

Exclusive Dealing and Common Agency in International Market¹

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Abstract

This paper investigates the contractual choice between exclusive dealing and common agency in a simple international oligopoly model where products are sold through intermediaries. We find that when trade barriers are high domestic firms tend to adopt exclusive dealing contracts, whereas trade liberalization may lead firms to choose common agency. Irrespective of the level of trade barriers, the contracts adopted in equilibrium are shown to decrease domestic welfare when products are close substitutes.

1 Introduction

This paper examines the contractual relations between manufacturers and intermediaries and their effect on international trade. Specifically it has been argued by antitrust experts that some contracts between manufacturers and distributors may represent an important obstacle to international trade [see, for instance, OECD (1999), U.S. Department of Justice (2000)].

Exclusive dealing (ED) contracts, by which distributors agree not to carry brands from competing manufacturers, have attracted particular attention. For instance, ED has been at the heart of several trade disputes between the United States and Japan [Nagaoka and Goto (1997)]. In 1995, Eastman Kodak filed a complaint under U.S. trade law against anti-competitive practices by its Japanese competitor Fuji in the market for photographic film and paper. Kodak's main complaint was that the ED contracts between Fuji and a number of Japanese wholesalers represented a severe obstacle in reaching Japanese consumers. Interestingly, the U.S. government took this case to the World Trade Organization (WTO) in 1996 where it was subsequently struck down with the argument that Kodak's complaint not be addressed to the WTO but rather to the Japanese antitrust authority, the Japanese Fair Trade Commission [WTO (1998)]. The markets for automobiles, flat glass and paper provide other examples, where ED contracts between Japanese manufacturers and their distributors have been blamed for the failure of U.S. producers to gain significant market share. Similar complaints have been made concerning exclusive dealing arrangements in a wide range of other industries and countries, including telecommunication in Europe, Hong Kong and Korea, fertilizer in Norway, ice cream in Germany, heart disease drugs in France, automobiles in the United Kingdom, bottle and biscuit manufacturing in Colombia, high-fructose corn syrup in Mexico, and artificial teeth in the United States [U.S. Department of Justice (2000)].

In many member countries of the European Union, automobiles are commonly sold through networks of exclusive dealers. But recently the European Commission has proposed new rules on distribution arrangements for automobiles that restrict the use of ED. The main reason given by the Commission is that ED contributes to restricting intra-EU trade in automobiles and prevents a convergence in pre-tax prices [see, for instance, Monti (2000)]. By contrast, ED is less common in the US automobile industry, where in 1989 about 30% of dealers held multiple franchises selling competing brands.

The legal theory of the anti-competitive effect of ED is based on the con-

cept of foreclosure, that is the presumption that ED denies market access to competing products. Papers by Comanor and Frech (1985) and Mathewson and Winter (1987), among others, examine the foreclosure effect of ED in a model with a limited number of retailers and show that *ex ante* asymmetries either between retailers or between manufacturers are a necessary ingredient in any foreclosure equilibrium. By contrast, Bernheim and Whinston (1998) in a seminal contribution on ED argue that the foreclosure in this earlier literature depends on the assumption of linear wholesale prices. If nonlinear wholesale prices are allowed, one should *ceteris paribus* not observe ED but rather common agency (CA), whereby competing manufacturers use the same agents. Only if there are other significant efficiency gains from ED relative to CA should the former occur in equilibrium. The classic argument for why ED may be preferred by manufacturers is that CA leads to suboptimal investment by manufacturers in their dealer network, as these investments provide positive externalities for competing brands. Examples of such investments are training for retailers' employees, support for local advertising and promotion, information about customers, financing for retail outlets. This reason for ED was discussed by Marvel (1982) and formalized, among others, by Besanko and Perry (1993).¹

Besanko and Perry (1993), as well as Gal-Or (1991) and Martimort (1996), suggest a basic trade-off in the choice between ED and CA. ED is better at dealing with interbrand externalities, but leads to tougher interbrand competition. Both the severity of the interbrand externality and the degree of interbrand competition should be affected by the level of trade costs. As these costs change, one would hence expect the trade-off between these two aspects to change as well, with in turn should affect the choice of contracts. In the current paper we build on this trade-off as modeled by Besanko and Perry. We examine games between domestic and foreign manufacturers competing in the domestic market. Each manufacturer chooses between ED and CA and then selects how much to invest in its retailers and what wholesale price to charge. We assume that the retail sector is perfectly competitive. We first start with the simplest possible case: one domestic and one foreign firm and then extend the analysis to the three firm case with either two domestic

¹Other disadvantages of CA arise when manufacturers are incompletely informed about the retail cost. Gal-Or (1991) and Martimort (1996) show that ED may be preferred by manufacturers to CA as this may make it easier to extract information rents from retailers. Specifically, the manufacturer may use the observed behavior of competing agents to learn about the cost of their own agent, provided these costs are correlated.

or two foreign firms.

We show two main points. First, the domestic manufacturer has always a strong incentive to use ED when the trade barrier is high, because this contract can prevent the entry of a foreign manufacturer (and thus trade) whereas CA would not prevent such entry. This incentive is very strong, since it exists whatever the characteristic of the products (i.e., the degree of substitution), whatever the degree of interbrand externality and whether there are two or three firms (and thus one or two domestic firms). Although this use of ED does not always decrease welfare, it does so when the products are good substitutes. Second, the manufacturers have an incentive to use CA when the barrier to trade is low. This incentive exists especially when the products are good substitutes and the interbrand externality is not very strong. The use of CA in this case decreases domestic welfare. Since, in both instances, the manufacturers' incentive is to mitigate interbrand competition, our results show that contractual arrangements can act as barriers to trade and, when switches in contracts occur, they are substitutes for standard trade barriers.

As far as competition policy is concerned, the results of this paper suggest two main conclusions. First, one cannot assume that, from a domestic welfare point of view, CA and ED are systematically 'good' or 'bad'. Their effect depends very much on the market environment (trade barrier, degree of substitution among products, the degree of spillover, etc.). Second, competition policy needs to be especially active when products are good substitutes. It is in this particular case that the use of ED (when barriers to trade are high) and the use of CA (when they are low) are welfare decreasing.

This paper belongs to the emerging literature on the organization of firms and markets in an international environment. Recent papers on this broad topic includes Grossman and Helpman (2001) which use an incomplete contract approach to understand in-house and outsourcing activities in an integrated world, and Spencer and Qiu (2001) who consider whether informal procurement within Japanese keiretsu act as barriers to trade. Articles more specifically aimed at the links between manufacturers and distribution include Fargeix and Perloff (1989) which, to our knowledge, is the first theoretical paper on this issue, Raff and Schmitt (2002) on exclusive territory, and Richardson (2002) who uses a spatial approach to look at the interaction between trade policy and market access.

The paper is organized as follows. In the next Section, we build a model where the choice of contract involves a trade-off between an interbrand ex-

ternality and interbrand competition. In Sections 3 and 4, we investigate the equilibrium choices of two manufacturers, one domestic and one foreign. In Section 5, we consider the welfare implications in the two manufacturer case. Section 6 extends the analysis to the cases with three manufacturers, and Section 7 concludes.

2 The Model

Consider an industry composed of domestic manufacturers and foreign manufacturers who produce imperfectly substitutable goods for sale in the domestic market. We consider two main cases: the case with two products (one domestic and one foreign), and the case with three products (one domestic and two foreign, and two domestic and one foreign). The production technology exhibits constant marginal cost, which we normalize to zero. The representative domestic consumer has a quasi-linear utility function:

$$U(x_1, \dots, x_n, y) = \sum_{i=1}^n x_i - \frac{1}{2} \sum_{i=1}^n x_i^2 - b \sum_{i=1}^n \sum_{j \neq i}^n x_i x_j + y, \quad (1)$$

where x_i denotes the consumption of manufacturer i 's product, y the consumption of the numeraire good, and n is either 2 or 3. Parameter b ($b \in [0, 1]$) reflects the degree of product substitutability between any pair of products. If $b = 0$, the products are not substitutable and each producer acts as a monopolist; if $b = 1$, the goods are perfect substitutes. Denoting income by M and the retail price of product i by p_i , the consumer's budget constraint is

$$\sum_i p_i x_i + y = M. \quad (2)$$

Maximizing (1) subject to (2) and inverting the resulting first-order conditions yields a demand function for each products. The exact specification of these demands depends on the total number of products on the market. We therefore postpone the derivation of these demands.

To distribute their products to consumers, manufacturers require the services of retailers. We assume that there are many *ex ante* identical retailers, each of whom can provide a retail service at marginal cost $c < 1$. Retailers carrying a foreign product also incur a trade cost t per unit, which may reflect both transportation costs and trade barriers and is treated here as a resource

cost. Each manufacturer may impose an ED contract on its retailers. The alternative is CA, where retailers carry at least two competing brands.

