz made suggested that even in the case when the downstream firms are symmetric, offering identical menu of contracts to all can eventually entail discrimination, as a second firm might choose not to accept an offer once a competitor has accepted.

4.3 Secret Offers

In order to establish some robustness to their idea that the monopolist is harmed by the belief that its intention is to act opportunistically renegotiating the contract offered with some firms, hence in a malevolent manner for the other competing ones, McAfee and Schwartz describe models that represent lack of commitment through the usage of the assumption of simultaneous and secret offers ⁴. These contracts are presented through the assumption the simultaneous offers are secret and firms never learn their rivals' terms. Hence firms will have to act based solely on the beliefs they have about their competitors' costs. The kinds of beliefs presented are: symmetry beliefs, passive beliefs and wary beliefs.

Symmetry beliefs: If all firms assume that the contract offered to them is identical to the contract offered to their rivals, then it is evident that $V = G^*$ and the monopolist will earn $V(r^*) = G^*$. Under the assumption of symmetry beliefs, the best-case scenario is achieved without commitment. The case of symmetry beliefs is the only case where the commitment solution is received as the outcome.

Passive beliefs: Under the assumption of passive beliefs, firms are assumed not to alter their expectations about their rivals' costs, even after they have been offered a contract with unexpected terms. In this case, since a firm's decision is not affected by the unobserved changes to its rivals, the monopolist's incentive is, when it offers a contract to each firm, to act as if it is vertically integrated with it. This bogus vertically firm is assumed to operate in a downstream market where the demand it faces is the residual demand (after all the other downstream firms have sold their portion). As in text-book cases, this "integrated" firm will set as its input cost the monopolist's marginal cost and will maximize its profit exactly as if it where just another downstream firm.

Wary beliefs: Wary beliefs capture the idea that firms expect the monopolist to act opportunistically and maximize profits taking into consideration, each and every time

 $^{^{4}\}mathrm{in}$ other words, they intend to show that firms do not believe that the monopolist will respect the contracts announced

it negotiates a new contract, the contract it offered to the last firm it negotiated with. Thus, under the assumption of wary beliefs, each firm thinks it received offers that are the monopolist's optimal choices given the offer it just made. Under this assumption firms will accept a contract if and only if the fee it asked to pay is not higher that the profit it expects to yield, given the input price and a belief function.

For the purposes of this paper, McAfee and Schwartz's analysis offers an immediate contribution to the question whether an upstream/downstream firm would choose to be vertically integrated by repurchasing a downstream/upstream firm. Under the assumption of passive beliefs, the reader may easily comprehend that all the positive results of vertical integration could be achieved at zero cost for the upstream monopolist. In this case the monopolist, may be "vertically integrated" as many times as the number of firms in the downstream market.

4.4 Discussion

The idea presented by McAfee and Schwartz could be summarized as fears of opportunistic re-contracting harm the monopolist if it fails to commit. Hart and Tirole (1990), DeGraba and Postlewaite (1992) note an additional resolution, that of vertical integration. However, vertical integration, holding different inefficiencies, does not respond to the question of how to assure independent firms against opportunism. Parts of the above paper will be used in the construction of the following chapter, enabling the reader to have a more complete view of the literature. Summarizing the work presented, McAfee and Schwartz, through a context of bilateral contracting where the competing downstream firms take into consideration the scenario in which the monopolist is acting opportunistically, prove that nondiscrimination clauses cannot restrain such third-party opportunism, even in the case of symmetric firms.

Chapter 5

Opportunism in Multilateral Vertical Contracting: Nondiscrimination, Exclusivity, and Uniformity: Comment

In the previous chapter the paper of McAfee and Schwartz was presented and its results were discussed. Marx and Shaffer¹ in their paper choose to alter one of the assumptions made in McAfee and Schwatrz's paper, concluding, as expected, to differentiated results, also indicating a flaw in the rationale of the latter. Marx and Shaffer prove the existence of equilibria in which the efficient contract is offered to firm 2, while 1 is left with the inefficient one and it then chooses to switch to the contract offered to firm 2. The intuition is that if the initial wholesale price of firm 1 is adequately high, then there are lowered potential gains from opportunism, as firm 1's divertable profit is initially small and the monopolist is better off when it maximizes overall joint profit- including both firms to operate under the efficient contract. The outcome of Marx and Shaffer' s paper is that overall joint payoff is maximized in every sub-game perfect equilibrium and that nondiscrimination clauses- which, as presented previously, are found in both final- and intermediate- goods markets, providing the seller with a commitment "device" that allows it not to lower the price to future buyers- are proven to be effective in restraining opportunism in the game presented be McAfee and Schwartz. Fine examples of studies in the field of nondiscrimination clauses are the papers of Cooper², who proves that nondiscrimination clauses can weaken competition through the induction

¹Marx and Shaffer (2004)

 $^{^{2}}$ Cooper (1986)

of less aggressive on the part of a firm's rival, and that of Butz³, who concludes that nondiscrimination clauses can be used in the solution of the time inconsistency problem with durable goods. Both these papers, use the assumption that the seller will deny better terms to a new buyer, as in that case, all the precious ones would ask for the same terms- something that was challenged by McAfee and Schwartz, but in scenario these papers presented would lead to the defeat of the seller's attempt to lower price selectively. Thus, in both these models the seller ends up to being committed to its initial offers.

Marx and Shaffer base their analysis on McAfee and Schwartz's paper noticing, however, that a mistake in the solution of the sequential game presented by the latter has been made as they did not consider whether "equilibria exist in which overall joint profit is maximized and nondiscrimination clauses are invoked". Marx and Shaffer the latter does occur in equilibrium. They show that in the scenario of two downstream firms, when the first of them is offered a not efficient contract, then it implements the nondiscrimination clauses to obtain its rival's efficient contract, suggesting that nondiscrimination clauses could result in the commitment of the seller to its final sales contract. The idea proposed is that the seller might strategically choose the terms of the initial set of contracts so that when it offers the last contract, buyers that already have contracts will request to invoke their nondiscrimination clauses.

5.1 Model and Opportunism Problem

Marx and Shaffer assumed an upstream monopolist that an upstream monopolist who was supposed to sell an input to two downstream firms, which are similarly supposed to use the input in order to produce substitute goods. The upstream monopolist is supposed to offer its supply terms on a take-it-or-leave-it concept. Similarly to the notation used by McAfee and Schwartz, the monopolist is assumed to have zero fixed cost and a marginal cost equal to z > 0, while its offer is given by the pair (r_i, f_i) , where r_i is the wholesale price and f_i the fixed fee. The monopolist is assumed to make an offer to the downstream firm 1 which can either accept or reject it. The same procedure takes place for firm 2 too, which is assumed to be able to observe the offer made to firm 1, before it is called to make its decision. The firms that reject the offer made to them ext the market- earning zero profit. The ones, on the other hand, that accept the offer, commit to paying the fixed fee, independently of the product market outcome. The firms that have accepted the offers can then order their inputs and participate in the product

 $^{^{3}}$ Butz (1990)

market, respecting the terms their contracts impose and the game commences. Marx and Shaffer assume a unique equilibrium for any pair (r_1, r_2) , when both downstream firms are active, defining firm i's equilibrium flow payoff $\pi_i(r_1, r_2)$. When r_i is large enough, then firm i's payoff is zero, in the case however, that both firms are active, π_i is assumed to be increasing in r_j and decreasing in r_i , for $i \neq j$. Marx and Shaffer also make assumptions about the cross-partial derivative of π_i , more specifically they assume:

$$\frac{\vartheta^2 \pi_i(r_1, r_2)}{\vartheta r_1 \vartheta r_2} < 0$$

implying that firm i's flow payoff would be less sensitive to decreases of its own wholesale price the lower is the wholesale price of its rival. In their model, Marx and Shaffer assume $q_i(r_1, r_2)$ to be firm i's equilibrium input demand. Then, it occurs that the uppermarket monopolist's payoff would be $\sum_{i=1}^{n} (r_i - z)q_i(r_1, r_2)$, while, when both firms are active, the joint payoff of the both upper- and down- markets would be

$$\Pi(r_1, r_2) \equiv \sum_{i=1}^{2} (r_i - z)q_i(r_1, r_2) + \sum_{i=1}^{2} \pi_i(r_1, r_2)$$

Letting $u_i(r_1, r_2)$ be the joint payoff of the monopolist and the downmarket firm i, ignoring the fixed fee f_j ,

$$u_i(r_1, r_2) \equiv \sum_{j=1}^2 (r_j - z) q_j(r_1, r_2) + \pi_i(r_1, r_2)$$
$$= \Pi(r_1, r_2) - \pi_j(r_1, r_2)$$

It follows that $\frac{\vartheta u_i(r_1,r_2)}{\vartheta r_i} < \frac{\vartheta \Pi(r_1,r_2)}{\vartheta r_i}$ for any value of r_1 , r_2 , when both firms remain active. For their analysis, Marx and Shaffer make the usual assumptions- that the firms' (flow) payoffs should be symmetric and also that $\Pi(r_1,r_2)$ and $u_i(r_1,r_2)$ are twice differentiable and concave in r_i .

5.2 The seller's opportunism problem

Letting, $r^* \equiv argmax_{r\geq 0}\Pi(r,r)$ so that $\Pi(r^*,r^*)$ be the maximum overall joint payoff, the writers make the hypothesis that in the case the monopolist could commit to a single contract, then it is evident that the only choice it would have would be to offer each downstream firm the efficient contract, denoted as, (r^*, f^*) , imposing that $f^* = \pi(r^*, r^*)$. In the scenario, however, the monopolist cannot commits itself to a single contract firm 1, which is called to make its decision before it observes firm 2' s offer, would be cautious to accept the contract offered as it stands to lose in the event of opportunism. When the monopolist is not committed to a certain action, or in other words when the monopolist is not restrained from acting opportunistically against the downstream firm 1, its incentive is to choose to offer a contract (r_2, f_2) so as to shift flow profit away from firm 1 and towards firm 2. It can be proven ⁴ that the monopolist will be better off if it offers different contracts to the two firms (lowering firm 2's wholesale price and simultaneously, raising its fixed fee).However, the monopolist risks to lose, in equilibrium, as if firm 1 is assumed to anticipate its opportunistic behavior, it will adjust its actions accepting or rejecting the initial offer accordingly.

5.3 Nondiscrimination Game

As McAfee and Schwartz showed, a possible answer to the problem presented could not be the offer, from the side of the monopolist, to firm 1 of some nondiscrimination clause, allowing the latter to alter its initial contract with any other offered and accepted be firm 2, before competition begins, as this clause does not necessarily prevent opportunism. However, Marx and Shaffer, state that the reasoning on which McAfee and Schwartz based their conclusion is somehow wrong. To be more concrete, suppose firm 1 does accept the terms (r^*, f^*) together with a nondiscrimination clause, while the monopolist offers to the other firm, firm 2, the exact same opportunistic wholesale price and fixed fee as in the previous case, $(r'_2(r^*; f^*), f'_2)$. In the case, firm 1 decides not to invoke its nondiscrimination clause, its payoff would be:

$$\pi_1(r^*, r_2'(r^*; f^*)) - \pi_1(r^*, r^*) < 0$$

while if it decides to invoke the clause

$$\pi_1(r_2'(r^*; f^*), r_2'(r^*; f^*)) - \pi_1(r_2'(r^*; f^*), r^*) < 0$$

Although it can be proven that firm 1's payoff is always negative- in both cases- it will not choose to invoke its nondiscrimination clause as its payoff in the second case is strictly lower, due to the higher fixed fee of firm 2 it will be called to pay- in order to enjoy the lower charges. By the assumptions stated above, the cross-partial derivative of π_1 is negative. Thus, a reduction $(r^* - r'_2(r^*; f^*))$ in marginal cost would worth less to firm 1, once $r'_2(r^*, f^*)$ has been accepted by firm 2, compared to firm 2 in the case firm 1 retains wholesale price r^* . Thus, if $f'_2 - f^*$ extracts firm 2's gain, firm 1 will prefer to retain contract (r^*, f^*) . Although the procedure so far seems to enhance McAfee and Schwartz's reasoning, their mistake lies in not recognizing that equilibria

⁴let $r'(r_1; f_1) \epsilon argmax_{r \ge 0} u_2(r_1, r) + f_1$, which by assumptions imply that both the monopolist and firm 2 would gain by lowering firm 2's wholesale price below r^*

in which nondiscrimination clauses are conjured up may exist. Marx and Shaffer prove that the joint payoff maximizing outcome could be achieved in every subgame-perfect equilibrium and, as a consequence, nondiscrimination clauses may indeed respond to seller's opportunism problem in the game of sequential contracting.

In order to respond to the questions set, the authors assume that the the set of wholesale prices is given by the relation $W_1 \equiv (r_1, f_1) | r_1 \ge 0, f_1 = (\pi_1, \inf)$ and they also assume that the fixed fees for the first firm are such that it would just break even if it were on its own in the downstream market, in the absence of firm 2. Last, they consider whether there is an equilibrium in which the monopolist would choose to offer a contract $(r'_1, f'_1) \epsilon W_1$ together with a nondiscrimination clause⁵, while to firm 2 the monopolist is assumed to offer a contract of the form (r^*, f^*) . The above reveals that firm 1's expected profit is negative, if firm 2 enters the market and competition begins, while if both firms choose the contract (r^*, f^*) then they both yield zero profit. Since $f'_1 > \pi_1(r'_1, r^*)$, firm 1 will definitely choose to use the nondiscrimination clause offered. From the above, it is easily seen that firm 1 would agree on a contract of the form (r'_1, f'_1) together with a nondiscrimination clause, if the upper-market monopolist, optimally thinking, was to offer a contract of the form (r^*, f^*) to firm 2, which would accept it, taking into consideration the possible actions of firm 1 (switch to the contract (r^*, f^*)). Marx and Shaffer, show that the monopolist would not offer a contract to firm 2 such that the first firm would not choose not to invoke the nondiscrimination clause. The above is proven by the method of contradiction: if one supposed that the monopolist did choose to offer a contract to firm 2, such that firm 1 would find it optimal to switch to it, then it would maximize its payoff by choosing (r_2, f_2) such that f_2 extracts the surplus of firm 2^6 , while r_2 solves for

$$max_{r_2\geq 0}u_2(r'_1,r_2)+f'_1$$

under, of course, the condition that the first firm does not use the nondiscrimination clause- which is given by the relation:

$$\pi_1(r'_1, r_2) - f'_1 \ge \pi_1(r_2, r_2) - f_2$$

the above system may or may not have an interior solution. If it does, the monopolist' s maximum payoff, which represents the best it could achieve if it attempts to act opportunistically against firm 1, is given by the relation:

$$u_2(r'_1, r'_2) + f'_1 = \Pi(r'_1, r'_2)\pi_1(r'_1, r'_2 + f'_1)$$

⁵it is evident that firm 1's payoff, if it does not choose to use the nondiscrimination clause, is $\pi_1(r'_1, r^*) - f'_1$ ${}^6f_2 = \pi_2(r'_1, r_2)$

In the case it does not, the monopolist maximizes its payoffs subject to the decision of firm 1 not to invoke its nondiscrimination clause by not selling to firm 2 and has its highest profit when it chooses (r^*, f^*) . The maximum payoff the monopolist can yield if it chooses not to act opportunistically but offers (r^*, f^*) to firm 2 is:

$$u_2(r^*, r^*) + f^* = \Pi(r^*, r^*)$$

It is easily seen that the latter payoff is greater only if "the gain in overall joint payoff if the monopolist does not act opportunistically against the first firm is greater than the maximum rent it can shift from it if it does act opportunistically"⁷. It can be proved that the seller can obtain the overall joint payoff, when nondiscrimination clauses are feasible is maximized in every subgame-perfect equilibrium. This initial offer to firm 1 could be interpreted as an attempt by the monopolist to eliminate its incentive to engage in opportunism by choosing to offer to firm 2 a discriminatory discount that does not cause firm 1 to invoke its nondiscrimination clause. Also, the nondiscrimination clause would result in the elimination of the loss of the monopolist of offering terms to the first firm that are suboptimal when both firms operate in the market- in equilibrium firm 1 will switch these terms to the ones offered to firm 2. If the monopolist has payoffs that are greater than $\Pi(r^*, r^*)$, then there is at least one firm with negative payoffs, when it could profitably deviate by choosing to reject its contract, which would lead to the desired contradiction. In the case the monopolist has payoff equal to $m < \Pi(r^*, r^*)$ then it could profitably deviate by offering to firm 1 a contract of the form $(r_1, f_1) = (\inf, -\frac{\varepsilon}{2})$ together with a nondiscrimination clause and to firm 2 a contract of the form $(r_2, f_2) = (r^*, f^* - \frac{\varepsilon}{2}), \varepsilon \in (0, \Pi(r^*, r^*)m)$. Thus, both firms would have the incentive to participate, and firm 1 would choose to invoke its nondiscrimination clause. The monopolist's payoff would be $\Pi(r^*, r^*)\varepsilon > m$, which would lead to contradiction.