Manufacturer i sets a wholesale price w_i . In addition, he must choose how much to invest in his distribution chain. We follow Besanko and Perry (1993) in treating this investment as lowering the marginal cost of the retailers carrying his product. The manufacturer's investment is not specific to a particular retailer, but rather benefits all of his retailers. However, if a retailer is a common agent, the investment may be less effective in reducing the selling cost of one's own brand and it may also benefit the rival brands sold by the common agent.² In particular, by investing an amount I_i at a cost of $(k/2) I_i^2$, manufacturer i lowers the marginal cost of selling its own brand by $\hat{I}_i$, where

$$\hat{I}_i = \begin{cases} I_i, & \text{if the retailer is an exclusive dealer of brand } i \\ \lambda I_i + (1 - \lambda) \left(\frac{\sum_{j \neq i}^m I_j}{m} \right), & \text{if the retailer carries } m \text{ additional brands,} \end{cases}$$

where $\lambda \in (0, 1]$. The parameter λ shows how much manufacturer i 's brand benefits from his own investment and how large the spillover is from the investments of other manufacturers selling their brands through the same retailer. The key however is the spillover effect.³ If $\lambda = 1$, there are no externalities between the manufacturers. This corresponds to the case of ED. CA is hence characterized by $\lambda < 1$. The lower is λ , the greater is the incentive to freeride on the investments of the other manufacturers.

The strategic interactions between the manufacturers and between them and their retailers can be summarized by the following four-stage game. In the first stage, each manufacturer chooses whether to impose an ED contract on its retailers or to allow CA with select other manufacturers. In the second stage, each manufacturer decides whether or not to enter the market. In

²For instance, the investment may be in providing assistance for the retailers' advertising and promotional activities, or in increasing the efficiency of the retailers' personnel or management. Under CA one would expect the return to this investment to be lower than under ED, since part of the retailers' time and resources are devoted to selling competing brands. Alternatively, one could model the investment as boosting demand for the manufacturer's product, for instance by informing potential customers about the existence of the product or the location of retailers. Here the investment would be rendered less effective by CA, if some of the potential customers visiting a retailer end up buying a competing product. Whether the investment lowers marginal cost or raises demand does not matter for the results.

³An alternative formulation of the externality, reminiscent of the way R&D spillovers are often modelled, would be to set $\hat{I}_i = I_i + (1 - \lambda) \sum_{j \neq i}^m I_j / m$. Our computations show that this formulation would yield qualitatively the same results as the one we chose.

the third stage, manufacturers choose their wholesale prices and investment levels. In the fourth stage, retailers choose retail prices and consumers then make their purchase decisions.

In the next two sections we solve this game for pure-strategy subgame-perfect equilibria for the simplest case: the case of one domestic and one foreign manufacturer. It is an interesting case, not only because it allows us to derive results in a straightforward way but also because it gives us strong results that are shown to hold in the more complex cases. With two manufacturers, a key part of the game becomes very simple. Specifically, if at least one manufacturer chooses to offer ED contracts to his retailers, then both manufacturers necessarily offer ED contracts in equilibrium whether or not the other manufacturer wishes to do so.

3 Equilibrium Prices and Investment

Since there is just one domestic and one foreign product in this simple environment, we use a single index i to denote whether a product (or a firm) is domestic or foreign ($i = h, f$). Price competition among retailers ensures that the equilibrium retail price of brand i is equal to

$$\tilde{p}_i = w_i + \delta_i t + c - \hat{I}_i, \quad i = h, f, \quad \text{where } \delta_h = 0, \delta_f = 1 \quad (3)$$

Manufacturer i 's profit maximization problem can then be stated as follow:

$$\max_{w_i, I_i} w_i D_i(\tilde{p}_i, \tilde{p}_j) - \frac{k}{2} I_i^2, \quad (4)$$

where the demand for product i in the two product environment is given by

$$D_i(\tilde{p}_i, \tilde{p}_j) = \frac{1 - b - \tilde{p}_i + b\tilde{p}_j}{1 - b^2}, \quad i, j = h, f; \quad i \neq j. \quad (5)$$

The first-order conditions for this problem are

$$w_i : D_i + w_i \frac{\partial D_i}{\partial p_i} = 0, \quad (6)$$

$$I_i : -w_i \left[\lambda \frac{\partial D_i}{\partial p_i} + (1 - \lambda) \frac{\partial D_i}{\partial p_j} \right] - k I_i = 0. \quad (7)$$

The first condition states that a manufacturer's optimal wholesale price equates his residual marginal revenue with marginal production cost. The

second condition shows that the optimal investment balances the marginal benefit with the marginal cost of investment. The marginal benefit of investment is the sum of two effects: (1) a direct effect that arises because investment reduces the retail price of the firm's own product, which in turn raises residual demand ; (2) a strategic effect that occurs because the investment also reduces the retail price of the rival product, which lowers residual demand. The difference between ED and CA is that under ED ($\lambda = 1$) the strategic effect disappears and the direct effect becomes stronger, thus *ceteris paribus* raising investment. To ensure that the marginal benefit of investment is positive and that second-order conditions in the two-firm case are satisfied we assume that $\lambda > b/(1+b)$ and $k > 1/(2+b)(1-b)$.

Using (5) in (7), we can express the profit-maximizing investment level as a linear and increasing function of the wholesale price

$$I_i = w_i \frac{[\lambda(1+b) - b]}{k(1-b^2)}. \quad (8)$$

We can also rewrite (6) as

$$A_i - 2w_i + bw_j + [\lambda(1+b) - b] I_i - [\lambda(1+b) - 1] I_j = 0, \quad (9)$$

where $A_h = (1-b)(1-c) + bt$ and $A_f = (1-b)(1-c) - t$. Eliminating I_i and I_j in (9), we obtain a system of equations in wholesale prices:

$$w_i = \frac{k(1-b^2)A_i}{2k(1-b^2) - (\lambda(1+b) - b)^2} + \left(\frac{bk(1-b^2) + (\lambda(1+b) - b)(1 - \lambda(1+b))}{2k(1-b^2) - (\lambda(1+b) - b)^2} \right) w_j. \quad (10)$$

Solving this system, we get as equilibrium wholesale prices

$$\tilde{w}_i = \frac{k(1-b^2)}{B} \{ [2k(1-b^2) - (\lambda(1+b) - b)^2] A_i + [bk(1-b^2) + (\lambda(1+b) - b)(1 - \lambda(1+b))] A_j \} \quad (11)$$

where $B = [2k(1-b^2) - (\lambda(1+b) - b)^2]^2 - [bk(1-b^2) + (\lambda(1+b) - b)(1 - \lambda(1+b))]^2$. We can then compute the equilibrium sales volume

$$\tilde{x}_i = \frac{\tilde{w}_i}{1-b^2} \quad (12)$$

and equilibrium profit

$$\tilde{\pi}_i = \frac{\tilde{w}_i^2}{1 - b^2} \left[1 - \frac{(\lambda(1 + b) - b)^2}{2k(1 - b^2)} \right]. \quad (13)$$

If the barrier to trade is high enough, the foreign manufacturer cannot sell in this market and the domestic manufacturer is the only seller. In this case, the demand faced by the domestic product is simply $p_h = 1 - x_h$ from which it is easy to derive that $w_h^m = x_h^m = \frac{k(1-c)}{2k-1}$, $I_h = \frac{(1-c)}{2k-1}$, $\pi_i^m = \frac{(1-c)^2 k}{2(2k-1)}$.

Consider first how the duopoly equilibrium changes with the trade cost taking as given the contract between the producers and the retailers.

Lemma 1 (i) *The equilibrium investment levels, wholesale prices and sales volumes are linear in the trade cost.* (ii) *As the trade cost increases, the equilibrium investment level, wholesale price and sales volume increase for the domestic firm and decrease for the foreign firm whether the products are sold under exclusive dealing or under common agency contracts.*

Proof: See Appendix

The linearity of demand and perfect competition at the retail level explain why investment, wholesale prices and sales volumes are linear in t . The domestic wholesale price changes in the opposite direction from the foreign wholesale price when t changes, because a lower trade cost decreases (increases) the residual demand faced by the domestic (foreign) manufacturer.

Since profit is a quadratic function of the wholesale price, we may state:

Lemma 2 *As the trade cost changes, the equilibrium profit for each manufacturer changes in the same direction as its wholesale price. Specifically, the domestic manufacturer's profit increases at an increasing rate ($\partial \tilde{\pi}_h / \partial t > 0$, $\partial^2 \tilde{\pi}_h / \partial t^2 > 0$) and the foreign manufacturer's profit decreases at a decreasing rate ($\partial \tilde{\pi}_f / \partial t < 0$, $\partial^2 \tilde{\pi}_f / \partial t^2 > 0$).*

Proof: See Appendix.

Lemma 2 describes a standard result in the literature since it says that the increased competition brought by trade liberalization decreases the domestic manufacturer's profit and increases the foreign manufacturer's profit. The value added of the Lemma is to confirm this is the case for both types of contract. The interesting issue is to identify the forces that determine the choice of contract given a particular level of t and to derive the equilibrium contracts. This is what we do in the next Section.

4 Equilibrium Contracts

In order to examine how contracts are chosen in equilibrium, we have to compare profit levels under the two contract arrangements. However, we can gain some useful insights into the economic forces determining this choice by considering how marginal changes of the parameter λ affect equilibrium profits. Taking into consideration that the equilibrium retail prices can be written as $p_i(\tilde{w}_i, \lambda, \tilde{I}_i, \tilde{I}_j)$ and applying the envelope theorem, we obtain three distinct effects:

$$\begin{aligned} \text{sign} \left\{ \frac{d\tilde{\pi}_i}{d\lambda} \right\} &= \text{sign} \left\{ \frac{\partial D_i}{\partial p_j} \left(\frac{\partial p_j}{\partial w_j} \frac{\partial \tilde{w}_j}{\partial \lambda} + \frac{\partial p_j}{\partial I_j} \frac{\partial \tilde{I}_j}{\partial \lambda} \right) \right. \\ &\quad \left. + \left(\frac{\partial D_i}{\partial p_i} \frac{\partial p_i}{\partial I_j} \frac{\partial \tilde{I}_j}{\partial \lambda} \right) + \left(\frac{\partial D_i}{\partial p_i} \frac{\partial p_i}{\partial \lambda} + \frac{\partial D_i}{\partial p_j} \frac{\partial p_j}{\partial \lambda} \right) \right\} \quad (14) \end{aligned}$$

The first expression on the right-hand side is the *strategic effect*. A change in λ affects manufacturer i 's residual demand D_i indirectly, because it changes both the level of investment and the wholesale price of manufacturer j and hence j 's retail price. From (8) we know that $\partial \tilde{I}_j / \partial \lambda$ has the same sign as $\partial \tilde{w}_j / \partial \lambda$. Assume then that $\partial \tilde{w}_j / \partial \lambda > 0$. When this is the case, a decrease in λ reduces $\tilde{w}_j$, thus decreasing p_j and hence also D_i . This effect would tend to decrease manufacturer i 's profit when λ is reduced. However, since $\partial \tilde{I}_j / \partial \lambda > 0$, the decrease in λ also decreases j 's incentive to invest which raises p_j and hence D_i . If the effect on $\tilde{I}_j$ is stronger than the effect on $\tilde{w}_j$ then the strategic effect associated with a decrease in λ increases i 's profit by mitigating the rivalry between the two manufacturers.

The second term can be described as a *free-rider effect*. A decrease in λ lowers manufacturer j 's incentive to invest, since it benefits from a stronger spillover from i . This effect must increase i 's retail price and thus decrease the demand for product i . Hence, with the free-rider effect, a decrease in λ is detrimental to manufacturer i 's profit.

The third effect is a *rent shifting effect*. This effect occurs only if the two firms have different levels of investment. Suppose then that i is the domestic manufacturer and t is positive (but not prohibitive) so that $\tilde{I}_i > \tilde{I}_j$. A reduction in λ reduces the effectiveness of investment and increases the spillover from the rival's investment, changing retail prices and hence demand. But these effects act differently on the two manufacturers. In particular, i 's big investment becomes less effective while he benefits only

relatively little from the greater spillover from j 's small investment. The opposite is true for j : while his small investment becomes less effective, he benefits from an increased spillover from i 's big investment. Hence a lower λ raises p_i relative to p_j , shifting market share and rents from the domestic to the foreign manufacturer.

As must be apparent, a decrease in λ has contradictory effects and several of them tend to decrease manufacturer i 's profit, at least when it is a domestic manufacturer. Using (5), we can rewrite (14) as

$$\text{sign} \left\{ \frac{d\tilde{\pi}_i}{d\lambda} \right\} = \text{sign} \left\{ b \left[\frac{\partial \tilde{w}_j}{\partial \lambda} - \lambda \frac{\partial \tilde{I}_j}{\partial \lambda} \right] + \left[(1 - \lambda) \frac{\partial \tilde{I}_j}{\partial \lambda} \right] + \left[(1 + b)(\tilde{I}_i - \tilde{I}_j) \right] \right\}, \quad (15)$$

where the terms in square brackets represent the three effects identified above.

Suppose we have free trade so that investments are symmetric and the last term, representing the rent shifting effect, is zero. If $\lambda = 1$, the second term (corresponding to the free-rider effect) is also equal to zero. The effect of a marginal decrease in λ then depends on the sign of the first term (the strategic effect). Using (11), it is easy to show that $\partial \tilde{w}_j / \partial \lambda > 0$, which implies that $\partial \tilde{I}_j / \partial \lambda$ is also positive.⁴ It can also be shown that in free trade the strategic effect is unambiguously negative for $\lambda = 1$, so that at that point a marginal decrease in λ must increase profit. If we lower λ , the free-rider effect becomes positive and the strategic effect less clearly negative and eventually positive; hence a reduction in λ ultimately lowers profit. Also note that lowering b has a similar effect as reducing λ , since it decreases the weight of the strategic effect. Keeping in mind that ED corresponds to $\lambda = 1$ and that CA corresponds to $\lambda < 1$, this discussion provides intuition for the following stronger result (see also Besanko and Perry (1993)):

Proposition 1 *In free trade, both manufacturers adopt a common agent unless the investment spillover is sufficiently strong and/or the degree of substitution between products is sufficiently low in which case both manufacturers adopt an exclusive dealing contract. Specifically, there exists a critical value $\lambda_0(b)$ such that $\pi_i^{CA}(\lambda, b) > \pi_i^{ED}(1, b)$ for $\lambda_0(b) < \lambda \leq 1$ and $\tilde{\pi}_i^{CA}(\lambda, b) < \tilde{\pi}_i^{ED}(1, b)$ for $b / (1 + b) \leq \lambda \leq \lambda_0(b)$.*

Proof: See Appendix.

⁴Using (11) and assuming free trade, $\tilde{w}_i = \frac{k(1-b^2)(1-b)(1-c)}{k(1-b^2)(2-b) - (1-b)(\lambda(1+b)-b)}$. Hence $\partial w_i / \partial \lambda > 0$.

The reason that CA raises profit for high λ is that it acts as a commitment to keep investment low and thus raise retail prices above the level achievable under ED. But for a low enough λ (and hence a strong enough externality) investment under CA becomes too small and manufacturers are hence better off with ED.

Next, suppose t is positive. This means that in (15) the rent shifting effect becomes relevant. Its sign is positive for the domestic manufacturer and negative for the foreign manufacturer. By itself this effect means that as λ falls rent is shifted from the domestic to the foreign manufacturer. Since the magnitude of this effect depends $(\tilde{I}_i - \tilde{I}_j)$, it becomes stronger as t increases. In turn this suggests that for high t the foreign manufacturer may have higher profits under CA than under ED and vice versa for the domestic manufacturer. This intuition can be confirmed indirectly by examining the level of the trade cost at which the profit of the foreign manufacturer becomes zero under the two contractual arrangement. Denoting the prohibitive levels of the trade cost under ED and CA by t_p^{ED} and t_p^{CA} , respectively, we may state:

Proposition 2 *In equilibrium, the prohibitive level of the trade cost is lower under exclusive dealing than under common agency ($t_p^{ED} < t_p^{CA}$).*

Proof: See Appendix

This is a strong result which holds irrespective of the degree of substitution between products and irrespective of the degree of interbrand spillover associated with the manufacturer's investment. Its implication is clear: ED constitutes a barrier to entry when associated with significant trade costs. We will come back to this point.

The previous Lemmas and Propositions can be conveniently summarized by Figures 1 and 2. In Figure 1, we have assumed that the investment spillover is sufficiently low (λ near 1) and that the degree of substitution between products is relatively high (b near 1) so that, in free trade $\tilde{\pi}_i^{CA} > \tilde{\pi}_i^{ED}$. Figure 2 illustrates the opposite case: one where the spillover is high (λ is low) and the degree of substitution between the two products is low (b is low). These figures are useful to state two important results, summarized in Propositions 3 and 4.

Proposition 3 *(i) If the degree of substitution is high and/or the degree of investment spillover is low, there is always a non-prohibitive trade cost $\hat{t}$*

such that, as t decreases below $\hat{t}$, equilibrium contracts switch from exclusive dealing to common agency. (ii) If the degree of substitution is low and/or the degree of investment spillover is high, both manufacturers adopt exclusive dealing irrespective of the level of the non-prohibitive trade cost.

The first result can be easily seen from Figure 1. When t is nearly prohibitive, the domestic manufacturer prefers ED to CA. In a two-manufacturer, two-product case, this ensures that ED is the equilibrium contractual arrangement even if the other manufacturer always prefers CA (in Figure 1, the foreign manufacturer prefers CA for all non-prohibitive values of t). A common agency contract can therefore emerge only if the domestic manufacturer also prefers it to ED. This occurs for $t < \hat{t}$. In Figure 2, the domestic manufacturer always prefers ED irrespective of t . This is sufficient to ensure that ED is the only equilibrium contract in a two-manufacturer environment irrespective of the foreign manufacturer's preferences.