The upper-market monopolist, acknowledging that it would be effective to offer the same contract to both firms, would choose to offer firm 1 the contract (r'_1, f'_1) with a nondiscrimination clause- forcing firm 1 to alter its contract along the equilibrium pathand a contract (r^*, f^*) to firm 2 and it would, eventually, achieve to maximize the joint payoff. Thus, Marx and Shaffer prove that it is the terms (r_1, f_1) of the contract offer to firm 1 that provide this commitment, while the importance of the nondiscrimination clauses is that they allow the switching of the terms, suggesting that nondiscrimination clauses would result in the monopolist's commitment to its final offer, rather than the initial one. As a conclusion, Marx and Shaffer base their idea on McAfee and Schwartz' s paper, but their contribution is that they prove that there are equilibriums, where firm

 $^{^{7}}$ Marx and Shaffer (2004)

1 is offered an inefficient contract, while firm 2 is offered the efficient one. Firm 1 would find it optimal to switch to firm 2's contract. Marx and Shaffer prove the effectiveness of nondiscrimination clauses in curbing opportunistic behavior by showing that, when firm 1's initial wholesale price is sufficiently high, the gains from opportunism are smaller because firm 1's initial divertable profit is smaller, and the monopolist gets better off when it chooses to maximize the overall joint profit.

Chapter 6

Vertical Mergers and Market Foreclosure

In this chapter, an analysis of the paper of Salinger¹ on the vertical mergers will be initially held, and a small introduction to "extensions" of the literature will follow. The paper of Salinger, despite its weaknesses²- which will be presented at the "criticism" part of the chapter-, is a cornerstone of the analysis of the topic and an important part of this thesis, as it studies vertical integration through the perspective of oligopolies rather than monopolies (see chapter 2). Salinger aims to answer three questions: do the integrated firms have the incentive to participate in the "intermediate" market??, how would the construction of the "intermediate" market be altered if integrated firms chose not to participate in it?? and last how do possible changes in the "intermediate" market affect the down-market- the market of the final good??. For his purposes, Salinger assumes i/homogeneous goods in both the upstream and downstream market, ii/fixed coefficients in technology and iii/fixed economies of scale. To follow up with the previous chapters, it worth mentioning that the intermediate market is simply the upper-level one- the reason the notation changes is simply to correspond to the one of the paper.

¹Salinger (1988)

 $^{^2\}mathrm{as}$ noted by Reiffen and Kleit (1990), Gaudet and Long (1996)

6.1 Do the integrated firms have the incentive to participate in the "intermediate" market??

In order to answer the above question, Salinger makes some additional assumptions about the beliefs integrated firms have about the behavior of their rivals. Salinger sets his model assuming that the integrated firms (following the Cournot assumption) believe their upstream rivals will not alter their production in response to a one-unit increase of their production, while one downstream firm will do. He, also, assumes that if an integrated firm purchases one extra unit of input, it believes that the firms of the lower-market will decide to hold their demand for "intermediate" good unchanged, while one producer will choose to increase its production by one unit (and assuming that downstream firms are price takers, he makes the Bertrand assumption). Last, Salinger assumes that $MC_I < P_I < P_F - MC_F$, where the I stands for "intermediate" good, P_I is the price the upstream firms charge, MC_I is the production cost, P_F is the price of the final good downstream firms set and MC_F the production cost of the final good. A closer look at the inequality reveals that it simply implies that the "intermediate" good firms charge above their marginal cost, while the term $P_I + MC_F < P_F$ implies that the upstream and the integrated firms are similarly expected to charge above their cost. Salinger concludes that the integrated firms will not operate in the "intermediate" market as they will realize that the sales of the "intermediate" good will compete these of the final good- since the input sold could be used for the production of the final good- and that the downstream market is more profitable. To be more precise, when the integrated firm acts as a buyer in the "intermediate" market, pays P_I , while when it produces the "intermediate" good itself has a cost equal to MC_I , where $MC_I < P_I$.

When the integrated firm acts as a seller in the "intermediate" market then the profits it will make will be: $\pi_{initial} = (P_F - MC_F)Q_F - (P_I - MC_I)X$, where X is the quantity of the "intermediate" good sold. In the case, however, the firm decides to use X in the production of the final good, then it would make: $\pi_{new} = (P_F - MC_F)(Q_F + X) - MC_IX$, as, because of the assumption of fixed coefficient technology, the total quantity will be $(Q_F + X)$. From the above, it is straightforward that:

$$\pi_{new} - \pi_{initial} = (P_F - MC_F - P_I)X > 0$$

due to the assumptions made. To sum up, even if the integrated firms could obtain a positive mark-up from the sales of the "integrated" good, it is proved to be more profitable not to get involved in the upstream market. Relaxing the assumptions of course would differentiate the results one would obtain. For example, relaxing the assumption of fixed economies of scale in the "intermediate" good market and assuming, say, increasing ones would result in a solution where firms sell a fraction of the "intermediate" good (and in this case firms would each get the $P_I - MC_I$ surplus), while if, on the contrary, decreasing economies of scale are assumed, then the excess production, because of the increasing cost, would be proven an injurious choice. In the latter case scenario, it might be more profitable for the firms, after a certain production level, to buy the "intermediate" good than to produce it (the marginal cost increases up to a level where the difference $P_I - MC_I$ changes sign).

6.2 How would the construction of the "intermediate" market be altered if integrated firms chose not to participate in it and how do possible changes in the "intermediate" market affect the market of the final good?

In order to examine the effect vertical integration has on the market of both the "intermediate" and the final good, Salinger compares the prices of the "intermediate" and of the final good that occurred after the integration to the ones before it. Salinger, in order to study input foreclosure, defines it as the decrease of the price of the "intermediate" good- in other words, to see whether upstream' s and downstream' s firms profitability increases and how the structure of the market is affected, he claims that it suffices to examine if vertical integration leads to the increase, or not, of the price of the "intermediate" good. It is easy to see that, integrated firms have lower costs, as the "intermediate" good costs them MC_I , while for the other downstream firms it costs P_I and it is for that reason why they can increase their production of the final good. The not-integrated downstream firms, under the assumptions made, facing the residual demand notice a decline of their profits, which consequently leads to a decrease of P_I . The fact, however, that the integrated firms will no longer operate in the "intermediate" market might increase competition in the market, but it also facilitates tacit collusion which, in contrast to the initial result, tends to increase P_I . As a result and in order to come up with a proper conclusion, all that is needed is to examine which side's (integrated or independent upstream firm's) advantage is the most "serious" one. Salinger proceeds by assuming consecutive Cournot oligopolies, first in the downstream and then in the upstream market and a linear demand $P_F = a - bQ_F$ for the final good. He assumes n integrated firms, N_I producers of the "intermediate" good and N_F of the final one. With this notation, it is evident there are N_I non-integrated upstream firms

and N_F downstream not-integrated ones. Given the above, the integrated firms solve the following profit maximization problem:

$$max_q\pi_i = (a - bQ_F - MC_F - MC_I)q_i$$

, where i = 1, ..., n, while the independent downstream firms solve: $max_q = (a - bQ_F - MC_F - P_I)q_j$, where $j = (n + 1), ..., N_F$ and $Q_F = nq_i + (N_F - n)q_j$. Taking first order conditions to the above equations gives the best response functions:

$$q_i(R_i) = \frac{(a - MC_I - MC_F - bR_i)}{2b}$$

i = 1, ..., n and $j = (n + 1), ..., N_F$

$$q_j(R_j) = \frac{(a - P_I - MC_F - bR_j)}{2b}$$

where *i* and *j* are defined as above and $R_i = (n-1)q_i + (N_F - n)q_j$ and $R_j = nq_i + (N_F - n - 1)q_j$ as each firm competes both integrated and not-integrated firms. Solving the above yields the equilibrium quantities $q_i(P_I)$ and $q_j(P_I)$. In order to find the price P_I the demand the "intermediate" good's producers faces is needed. This demand would be equal to the total production of the independent downstream firms and will be equal to $Q_U = (N_F - n)q_j$. Multiplying the equilibrium quantity $q_j(P_I)$ with $(N_F - n)$ yields the demand function for the intermediate good $P_I(Q_U)$. Thus the upstream firms need to solve: $max_q\pi_{Uj} = [P_I(Q_U - MC_I)q_j$, from the solution of which the equilibrium quantity q_j would occur. From the above results, it is easy, using the derivative $\frac{dP_F}{dn}$, to test the effect integrations have on the prices. The result is, as expected, ambiguous- the derivative could be both positive or negative which proves that even in the (seemingly extremely easy) case of linear demand no safe conclusion can be drawn. The sufficient condition to observe a negative derivative is: $n < \frac{N_I}{2}$

Symmetrically, to test the effect integrations have on the "intermediate" 's good price P_I , one would need to use the derivative $\frac{dP_I}{dn}$, which equation' s sign is also ambiguoushowever, as expected, the sufficient condition for a negative relation between the "intermediate" price and the number of integrated firms is $n < \frac{N_I}{2}$. In other words, for the price of the "intermediate" to decrease it takes less than half of the upstream firms to be vertically integrated, which illustrates the reasoning expressed above that the increased number of independent upstream firms caps the pressure for an increase of P_I . On the contrary, when $n > \frac{N_I}{2}$ the price will rise as a result of the vertical integration, as enough firms are integrated and the cost advantage is weakened.
When the price of the "intermediate" good is lower, then it would be reasonable to assume that the price of the final good lessens as well, as all downstream firms face a lower cost. From the solution of the above equations, Salinger reveals that it would be hard to observe a vertical integration that leads to higher price of the final good, which states that the reduction of the profits of the upstream section of the integrated firm will be higher than the increase of the profits of the downstream section, which enjoys the cost advantage, compared to its rivals, to obtain the input at a price equal to the marginal cost.

6.3 Important Criticism

As it was noted in the first part of the chapter, Salinger's paper, although very didactic, it does suffer from some very restrictive assumptions (see Gaudet and Long (1996)). The most serious is perhaps the one that leads to input foreclosure. More specifically, it might not be an optimal strategy for the integrated firms to exit the input market. The main idea behind it is that the integrated firms might choose to operate as sellers in the input market and, additionally, as buyers too- achieving both to increase the input price and weaken their rivals in the market of the final good. To sidestep that problem, integrated firms could be allowed to decide endogenously if they will operate in the input market. In order to proceed, the implementation of x_i is suggested, a value that corresponds to the input the integrated firms buy or sell (it is easily seen that $\sum x_i = X_{VI}$). Thus the profit maximization problem integrated firms are called to answer is:

$$max_q\pi_i = (P_I - MC_I)x_i + (a - bQ_F - MC_F - MC_I)q_i$$

where i = 1, ..., n. From the transformation of the problem new reaction functions would occur, as Salinger's approach is similar with the exemption that he sets $X_{VI} = 0$.

 X_{VI} can be either positive (in the case integrated firms operate as sellers in the input market) or negative (in the case integrated firms operate as buyers, trying to weaken their rivals in the final good market). X_{VI} depends on n, N_I and N_F . For example, when n = 0 (i.e. when there is no vertical integration), $X_{VI} = 0$, while when $n = N_I$ (complete vertical integration), $X_{VI} > 0$ if $N_I > N_F$ and $N_I > 1$, and alternatively, $X_{VI} = 0$. The results obtained are that when the number n of the vertically integrated firms is rather small, then they have the incentive to buy the input from the independent producers, so as to raise the profit of their rivals. When n, on the other hand, is comparatively bigger then the profits obtained by the selling of the input are bigger than the benefits firms would gain from the weakening of their rivals and, as a result, integrated firms choose to operate as sellers in the input market.

As it is seen, the results from the behavior of X_{VI} are not clear, and Salinger has (at least partially) explained the contradictive motives of the firms. However, an important result comes up:

$$\frac{dQ_{total}}{dn}$$

for prices $n \approx 0$, where $Q_{total} = Q_{VI} + X_{VI} + Q_U$, which shows that even if the price of the input gets increased, the total final product gets increased and the vertical integration favorites competition (pro-competitive).

An alternative way to evaluate Salinger's conclusion about the foreclosure of the independent firms from the input market, through the raised input price (input foreclosure) would be to re-think the assumptions that led us to it. The main assumption is that integrated firms "adopt" Cournot-like competition assumption about the input sales and the Bertrand-like competition when they ask to buy input³. Alternatively, if one assumed that integrated firms "adopt" Cournot-like competition for the total of their transactions, it is seen that it is for their interest to operate in the input market as buyers. In this case scenario, social welfare gets increased through vertical integration, as the total output is more (due to cost advantage integrated firms enjoy and the Cournot assumption).

Last, but definitely not least, another way to deal with the assumptions made by Salinger is to differentiate the game played. One could think of a more dynamic game where independent firms, after having observed some integrations, might choose to respond using the counter-strategy of getting (vertically) integrated too. That possibility, rationally, affects the initial decision made by firms in the first stage of the game. That additional stage, where firms decide whether to get integrated or not leads to a la Cournot competition in the input market and to a similar type competition in the final good market. In this case scenario, it is this stage when integrated firms decide endogenously whether they will operate as sellers or as buyers in the input market. As it is noted, there are two conditions that need to hold in equilibrium: the profits the integrated firms make need to be higher compared to the ones they would make in the case they remained independent and, similarly, the profits the independent firms make need to be higher compared to the profits they would make if they got integrated. It is easily seen that if

³Avenel and Barlet (2000)

any of the above does not hold, then "incentive compatibility" is violated ⁴ in the sense that any of the integrated or independent firms would choose to alter its initial decision.

When $N_I = N_F$, the equilibrium occurs when all firms get vertically integrated. When $N_I = N_F < 4$, vertical integration constitutes the dominant strategy for all firms and the above equilibrium is unique, while the game shares some common characteristics with "prisoner's dilemma" as the profits would be higher in the case firms remained independent. However, when $N_I = N_F > 5$, there are two equilibriums. Either all firms get integrated or they remain independent. There is no equilibrium where integrated and independent firms co-exist, when $N_I = N_F$.

Given all the above, it is clear that Salinger's model ignores some important factors and chooses to simplify the analysis adopting exogenously input foreclosure. Nevertheless, Salinger manages to capture the incentive firms have for the additional actions mentioned above and even by his relatively simple model, he incorporates many important issues of vertical integrations.

6.4 Vertical Integration and Foreclosure in Multilateral Relations

The literature has commenced to set into question several of the assumptions on which the models that describe vertical relations rely. Perhaps, the most binding assumption is the one that refers to the observable to all the agents of the market contracts- an assumption that McAfee and Schwartz attempted to evade by attributing different beliefs to the agents/downmarket retailers. There are several papers, nowadays, that focus on the issue both in theoretical and more applied concepts ⁵. Since the presentation of the majority of the literature of the topic will not offer much to the reader, a more targeted presentation of works will be held- the working paper of Nocke and Rey (2013), the paper of Kokesen (2007) and an older approach to the topic by Katz (1991) will be used.

Volker Nocke and Patrick Rey, in their working paper⁶, construct a model of multilateral relations between upper-market manufacturers that produce differentiated goods and

 $^{^4}$ incentive compatibility is defined as the choice of the agent to accept the contract that was designed for him. The term is used abusively here

⁵examples of the latter could be found in the works of Katherine et al. (2012), Carlton and Waldman (1998) and Villas-Boas (2006)

 $^{^{6}}$ which is based on Hart and Tirole (1990)

downmarket retailers that sell these goods. Assuming that contract offers as well as acceptance decisions remain private information, exclusively known to the contracting parties, the authors show that vertical integration between a retailer and a manufacturer leads to the foreclosure of opponent manufacturers from access to the integrated retailer, at the detriment of consumers. Additionally, and not surprisingly, through the paper it is proved that firms have an incentive to get vertically integrated. In their model, Nocke and Rey assume a vertically related industry with two symmetrically differentiated manufacturers, named M_A and M_B who produce good i ($i \epsilon A, B$) at a constant unit cost equal to c > 0. These two manufacturers are considered to distribute their goods through two perfectly substitutable retailers, named R_1 and R_2 , who are assumed to face zero constant cost. The demand function for the consumers is given by the relation: $P(q_{i1} + q_{i2}, q_{j1} + q_{j2})$ under the assumptions of: P(0,0) > c and, for Q sufficiently large, P(Q,0) < c and P(0,Q) < c and for any $(Q_i, Q_j) \ge 0$:

$$\vartheta_1 P(Q_i, Q_j) \le \vartheta_2 P(Q_i, Q_j) \le 0$$

A contract between a manufacturer M_i and a retailer R_k is a (nonlinear) tariff of the form $\tau_{ik}(\cdot)$, where $\tau_{ik}(q)$ represents the payment given from R_k to the manufacturer M_i in return for the delivery of q units of good i. The two cases that interest the authors the most are:

Two-part tariff: $\tau_{ik}(q) = F + w * q$ where F is the fixed fee and $w \ge 0$ the marginal wholesale price, and

Forcing contract: $\tau_{ik} = T^*$ if $q = q^*$ while $\tau_{ik} = \infty$ otherwise, where q^* is the "forced" quantity. A forcing contract will be denoted as (T^*, q^*) .