If these results depend on the degree of investment spillover, they also depend on the degree of substitution between products. In particular, when products are strongly differentiated (as in Figure 2), ED is always preferred. If products are not strongly differentiated (as in Figure 1), trade liberalization by fostering interbrand competition induces the domestic manufacturer to switch contract to CA as the latter contract is more helpful than ED at mitigating the competitive impacts of trade liberalization. Hence the only possible switch in contract induced by trade liberalization is one from exclusive dealing to common agency. We have here a case where one manufacturer substitutes private contracting for traditional trade barriers in order to minimize the economic impacts of trade liberalization.⁵

The model has also interesting results when the trade cost is high. In particular,

Proposition 4 *In the range of trade costs $t_p^{ED} \leq t \leq t_p^{CA}$ exclusive dealing acts as a prohibitive barrier to trade. Specifically, (i) the domestic manufacturer adopts exclusive dealing and the foreign manufacturer cannot trade; (ii) the foreign manufacturer would trade under a common agency contract.*

This result is interesting because ED acts here as a barrier to trade above and beyond the effect of t itself. Readers familiar with the industrial organization literature on exclusive dealing might think that this is nothing else

⁵See Raff and Schmitt (2002) for similar results with exclusive territory contracts.

than the foreclosure result that arises with exclusive dealing and with manufacturers' pricing strategy restricted to linear pricing (see Bernheim and Whinston, 1998) in the presence of a large cost asymmetry among manufacturers (see Comanor and Frech, 1985; Mathewson and Winter, 1987). In part this is indeed the case since the foreign manufacturer faces a barrier to trade that the domestic firm does not. However, the standard foreclosure result comes from the fact that a manufacturer with a cost advantage signs up exclusive dealing contracts with *all* the existing retailers thereby making entry impossible. This feature does not exist in the present model since we have a large number of perfectly competitive retailers. This has two implications. First, a manufacturer cannot use other pricing strategies than linear wholesale pricing at its disposal. Second, it is not that the foreign manufacturer could not find independent retailers to sign a retailing contract with. Simply, the foreign manufacturer *chooses* not to sell in the domestic market with ED, because he cannot make a profit.

5 Welfare

In this section we want to identify what the adoption of different contracts implies for domestic social welfare. There are two cases we are particularly interested in: (i) a switch from ED to CA when the trade barrier is low; and (ii) the domestic manufacturer's monopolization of the market through ED when the trade barrier is high.

First, consider the case where the trade barrier is non-prohibitive. Here the welfare effect of a switch to CA can be decomposed into a change in profits and a change in consumer surplus. Note that CA will be adopted only if it yields each manufacturer a higher profit than ED. Hence the move to CA must lower social welfare if it reduces consumer surplus. Given the quasi-linear utility function, the consumer surplus associated with consuming quantities x_h and x_f is

$$CS = x_h + x_f - \frac{1}{2}(x_h^2 + x_f^2) - bx_h x_f - p_h x_h - p_f x_f \quad (16)$$

Defining the average quantity sold on the market as $\bar{x} \equiv (x_h + x_f)/2$, the difference between the domestic and the foreign sales as $\Delta \equiv x_h - x_f$, and substituting for p_f from the demand function consumer surplus can be rewritten

as

$$CS(\bar{x}, \Delta) = 2\bar{x} - (1+b)\bar{x}^2 - 2p_h\bar{x} - \frac{1}{4}(1-b)\Delta^2 - (1-b)x_f\Delta. \quad (17)$$

Hence consumer surplus is essentially a function of the average quantity sold on the market and of the difference in market share between the two firms. Not surprisingly, consumer surplus is decreasing in the difference in market shares and increasing in the average quantity sold. Differentiating consumer surplus and rearranging, the effect on consumer surplus of a switch in contract is equal to

$$\frac{dCS}{d\lambda} = \left[(1-b)(x_h - x_f) - 2\bar{x} \frac{\partial p_h}{\partial \bar{x}} \right] \frac{d\bar{x}}{d\lambda} - \frac{(1-b)}{2} [3x_f - x_h] \frac{d\Delta}{d\lambda}. \quad (18)$$

The first expression in square brackets is unambiguously positive, since $x_h \geq x_f$ and $\partial p_h / \partial \bar{x} < 0$. The second expression in square brackets is positive for low values of t but negative for high values of t . The total effect on consumer surplus of a switch in contract from ED to CA can then be viewed as a weighted sum of the impact of this switch on the average quantity sold and of its impact on the redistribution of market shares. We show below that consumer surplus and hence welfare must fall if b and λ are sufficiently close to 1, or if t is not too large.

Second, suppose we are in the range where the domestic manufacturer chooses ED over CA with the result that there is no longer trade. The welfare effect of choosing ED over CA in this case is generally ambiguous. Domestic consumers are hurt, since they face a domestic monopoly instead of a duopoly, thus paying a higher price and facing less product variety. On the other hand, under CA rent is shifted to the foreign manufacturer. When the products are good substitutes, however, it is straightforward to predict how choosing ED over CA will affect welfare: competition among products under CA must yield higher domestic welfare as there is necessarily a strong pro-competitive effect, consumers benefit from greater product variety, and the rent being shifted to the foreign manufacturer is small. On the other hand, if the products are poor substitutes it is easy to provide examples in which social welfare is higher under ED and domestic monopoly. Proposition 5 summarizes the results:

Proposition 5 *(i) Common agency yields lower social welfare than exclusive dealing around free trade. More generally if $t < t_p^{ED}$, common agency leads*

to lower welfare than exclusive dealing when the externality is not too large and the products are sufficiently close substitutes. (ii) If $t_p^{ED} \leq t \leq t_p^{CA}$, exclusive dealing leads to lower social welfare when products are sufficiently close substitutes.

Proof: See Appendix.

Recall from the previous section that a switch in contract from ED to CA requires both a high degree of substitution and a low degree of investment spillover. But these are exactly the conditions under which welfare has a tendency to fall when this switch occurs. These conditions are not very surprising. In particular, a high degree of substitution ensures that, associated with the switch in contract, any redistribution of market shares has little impact on consumers. Hence, the main effect takes place through the average quantity sold on the market and a switch to CA tends to decrease the average quantity irrespective of the non-prohibitive trade barrier.

What policy implications emerge from this analysis? Clearly whether the trade barrier is high or low, a high degree of substitution between products is a key indicator that the manufacturers' choice of contract is bad for domestic welfare; competition policy should therefore be active *whether ED or CA is chosen*. The specific recommendations for how competition policy should deal with ED and CA when products are close substitutes differ dramatically depending on the level of trade barriers. If trade barriers are high, competition policy should prohibit ED. If trade barriers are low, competition policy should not be concerned with ED, but rather with CA.

6 The Three-Manufacturer Case

There are two possible cases: one domestic manufacturer and two foreign ones, or two domestic manufacturers and a single foreign one. In each of these two environments, CA may involve the three products together or just two of them and it may involve products from the same or from different origins. It is useful to investigate these cases for two reasons. First, the three-manufacturer case opens new interesting questions. For instance, are there circumstances where the foreign manufacturers distribute their products through CA? Does this help them penetrate the domestic market? Second, we would like to know whether the results found in the two-manufacturer case extend to the three-manufacturer case. As the nature of the three-

manufacturer problem is very close to the two-manufacturer case just derived, we do not provide a complete derivations of the equilibria but only highlight two main points.⁶

First,

Proposition 6 *Common agencies selling only foreign products do not improve foreign manufacturers' market access.*

Proof: See Appendix

This result comes from the fact that, like in the two manufacturer case, the prohibitive barrier to trade is solely determined by the domestic manufacturer's choice of contract. Hence, as long as the domestic manufacturer sells its product through exclusive retailers, *the prohibitive rate is the same whether the two foreign manufacturers sell through common agents or not.* If the domestic manufacturer agreed to form a three product CA, then trade would occur for a wider range of trade costs (up to t_p^{CA}). However, this is not a profitable strategy for the domestic manufacturer and as a result, to the right of t_p^{ED} , he remains a monopolist. This implies that, even in a three-manufacturer environment, a single domestic manufacturer has a strong influence on foreign manufacturers' market access provided that the trade cost is high.

Second, we want to verify that the three-manufacturer case produces similar results as the two-manufacturer case. We need simulations to identify the equilibrium choice of contracts. We therefore impose specific values on the degree of substitution between product (b), the unit retail cost (c) and the investment cost parameter (k). We then ask what the subgame perfect Nash equilibrium of the four-stage game is for different values of the externality (λ) and the trade cost (t).

Figure 3 illustrates the case of two domestic manufacturers and one foreign manufacturer in (t, λ) space. Consistent with our previous analysis, it shows that the prohibitive level of the trade cost is lower under ED: $t_p^{ED} \leq t_p^{CA}$. All the curves for t below t_p^{ED} are indifference curves such that one manufacturer is indifferent between CA and ED given the other manufacturers' contracts. The two upward sloping curves characterize a domestic manufacturer's choice between having CA with the foreign manufacturer or with the two other manufacturers. The reason they are upward sloping is

⁶A detailed solution is available from the authors upon request.

that, in response to a rise in t , a domestic manufacturer invests more in retailing cost-reducing activities while the foreign manufacturer does the opposite. Hence, as t rises, rent is being shifted from the domestic to the foreign manufacturer with whom it is engaged in a CA. To remain indifferent between CA and ED when t rises, the domestic manufacturer needs a higher λ . Exactly the opposite occurs with the foreign manufacturer when it is engaged in a CA with a domestic manufacturer. Therefore the foreign manufacturer's indifference curves are downward sloping. We show only the curve that matters for the equilibrium, which in this case is the one where the foreign manufacturer is indifferent between ED and having CA with both domestic manufacturers. Finally, the horizontal line shows the case where one domestic manufacturer is indifferent between ED and CA with another domestic manufacturer.⁷ In every case, the manufacturer prefers CA for (t, λ) above the curve and ED for (t, λ) below the curve.

Figure 3 shows the equilibrium contracts for each of the regions defined by the above curves. To understand how these equilibria are obtained, consider two of them: (CA,CA,CA) and (ED,ED,ED). CA between all three manufacturers is an equilibrium, because above the uppermost upward sloping curve a domestic manufacturer does not want to deviate from a three-product CA and, above the downward sloping curve, the same is true for a foreign manufacturer.⁸ Consider now the north-east region denoted (ED,ED,ED). Below the lower upward sloping curve, a domestic manufacturer wants to deviate from a CA with a foreign manufacturer or from a CA with the two other manufacturers. A domestic manufacturer would not want to deviate from a CA with another domestic manufacturer (since we are above the horizontal line). The foreign manufacturer would like to form a CA with one or with both domestic manufacturers. There is no equilibrium (in pure strategies) with CA, since none of the domestic manufacturers wishes to have CA with the foreign manufacturer. The only possible equilibrium is thus ED for the three manufacturers. Similar reasoning can be applied to the other region. Note that Figure 3 has one region with two equilibria involving CA: one

⁷When a common agency involves products from the same origin only, the equilibrium wholesale price takes the form $w(\lambda, t) = \frac{n(t)}{d(\lambda)}$. Since $\pi = w^2(\lambda, t)R(\lambda)$, a manufacturer is indifferent between keeping CA and switching to ED when $n^2(t) \left\{ \frac{R(\lambda=1)}{d^2(\lambda=1)} - \frac{R(\lambda)}{d^2(\lambda)} \right\} = 0$. This implies that the roots in λ are independent of t .

⁸Note that in this region, like in all other ones, (ED,ED,ED) is always an equilibrium contract combination, since one manufacturer alone cannot form a CA.

between a domestic and a foreign manufacturer and the other between the two domestic manufacturers. Finally consider the region to the right of t_p^{ED} . Both domestic manufacturers choose ED because if they do not, the foreign manufacturer enters at least as long as t is less than t_p^{CA} .

Figure 3 shows that trade liberalization, when it brings switches in contracts, leads to switches toward CA, not toward ED. Moreover, like in the two-manufacturer case, ED is the domestic manufacturers' contract of choice when the trade barrier is high. In short, the main result found in the two-manufacturer case extends to the case of two domestic manufacturers and one foreign manufacturer.

Consider now the case of two foreign and one domestic manufacturer. Its interesting feature is that the foreign manufacturers may form a CA, whether or not the domestic manufacturer participates. Figure 4 illustrates this case. The interpretation of the curves is similar to that in Figure 3. The striking feature of Figure 4 is that, although trade liberalization brings more CA, equilibria with CA are far more prevalent than in the previous case. Indeed all the regions in Figure 4 except the one where the externality is so strong that no one wants to be involved in a CA (below the horizontal line) are consistent with CA between the two foreign manufacturers. The fact that foreign manufacturers have a stronger incentive to sell their product through CAs is not surprising. When the trade barrier is high, the competitive environment is intense for the foreign products and CA helps mitigate it. However, the domestic manufacturer cannot avoid the presence of the foreign products, but does not want to sell its product through CA, because significant rents would then be shifted to the foreign manufacturers.

7 Conclusions

In this paper, we examine domestic and foreign manufacturers' choice between exclusive dealing and common agency. We show three main points. First, domestic manufacturers use exclusive dealing when trade barriers are high, because common agency tends to shift rent from domestic to foreign manufacturers. This occurs because under common agency foreign manufacturers can benefit much more from domestic manufacturers' investments in their distribution chain than vice versa. Exclusive dealing is adopted whatever the characteristic of the products (i.e., the degree of substitution), whatever the degree of interbrand externality and no matter whether there

are two or three manufacturers. Second, manufacturers tend to use common agency when trade barriers are low. This incentive exists especially when the products are good substitutes and the interbrand externality is not very strong. Since the manufacturers want to mitigate interbrand competition, our results show that contracts can act as barriers to trade and, when switches in contracts occur, they are substitutes for standard trade barriers. This confirms the view held by antitrust authorities that private anti-competitive contractual arrangements may gain greater importance as traditional trade barriers are removed and that competition authorities may therefore have to be tough in a free-trade environment.

Third, our analysis implies that competition authorities should be active especially when products are close substitutes, but that the policy they should pursue depends on the level of trade barriers. When trade barriers are high, authorities should be especially concerned with exclusive dealing arrangements by domestic manufacturers. However, when trade barriers are low their attention should turn to common agency arrangements.

These findings are helpful to interpret some of the examples mentioned in introduction. In the European automobile market, the fact that exclusive dealing agreements have continued to be prevalent despite significant economic integration suggests that the degree of spillover is high and/or the degree of substitution between products is relatively low. A policy aimed at discouraging exclusive dealings would then unambiguously lower the profits of the automobile producers. However this outcome is achieved by decreasing competition, not by increasing it. In other words, profits are being reduced by decreasing investments, increasing retail prices and decreasing sales. Such a policy unambiguously reduces social welfare at least if the market is at or near free trade. There is however another interpretation that would more strongly justify the recent EU policy. The use of exclusive dealings in the automobile industry varies a lot across European countries with at least 85% of the retailers under exclusive contracts in countries like Germany, Italy and in the UK and with rates below 71% in countries like Austria, Denmark, Finland, Ireland and Sweden. Since it is doubtful that the degree of spillover or the degree of substitution in this market differ significantly across Europe, it is tempting to conclude that these differences are due to differences in explicit or implicit barriers to trade and that it is those barriers that facilitate the extensive use of exclusive contractual arrangements in the large (automobile producing) countries. In other words, the European market integration has largely by-passed the automobile market.

Finally, a central message of this paper is to show that the use of exclusive dealings is closely linked to the trade environment. By ruling that Kodak's complaint with respect to Fuji's alleged behavior is a domestic issue, the WTO is essentially correct if it is true that Japanese trade barriers in this market are low. If impediments to trade are significant however, our analysis suggests that the WTO should have been pro-active not only with respect to the trade barriers themselves but also with respect to the contractual arrangement they induce.

Our model is admittedly simple. In particular, our assumption of perfect competition at the retail level may seem at odd with the above two cases. When the trade barrier is high, the domestic manufacturers' incentive to prevent entry by signing up exclusive contracts with all the existing or all the most efficient intermediaries cannot be ruled out. Clearly, this argument goes in the same direction as the one inducing the domestic manufacturer to adopt exclusive dealing developed in this model. Similarly, market power at the retail level implies that the collusive aspect of common agency is enhanced by their ability to internalize price competition. We therefore conclude that the qualitative results of this paper are reinforced by the presence of a limited number of imperfectly competitive retailers.

8 Appendix

Proof of Lemma 1:

Since $\lambda > b/1 + b$ and $b < 1$, then from (8), $\frac{\partial \tilde{I}_i}{\partial t}$ has the same sign as $\frac{\partial \tilde{w}_i}{\partial t}$. Using (12), $\frac{\partial \tilde{x}_i}{\partial t}$ has also the same sign as $\frac{\partial \tilde{w}_i}{\partial t}$. Note that t can be found only in A_h and in A_f and that both A_h and A_f are linear in t . This implies that $\frac{\partial \tilde{w}_i}{\partial t}$ and thus $\frac{\partial \tilde{x}_i}{\partial t}$ and $\frac{\partial \tilde{I}_i}{\partial t}$ are independent of t . This establishes part (i). To show part (ii), we only need to show that $\frac{\partial \tilde{w}_h}{\partial t} > 0$ and $\frac{\partial \tilde{w}_f}{\partial t} < 0$. Using $\tilde{w}_h$ as given by (11),

$$\frac{\partial \tilde{w}_h}{\partial t} = \frac{k(1 - b^2)}{B} \{b\beta_1 - \beta_2\},$$

where $B = \beta_1^2 - \beta_2^2$, $\beta_1 = 2k(1 - b^2) - (\lambda(1 + b) - b)^2$ and $\beta_2 = bk(1 - b^2) + (\lambda(1 + b) - b)(1 - \lambda(1 + b))$. Hence, $\frac{\partial \tilde{w}_h}{\partial t} > 0$ if and only if $B > 0$ and $b\beta_1 > \beta_2$. This second inequality holds if and only if $bk > (\lambda(1 + b) - b)(1 - \lambda)$. Observe that, since $b < 1$, then the condition to have $b\beta_1 > \beta_2$ also implies $B > 0$.