Volker and Rey allow manufacturers to offer a variety of such contracts (menus) and assume the contracting terms between M_i and R_k to be private information to the two parties (as is R_k 's acceptance decision). If the manufacturer M_i and the retailer R_k are vertically integrated, they are assumed to maximize their joint profits independently of any internal transfer prices. Thus, when vertically integrated, M_i and R_k behave as if they relied on $\tau_{ik}(q) = cq$, and each affiliate's decisions are assumed to take into consideration the impact on the other affiliate's profit. Furthermore, there is "information sharing" between the affiliates of a vertically integrated firm, in the sense that, when making its acceptance and output decisions, the integrated retailer R_k is already informed about the offer that its upstream affiliate M_i has made to the rival retailer R_l , $l \neq k$. By contrast, acceptance and output decisions are made simultaneously, implying that the integrated retailer R_k is not informed of whether its rival R_l had accepted the offer of the upstream affiliate M_i , when he/she is called to make its own output decisions. The timing of the game is as follows:

stage 1: Manufacturers simultaneously and secretly offer contracts to retailers.

stage 2: Retailers simultaneously and secretly: (i) accept or reject the offers made; and (ii) for each contract that has been accepted, they choose how much to put on the market of the output- The resulting prices are such that markets clear.

In order to allow for coordinated deviations, Volker and Rey assume that a retailer R_h is informed of the offer made by M_i to the rival R_k and they look for a Perfect Bayesian Equilibrium with passive beliefs ⁷, in which retailers do not revise their beliefs about the offer made to the other retailer when receiving an out-of-equilibrium offer. As retailers compete in the downstream market in quantities, these passive beliefs also coincide with the "wary beliefs" as introduced by McAfee and Schwartz (1994), as the contract signed with a retailer has no impact on a manufacturer's gains from trade with the other retailer. The problem and the characterization of the solution/equilibrium in the scenario of vertical separation (when no firm is vertically integrated) are then presented in the paper. Although the mathematical part of the solution will be omitted for the needs of the thesis, it is worth mentioning that the analysis is, at first, based on the definition of the notion of a "cost-based contract", in which the input price (marginal) coincides with the marginal cost of production. At the second stage of the analysis, Volker and Rey come to prove that any not-integrated manufacturer offers "cost-based contracts" to every retailer and that these contracts are accepted in equilibrium, while at the third and last part they state the main characterization result for the case of vertical separation.

Their rationale lies on the intuition that under passive beliefs, a retailer R_k expects its rival R_l to stick to the equilibrium quantities even when it receives a deviant offer from an independent manufacturer, say M_i . Such a deviant offer does not seriously affect the profit that M_i makes on its contract with R_l . In equilibrium, the authors note, the contract between M_i and R_k must maximize the joint bilateral profit of the contracting parties, assuming that R_l sticks to its equilibrium quantities, which is achieved by agreeing to a cost-based contract. Volker and Rey state that the possibility for one to find other equilibria is not excluded, in their model, by any assumption; however, even if all these equilibria should rely on cost-based contracts, they can involve different divisions of profits.

⁷working similarly to McAfee and Schwartz (1994)

The next scenario that is mentioned is the one of the two already integrated firms, named $M_A - R_1$ and $M_B - R_2$. Volker and Rey consider, at first, an associated duopoly game and introduce some regularity conditions from conditions imposed on demand side. Then, they show that under these regularity conditions, a unique equilibrium in which there is no cross-selling could be identified. It as stated that each integrated retailer's access to the rival manufacturer's good is foreclosed and, equivalently, each integrated manufacturer's access to the rival retail outlet is foreclosed. It is also proved, in the concept of pairwise vertical integration, that the pairwise vertical integration leads to a strong form of foreclosure: each integrated firm refuses to deal with the other integrated firm. Additionally, Volker and Rey prove that, that the market is relatively more competitive under single vertical integration compared to pairwise vertical integration. The above analysis proves that the basic insights from the foreclosure literature triggered by the work of Hart and Tirole (1990) carries over to situations where several suppliers compete imperfectly in the upstream market: vertical integration by one or more upstream firms affects the market outcome and tends to make it less competitive. In particular, it is shown that:

 \cdot in the absence of any vertical integration, all upstream firms are willing to supply all downstream firms on a marginal cost basis (using fixed fees to share the profits, say), which fosters competition in the downstream market,

 \cdot in the absence of any vertical integration, all upstream firms are willing to supply all downstream firms on a marginal cost basis (using fixed fees to share the profits, say), which fosters competition in the downstream market.

The analysis made also confirms that, when upstream firms supply differentiated inputs to the downstream firms, each vertical integration matters; that is, while a first merger will induce the new entity to depart from cost-based supply contracts, a second merger will further contribute to generate market foreclosure and result in an even tighter oligopoly outcome. This suggests that the foreclosure concerns captured by Hart and Tirole (1990) may be relevant in a broader range of cases than suggested by the actual case law.

6.5 Unobservable Contracts as Pre-commitments

In this section another paper that addresses to the problem of unobservable contracts in vertical integrations will be presented. Kokesen (2007), in his work "Unobservable Contracts as Pre-commitments", is concerned with issues of games in extensive form in which both players can sign contracts and characterize the set of sequential equilibria. He initially shows that in numerous environments, unobservable contracts may have commitment value. Moreover, if it is assumed that there is one agent who adopts a

forward induction type refinement, then unobservable contracts may have commitment value in more games. As shown by Katz (1991), in environments of unobservable contracts the Nash equilibrium outcomes without delegation and those of the same game played between the agents are identical. The above conclusion seems to suggest that delegation through unobservable contracts has limited effect on the expected outcome of a strategic situation and consequently cannot yield any strategic advantage to the delegating party. Katz also demonstrates that in a standard Cournot duopoly game, the result obtained implies that the equilibrium outcome of the game is simply the standard Cournot outcome, irrespective of whether the game is played among agents or principals. However, in games of extensive form, some type of sequential rationality is assumed on the part of the players which makes the set of predicted outcomes smaller than the set of Nash equilibrium outcomes. The important question is, Kockesen notes, whether unobserved contracts have commitment value when the analysis is limited to sequential equilibrium outcomes. This paper, extending the work Kockesen and Ok (2004), analyzes games where both principals are assumed to have the option to delegate and characterizes the set of sequential equilibrium outcomes of two-sided delegation games. At stage one of such a game, principals are called to choose between playing the game themselves or alternatively offer a contract to an agent. It is assumed that both the delegation decision and the contract choice are unobservable to the other agent/principal pair in this stage. At stage two, all players learn whether they are facing a principal or the agent the former has chosen and the original game (principals-only) is then played. Contracts are not unobservable throughout the game. The results of the paper could be shorted into two observations. Firstly, the possibility of the other principal delegating enlarges the set of sequential equilibrium outcomes significantly. The set of sequential equilibrium outcomes of the delegation game is seen to be equal to a particular subset of Nash equilibrium outcomes of the principals-only game. Particularly, any Nash equilibrium outcome of the principals-only game where the principals receive more than their individually rational payoffs can be supported as a sequential equilibrium outcome⁸. Additionally, and contrary to one-sided delegation games, there may exist well-supported equilibria in which no player delegates. Kockesen shows that the above outcome occurs primarily because in two-sided delegation games there may be found equilibria (mix equilibria) in which both principals choose to completely mix between delegating and not delegating. Thus, if one attempts to limit the analysis to pure strategies, then in all well-supported equilibria at least one of the players is observed to choose to delegate. Moreover, even in cases when mixed strategies are allowed, there is a large class of principals-only games in which delegation is met in any of the

⁸Katz' s analysis would imply that the set of sequential equilibrium outcomes of the delegation game is a subset of Nash equilibrium outcomes of the principals-only game, which includes the possibility that the unique sequential equilibrium outcome of the delegation game is the subgame perfect equilibrium outcome of the principals-only game

well-supported equilibrium of the delegation games. In the paper, a characterization of this class of games by a certain monotonicity condition regarding the way players' Nash equilibrium payoffs change as they choose to commit to sequentially irrational strategies is used.

To describe delegation games, Kockesen implies a "delegation environment", where both principals have the option to either play the game themselves or alternatively use a contract to hire a delegate. If a principal *i* offers a contract, the agent, A_i , may decide to either accept or reject the offer. In this stage of the game neither of the two principal/delegate pairs is yet informed about whether the other principal has decided to offer a contract and whether the delegate has or has not accepted it. It is assumed that if the agent rejects the contract, the game ends and the principal who has offered the contract receives a payoff equal to $-\infty$. If, alternatively, the agent is offered a contract and he/she accepts it, then he/she proceeds to the second stage of the game. It is assumed that in the second (game) phase every player knows the identity of the player he/she is facing without however knowing the contract, if any, offered by the rival principal. One crucial assumption that is maintained throughout the paper is that contracts cannot be renegotiated during the game phase.

The result ones extracts from the paper could be summarized into the observations that along the equilibrium path, any gross sequential equilibrium payoff profile of the principals in the delegation game, are conditional upon (i) neither principals delegating, must be the sub-game perfect equilibrium payoff profile of the principals-only game, which is seen in the scenario when both principals find themselves in a position to play in the game phase themselves, $(ii)^9$ only principal *i* delegating must be in the set of Nash equilibrium payoff profiles $\Pi_{\Gamma}^{NE*_j}$, $j \neq i$, which is established by the fact that if the other principal does not delegate, then sequential rationality implies that his strategy must be not only a best response to the agent's strategy but it must also be sequentially rational and (*iii*) both principals delegating must be in the set Π_{Γ}^{NE} , which is yielded by the observation that when both parties delegate, the agents' strategies must be best responses to each other in terms of the principals' preferences (but no sequential rationality is imposed). It is evident that delegation acts mainly as a device for freeing the principal from the requirement of sequential rationality, but not from rationality altogether, which is a result similar to the one stated by Katz (1991) in that it shows delegation cannot enlarge the set of Nash equilibrium outcomes. It is demonstrated that delegation enlarges significantly the outcome space of the principals-only game. In particular, it is shown

 $^{^{9}}$ results (*ii*) and (*iii*) rely on the assumption that any contract offered in equilibrium must be such that the agent plays a best response

that any Nash equilibrium outcome with payoffs greater than the individually rational payoffs can be supported in equilibrium. This indicates the potential use of delegation not only as a competitive device to gain advantage over the opponent (for example in bargaining situations), but also as a cooperative device to attain Pareto improvements over the sub-game perfect equilibrium outcome.

Important criticism to the paper has been made for omitting to analyze whether contracts have any commitment value if the possibility of renegotiation is not withdrawn. In the present framework, renegotiation completely annihilates the commitment power of contracts, as it precludes the agent from acting sequentially irrationally from the perspective of the principal. In general extensive form games, it seems reasonable to conjecture that the set of equilibrium outcomes, that can be achieved via renegotiable contracts, depends on the extent and the nature of asymmetric information between the principal and the agent. In particular, depending upon the set of histories that are observed only by the agent, it could be possible to support outcomes other than the subgame perfect Nash equilibrium outcomes of the principals-only game via renegotiable contracts.

Chapter 7

Exclusionary Vertical Contracts

This chapter will be dedicated in the analysis and presentation of the approach of the School of Chicago to the topic of vertical integrations. For the needs of this analysis, exclusive contracts, as seen by Whinston (2006) will be presented and generalizations as well as differentiated perspectives will follow. The last part of the chapter will be dedicated to the dynamic vertical contracting in a learning-by-doing in the side of production environment.

Exclusionary vertical contracts have a long and controversial history in U.S. and European antitrust law and commentary. Courts in both Europe and America expressed hostility towards practices such as exclusive contracts or vertical mergers, for a long time, due to their fear that these deals would eventually serve to exclude rivals and, as a result, to reduce competition in the markets. Later in the 1950's the School of Chicago¹, by the use of price theoretic or simple monopoly models, argued that the traditional concern was not logical. They, initially, claimed that rational firms would not engage in the practice for anti-competitive reasons and, secondly, they proposed other efficiency-enhancing reasons for which firms would choose to write this type of contracts. The Chicago School's arguments were enormously influential and continue to affect markedly current courts' views of these practices. However, after 1980 and the entrance of game theory in the field of industrial organization, researchers were able, by formally modeling oligopolistic markets, to reconsider many old questions, among which the ones concerning exclusionary vertical contracts. Thus, using game theoretic models, researchers proved that the courts' initial traditional concerns might not have been completely illogical after all. In the well-specified models studied, rational firms would, in

 $^{^{1}\}mathrm{as}$ expressed by the works of Landes and Posner (1976) and Bork (1978) at first

some circumstances, use these deals in order to exclude competitors and reduce competition. This first part of the chapter will conclude with the more "theoretical" approach of exclusivities in vertically linked distribution networks, before a more "applied"-oriented chapter follows.

7.1 The Traditional and Chicago Views of Exclusive Contracts

The analysis will commence with the presentation of the integration-friendly approach of the School of Chicago. The justification for the treatment described above stemmed from the courts' concern that exclusive contracts might lead to "market foreclosure"; that is, exclusion of rivals and consequent monopolization of the market. Examples of this rationale can be found in cases such as "Standard Fashion Company vs Magrane-Houston Company" (1922) (where Standard- a leading manufacturer of dress patternsattempted to contract with the prominent Boston retailer Magrane-Houston to sell its patterns under the the condition that the latter would not sell the patterns of any other manufacturer) for which Bork argued whether exclusion can be proved profitable for the seller. Bork claimed that:

"The Standard cannot charge the retailer that full amount in money and then charge it again in exclusivity that the retailer does not wish to grant. To suppose that it can is to commit the error of double counting....Exclusivity has necessarily been purchased from it, which means that the store has balanced the inducement offered by Standard...against the disadvantage of handling only Standard's patterns....The store's decision, made entirely in its own interest, necessarily reflects the balance of competing considerations that determine consumer welfare.....If Standard finds it worth- while to purchase exclusivity..., the reason is not the barring of entry, but some more sensible goal, such as obtaining the special selling effort of the outlet.".

More formally, supposing there are three participants in the market, a buyer $(B)^2$, a seller (S), and a potential entrant (E)- the potential entrant, initially, is not found in the market, and so the buyer can only contract with the seller. The buyer's demand is found to be D(p) when facing price p, while the incumbent's cost is c_S per unit. The potential entrant is assumed to incur an entry cost, defined as f > 0, in order to enter

 $^{^{2}}$ buyers are assumed to be symmetric. With asymmetrically sized buyers, it is evident to expect buyers of different sizes to get different offers from the seller

the market, and if it does so, then the marginal cost it will face will be $c_E < c_S$.

The timing of the "exclusive contracting game" is the following:

First, the seller S can offer B an exclusive contract along with a payment, noted t, in return for B signing the contract. Second, B decides whether to accept the contract or not.

Third, E, after having observed whether B has signed the contract, decides to enter (and, consequently, incur the entry cost f).

Finally, whichever firms are in the market name prices to B, who chooses from whom and how much to purchase. In the case E enters, it will win B's market if it has a cost below c_S . Assuming that E enters in the absence of an exclusive contract- which is true if $(c_S - c_E)D(c_S) > f$. If E does not enter, the seller S will charge B the monopoly price p^m that solves $max_p(p-c)D(p)$.

In this setting, S, by offering a large t, can induce B to sign an exclusive contract and thereby achieve the monopoly outcome. But, the question that rationally arises is: "is it profitable to do so?" The Chicago School's answer is "no". The reason is that B will not choose to sign an exclusive contract, and commit to buying at a monopoly price, unless S compensates it for its lost consumer surplus. After all, B is aware of the fact that if it does not sign then it will get a competitive outcome³. If, however, S offers Bthe compensation, then S incurs a loss, which is less than the required compensation x^* . The difference described is the result of the deadweight loss of monopoly pricing. Thus, while S can get B to sign and thereby exclude E, the profitable action would be to avoid doing so. The conclusion reflects what the seller S would call the bilateral contracting principle: if two parties (*i*)contract in isolation,(*ii*)have complete information about each others' payoffs, and if (*iii*) lump-sum transfers are possible, then they will reach an agreement that maximizes their joint payoff.

7.2 Anti-competitive Exclusive Dealing: First-mover Models

The critique expressed by the School of Chicago, turns out to be rather special. In recent years, a number of researchers have proved that there are sensible alterations to this model that can make exclusive contracts a profitable strategy for excluding rivalspart of these works have and will be discussed in this thesis. These models all share

³the loss equals $x^* = \int_{c_s}^{p^m} D(s) ds$

some form of externality, which makes the contract jointly optimal for the parties that sign it. In this section, two models of anti-competitive exclusive contracting will be held. In these models, similar to the simple Chicago School model presented above, the seller is addresses to a first-mover advantage in being able to contract with buyers prior to an entrant's arrival in the market.

Partial Exclusion through Stipulated Damages: The first model presented will be that of (Aghion and Bolton, 1987) (ideas of which were used when the paper of McAfee and Schwartz (1994) was presented) who proved that a seller and a buyer could use stipulated damage clauses in order to extract profits from a potential entrant. The rationale is that a seller and a buyer can use a stipulated damage to make the buyer unwilling (or at least less willing) to switch to an entrant. Thus, they can strategically force the entrant to lower the price it offers the buyer, which increases the joint profits the buyer and the seller would enjoy. The damage provision typically creates an inefficiency, as the damage clause is exclusionary, leading the buyer to buy from the entrant less frequently than would be socially efficient. The change from the model introduced by the Chicago School is that now B and S can sign a contract that specifies a price p for the good and a damage payment, noted as d that B must pay to S if B instead buys from E. Assuming as before that there are three participants in the market, a buyer (B), who is now assumed to ask for at most one unit and values it at v, a seller (S), and a potential entrant (E) and that the seller's and the entrant's costs satisfy the relation $(c_S - c_E) > f$ - so that E will decide to enter once again if B and the seller do not sign a contract- the model is as follows:

First S and B can agree to a contract with price and damage terms (p, d). Aghion and Bolton remain agnostic about the bargaining process they follow, assuming that it satisfies the bilateral contracting principle as stated previously. At the second stage of the game, E decides whether to enter (and pay a fee f), while in the final stage of the game, if E has entered it will offer a price p_E to B, who then decides whether to buy from I or E. If E has not entered, B will buy from I (assuming in this case that p < v). By backward induction, in the scenario both B and S have signed the (p, d) contract and E has entered and offered price p_E , B will decide from whom to buy by comparing the seller's price p to the total cost of buying from E, which would be $p_E + d$. Equivalently, B would compare S' s "effective price" p - d with E' s price p_E . Thus B will buy from E provided that $p_E \leq p - d$, which implies that E will find it profitable to make a sale to B if and only if $c_E \leq p - d$ and when it does so it will set $p_E = p - d$, which reveals the contract E and S will choose to sign⁴.

⁴the largest possible aggregate surplus in this setting is $v - c_E - f$

Given a contract that sets S' is effective price p - d equal to $c_E + f$, E would be just barely profitable if it does enter and sells at price p-d to B, which means that with this contract the largest possible surplus is achieved, and that together B and S get all of it. Aghion and Bolton, at this point, change slightly the model to incorporate uncertainty over E's marginal cost c_E . Then, inefficiency arises as well. Although the mathematical part of the paper will be avoided, it is easily seen that B and S act like a monopsonist, using the contract to commit to a price at which they are willing to buy from E. They trade off the possibility of making a purchase against the price they have to pay to the entrant for the good, just like a monopsonist, ending up purchasing the good too infrequently. Furthermore, the result highly depends on B and S' s ability to commit to the terms of the contract signed. As it has been discussed, this could be undermined if they were able to re-evaluate the terms of the contract after E has entered. There are cases when this can lessen the value of the contract. Suppose that once E makes his offer (in the form of a take-it-or-leave-it deal), B and S are able to renegotiate their contract without additional cost. An efficient agreement given E's offer is achievablethey would buy from E if and only if $p_E \leq c_I$. But if E anticipates this re-evaluation, it always will offer price $p_E = c_I$ regardless of the contract B and S have signed, and none of E s profits will be extracted. Another point that should be made about Aghion and Bolton's model is that it "demands" E to enter the market, as they form a model that extracts some of E's profit.

Externalities across Buyers: In the model, buyer's insistence on compensation for its lost surplus made inducing him/her to sign an exclusive contract which was proved to be an unprofitable proposition for the seller S. To alter the results occurred, one could assume instead that there are numerous buyers and that the entrant E faces scale economies⁵, a fact that make E's entry decision for a B depend on the existence of other buyers- as shown in Rasmusen et al. (1991) and Segal and Whinston (2000). In that scenario, E will enter only if there is a sufficient number of buyers who have not signed exclusive contracts. Consequently, the contract signed by any B can lead to a negative externality on all the other buyers since it would reduce the likelihood of entry. In such circumstances, the incumbent may find it worthwhile to impel a particular B or subset of Bs to sign as by doing so it would be able to monopolize other Bs (buyers) at zero cost. An easy way to see it is by considering a model in which, there are three buyers. Assuming that that each one of them has demand curve given by $D(\cdot)$, and that S' s unit cost is c_S while the entrant E has entry cost f > 0 and marginal cost $c_E < c_S$.

⁵possibly because of an entry cost. Similar effects could arise if there are instead demand-side economies of scale arising from network externalities

Imagine that the monopoly profit from any single B is $p^m = 9$, and each buyer loses $x^* = 12$ if it foregoes competition. In order to introduce externalities across buyers, assume that the entry cost f is such that it would take two buyers who have not signed a contract for E to be willing to enter, i.e. that:

$$2(c_S - c_E)D(c_S) > f > (c_S - c_E)D(c_S)$$

from all the possible bargaining scenarios two will be discussed:

At first, assume that S makes public offers to the three buyers at the same time and that the offers are observable to all of them and last that it cannot discriminate among them. Hence, S offers each B the same payment t to sign. For any positive offer $t < x^*$, two possible equilibriums could be found. One possibility is that no B signs- if a buyer expects all the other buyers to reject S's offer, then it will reject the contract as well, as it anticipates E's entry and the compensation by S to be less than the benefit x^* it will have from competition. The alternative possibility is that all buyers sign the contract offered. As long as each B expects the others to sign, it will assume that the entrant will not enter regardless of its own decision. In this case scenario, if S offers even a small amount then the B will have no reason to reject it. There is an equilibrium in which the seller S gets all buyers to sign for free. Even if the above establishes the probability of a rational incumbent by using exclusive contracts for anti-competitive ends, one would worry that the result is somewhat fragile, as it would rely on Bs failing to coordinate on the Pareto superior equilibrium response⁶. However, once the seller S can discriminate across buyers, the anti-competitive use of exclusive contracts becomes a more robust phenomenon. To see the above, assume that S can make distinct but simultaneous public offers to Bs. In the example studied, the seller would always exclude E. In particular, in the case E offers $t = 12 + \varepsilon$ to two of the total three buyers, these two buyers will accept regardless of the belief other buyers hold, as they are assumed to be paid strictly more than their value compared to an environment without competition. Then, S, while compensating only two buyers for their lost surplus, will end up earning monopoly profits from these three buyers. Thus, once there are more than one buyers, rational incumbents may conclude that exclusion through exclusive contracts is proved to be profit maximizing.

⁶ in this case it would be: all rejecting S' s offers

7.3 Exclusive Dealing: Competing for Exclusives

In actual markets, compared to the model examined above, there are usually a number of rivals trying to secure exclusive deals. This section examines the potential for anti-competitive exclusive contracts to arise in settings as the one presented. Similarly to the first-mover models, the presence of contracting externalities is assumed to play a crucial role in the discussion developed. In the models studied here, however, there are two kinds of externalities that appear simultaneously. First, the ones on parties who are not involved in the contracting process⁷. Second, there are externalities (among parties involved) that stem from the fact that contracts are bilateral⁸. One could concentrate on some specific ideas expressed in these models:

i. There are some "outside parties" that do not participate in the contracting process, but may eventually benefit from the existence of competition among some of the parties who are involved in the contracting process. Example of the above could be found in final consumers, who although may not be part of the contracting process between manufacturers and retailers, but they would benefit from enhanced retail competition.

ii. The combined payoff of the parties involved in the contracting process would be increased if they could restrict the level of competition enjoyed by the outside parties. Thus, the multilateral contract could be design in a way that succeeds in both maximizing their joint profit and reducing that competition.

iii. If the ability to write a multilateral contract is absent, contracting externalities among the parties involved may prevent the latter from achieving this profit- maximizing outcome using simple contracts. In that case, exclusive contracts, that take into consideration the externalities observed, may lead to a second- best way to achieve parties' objective. To illustrate the above, when an upstream firm sells through downstream retailers, the joint incentive is to implement the monopoly retail price- which could be achieved if the manufacturer sold the monopoly quantity to one of the downstream retailers. In the absence of an exclusive, however, the upstream firm may be tempted to sell to other retailers as it will fail to internalize the negative externality those sales impose on the first retailer. In such a case, the additional sales will enhance the possibility of achieving the monopoly retail price. In this section, three settings where contracting parties compete for such exclusive contracts that are signed in order to facilitate the reduction of competition that "outside" parties might as well enjoy.

Exclusives to Reduce Retail Competition: In the first setting, a model of an upstream manufacturer that commits to selling solely through one single downstream retailer as

⁷Aghion and Bolton (1987)

 $^{^{8}}$ Rasmusen et al. (1991)

a means of reducing retail competition is assumed. Similarly to the works of Hart and Tirole (1990) and McAfee and Schwartz (1994)(parts of which have been already discussed in the thesis), this single manufacturer produces (M), and the two retailers are assumed to sell the good to consumers $(R_A \text{ and } R_B)$. The upstream firm's unit cost is given as c_M , while each retailer, say R_j , has a constant unit cost c_R .

Market Outcome without Exclusives: In the case exclusive contracts are not signed, contracting and competition would work as follows: At first, manufacturer M makes simultaneous offers of the form (x_j, t_j) to each retailer R_j^{9} , where x_j is the quantity that is offered and t_i the payment required. The retailers are assumed to simultaneously announce whether they accept the manufacturer's offer. It is evident that in this concept, a downstream firm that rejects the offer has nothing to sell and earns zero profit. Then competition occurs, this competition is supposed to take the form of a Cournot game in which each downstream firm sales all the units it has bought and prices are assumed to clear the retail market. The retailers, in this environment, are left to be differentiated ¹⁰ and the quantities offered and the price received by R_i are x_A and x_B and $p_i(x_A, x_B)$. The retailer R_j is then supposed to earn $\pi_j(x_A, x_B) = [p_j(x_A, x_B) - c_R]x_j$ less the payment t_j , while the manufacturer earns $\pi_M(x_A, x_B) = t_A - t_B - c_M(x_A + x_B)$. The bargaining process, where the manufacturer makes offers to the two downstream firms, is less related to scenarios like "competitors who try to to secure exclusive deals" than to retailers who make offers to the manufacturer. In what follows, two special cases will be highlighted. At the first case, the two retailers, at first, sell their products in distinct markets. Then each R_j faces an inverse demand independent of the sales level of the others R_{-i} , so that $p_i(x_A, x_B) = P_i(x_i)$. The second extreme case that will be studied is the one where the two retailers are undifferentiated. In this concept, retailers' competition takes the form of quantity- choice model with $p_1(x_A, x_B) = p_2(x_A, x_B) = P(x_A + x_B)^{11}$.

For reasons of comparison, the problem of a monopolist who sells two differentiated products, with marginal cost $c_M + c_R$ is presented first. The sales levels (x_A^{**}, x_B^{**}) that maximize the combined profit, solve the problem:

$$max_{x_A, x_B} \sum_{j=A, B} [p_j(x_A, x_B) - (c_M + c_R)]x_j$$

and the combined profits are denoted as: $\Pi^{**} = \sum_{j=A,B} [p_j(x_A^{**}, x_B^{**}) - (c_M + c_R)] x_j^{**}$. The outcome of the contracting process will be that the manufacturer and retailers will fail to achieve the joint monopoly profit Π^{**} due to the externalities and to the private

⁹here, each retailer is assumed to observe only its own offer

¹⁰perhaps because of location

¹¹where $P(\cdot)$ is the market inverse demand function

offers. Avoiding the strict mathematical proofs, with the private offers the upstream firm can always make additional sales independently to each retailer. Furthermore, in the presence of contracting externalities, the upstream firm will definitely try to sell more than the monopoly level as itself and the retailer it secretly sells to will not take into consideration the negative effect of those additional sales on the other retailers.

When a retailer receives an offer, given private offers, it must form some belief/conjecture about the offer that the other downstream firms has received to decide whether to accept M's offer. This is so because the price the downstream firm receives will be affected by the quantity the other retailer is buying. The mathematical proof will not be presented as a large part of it has already been presented through the work of McAfee and Schwartz (1994), however it worth restating two things: 1 Under the "passive beliefs" assumption, the extension of the bilateral contracting principle that holds is that in any equilibrium each upstream- downstream firm pair will end up agreeing to a contract that maximizes their joint profits, taking as given the contract signed between the manufacturer M and the rest of the retailers R_{-j} . 2 The joint profit of the manufacturer and the retailer R_j consists of two terms, the bilateral surplus between the two firms and a the second term that denotes M's profit from its trade with the other retailers. The rationale is that since the manufacturer can extract all R_j 's profit in return for the x_j units, it will choose x_j so as to maximize the bilateral surplus of Mand R_j .

Supposing now that the retailers are not differentiated and that contracting externalities are present as the more R_{-j} purchases from the manufacturer, the lower the market price is, the lower is R_j 's profit is. In this case scenario, the conditions that the quantities x_A^* and x_B^* maximize are:

$$max_{x_A}[P(x_A + x_B^*) - (c_M + c_R)]x_A$$

and

$$max_{x_B}[P(x_A^* + x_B) - (c_M + c_R)]x_B$$

which are the conditions for the standard Cournot duopoly outcome for duopolists with marginal costs $c_M + c_R$. In this game, the manufacturer makes all the offers, partly to its ability to make take-it-or-leave-it offers, and is hampered by a commitment problem that arises from the combined presence of the contracting externality and private offers. With other bargaining processes, however, this would no longer be true, the failure to achieve combined outcome maximization when contracting externalities are present would remain.

Market Outcome When Exclusives Are Possible: In this part of the chapter the possibility that the manufacturer offers an exclusive contract to a $R(\cdot)$ is introduced. Formally, a contract, in this case scenario, may specify (x, e, t) where e = 1 stands for the case the contract is an exclusive one while e = 0 is the one where it is nonexclusive. The manufacturer has the option to offer either or both retailers nonexclusive contracts, but it can offer only one contract if it chooses to offer an exclusive contract. For the study of this model, another assumption about the beliefs is made. It is assumed, first, that when R_j is offered an exclusive contract it acknowledges that R_{-j} has not received any offer. Second, it is assumed that whenever a retailer is offered the equilibrium nonexclusive quantity x_j^* then it believes that the manufacturer has also offered R_j his equilibrium nonexclusive quantity x_{-j}^* . Again the mathematical proof will not be presented extensively as it coincides with other studies that have been presented in other parts of the thesis. The contracting outcome, however, of the above assumptions whether an exclusive or a nonexclusive one, maximizes the joint profit of the contracting parties, taking into consideration any inefficiency of nonexclusive contracting. One could say that, intuitively, this involves a trade-off between the benefit of selling M's product at both retailers and the costs arising from contracting externalities when both retailers are active. In this concept, non-exclusive contracts involve no contracting externality, and so an exclusive outcome merely loses the profit from selling in one of the markets. While at the other "extreme" case, where R's are undifferentiated and the manufacturer will always sign an exclusive contract with one of the downstream firms, there is no loss from selling through a single retailer and contracting externalities are absents with exclusive representation. The lower output and a higher price than in the case exclusives are banned results in an exclusive outcome where both aggregate surplus and consumer surplus are necessarily lower.