Finally,

$$\frac{\partial \tilde{w}_f}{\partial t} = \frac{k(1-b^2)}{B} \{b\beta_2 - \beta_1\} < 0,$$

since $b\beta_1 > \beta_2$, then $\beta_1 > b\beta_2$ when $b < 1$. Hence, $\frac{\partial \tilde{w}_h}{\partial t} > 0$ and $\frac{\partial \tilde{w}_f}{\partial t} < 0$ whenever $b\lambda > (\lambda(1+b) - b)(1-\lambda)$.

Proof of Lemma 2:

Since (13) is quadratic in w_i , $\text{sign} \left\{ \frac{\partial \tilde{\pi}_i}{\partial t} \right\} = \text{sign} \left\{ w_i \frac{\partial \tilde{w}_i}{\partial t} \right\}$ and $\text{sign} \left\{ \frac{\partial^2 \tilde{\pi}_i}{\partial t^2} \right\} = \text{sign} \left\{ \frac{\partial \tilde{w}_i}{\partial t} \right\} \text{sign} \left\{ \frac{\partial \tilde{w}_i}{\partial t} \right\}$. Since $\frac{\partial \tilde{w}_h}{\partial t} > 0$, then $\tilde{\pi}_h$ is increasing at an increasing rate with respect to t ($\text{sign} \left\{ \frac{\partial \tilde{\pi}_h}{\partial t} \right\} > 0$, $\text{sign} \left\{ \frac{\partial^2 \tilde{\pi}_h}{\partial t^2} \right\} > 0$). Since $\frac{\partial \tilde{w}_f}{\partial t} < 0$, then $\tilde{\pi}_f$ is decreasing at a decreasing rate with respect to t ($\text{sign} \left\{ \frac{\partial \tilde{\pi}_f}{\partial t} \right\} < 0$, $\text{sign} \left\{ \frac{\partial^2 \tilde{\pi}_f}{\partial t^2} \right\} > 0$).

Proof of Proposition 1:

Using the equilibrium wholesale price, the manufacturer's equilibrium profit in free trade ($t = 0$) can be re-written as

$$\tilde{\pi}_i |_{t=0} = \frac{k\beta_1 A^2}{2(\beta_1 - \beta_2)^2}, \quad (19)$$

where β_i ($i = 1, 2$) has the same definition as in the Proof of Lemma 1 and $A = A_h = A_f$. Differentiating this expression with respect to λ , we get

$$\frac{d\tilde{\pi}_i |_{t=0}}{d\lambda} = \frac{kA^2}{2(\beta_1 - \beta_2)^3} \left[-2\beta_1 \left(\frac{d\beta_1}{d\lambda} - \frac{d\beta_2}{d\lambda} \right) + (\beta_1 - \beta_2) \frac{d\beta_1}{d\lambda} \right].$$

Since $\beta_1 > \beta_2$, $\frac{d\beta_1}{d\lambda} = -2(1+b)(\lambda(1+b) - b)$ and $\frac{d\beta_2}{d\lambda} = (1+b)^2(1-2\lambda)$ then $\frac{d\beta_1}{d\lambda} - \frac{d\beta_2}{d\lambda} = -(1-b^2)$. It follows that

$$\text{sign} \frac{d\tilde{\pi}_i |_{t=0}}{d\lambda} = \text{sign} \{ \beta_1(1-b) - (\beta_1 - \beta_2)(\lambda(1+b) - b) \}$$

Hence, for $\lambda = 1$, $\text{sign} \left\{ \frac{d\tilde{\pi}_i |_{t=0}}{d\lambda} \right\} = \text{sign} \{ -b\beta_1 + \beta_2 \} < 0$ (see Proof of Lemma 1) and for $\lambda = b/(1+b)$, $\text{sign} \left\{ \frac{d\tilde{\pi}_i |_{t=0}}{d\lambda} \right\} = \text{sign} \{ \beta_1(1-b) \} > 0$. We can further show that $\tilde{\pi}_i$ reaches a maximum at $\bar{\lambda} = \frac{2-b^2}{(1+b)(2-b)}$ since $\frac{d^2 \tilde{\pi}_i |_{t=0}}{d\lambda^2} < 0$ when evaluated at $\lambda = \bar{\lambda}$. It follows that if $\tilde{\pi}_i |_{t=0, \lambda=1/(1+b)} > \tilde{\pi}_i |_{t=0, \lambda=1}$, CA is preferred for all $\frac{b}{1-b} \leq \lambda \leq 1$. If, however, $\tilde{\pi}_i |_{t=0, \lambda=1/(1+b)} < \tilde{\pi}_i |_{t=0, \lambda=1}$, the

manufacturer's profit is higher with ED when $\frac{b}{1-b} \leq \lambda < \lambda_0$ and with CA when $\lambda_0 < \lambda \leq 1$ (where λ_0 is such that $\tilde{\pi}_i|_{t=0,\lambda_0} = \tilde{\pi}_i|_{t=0,\lambda=1}$). Accordingly, we must simply show that values of b exists such that $\tilde{\pi}_i|_{t=0,\lambda=1/(1+b)} < \tilde{\pi}_i|_{t=0,\lambda=1}$. Using (19), it is easy to find that $\tilde{\pi}_i|_{t=0,\lambda=1/(1+b)} < \tilde{\pi}_i|_{t=0,\lambda=1}$ around $b = 0$ (but not for $b = 1$).

Proof of Proposition 2:

The prohibitive level of the trade barrier is determined by $x_f = 0$. Using (12) and (11), the prohibitive barrier is

$$t_p(b, \lambda) = \frac{(1-c)[k(1-b)(2+b) - (\lambda(1+b) - b)(2\lambda - 1)]}{k(2-b^2) + \lambda(b - \lambda(1+b))}. \quad (20)$$

Taking the derivative with respect to λ , we find that:

$$\begin{aligned} \text{sign} \left\{ \frac{\partial t_p}{\partial \lambda} \right\} &= \{-[4\lambda(1+b) - 1 - 3b][k(2-b^2) + \lambda(b - \lambda(1+b))] \\ &\quad + [2\lambda(1+b) - b][k(1-b)(2-b) - (2\lambda - 1)(\lambda(1+b) - b)]\} \end{aligned} \quad (21)$$

Assuming that $\lambda = 1$, $\text{sign} \left\{ \frac{\partial t_p}{\partial \lambda} \right\} = \text{sign}\{-2(1+b)k + 1\} < 0$ since we require $k > \frac{1}{2(1-b^2)}$. Hence, introducing a small externality (lowering λ) increases the prohibitive rate at least in the neighborhood of $\lambda = 1$. When evaluating $\text{sign} \frac{\partial t_p}{\partial \lambda}$ at $\lambda = \frac{b}{1+b}$ however, $\text{sign} \left\{ \frac{\partial t_p}{\partial \lambda} \right\} = 2k(1-b^2) > 0$ so that we need to compare the level of the prohibitive rates to make sure that $t_p^{ED} < t_p^{CA}$. With ED ($\lambda = 1$), the level of prohibitive trade cost is

$$t_p^{ED} = \frac{(1-c)[k(1-b)(2+b) - 1]}{k(2-b^2) - 1}, \quad (22)$$

and under CA subject to the strongest externality consistent with positive equilibrium investment ($\lambda > b/1+b$), the level of the prohibitive trade cost is

$$t_p^{CA}(\lambda = \frac{b}{1+b}) = \frac{(1-c)k(1-b)(2+b)}{k(2-b^2)}. \quad (23)$$

It is straightforward to show that $t_p^{ED} < t_p^{CA}(\lambda = b/1+b)$ whatever $b > 0$. Hence $t_p^{ED} < t_p^{CA}$ for $\frac{b}{1+b} \leq \lambda < 1$.

Proof of Proposition 5:

The sign of $dCS/d\lambda$ depends on $d\bar{x}/d\lambda$ and $d\Delta/d\lambda$ (see (18)). Using the equilibrium quantities, we have $\Delta = \frac{tk}{D}$, where $D = (1-b)(2+b)k - (2\lambda -$

1)($\lambda(1+b) - b$), so that

$$\frac{d\Delta}{d\lambda} = \frac{tk[4\lambda(1+b) - (3b+1)]}{D^2}$$

The sign of $\frac{d\Delta}{d\lambda}$ depends on λ , at least as long as $t \neq 0$. A sufficient condition for $\frac{d\Delta}{d\lambda} > 0$ is $\lambda > \frac{3b+1}{4(1+b)}$. Similarly, $\bar{x} = \frac{k[2(1-c)-t]}{2E}$, where $E = 2[k(1+b)(2-b) - (\lambda(1+b) - b)]$, so that

$$\frac{d\bar{x}}{d\lambda} = \frac{k(1+b)[2(1-c)-t]}{2E^2},$$

where $\frac{d\bar{x}}{d\lambda} > 0$ for $t < 2(1-c)$ and $\frac{d\bar{x}}{d\lambda} < 0$ for $2(1-c) < t < t_p^{CA}$.