There are cases found between the two extremes of distinct markets and undifferentiated retailers that could be seen and that have either exclusive or nonexclusive outcomes. The final outcome depends on the relative benefits of avoiding contracting externalities and selling through two versus only one retailer. However, it is worth mentioning that the welfare conclusion with undifferentiated downstream firms depends on the absence of fixed costs for them. There are two other conclusions that may, eventually, change. The first, exclusion sometimes will be sustainable using a quantity contract¹². The second difference affects the welfare effect of banning exclusive contracts when the outcome

¹²without any need for an explicit exclusivity provision

without exclusives still has the manufacturer to sell to both Rs. In this latter case, a ban on exclusive contracts although still raises consumer surplus, it may result in lower aggregate surplus. The reason is, predictably, that with quantity competition (Cournot), entry into the retail sector may be proved to be excessive from a social perspective because of business stealing.

Exclusives to Reduce Competition in Input Markets: Another model that has been developed, based on the work of Bernheim and Whinston (1996), presents the cases where exclusive contracts are adopted as a way to reduce competition in input markets. In this model, the vertical structure is somewhat reversed compared to the one in the previous subsection. Here a single retailer R is assumed together with two manufacturers, denoted as M_A and M_B who compete in order to make sales to that one retailer. x_A and x_B denote the selling quantities of the two products and the retailer is assumed to face inverse demands $p_A(x_A, x_B)$ and $p_B(x_A, x_B)$ and a constant unit cost, c_R . The upstream firms, on the other hand, have a constant unit cost c_M . Bernheim and Whinston suggest that when bargaining over contracts, the two manufacturers make simultaneous offers to the retailer, who then chooses which contracts, to accept. In the case the contracts were absent, the combined profit- maximizing outcome for the retailer and M_A and M_B two manufacturers has sales levels (x_A^{**}, x_B^{**}) that solve:

$$max_{(x_A, x_B)} \sum_{j=A, B} [p_j(x_A, x_B) - (c_M + c_R)] x_j$$

Thus the profit will be $\Pi^{**} = \sum_{j=A,B} [p_j(x_A^{**}, x_B^{**}) - (c_M + c_R)] x_j^{**}$. In the case described, it is possible to sustain the joint- maximizing outcome with an exclusive contract, but also with a nonexclusive quantity contract as well. That non-exclusive quantity contract could be one that has M_{-j} selling x_{-j}^{**} to the retailer¹³. This result contrasts our findings in the model of exclusives¹⁴ to reduce retail competition. In the case studied here, however, efficiency is achieved when there is a single contracting party that deals with the outsiders. Intuitively, as there is only one contracting party interacting with the outsiders, the former is already able to "monopolize" the latter; thus, there is no concern that competition will limit this ability, and so there is no need to use exclusive contracts to maintain it.

Exclusives to Reduce Competition in Another Retail Market: The following model that will be studied is the one of Bernheim and Whinston (1998) where the manufacturers

 $^{^{13}{\}rm the}$ same outcome would occur if manufacturers had a fixed cost f>0

¹⁴where bilateral contracting failed to achieve efficiency when there was competition among the retailers (or more generally, among some of the contracting parties)

compete in another retail market. Similarly to the model of exclusives to limit competition in input markets, the analysis commences with an existing retail market where the retailer is the monopolist retailer and there are two manufacturers. The general model is a two-period one. At the first period, the retailer R_1 and the two manufacturers M_A and M_B sign long-term bilateral contracts for supply in the second period. Between the two periods, one of the manufacturers, say M_B may make an investment, denoted as i_B in order to reduce its cost at $f(i_B)$. At last, in the period 2, a second retail market with monopoly retailer R_2 emerges and the two manufacturers compete in making sales to it. At a general level R_2 changes the model, as at the time of contracting with the first retailer R_1 , the profits π_2^A and π_2^B could be seen as functions of contractual commitments (x_{1A}, x_{1B}) of M_A and M_B with R_1 : $\pi_2^A(x_{1A}, x_{1B})$ and $\pi_2^B(x_{1A}, x_{1B})$. Additionally, because of the possibility of monopolizing R_2 , the combined profit of the retailer R_1 and the two manufacturers may be highest if x_{1B} is low enough to force M_B not to invest.

Multiseller/ Multibuyer Models: All of the models studied in this section, involve simultaneous contracting that always took place between a sole buyer and several sellers, or perhaps between one seller and numerous buyers. The main reason is that, in literature, little is known about how to handle contracting with numerous parties on both sides of the market given contracts that have general forms. The most important multiseller/multibuyer model is the one of Besanko and Perry (1994). In this model, two symmetric upstream manufacturers of differentiated products are assumed to sell to retailers. Free entry into the retail sector is suggested, and active retailers (similarly to Salop' s model) are spaced (evenly) along a circular product space. At the first stage of the game, each manufacturer is assumed to decide whether to use exclusive or nonexclusive contracts. In the case either manufacturer chooses "exclusivity", then each of them is assumed to be able to sell to half of the retailers. If, on the other hand, both choose nonexclusive representation, then it can sell to every retailer. After the stage when exclusivity choices are made, retailers make entry decisions. The model allows for a retailer's fixed cost to be lower under exclusivity.

Then, the manufacturers name linear wholesale prices ¹⁵ and the set of permitted contracts is too restricted. Active retailers decide on their retail prices and the demand for each consumer takes the form of a logit model, with no outside good. In the model described, exclusives play several roles. At first, exclusives are the ones that make consumers travel further in order to purchase. Secondly, by intermingling retailer and brand differentiation, they help to the increase of product differentiation at the retail level, which leads to larger wholesale and retail markups for any number of retailers.

¹⁵they cannot discriminate in their offers across retailers nor use nonlinear pricing schemes

This last effect together with the possibly lower fixed costs, leads to observe more entry of retailers under exclusivity. The additional entry improves both the pricing and extra travel effects at the cost of higher fixed costs. Last, the model proves that the profits manufacturer makes could be prove to be higher when exclusive dealing has taken place. More "empirical", computational results demonstrate that consumer welfare would generally fall, profits would increase and that aggregate surplus would fall unless the reduction of the fixed-cost from exclusivity was large.

However, as it was stated at the beginning of the subsection, literature of multiseller/ multibuyer models is still somewhat poor. Besides the greater realism, these models allow us to set and subsequently respond to some important questions. Example of such questions could be: to what extent would someone be able to claim that defendants in exclusive dealing investigations could suggest that other competitors are using identical or similar contracts, as evidence that exclusive contracts are not anti-competitive, but they rather promote efficiency? The literature on anti-competitive exclusive dealing has more or less focused on producing "possibility results" in simple market settings to counter the arguments of the Chicago School. Gaining an understanding of the likelihood of anti-competitive effects in richer market structures is of critical importance as, in order to answers these types of questions models with competing sellers and more than one buyer (for realism purposes) are required, an observation that justifies the importance of multiseller/ multibuyer models.

Other Justifications: As a conclusion, exclusives may serve pro-competitive purposes such as investments from the side of the supplier or, alternatively, of the consumer as well as other non-contractible relationship-specific investments. Bernheim and Whinston (1998) in their model prove that exclusives may well arise in response to inefficient incentive provision in settings of "common agency". As an example, each of numerous manufacturers may try to provide incentives for a common retailer to favor their own product. That action leads to a situation where contracting with externalities is present. The outcome is a retailer who is risk-averse and who may encounter too much risk. A similar point is made by Martimort (1996) who assumes a retailer that knows more about its costs or demand than manufacturers do. Another pro-competitive motive that leads to exclusive contracts is as a means to prevent inefficient entry. Taking into consideration the model presented by the Chicago School in a previous section, it is evident that in the model presented, entry always generates a positive externality on the incumbent and also on the buyer. This was mainly because of the price competition (Bertrand-like form) of post-entry competition. If, in contrast, it was assumed that post-entry competition took a form of quantity competition (Cournot-like form), then

entry may lead to lower total (aggregate) surplus. Whenever this is the case, entry should generate a negative externality on the buyer B and the seller S jointly. In that case, S and B can sign an exclusive contract in order to prevent the entrant E from entering. The result would be that they would both raise aggregate surplus and their pay-off. Inefficient entry may also arise in cases where the buyer B is in position to sponsor an entrant. For example, it might be proved to be worthwhile for the buyer to subsidize the entrant's entry even in cases E is less efficient than the seller. As an example, in the case of a railroad and a coal mine, exclusive contract could be written in order to prevent the latter from attempting inefficiently to bypass the railroad once it has laid its track to the mine. Works that provide empirical evidence for the ideas presented could be found in numerous articles and books. These works represent a more refined attempt to look at the effects of exclusives and tend to boost further work of this type.

7.4 Dynamic Vertical Contracting with Learning-by-Doing

The literature of both the role of exclusivity in a dynamic environment and of learningby-doing production technology in vertical relations is still growing and the outcomes are still being enriched. However, it would be a mistake not to include at least a section that studies the above idea. The analysis will be based on the paper of Vettas and Kourandi $(2012)^{16}$ who examine a concept of dynamic interactions between an upstream duopoly and a downstream monopoly, where the upper-market product differentiates manufacturers' gain proficiency through the repetition of their production (learning-by-doing assumption). That notion is captured by the hypothesis that the unit production cost decreases as the producer gains experience from past accumulated production, while the downstream sector is dominated by a large retailer. Summarily, it could be noted that throughout the paper, emphasis is given in the dynamic interactions in the vertical chain and that the main outcomes that occur could be condensed into the observation that upstream foreclosure may arise in equilibrium when the products are close substitutes. Additionally, the authors prove that in equilibrium the rate of learning is notably lower than the social optimum and that the social planner may tend to impose exclusivity more often compared to the downstream monopolist. In Vettas and Kourandi's model, exclusivity occurs by the existence of a "large player retailer", while the upstream firms can reach the final consumers only via this retailer¹⁷.

¹⁶ideas discussed in Brenkers and Verboven (2005) and in Tracy and Huseyin (2002) will be used too ¹⁷in contrast to the usual approach of a denial by a dominant upstream firm to supply some downmarket firms the essential input that it produces

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It is proved that, in equilibrium, exclusivity arises when products (offered by the uppermarket manufacturers) are close substitutes, as in the case when products are complements or at least not close substitutes, both products produced are purchased in all periods¹⁸. This result stems from two opposite effects- the lack of trade-off between lower prices and the existence of more varieties in the market. When product differentiation (in the upper-market) is low, it is seen that the "lower prices" effect dominates the "more varieties" effect and that the total profits of the chain and the consumers' surplus are higher when one product is excluded from the market. Moreover, relatively to the non-exclusivity scenario, the product prices in all periods are found to be lower when exclusivity is imposed by the retailer. In the (dynamic) model studied (where two periods are assumed for reasons of convenience) the unit production cost of the manufacturers in the second period reduces proportionally with the production of the first period, something that captures the idea that the firm learns only by its actions. Furthermore, interdependence between the two periods is assumed (due to the learningby-doing process) and the unit cost functions in the second period are affected by the quantities produced in the first one. As it is evident from all the above, in the model the retailer maximizes the present value of its profits in each period (using a discount factor δ for the second period's profits) taking under consideration the positive effect by the learning-by-doing "constraint".

Using backward induction and taking into account all the possible values of the two production costs in period two, the retailer decides if it will impose exclusivity in that (second) period or not. By comparing the retailer's profits in period two obtained when no manufacturer is excluded from the market to the two alternative cases of a high cost asymmetry and of the possibility of a retailer who purchases only one product in period two (by offering the other supplier very disadvantaged contract terms), it becomes clear that it is profitable for the retailer to purchase both products in the final period of the game. This result holds when the cost asymmetry is not high enough and both products may be produced and offered in period two. The second period is the last period of the game and excluding one supplier from the market by offering disadvantaged terms results only to the reduction of the variety in this period without, however, opting for future cost reduction. Thus, for the first period of the game, if no exclusion is assumed, producers are seen to be equally cost efficient in the future, in contrast to the case where exclusivity is imposed in the first period. As it has already become evident, there are two alternative cases: the case where the retailer purchases both products and the case where the retailer purchases only one product in period one by offering disadvantaged contract terms to one producer. In the case of non-exclusion (given that the suppliers

¹⁸the authors implement two periods in their analysis

are initially equally cost efficient), the equilibrium in period one will be symmetric and the suppliers equal efficient in the second period too. The retailer is assumed to maximize the present value of its profits and the quantities purchased in period one affect the production costs in period two and subsequently the prices and the profits obtained. In the case of exclusion, however, in the first period of the game, the retailer chooses to distribute only one product. In this case, the producer of the chosen good will be more cost efficient in period two since it is benefited by the learning-by-doing process. This cost reduction determines whether the other product (not the chosen one) will be produced in period two (depending also on the product differentiation parameter).

After solving the model, it is seen that when products are complements or when products are not so close substitutes both products are purchased in period two. There is a trade-off between more intensive learning process under exclusivity and more varieties in the market under non-exclusivity. When product differentiation is low, the "learning" effect dominates the "more varieties" effect and one firm is excluded in period one and subsequently in period two. Intuitively, the more substitutable the products are, the less aggregate demand is foregone if good produced by the excluded firm is not present in the market and the lower cost is preferred.

To sum up, in the dynamic model studied, the decision of imposing exclusivity or not depends on the product differentiation parameter. Close substitutability leads to exclusivity in the dynamic model, since the "lower prices" effect (due to lower production costs) dominates to the "product variety" effect. In contrast, complementarity or not close substitutability leads to an equilibrium where the retailer purchases both products in both periods. Finally, when products are complements or close substitutes the presence of the retailer is necessary to coordinate the learning process.

Chapter 8

Vertical Integration and Exclusivity in Platform and Two-Sided Markets

In this chapter the more applied, compared to the theoretical models presented by Salinger, Marx and Shaffer and McAfee and Schwartz, paper of Lee will be presented¹. Lee, in his paper, introduces techniques in order to analyze the adoption decisions of both firms and consumers for competing platform intermediaries in two-sided markets. Then he applies the methodology presented to empirically measure the outcome of vertical integration and exclusive contracting in the 2005- 2006' s American video-game industry arguing, in the end, that exclusive arrangements made and vertical integration observed benefited the two smaller entrant platforms at the expense of the industry incumbent. Lee, based his approach on the work of Berry et al. (1995), adjusting his model to correctly capture the idiosyncrasies of the market studied. The importance of this paper lies on the fact it is one of the first papers that estimate dynamic demand for multiple markets' sides in a platform and that account for the re-matching process between contracting partners within a counterfactual regime.

Two goals are fulfilled in the paper: *Firstly*, a framework to analyze the adoption decision of both firms and consumers for competing platform intermediaries is presented. It is evident that, fundamentally, any analysis of how exclusive arrangements may possibly affect a platform market's competitive structure requires a good understanding of how the parties involved in the market choose which platform to join. Consumers time their purchase and choose a specific platform anticipating the adoption decisions of other

 $^{^{1}}$ Lee (2007)

consumers and firms; likewise, firms join platforms only after they have formed their expectations over the number of consumers and of the other firms that will choose to participate in the market. *Secondly*, Lee's objective is to apply the proposed methodology to empirically measure the effect of exclusive contracting and of vertical integration by hardware providers into software provision in the American video-game industry. The video-game industry is chosen as it is one where integration or exclusionary contracting by platforms into software development is not intended to foreclose other third-party software providers. On the contrary, any exclusive titles are intended to attract other software developers as much as they are intended to attract consumers. Thus, this industry is carefully chosen, as it can separate out the possible foreclosure effects in software provision and instead focus on foreclosure at the platform level. In contrast to other empirical works, that choose to mainly focus on the possibility of upstream foreclosure and on the supply-side efficiencies², this paper focuses on the competition between downstream platforms and on how integration and exclusivity interact with the networked aspect of the industry in attracting both software and consumers to join.

8.1 Consumer Demand: Introduction

In the first part of the paper, a method for estimating a structural demand system focusing on general platform intermediate markets is presented. Lee aims to determine how consumer demand for hardware platforms (the platforms used to "run" the games, i.e. consoles) may be altered, respectively to changes in software availability, and he, also, aims to examine whether consumers' demand for any piece of software title(game) would be conditional on that title developing for any set of platforms. It is rationally assumed that in networked industries, when consumers choose a platform, their choice depends, mainly, on the goods or services that are or will be available in the future for it. However, similar to Tiebout's approach³, for different consumers the researcher will observe different choices of hardware platforms- due to consumers' differentiated perspective of the affiliated products offered. If the researcher fails to acknowledge the above, Lee notices, it is evident that his/her estimation will suffer from upward biases in the quality and in the contribution of goods and services to the specific platform. Lee, through his structural approach demand system, is able to recover the individual software title's marginal contribution to each platform's installed base of users. Additionally, accounting for dynamic concerns is proven to be critical in platform markets as the affiliation decision often involves the purchase of a durable good or agreement to a long-term commitment- Lee implements and extends instruments used in the works of

²Asker (2004), Sass (2005), Chipty (2001)

³Tiebout (1956)

Berry et al. (1995) and Hendel and Nevo (2006) in order to deal with each consumer' s dynamic optimization problem. These extensions include the explicit handling of seasonality effects together with the persistence of observable product characteristics and a differentiated usage of a general evolution process for product prices and qualities.

8.2 Hardware-Software Network Formation

In the second part of the paper, the contracting decisions between software firms (firms that produce and release the games) and hardware platforms (consoles) are examined. It is stated, however, that in cases such as in the vertical integration of hardware platforms into software provisions, when institutional features of an industry change, it is highly unlikely that the contracting relationships between parties will remain unchanged. From the side of the consumer, (time) panel data set of software products for each platform/product at any time has been taken into account. From the side of the supply, to determine the response of which platforms each software title joins, Lee defines and computes a new equilibrium for a dynamic network formation game. In this game, software titles' providers, after they have observed the previous actions of consumers and other industry agents and after they have formed expectations over the future profitability of each potential strategy, they are allowed to choose which platforms to develop for. The setup⁴ implemented allows for contracting partners and consumer demand to change over time- past actions, however, would be allowed to influence future decisions. To compute the equilibrium, an estimation of the profits each software title expects to yield if it chose to develop for any set of platforms is used. To address to the problem of the unobserved underlying "entrance" $costs^5$ of developing different sets of platforms, an assumption of profit maximization choice of the set of platforms from each software title is initially imposed. Then, the author computes the difference in profits (as a function of costs) each title producer could have expected to yield if it had chosen to develop for a different set of platforms. Last, he recovers an estimation of entrance costs that rationalize each title's observed choice through an inequalities-based estimator similar to the one developed by Pakes et al. (2007). In order to evaluate the fit of the dynamic network formation model and of the estimated parameters, Lee initially fixes the decisions of exclusive first-party titles and then computes a new equilibrium among remaining third-party titles.

⁴similar to the work of Ericson and Pakes (1995)

⁵ in the paper they are called "porting" costs

8.3 The U.S. Videogame Industry- Description

In 2006 the industry of video-games in U.S.A. reached a total of 13.5 billions U.S. dollarsan amount that justifies that playing video-games has developed to a mainstream trend, rather than being simply a child's hobby. It has been observed that the average player is now 33 years old and over 65 percent of American households have engaged in computer and video-games. Nowadays, each console (hardware platform) is provided by one firm as a tightly integrated and standardized device that is required to run any of the titles that are provided for the system, while video-games are brought to market by two types of entities, developers and publishers. Developers' role is to undertake the programming and the execution of each title, whereas publishers usually handle the sections of marketing and of distribution of the games. Although there are some independent software development studios, they often end up turning to software publishers in order to finance their projects in exchange for distribution and publishing rights. Publishers, on the other hand, are usually integrated into software development and have their own in-house development studios.

Apart from the cases a firm produces games exclusively for its own consoles, there are firms that produce (and later release) games that could be played by more than one consoles- the so-called *third-party* titles. It is now evident that the choice of which platforms to develop for is a strategic one: a third-party software developer could decide to release a title that operates equally well on numerous platforms- in order to reach more consumers- and, of course, pay the additional porting(entering) costs, such as development or distribution costs or, alternatively, develop exclusively for one single console and forego consumers on other platforms. However, even in the latter case, the developer may still have multiple options: it could either enter into a publishing agreement with the console provider, or it could opt to sell its game or even entire studio outright. Taking advantage of the above situation, most video-game console manufacturers subsidize on their pricing front the sale of their hardware devices to consumers. Manufacturers usually decide to sell their consoles close to or even below cost and then make profits by charging publishers and developers a royalty for every game sold on their platform.

The paper focuses on the sixth generation of video-games. The sixth generation could be identified in the period 2000 - 2006 and it is a period where there are mainly three competitors in the market as apart from the leader Sony (that has already produced the first generation of PlayStation (PS1) and *Nintendo* that were already in the market, *Microsoft* entered too. Last, this sixth generation, with the introduction of DVD and online capabilities, marked the first steps towards placing the video-game industry within the battle general consumer electronics and personal computers.

8.4 Data and Descriptive Statistics

The data Lee used came from monthly observations of (i) the average selling price and of the quantity sold of each video-game console and (ii) of the average selling price and of the quantity sold, as well as of other descriptive information for each software title on each console, from September 2000 to October 2005. During the period studied, three videogame consoles and a total of 1581 unique software titles(games) were released while the population of potential consumers was taken by the number of television households.

Prices: Hardware prices remain mostly unchanged, while the main interruptions occurred only by two major discrete jumps. The second generation of PlayStation 2 (PS2) and Xbox started retailing for approximately 300 dollars, but in May 2002 both Sony and Microsoft simultaneously announced a cut of their prices by 100 dollars prior to the "E3" industry trade show. Nintendo followed with a 50 dollars price reduction of its own console. The reaction of Microsoft and Sony took place two years later, when both firms dropped their prices one after the other.

Seasonality: The video-game industry exhibits noticeable seasonality both in consumer demand and in software supply. The industry also exhibits variance across months as during some months there is release of many new titles, while during others there are only few new releases.

Exclusivity and Multi-Homing: Approximately 65 percent of unique software titles are exclusive to only one console, nevertheless, there is still significant variation in the number of software titles that remain exclusive across platforms.

Concentrated Software Sales: Video-games are primarily a trend-driven industry whereby a few top-selling games "push" the sales. The concentration of the sales applies mostly to software publishers. From the over 150 publishers, who have released a game for a sixth generation console, approximately the top 20 was responsible for the 90 percent of the total quantity sold. Last, as it was expected, the majority of the sales took place in the early stages of the life of the game, as it has been observed that over half of the total sales have taken place in the first few months after the release of the game.

Significant Consumer Heterogeneity: According to Nielsen, there are great differences among the different "types" of video-game players. The heaviest 20 percent of gamers is measured to account for nearly the 75 percent of total usage, averaging 345 minutes per day during the fourth quarter of 2006. On the other hand, "casual" video-game players spend less than 5 hours a week playing games.

8.5 Consumer Demand

After having presented, in a previous section, how consumers' demand is going to be measured, as well as some introductory factors about it, Lee uses consumer demand not only to measure the resultant platform and software market shares after a change has occurred, but also to present the incentives that influence each specific software title producer's decision of which platforms to develop for. The structural approach Lee implements is first presented in a general platform market basis and then it is applied in the model constructed for the video-game industry.

At first, in the theoretical model introduced, Lee assumes that there are J hardware platforms and K software products available in a given market. K_j is assumed to represent the set of software available on platform (console) j. A consumer is restricted to utilize a software product $k \in K_j$ if he/she has first purchased the platform j. In the static "world", that is first examined, the game that will be played is the following:

Stage 1: Consumers may choose to purchase any hardware platform $j \in J$

Stage 2: If consumer i has chosen platform j, he/she may purchase any subset of products $K_{i;j} \subset K_j$

The econometrician is assumed to be able to observe the aggregate share of each hardware platform chosen in the first stage of the game played and also he/she is assumed to observe the share of consumers on each platform who have purchased each piece of software in the second stage of the game. The ideas that the static model needs to incorporate are that platform utility needs to be endogenous and, also, a function of affiliated products K_j and that consumers are assumed to choose across platforms based on their preferences and the characteristics of the latter. The first idea presents that each consumer derives utility from buying a particular piece of software, and this must be taken into account in the utility he/she expects to derive from the adoption of the platform. Any parameters, such as price sensitivity, that may enter into the specification of utility of both software and hardware need to be consistent and jointly estimated. Additionally, a consumer's utility, upon joining a platform, can only be a function only of the affiliated products with that platform and, last, the choice set over software products should change depending on which platform the consumer joins. The second idea presents that a potential failure to account for heterogeneity in consumer preferences or for their selection across platforms will inevitably lead to biased estimates of the

quality and contribution of a piece of software to consumer utility, as those consumers who have purchased the platform have already exhibited their preference for those affiliated goods. Consequently, any model which implies that consumers who purchase and consumers who do not are identical, is likely misspecified. Nonetheless, this is often the assumption made when estimating software demand without also explicitly accounting for hardware demand.

Works in estimating demand in platform markets have approached the issue from two different perspectives. (1) They have estimated only the one side of the market, in most cases the hardware side, using a reduced form approximation for the contribution of utility of the other side, usually the number of complementary products available. This first approach is limited by its "inability" to correctly estimate the entire structure of the demand and perform counterfactual experiments where contracting partners change. (2)They have estimated each side in a separate two-stage procedure, combining the software estimates in the first stage in order to construct a measure for hardware utility. This second method is restricted by the fact that the econometrician needs to observe all the characteristics of the consumers on-board each console that may influence their demand for software. It is easily seen that the data requirements are more intensive, which also rules out the possibility for controlling for selection on any unobservable characteristics.

The tight integration between hardware and software demand that suggests moving towards a method which can simultaneously estimate both sides at once- similar to the one used by Berry et al. (1995)- is adopted by Lee. The total expected lifetime utility that a consumer derives from a single platform is given by the relation:

$$U(\psi_i, \chi_j, \xi_j, \Gamma_j(.); \theta)$$

where ψ_i indicates a vector of individual characteristics and preferences, ξ_j indicates the unobserved product characteristics and χ_j the observed ones. Γ_j is an indicator of the total expected utility a consumer could derive from purchasing and using software available on platform j and θ is the vector of parameters that need to be estimatedthis vector also includes any parameters that may govern the distribution of the unobserved consumer characteristics and preferences. To continue, Lee assumes that software quality or availability are uncertain. This uncertainty is resolved after the hardware is purchased. The consumer will purchase the console that will maximize its utility and thus will choose j if and only if:

$$U(\psi_i, \chi_j, \xi_j, \Gamma_j(\cdot); \theta) \ge U(\psi_i, \chi_r, \xi_r, \Gamma_r(\cdot); \theta) \forall r \in J \cup \{0\}$$

where $j = \{0\}$ represents the "outside option" of non purchase. Let

$$A_j = \{\psi\} : U(\psi_i, \chi_j, \xi_j, \Gamma_j(\cdot); \theta) \ge U(\psi_i, \chi_r, \xi_r, \Gamma_r(\cdot); \theta) \forall r \in J \cup \{0\}$$

denote the set of values for ψ which induce consumers to choose good j. Assuming that $P_0(d\psi)$ denote the population density of ψ in the beginning, then the share of consumers who would choose platform j is given by the expression:

$$s_j(\chi_j, \xi_j, \Gamma(\cdot); \theta) = \int_{\psi \in A_j} P_0(d\psi)$$

 $\Gamma(\cdot)$ stems from the software side of the markets and is endogenous in the model. If one assumed that all software products are in independent markets, so that that there are not any substitution or complementarities across titles, then a consumer could decide whether or not to purchase a particular title in isolation, and will be observed to buy a given title if it yields utility U^{sw} that is higher than the one derived by the outside good. In mathematical form, the consumer will purchase a particular title if:

$$U^{sw}(\psi_i, \omega_k, \eta_k; \theta) \ge U^{sw}(\psi_i, \omega_0, \eta_0; \theta)$$

where w_k and η_k play the role of the observable and unobservable characteristics of title k, respectively. Although the set of consumer types A_k who choose to buy the good k is defined similarly as on the hardware adoption side:

$$A_k = \psi : U^{sw}(\psi_i, \omega_k, \eta_k; \theta) \ge U^{sw}(\psi_i, \omega_0, \eta_0; \theta)$$

the share on platform j of consumers who purchase k is given by the expression:

$$s_k(\omega_k, \eta_k, \theta) = \int_{\psi \in A_j \cap A_k} P_0(d\psi)$$

In the case independent software titles are assumed, software utility on platform j will be the max utility from the purchase (or not) of each particular software title, which is, similarly, given by the expression:

$$\Gamma_j(\cdot) = E[\sum_{k \in K_j} max U^{sw}(\psi_i, \omega_k, \eta_k; \theta), U^{sw}(\psi_i, \omega_0, \eta_0; \theta)]$$

In order to solve the above, the problem of endogeneity and of selection need to be solved. However, with unknown distribution of the types of consumers who select a given platform, it is impossible to calculate the share of consumers who choose to buy a particular software title. Lee fixes the distribution of the types of the consumers on-board each platform, obtaining a first-step estimate of the fraction of consumers who purchase each title. Consequently, he updates the distribution of the types of the consumers on-board each platform implementing the new estimated software quality. The above procedure is repeated, iterating the estimate of hardware adoption and software adoption until convergence has been succeeded. The convergence will eventually occur when predicted values from the hardware side are consistent with the ones of the software side.

8.6 Dynamic Model of Consumer Demand

The static case examined above is somewhat restrictive and in a way unrealistic, as in most applications the problem becomes a more dynamic one. In the case of the videogame industry, consumers internalize future software availability, potential price drops and quality differences, before they decide when and whether or not they will purchase either a hardware system or software title. It is clear that there is no interdependence of demand across time. Issues that should be taken into consideration are that since both the consoles and the games are durable goods, once consumers have purchased their item they will not participate in the market again and that also it is evident that the durability will lead to different expectations over the evolution of the qualities and the prices. Additionally, it is easily understood that the consumers who choose to buy their items earlier than the others are less price sensitive and willing to pay more for the good. Controlling for dynamic issues, like the ones mentioned, is crucial for the accurate estimation of the demand, in most platform environments. In the dynamic analysis, in each time period t there are J_t hardware consoles and $K_{j,t}$ software games on each platform. Consumers are assumed to have the choice to either buy their items at this period or wait until the next one, any consumer who has purchased by time t a console may choose to buy any software title $k \in K_{j,t}$, not previously bought.

In order to examine the hardware adoption, Lee assumed that the expected total lifetime utility consumer i, who chooses to purchase platform j at time t, will have is given by the expression:

$$u_{ijt} = \alpha_i^x \chi_{j,t} - \alpha_i^p ln(p_{j,t}) + \Gamma_{j,t}(\alpha_i^p, \alpha_i^\gamma) + \xi_{j,t} + \varepsilon_{ijt},$$

where $\alpha_i^x \chi_{j,t} - \alpha_i^p ln(p_{j,t}) + \Gamma_{j,t}(\alpha_i^p, \alpha_i^\gamma) + \xi_{j,t} = \delta_{ijt}$ and $\chi_{j,t}$ are observable characteristics of platform j at time t, $p_{j,t}$ is, as expected, the price of the console(PS2, XBOX etc), $\xi_{j,t}$ is a product characteristic unobservable to the econometrician but observable to the consumer, $\Gamma_{j,t}$ is the discounted expected value of being able to buy software for the platform in the current and future periods, $\delta_{i,j,t}$ is the price-adjusted quality for platform j^6 and last ε_{ijt} is an individual-platform-time specific component which represents idiosyncratic consumer heterogeneity also unobservable to the econometrician, as $\xi_{j,t}$ was but realized by the consumer at time t^7 . The consumer, instead of buying the console, may choose to wait to return to the markets for one period and purchase the outside good, a choice that would yield utility equal to $u_{i0t} = \varepsilon_{ijt}$.

A consumer's utility from choosing to be on the market for a hardware platform is given by the following relation:

$$V_i(\varepsilon_{i,t},\Omega_{i,t}) = max(max_ju_{ijt}, u_{i,0,t} + \beta E[V_i(\varepsilon_{i,t+1},\Omega_{i,t+1})])$$

where $\Omega_{i,t}$ captures both current product attributes and the time of year- so as to account for seasonality effects- as well as any other market characteristics which affect firm product pricing, exit, entry, or attributes such as installed base. To deal with the large state space, Lee assumes that consumers perceive the mean utilities $\delta_{i,j,t}$ for each console to evolve according to an exogenous Markov-chain Process in addition to $\delta_{i,j',t_{j'}\neq j}$ of all other competing hardware platforms. The consumer's final expected value function, after the assumptions made, could be rewritten as:

$$EV_{i}(\delta_{i,j,t_{j\in J_{t}}}, m(t)) = ln(exp(\delta_{i,t}) + exp(\beta E[EV_{i}(\delta_{i,j,t+1_{j\in J_{t}}}, m(t+1))|\delta_{i,j,t_{j\in J_{t}}}, m(t)]))$$

As a result of the limited number of consoles in the video-game industry, the state space described is small enough for implementation.