In free trade, (18) reduces to

$$\frac{dCS}{d\lambda} = -2\bar{x} \frac{\partial p_h}{\partial \bar{x}} \frac{d\bar{x}}{d\lambda} \quad (24)$$

This expression is unambiguously positive since $\frac{\partial p_h}{\partial \bar{x}} < 0$ and $\frac{d\bar{x}}{d\lambda} > 0$ for $t < 2(1-c)$.

Consider now $0 < t < t_p^{ED}$. Since $\frac{d\bar{x}}{d\lambda} > 0$ when $t < 2(1-c)$, $\frac{d\bar{x}}{d\lambda} > 0$ when $0 < t < t_p^{ED}$ provided that $t_p^{ED} < 2(1-c)$. This is the case whenever $\lambda > [b + (\frac{2(1-b)^2}{2+b(1-b)})^{1/2}] \frac{1}{1+b}$ and thus whenever the externality is not too strong. If this condition holds, $\frac{dCS}{d\lambda} > 0$ for $0 < t < t_p^{ED}$ unless $\frac{d\Delta}{d\lambda} > 0$ is positive and strong. The presence of highly differentiated products makes sure the second part of (18) does not affect the sign of $\frac{dCS}{d\lambda}$.

Proof of Proposition 6:

To show this proposition, we must show that, when the domestic manufacturer has ED, the prohibitive trade cost is the same whether the two foreign manufacturers have CA or ED.

Consider the profit of a foreign manufacturer when it sells its product through common agencies with the other foreign manufacturer. Its profit takes the form

$$\pi_f^{ED,CA,CA} = \frac{n^2(t)R(\lambda)}{d^2(\lambda)}, \quad (25)$$

where $n(t) = t[(1+b)(1-2k) + 2kb^2] + (1-c)(-1-b+2k+kb-3kb^2)$, $R(\lambda) = k[2k(1-b^2)(1+2b) + (1+2b)(2b\lambda - \lambda^2(1+2b)) - b^2]$ and $d(\lambda) = k^2(12b^3 + 2b^2 - 10b - 4) + k(-4b^3\lambda + b^3 + 2b^2\lambda + 6b\lambda + 3b + 2\lambda + 2) + b^2 - 2\lambda b^2 + b - 3\lambda b - \lambda$.

When all the manufacturers have ED, the foreign manufacturer's profit takes the form

$$\pi_f^{ED,ED,ED} = \frac{n^2(t)R(\lambda=1)}{d^2(\lambda=1)}. \quad (26)$$

It follows that t such that $\pi_f^{ED,ED,ED} = 0$ and $\pi_f^{ED,CA,CA} = 0$ takes the same value that we denote t_p^{ED} .

When the domestic manufacturer shares common retailers with one or with both foreign manufacturers, the volume of trade and the wholesale price can no longer be written as a function of $n(t)/d(\lambda)$. In these cases, the prohibitive rate depends on λ and is higher than when the domestic manufacturer selects ED.

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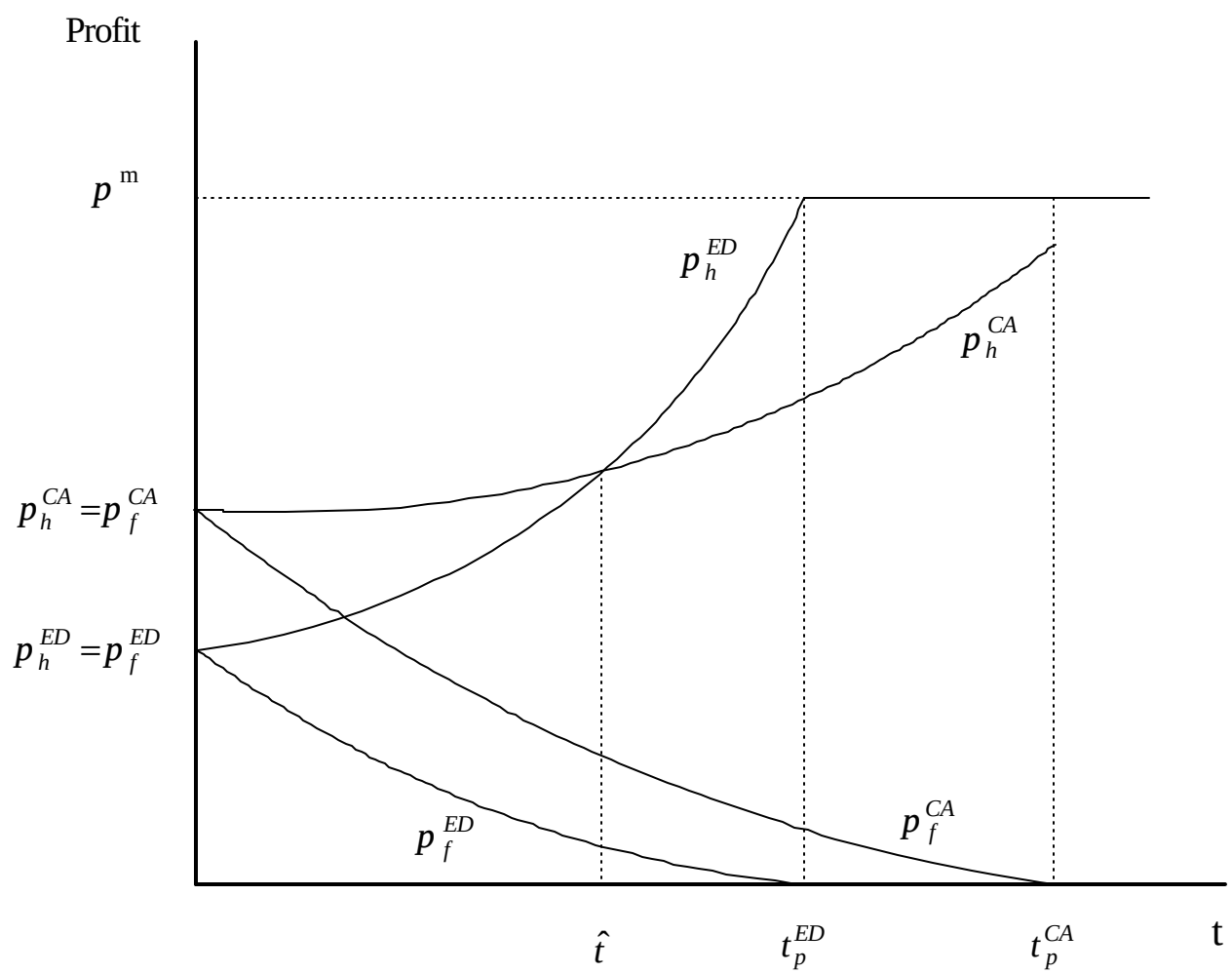


Figure 1: Exclusive Dealing vs Common Agency (low externality)