In order to examine the software adoption, Lee analyzes consumers' software purchase decisions in order to get to the so-called "software quality" function, $\Gamma_{j,t}(\cdot)_{\forall j,t}$. $\Gamma_{j,t}$ is linked- via the "total software utility"- to the value of being on the market for software on platform j. This total utility could be seen as the combination of the utility obtained from software available in the present period and the (expected) utility from new software that will show up in the future. Assuming a consumer that has already bought the console, his/her expected lifetime utility from purchasing game(title) k in time period t

 $^{^6\}mathrm{if}\;\varepsilon_{ijt}$ has zero mean then $\delta_{i,j,t}$ would represent the mean utility

⁷all the α 's represent coefficients that reflect how intensely a consumer prefers platform characteristics, price, and software

is expressed by the relation:

$$u_{i,k,t} = a_i^{i,\gamma} + a^{w,i}w_{k,t} + \eta'_{k,t} - a_i^p ln(p_{k,t}) + \epsilon'_{i,k,t}$$

where $w_{k,t}$ indicates the observable software characteristics, $\eta_{k,t}$ plays the role of the unobservable to the econometrician software characteristic and $\epsilon_{i,k,t}$ is the individualsoftware-time specific utility shock. Lee chooses to let the variance of unobserved heterogeneity, indicated as σ_{ε} , to vary between the software and hardware sides. Taking into account the above, Lee appropriately scales all shared coefficients by multiplying and simultaneously dividing through by the variance σ_{ε} . Then, the above expression yields:

$$u_{i,k,t} = \sigma_{\varepsilon}(a_i^{\gamma} + a^w w_{k,t} + \eta_{k,t} - a_i^p ln(p_{k,t}) + \epsilon_{i,k,t})$$

where the term $a_i^{\gamma} + a^w w_{k,t} + \eta_{k,t} - a_i^p ln(p_{k,t}) = \delta_{i,k,t}$ represents the scaled utility of buying one unit of software net of the individual-specific-unobservable error term. Thus, the optimal stopping problem any consumer needs to solve for the time he/she decides to buy a video-game(software title) k is given by

$$W_i(\Omega_{k,t}, \epsilon_{i,k,t}) = maxv_{i,k,t}(\omega_{k,t}, v_{i,k_0,t} + \beta E[W_i(\Omega_{k,t+1}, \varepsilon_{i,k,t+1}])$$

where $\Omega_{k,t}$ represents any relevant variables which influence consumer *i*'s utility from buying or waiting for a title *k*. Finally, given assumptions that deal with the dimensionality problem that reappears, the expected value function of operating in market for software at time *t* for title *k* is given by:

$$EW_i(\zeta_{ikt}) = \int_{\epsilon_{i,k,t}} W_i(\zeta_{i,k,t}, \epsilon_{i,k,t}) dP\epsilon = \sigma_\epsilon ln(exp(\zeta_{ikt}) + exp(\beta E[EW_i(\zeta_{i,k,t+1})|\zeta_{ikt}]))$$

which illustrates consumer i's expectations over characteristics for software k as well as for future prices.

8.7 Market Equilibrium

The game played, in order to specify the market equilibrium, could be seen by dividing the actions played into different "times". The result would be that at time:
1. all titles $k \in K_t^R$ are released and added to the stock of already existing software products for each console according to $s_{k \forall k \in K_t^R}$

- 2. $\delta_{i,j,t}$ and $\zeta_{i,j,k,t}$ for all consoles and games are determined
- 3. consumers decide about which hardware and software they will choose
- 4. every title $k \in K_{t+r}^R$ that will be released in τ periods chooses s_k

It follows that in the equilibrium occurred, each video-game(software title) conditions entirely on its prices, mean qualities, and other "payoff relevant" state variables when it is to determine its optimal strategy. Furthermore, a consumer's decision to buy a particular console (platform) or game (software title) is a function of his/her own characteristics and of the product's expected utility. Given the assumption of the Markov-chain rule, a first-order Markov equilibrium is a Markov-Perfect Nash equilibrium with the remark, however, that agents' beliefs over the transition probabilities remain contained within the class of first-order Markov processes. It could also be seen that this equilibrium is subgame perfect, under the assumptions that i/every agent acts optimally based on a function of his/her own payoff-relevant state variables, ii/ any agent's decision is optimal and iii/ it is a best-response strategy even in the case of more general deviations.

8.8 Estimation, Identification and Computation

Using instruments taken from the literature of dynamic panel data models, ruling out time-persistent components of the error terms and implementing lagged values of $\delta_{j,t}$ and $\zeta_{j,k,t}$ Lee follows the solution suggested by Berry et al. (1995) (who estimate discrete choice models choosing to recover the set of the unobserved product characteristics for any given parameter vector θ and then use a generalized methods of moments estimator based on forming conditional moments with these unobserved characteristics) leveraging, however, the dynamic aspect of his data and estimating the model based on the predicted evolution of the unobserved product characteristics. The log-likelihood function in which he concludes is:

$$\ell(\theta) = \sum_{j=1}^{J} (\sum_{t=r_j+1}^{T} \ln f^{hw}(v_{j,t}^{hw}(\theta); \theta) + \sum_{t=r_{k+1}}^{T} \sum_{k=1}^{K_{j,t}} \ln f^{sw}(v_{j,k,t}^{sw}(\theta); \theta))$$

where f^{hw} and f^{sw} are the probability density functions of consoles and games respectively. To solve the log-likelihood function ξ and η need to be specified. Similar to works that were conducted in the past footnoteNair(2006) Lee links the two demand systems and chooses to estimate both sides simultaneously. The above expression would be maximized for $\theta' = \sup_{\theta \in \Theta} \ell(\theta)$. For *T* being sufficiently large, the contribution of the initial values of ξ and θ to the likelihood become negligible. Leveraging the dynamic aspects of the problem in this fashion allows both to condition for an initial conditions problem but it also proves to be robust to the possibility that hardware and software release dates are assumed time-dependent⁸. Lee proves that the estimator derived by the GMM process is a consistent and an asymptotically normal estimator. As both η and ξ terms are subject to population sampling error and the need to simulate the integrals defining market shares for each product, none of them can be computed accurately. Thus only an approximation of η and ξ is available.

For the "identification" section of the paper, Lee fixes the discount factor β to 0.99 and, to parameterize the heterogeneity observed in consumers' side and the price sensitivity for software and hardware, he uses the relation (implementing y_i as consumer i's annual household income): $a_i^{p,\cdot} = a_0^{p,\cdot} - \sigma_{p,\cdot} y_i$. Because of the dynamic model studied, α^x and $\alpha^{w~9}$ are identified through the time variation in the sales, while σ_ϵ and β_γ are identified from changes taking place in hardware demand in response to the release of both current and future games. Last, for the identification of $D(I_{i,t})$, Lee observes that when D is very high, then any buyer of a hardware system would essentially chose to exit the market and he/she would not buy another console. When, on the other hand, D is low, previous purchase does not remove that specific consumer from consideration when buying other consoles. The intuition remains the same, even with heterogeneity. The Sony's hardware device, PlayStation 2, was released a year earlier than its rivals. Thus, whereas the change in sensitivity to price or software availability on the PS2 in the first year identifies the degree of consumer heterogeneity, whether or not these same early adopters are still looking for a console to buy the Microsoft' s Xbox or Nintendo' s GC is a function of D.

8.9 Results and Discussion

After the regression, Lee found that the heterogeneity in price sensitivity was statistically insignificant and that σ^p s for both consoles and games were equal to zero. Since α^{Γ} and the discount factor β were found to be statistically significant and different than zero, consumers were observed to respond to both current and future software (games) availability when making hardware(consoles) purchasing decisions. If D = 0, it is seen

 $^{^{8}\}mathrm{games}$ that have a relatively high initial unobserved quality may traditionally be released during periods of high demand

⁹they include product and month level fixed effects and installed base terms

that there is little substitutability or complementarity effects across additional consoles when duplicate titles are not taken into account. A surprising observation is that the total number of households predicted to own a console matches the data used as a moment estimation(44.4 millions). The model also predicts that a total of 6.7 households own two (different) consoles and only 1 million is predicted to own all three consoles. The estimated fixed effect for the PlayStation 2 is found to be significantly larger than the ones of the other platforms, which may be (partly) a result of its function as a DVD player and of the fact that there are over 1000 games available for the first generation' s PS1. As it was expected, the age of a hardware and of a game affects negatively lifetime utility from purchase. The "easy" explanation is that consoles "lose" the utility they offer once the new generation has arrived, while software titles may be less popular after time passes. Finally, the model predicts that seasonality effects do influence when people purchase goods with holiday months exhibiting highly positive and significant coefficients.

Counterfactual experiments, that were carried out, suggest that exclusive vertical arrangements have harmed the incumbent and aided platform entry. PS2 had already 5 millions of users before the arrival of the two rivals. Without exclusivity, software developers could only have supported the XBox and GC after supporting the PS2. Hence, without a game advantage over the incumbent, the entrants would have sold far fewer video-games, and, due to the importance of software royalties, may even not have entered (or exited the market). There has been a question of why the entrants would be able to secure access to higher quality exclusive titles. First of all, the observed allocation of software titles across platforms may be efficient from the perspective of the contracting parties or it might have been the case that Sony did not intentionally pursue third-party exclusive titles at the start of the generation, assuming that it did not need to, based on first generation's PlayStation. Hardware competition may not always be desirable, particularly in cases when a platform cannot exercise market power upon establishing a dominant position.

Chapter 9

Cases of Vertical Integrations in E.U.

This chapter of the thesis will be dedicated to the presentation of specific cases of vertical integrations that have been subject of discussion in the competition commission during the last years. The case of the integration between General Electric and Honeywell will be analyzed thoroughly with the cases of Goodrich and TRW and Carlyle, Finmesic-canica and Avio to follow. The last cases of vertical integration that will be presented in this chapter will be the ones of KPN and Getronics and of Russian machines and Magna.

9.1 General Electric and Honeywell

In 2001 it was announced that General Electric Company agreed to acquire the total of the stocks of Honeywell International Inc (a deal that was validated when the two firms exchanged shares). General Electric (GE) has a long history in numerous markets such as planes' engines, network services, lighting systems, industrial equipment, medical equipment, plastics, financial services and others, while Honeywell International Co. (Honeywell) is a company that specializes in products and services in the market of aerospace, car industry, electronics and others. GE, in terms of capitalization (total value of firm' s stocks), is the biggest company in the world, something that enables it to invest significantly more than its competitors to new technologies and product development. Its size, allowed GE to introduce a new product at every stage of the market every year, to buy off over a hundred firms per year- every year and to operate in a market, as the one of plane engines, where the investments cost a lot and the profits they yield usually delay. The market that this integration seemed to interest the most was that of plane engines. A subsidiary firm of GE, General Electric 2000 Merger Sub Inc. merged with Honeywell- something that constituted Honeywell a subsidiary firm of GE as well. In 2001, the sum of the profits the two firms made globally per year was more that 5 billions euros, while each firm had a total income that exceeded 250 millions euros in the European Community, but since none of them made more than two thirds $(\frac{2}{3})^1$ of its turnover in one country, their integration was a matter of the community as a whole. Since the integration of GE and Honeywell involved several markets, (such as energy production, aerospace) it was evident that the vertical, horizontal and cross consequences would be multiple.

Competition in plane engines, that both GE and Honeywell produced, takes place in two stages. First, plane engines compete in order to get the approval to be used in an under construction type of plane, while in a second stage, firms that buy that specific type of plane, choose among the approved types of engine that carry the engine or they want to change the engine of an already bought plane. Thus, The demand from plane engines stems from two different markets. The demand for plane engines results from the one for planes- an observation that constitutes plane engines a complementary good. The demand for the plane engines stems from the one for fuselage, which constructors use a specific type of engine for their planes (GE, taking advantage of its size, provided economic assistance to fuselage manufacturers in order to produce planes that operated only with its engines- reducing price competition) and from the one for final users, which in this case are the firms that buy planes mentioned above. The types of engines that were discussed in the committee were the three main types: engines for large commercial planes, for which GE seemed to be the main producer, engines for regional planesregional planes are divided into two categories, larger and smaller ones- Honeywell was the producer of the first large regional planes to be built, while GE for the last three, making the integrated firm a monopolist in this market as it would be the sole supplier of this type of engines. Another type of plane engines was that of engines for business planes. In that market GE and Honeywell had to compete numerous rivals, such as RR-Allison and P-W Canada- there were also many manufacturers of planes that used this type of planes such as Bombardier, Cessna, Dassault and Raytheon. GE and Honeywell also involved in the market of maintenance and service of their engines, a secondary market in which the firms that have bought the planes usually address to periodically.

From the perspective of competition, demand in this industry was determined by the manufacturers of the plane engines while supply was determined from the manufacturers of the fuselage and the final buyers. The manufacturers of the plane engines could be

¹europa.eu, ftc.gov

also divided into two broad categories as they could either construct an engine for a specific type of plane (which would be sold exclusively with this engine) or to provide their engine separately from a fuselage and the final buyer would be the one to decide which combination is the chosen one. Usually decisions about the production of the engines are hard to be predicted as the preferences of the particular buyer play a significant role in it.

The competition authority treated GE as a firm that dominates the market of engines for large commercial planes, as it had by great difference the largest market share, which was steadily increased during the past years (gaining the market share P-W and RR held). Additionally, the competition committee predicted GE, through that deal, would enjoy a significant advantage, in comparison to its rivals, in the markets of financial services, in the one of spare parts and of plane leasing. Thus, the committee treated the merge of GE and Honeywell as an attempt of vertical integration.

Also, in the market of regional planes, for which GE and Honeywell were already the only suppliers, their merge would result in a monopoly in the market. The market of regional planes was another market in which GE dominated.

Maintenance and services of the engines was a large market (the cost for maintenance and service was 200 percent of the initial cost of the engine) which GE exploited through an extensive global network of workshops and had observed an increase in its profits from 215 millions USD in 1991 to 588 millions in 2000. Maintenance and services was a market where both R-R and P-W were strong competitors for GE, thus the deal with Honeywell would seriously weaken competition, forming a dominant firm in the market.

GE except for its presence in different markets, all related to plane engines, was also buyer of planes, through its subsidiary GE Capital Aviation Services (GECAS). GECAS bought approximately the 10 percent of new planes and was a top firm in the market of plane leasing. The competition committee, however, concluded that this 10 percent of new planes, given the bias of GECAS, does not sufficiently represent GE's influence in the process of choosing a plane engine. The influence GECAS had in reality stemmed from its ability to create a non-comparable in economic terms incentive for the fuselage manufacturers to favorite the products of GE, as GE could guarantee limited risk to the fuselage manufacturers when the latter created exclusive products for GE and could also guarantee better collaboration with other firms of GE's group, such as GE Capital. GECAS also facilitated GE in cases of firms that constructed planes that could operate with different engines (in cases when there is an engine choice). GECAS provided solutions to these firms and funding in flexible ways and in the same time promoted GE's engines. One of the main competitors of GE and Honeywell was P-W. P-W was a supplier of the army which ensured the long-term profitability of the firm. However, during the last years, it seems to abstain from the market of big commercial planes, where it can no longer operate independently. The competition committee, after taking into consideration the actions of P-W, proved that the consumers (fuselages manufacturers or plane firms) usually prefer the products of GE, as the increased market share of the latter proves. The committee, also proved that GE maintained an independent behavior towards rivals and consumers, mainly due to its unique economic power, its vertical integration and its dominant place in distribution chain. All the above, the structure of the market of plane engines which has entry boundaries, GE Capital's role with the GE' s clients, the ability of the latter to use GECAS as a form of pressure that ensures its vertical integration and the gradual weakening of the rivals permit GE to maintain its dominance firm in the market of engines for large commercial and large business planes.