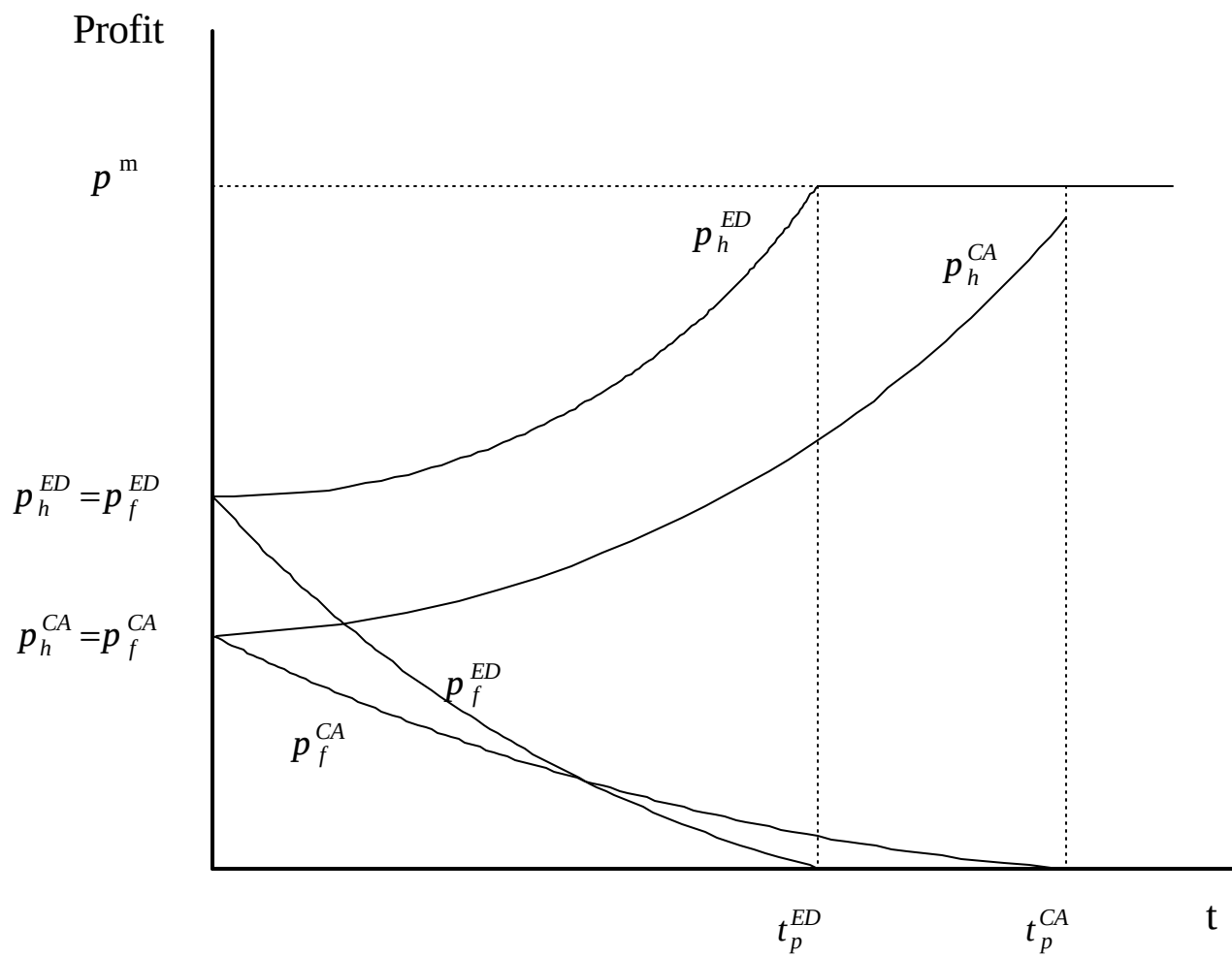


Figure 2: Exclusive Dealing vs Common Agency (high externality)

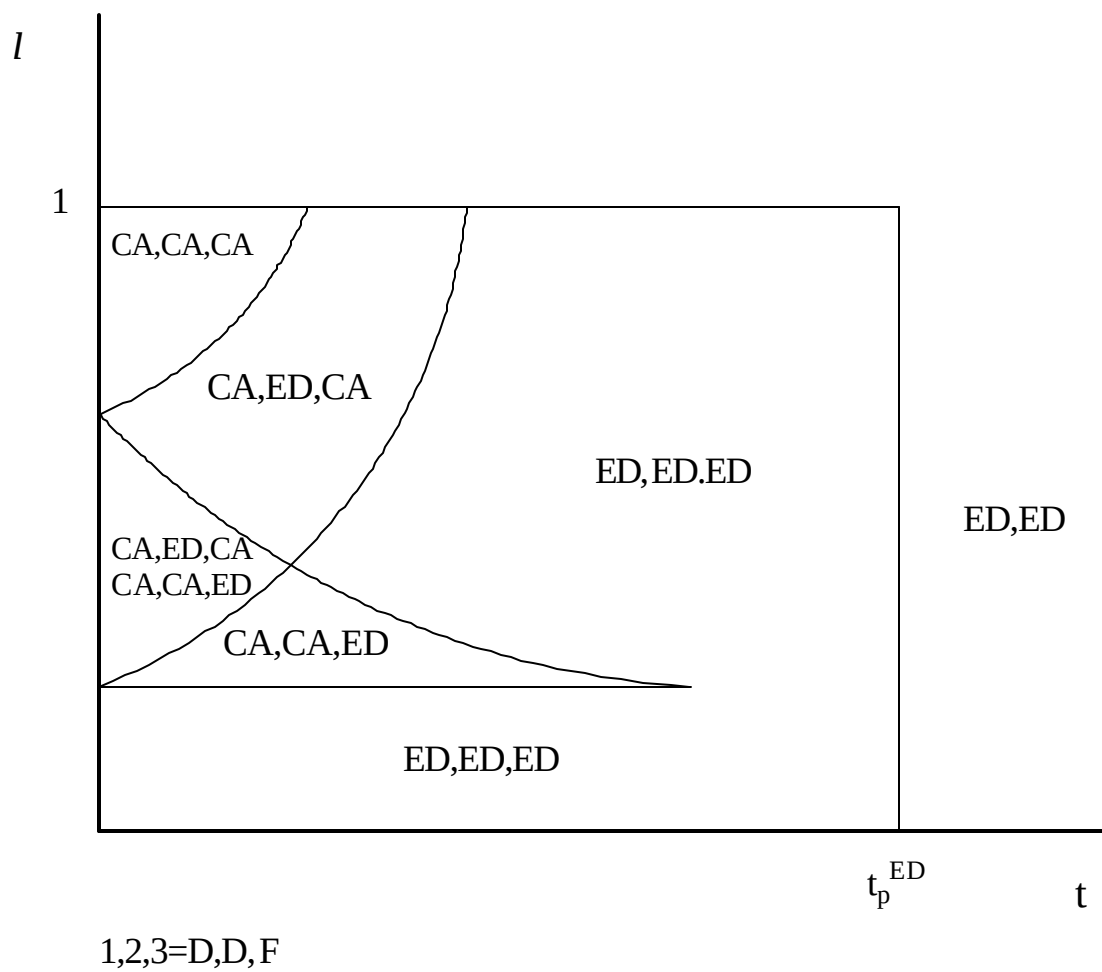
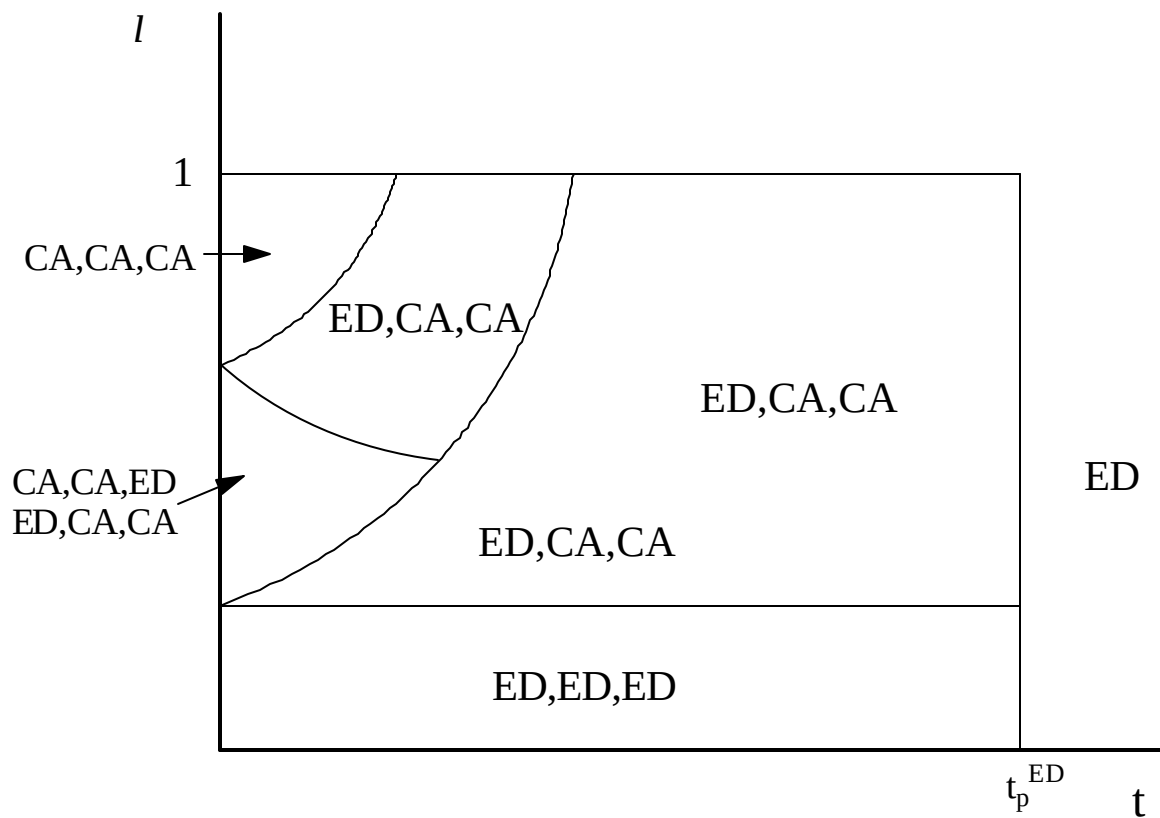


Figure 3: One Foreign and Two Domestic Manufacturers



1,2,3=D,F,F

Figure 4: One Domestic and Two Foreign Manufacturers