Honeywell, on the other hand, manufactured, except for plane engines, a large variety of other products related to plane industry referred as aeroelectronic or non-aeroelectronic systems, or simply as systems. Honeywell was the main supplier of this kind of equipment as its market share was calculated at 50-60 percent while Rockwell Collins, Smith Industries, Trimple Navigation and Chelton Avionics were its main competitors. The majority of the aeroelectronic systems- which cost is approximately the 5 percent of the total cost of the plane- assist to the control and navigation of the plane (in which market Honeywell was expected to lose market share and profits as the next generation of these systems depended on software produced by Collins and Thales), to the communication with the authorities and the prediction of weather conditions (winds and rainfall). The non-aeroelectronic ones- which cost is approximately the 4 percent of the total cost of the plane- were usually independent units of energy production (Honeywell's market share was calculated at 70-80 percent), systems of electricity production, wheels or brakes for the planes (Honeywell's market share was 30 - 40 percent, while BF Goodrich's was 30 - 40 percent and ABS' s 10 - 20 percent), landing systems (in which systems Honeywell is the leading supplier, as its market share is approximately 100 percent of the market) and lighting systems for the plane. One of the characteristics of the market of aeroelectronic and non-aeroelectronic systems is that most of the services and the maintenance these systems demand is done by the suppliers of the systems- each supplier services its own products. Because technology changes rapidly most systems are either upgraded or replaced and rarely repaired. Although Honeywell's leading position was undeniable, the systems related to flights' data were more rarely sold as a separate product. Honeywell operated in integrated products- products that are connected with

each other in order to form a complete system- taking advantage of the fact most fuselage manufacturers preferred suppliers that were integrated. Honeywell also had a large variety of products, covering all systems. It is evident that the collaboration of the two firms leaded to a vertical relation in the industry, as the products of the two are closely related. By the deal Honeywell would be immediately benefited through the connections of GE Capital to gain exclusive collaboration with plane firms, excluding rivals from a large variety of part of the market. Also, GECAS would augment its exclusive GE influence to Honeywell's products over rivals as Collins, Thales and Hamilton Sundstrand.

Of course, that vertical integration was expected to reduce the consumers' welfare, as competition would be reduced (exclusion of other rivals). The two firms tried to convince for the benevolence of their merge, agreeing to commit to a level of terms, however, the committee did not allow it ², rejecting their attempt to merge.

9.2 Goodrich and TRW

A merge that the competition committee eventually approved was that between Goodrich³, a firm operating in aerospace industry (as well as in technical services, electronic systems and landing systems), and TRW, a firm operating in aerospace industry (as well as in car industry).

TRW strategically decided to sell its products related to aerospace industry to TRW Aeronautical Systems- a firm created for this purpose. Goodrich would buy off TRW ASG, taking the control of the assets of TRW, improving its already leading position in the market. For Goodrich and TRW ASG it was calculated that they had profits equal to 5 billions euros in 2001, but none of them yielded more than $\frac{2}{3}$ of its profits in a single country. A characteristic both firms share is that they are vertically integrated in a series of aerospace and mechanical fitments. The competition committee, having gained experience from the case of Honeywell and GE, treated each operation (each product they constructed) of the two firms as a separate market, calculating the different market shares and the consumers' welfare. More specifically, the committee calculated that in all markets the new firm would operate, its market share would not exceed 25 percent. Thus, in all markets firms would face serious competition from other independent firms and even in the worst case scenario (in the least competitive market) the competing firms would only reduce from six to five- thus serious degree of competition would remain. Two examples of the different markets the committee investigated were the one of thrust reversers (which role is to enable the plane to move on the ground, by managing

²europa.eu, money.cnn.com

³utcaerospacesystems.com

the air through the engine) and the one of gears for landing. The reason only two markets will be analyzed is that the thesis wishes to enable the reader to further understand the techniques the competition committee and the E.U. implement, avoiding however the tiring details. For reasons of completeness, it would be wise to acknowledge that in the markets described all the different materials were equally important for the regular operation of the engine and, as a consequence, of the plane. Thus, there is limited substitution from the perspective of the demand for the different markets. Another reason, the thesis is concentrated in only two markets, it is due to the difficulty to indisputably define a markets. For the first market, the one of thrust reversers, the merge was predicted to result in the vertical integration of Goodrich as it would purchase thrust reversers starters from TRW ASG, which enjoyed a dominant place in the upstream market having a market share over 30 percent, while itself (Goodrich) had a market share of only 10-20 percent in the downstream market, when its main competitors Boeing, Hurel Hispano and General Electric had 30-40 percent, 20-30 percent and 10-120 percent market share. It is important to note, however, that even if these firms competed with Goodrich in that specific market, they were important clients to other markets in which the latter operated. The competition in the upper market for TRW ASG, although it had the largest market share, was similarly intense as firms like Honeywell, Smith's and Parker operated in it. These competitors were assumed to be strong enough to counteract any potential attempt from the integrated Goodrich to exclude them from the market, after the deal was completed. The committee concluded that the deal would not increase the horizontal overlaps in the market of thrust reversers- it would, however, result in vertical integration, as mentioned above. For the second market, the one of gears for landing, Goodrich was the main supplier while TRW ASG produced solely fitments for the handling of the gears for the landing. The integration would result in a small increase Goodrich's market share, as TRW ASG had only a mere 5 percent of the market. TRW ASG owned, however, the 40 percent of CESA, a supplier of fitments for landing gears, which "happened" to be the subcontractor of Messier Dowty, the most important rival of Airbus platforms. Apparently, the deal, if made, would strengthen Goodrich's position as it would permit it to have a role in the possible deals made among CESA, Messier Dowty and Airbus. Taking into consideration all the different markets in which the new firm would operate and the characteristics of vertical integration of it, the competition committee allowed the merge as it concluded that the merge would not enforce the dominant position in such a degree that competition would be eliminated.

9.3 Carlyle, Finmesiccanica and Avio

Another merge that the competition committee allowed was that between Carlyle Group (Carlyle), Finneccanica and Avion that agreed on the creation of a new firm, Avio Holdings. Carlyle is a private investment corporation, that mostly invests in equity funds in chosen industries, most often in the automobile, telecommunication, aerospace, financial and energy industries. Finmesiccanica, on the other hand, was a state firm ran by the Italian treasury, which held the 34 percent of its shares, and operated in the design and the construction of military and public planes, helicopters, radars and satellites. The other part of the marge, Avio, was a firm founded by Fiat S.p.A., the well-known Italian firm, operating in many markets- automobile included-, which transferred all the assets of Fiat Avio to Avio. Avio operated in the industry of mechanical fitments for military and public planes and helicopters, systems used in aerospace industry and secondary systems used in the production of energy, in space propulsion as well as service and maintenance of these systems. Carlyle and Finmeccania had agreed on the common control of Avio Holdings, even if Carlyle owned a good 70 percent of its shares, while Finneccanica the rest 30 percent, holding although the right to veto strategic decisions. The committee, after analyzing the markets in which the new firm was expected to operate, and taking into consideration the difficulty to concretely define a market, concluded that there were four markets that should be examined (a method used before and presented in all previous cases). These markets would be: the market of mechanical fitments for military and public planes and helicopters, the secondary systems used in energy production, aerospace forwarding and the market of service and maintenance of the systems used in the previous markets.

The committee, in order to test the implications the merge would cause in both horizontal and vertical level, studied each market separately and considered all the different firms that operate under the control of Carlyle, Finmeccania or Avio. Horizontally, the committee concluded that there were neither overlaps nor other consequences in the markets caused by the deal. Additionally, the competition committee concluded that Finmeccanica and Avio did not compete in the same market of the secondary systems used in energy production. In order to respond to the scenarios of the possible vertical consequences the deal would have, the committee carefully evaluated the vertical structure of the firms and after taking into consideration that the market shares Carlyle and Finmaccenia held did not exceed 15 percent in none of the market they operated, while the presence of big independent firms, as Smiths Group, Otto Fuchs and Doncasters guaranteed that competition would remain intense, concluded that competition would not be influenced by the deal announced. The upper-markets for the majority of the products used by all the involved firms were global markets and so was the competition faced. The fact mentioned above, together with the notice that there were no sufficient indications for the concrete market shares the firms held in all markets they operated led to the allowance of the deal. Apart from the vertical relations in the field of markets, neither Finmeccanica nor any of the firms controlled by Carlyle operated in the primary or in the secondary markets in which Avio did. Additionally, Avio Holdings, also operated in markets where neither Carlyne nor Fimneccanica operated prior the buy off. As a result, the competition committee concluded there were not adequate evidence of malevolent effects of vertical integration and allowed the deal.

9.4 KPN and Getronics/ Russian machines and Magna

In one of the two the most recent cases that will be presented in this thesis, in 2007 KPN announced it would buy off Getronics. KPN was mainly involved in the market of telecommunications and internet connection in Holland, Denmark and Germany. Getronics was a multinational consultancy firm, mainly operating in Holland. The two firms had a combined turnover of 5 billion euros. The argument on which the two firms based their defense for their merge was the development of new systems and technologies that would significantly enhance public welfare and the fact they operated in markets with limited entry barriers. The markets that the committee investigated before concluding were the market of hardwardware upkeep and support, consulting services, IT management services and educational services. Taking into consideration the markets in which the integrated firms operated, the competition committee concluded that the market shares of the competing firms (the integrated and the independent) would not be seriously influenced after the merge would take place. All the main competitors involved in all of the sections and subsections of the markets KPN and Getronics were involved would remain active holding market share approximately 75 percent. Additionally, the majority of rivals and a large percentage of final consumers stated they did not worry about reduction of their profits or welfare, besides the fact that when the contracts the final consumers have signed with their provider expired, a large number of consumers signed new contracts with a different provider guaranteed the competitiveness of the market.

In 2007 the competition committee allowed the buy off of Magna International (Magna) by the Open Joint Stock Company Russian Machines (Russian Machines) and Stronach Trust. Russian Machines was a subsidiary firm of Basic Element Group that constituted of an automobile manufacturing firm, a plane manufacturing firm and a train one. The

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cars produced by Russian Machines were mainly sold in Russia and only a small fraction of them was sold in other European countries. Magna was a vertically integrated manufacturing firm that operated in all "peripheral" markets car equipment involves, such as seats and their mechanisms or internal (in which market it held market share of 40-50 percent) and outside mirrors. Stronach was the firm that had the control of Magna, thus the deal suggested Russian Machines would purchase some of the Magna's stocks Stronach held and the two firms would have the common control of Magna. To be more precise, the deal stated that Russian Machines would pay 1.54 billion dollars and would get 20 millions of class A Subordinate Voting Shares of Magna. It was evident that the deal suggested would increase the degree of vertical integration as both Magna and Russian Machines would gain access to different stages of the production chain. The committee focused on the downstream market of light commercial vehicles and on the upstream market of internal mirrors, also defining that the geographical area the firms operate was the whole European market. However, the precise definition of the market was not essential in this case, as the competition assessment did not demand it. The market shares that the committee took into consideration, combined with the low possibility to exclude other upstream or downstream firms from the different markets allowed it not to object to the deal.

Chapter 10

Alternatives of vertical integration- Conclusion

The choice a firm might make to get vertically integrated implies several important benefits such as the safety the firm might enjoy when it comes to input supply, specific investment in its upper market and lower transaction costs but also some serious drawbacks as potential uncertainty about future demand or constant technological changes which the integrated firm finds it hard to follow. This last chapter will be dedicated to alternative strategies firms could adopt instead of vertical integration. Under some certain assumptions firms could operate as if they were vertically integrated, without however having to deal with all the costs vertical integration demands. The above could be achieved in cases when a firm chooses a "within" strategy- not to be vertically integrated and, at the same time, not to be independent. As it will be shown, there is a variety of such "within" strategies through which firms could enjoy the benefits and avoid the costs of vertical integration.

10.1 Tapered Integration

Tapered Integration is a strategy that combines vertical integration and transactions with other firms via market mechanisms. Firms that adopt tapered integration choose to produce a certain quantity of input and use it to produce a fraction of the total production of the final good and purchase the remaining input from other independent firms. Alternatively, tapered integration could be used in the lower level of the production/distribution chain as a firm could sell a fraction of its output via its own network and the remaining via an independent firm that will operate as a representative agent. Examples of such strategy are Blockbuster's Video corporation as well as Coca-Cola and Pepsi, which although they do have their own network they often use either independent firms to sell the product or bottle their package¹.

The benefits firms enjoy through tapered integration could be summarized in three arguments. Firstly, firms' available routes in an upstream or downstream part of the chain are seriously increased, without the need of extravagant investment. Secondly, firms could use for their own benefit the information they get from their transactions with other independent firms. Last, firms avoid the holdup risk they would otherwise have to take².

Despite the benefits it offers, tapered integration does have some constraints too. It is evident that since only a fraction of the total production will be produced inside the firm, economies of scale will not be observed. In other words, the tapered integrated firm is not as efficient nor as productive as it could have been. The same argument holds for the independent firms as they will be called to produce the residual quantity of the firm adopted the tapered integration strategy. A more practical issue that may come up is that of co-ordination between the integrated and the independent firms. The delivery dates as well as the characteristics of the input are crucial for the normal operation of the firm- when multiple firms are involved, lack of co-ordination might show up and affect the firm and the quality of the product.

10.2 Joint Ventures

Joint ventures are a type of alliances among firms, which *jointly* hold the ownership of new independent firm. This new firm might be constituted of the employers of the firms that decide to collaborate or of others. The underlying idea is that in joint ventures each firm could offer its expertise to a specific field and benefit from the expertise of the others. The question that might arise is whether joint ventures could be used as an alternative to vertical integration. Well, in the sense that nowadays more and more markets appear and if this observation is combined with the huge development of technology, it is evident that collaboration among firms is more than needed. Joint ventures offer

¹Lawrence and Johnston 1988

 $^{^{2}}$ The holdup risk could be easily seen in the case of a very specific investment in which buyer's incentive is to renegotiate the terms of the deal, after the latter is completed as it is easily seen that a specific investment is hard to find other buyers

the benefit of low cost and a flexible strategy- qualities that make firms more competitive³. Sharing the danger of a new investment, achieving economies of scale, using the expertise of other firms and enjoying minimum cost are some of the reasons firms would choose joint ventures as their strategy. However, there are several drawbacks as well. The fact that nowadays a large percentage of joint ventures does not flourish (estimated just below 50 percent), in addition to their peculiar way of organization and operation, is mainly responsible for their failure. During the collaboration, firms are called to share many details about their cost or operation with each other- something that is usually avoided. Furthermore, decisions in joint ventures usually take longer to be taken, as a consequence of the absence of one central authority. Finally, another reason for which joint ventures might not flourish could be the existence of agency costs. Since the profits will be divided among the involved firms, no firm has the incentive to work as hard as it can as it realizes that it will not gain the maximum reward for its effort⁴.

10.3 Tacit Collusion, Long-term Collaborations

"Tacit collusion" is a collaboration among firms that is not explicitly stated in any contract or other document. The fact that firms might lose future profits if they decide to violate the deal made, is the main reason tacit collusions do last⁵. Similarly to the other drawbacks mentioned above, tacit collusions involve the risk that each firm that participates in the collusion might have the incentive to "fool" the other(s) and avoid to respect the terms of the deal. In that case, tacit collusion might be a possible and an effective strategy if and only if the discount factor that the firm uses to calculate its profits makes it more profitable in the long-term for it to respect the deal than to deviate.

The strategies presented in this section are implemented more and more often nowadays. The main reason is that many firms choose a mixture of the more "extreme" strategies of vertical integration and market transactions, in order to benefit from every strategy. During the last years, firms avoid to respond to the dilemma "make or buy"⁶ choosing the intermediate road to either "make" or "buy", depending on the specific case they are found. In most cases, the question firms will be called to answer would be in what extent they will be integrated and in what extent they will use the market. In the scenario firms use the open market, rather than choose to create a new firm, it has been noticed

 $^{^{3}}$ Child et al. (2005)

⁴free-rider problem

 $^{{}^{5}}$ Klein and Leffler (1981)

⁶where the term "make" suggests vertical integration and "buy" independent market transactions

that more and more firms choose multiple sourcing instead of exclusive collaboration with only a unique producer or distributor. Alternatively, the usage of outsourcing (to let parts of their production or distribution to other firms) has led many firms to expertise on specific stages across the distribution chain. As a consequence, outsourcing has forced many firms, operating in a vertical chain, to strategically (both in terms of efficiency/ability and competitiveness) choose the stages of the chain in which they will expertise. Since outsourcing and long-term tacit collusions are chosen by numerous firms, emphasis is given in methods of protection from opportunistic behavior- in order to avoid letting one part of the collusion exploit the other.

10.4 Conclusion

The aim of this thesis was to present a summary of the literature of vertical integration and its effects. Several papers were used in order to illustrate both the theoretical and the more applied work that has been carried out in the field. It is easily understood that, apart from the more "standard" outcomes that one might expect to encounter, the analysis of vertical integration and, as a consequence, of vertical exclusivity relies heavily on the idiosyncrasies of each model/case studied. Each model, imposing differentiated assumptions influences, inevitably, the results the model would yield. The entrance of behavioral economics, which provide a fruitful tool in the more theoretical analysis, as well as the applications of the fine papers of Lee (2007) and Berry et al. (1995) in numerous studies, when it comes to more "applied" works, in an economic environment that favorites the analysis of vertical relations, as well as the still limited searched field of dynamic vertical contracting are the guarantees of an even deeper and more extensive analysis of the field which will lead to more precise results and to the answers of numerous questions.

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