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by

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Delegated bargaining and competition[1]

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Abstract

In this paper, we analyze a two-producers two-agent model in which producers delegate sales and price negotiations to exclusive, separate, and independent agents. Producers first choose a pricing arrangement (two-part tariff versus linear tariff) and then set wholesale prices (and fixed fees) to their agents. Given this, agents announce prices to consumers as a basis for negotiations. Finally, consumers make their buying decision and bargain about the actually paid price once they arrive at an agent's location. We show that both franchise pricing and linear pricing can be supported as equilibrium outcomes depending on the agents' fixed costs and consumers' bargaining power. With ex ante unobservable two-part tariffs consumers may be worse off from the ability to bargain and more so the higher their bargaining power. In the case of linear pricing, consumers gain from the ability to bargain and more so the higher bargaining power they have. On the balance, however, consumers are worse off from higher bargaining power due to the fact that increasing bargaining power affects the manufacturers' equilibrium actions regarding pricing schemes to the consumers' disadvantage.

1 Introduction

All dominant natural gas producing nations in Europe have coordinated their sales of natural gas through more or less centralized bargaining bodies. In Norway for instance, a body named GFU, consisting of the two dominant Norwegian producers, carried through all negotiations concerning the sale of natural gas, and this irrespective of the ownership of the gas. Other important producing countries like Russia, Algeria and the Netherlands all have similar centralized bodies (Gazprom, Sonatrach and Gasunie).

From the perspective of the large producing countries the argument for this organisation has been to secure a 'responsible' exploitation of the gas ressources owned by each country by optimizing investments in fields and infrastructure and the extraction of gas over time. By coordinating sales through one single body, a defacto sales monopoly, economies of scale and scope could be realized. However, it is also acknowledged that this type of coordination may improve the market position of each producing country compared to a situation where each individual producer offered volumes independently.

The latter point has been the main concern for the European Union, and the scepticism toward this system has been significant. The fear of course is that a centralized bargaining system will enhance the market power of the producing countries and thereby enable producers to coordinate themselves to exploit market power at the expense of the consumers.

The EU has therefore demanded the dismantling of the centralized bargaining bodies in the membership countries and instead required a system where each producer bargains independently with industrial customers. By securing 'third party access' (TPA) to the the pipeline system, large industrial customers can now negotiate directly with natural gas producers. Presumeably this would reduce the sellers' market position to the benefit of the buyers as the producers now will have to compete for the customers.

Norway started exporting gas as early as in 1977. Since then the sale of natural gas has mainly been governed by long term contracts. Contracts were either field extraction contracts where all the ressources of a field were sold. Later, customers signed volume contracts ('take or pay', TOP), where the origin of the gas were not specified. Clearly, with the dismantling of centralized bargaining unit such contracts are no longer viable, as there is no longer any coordinating body. Partly as a consequence of this the new EU directive allows buyers (but not sellers) unilaterally to opt out of the long term contracts, and instead enter into more short term relationships with suppliers of natural gas. Unfortunately, at the present we have little insight into to what extent old contracts are cancelled and eventually how new contracts are negotiated. This is partly due to the fact that this is business sensitive information, but also because the new negotiations are still in its infancy.

The aim of this paper is to explore how a decentralized bargaining system with competing sellers of natural gas will perform. Clearly, the loss of a centralized negotiating body should imply a loss in price making power, and a central question is how the producers should organize their future sales to compensate for this loss. In the future several different systems may emerge, but two obvious alternatives is this: Producers may either sell directly to their customers, or they may establish a system where they use independent agents in the different regional markets to perform negotiatiations on their behalf. In this paper we therefore contrast a system were each upstream producer independently performs negotiations directly with prospective customers with a system where the producers delegate such negotiations to separate agents.

Central elements of an analysis of this kind naturally involves aspects of both bargaining and competition. Exploring economic theory that involves both delegated bargaining and competition reveals that this literature is relatively scarce. Before we present our setup and findings it may be worthwhile to see what issues the received literature has focused on and what the main findings are.

1.1 Some relevant literature

Generally, when a buyer is able to negotiate the price with a seller this is perceived as positive for the buyer compared to the case when he cannot bargain. Furthermore, the outcome of the bargaining process will be more beneficial to the buyer the higher bargaining power the buyer has. However, it is also recognized in the literature that with a single seller and a single buyer, the seller may improve his position by delegating the bargaining process with the buyer to an independent agent (Katz 1991; Fershtman/Judd/Kalai 1991; Fershtman/Kalai 1997). With an appropriate design of the delegation contract the seller can commit his agent to tougher negotiations with the buyer. Thus, delegation to a third party acts as a commitment device (Schelling 1956, 1960).

Much of the literature of delegated bargaining considers a setting where a single seller delegates the bargaining process to an agent who negotiates with either a single buyer (bilateral monopoly) or with several buyers. The focus in this literature is whether the beneficial effect of third-party delegation may be counteracted by the possibility of renegotiation (Dewatripont 1988; Green 1990). However, as shown by Bester/Sákovics (2001) the beneficial effect of delegating bargaining survives as long as there is a positive cost of renegotiation. In the present paper we abstract from the issue of renegotiation and instead push this research in yet another direction: How will the delegation effect work in a setting with competition, i.e. when there are several sellers of a differentiated product who may delegate negotiations with customers to independent and exclusive agents?

In the bilateral monopoly case, delegation to a third party will counteract the buyer's bargaining power. However, the ability to bargain is beneficial to the buyer as his outcome is generally improved compared to the case when the seller is able to commit to refrain from negotiating. When introducing competition two additional effects come into play. First, under imperfect competition it is well understood that delegating sales to exclusive agents may act as a commitment device when no bargaining is going on (Vickers 1985; Sklivas 1987; Bonanno/Vickers 1988).[1] By delegating sales to independent agents firms may be able to raise prices over the competitive level by offering their agents contracts with marginal prices over marginal costs. When the agents' actions exhibit strategic complementarity (price competition), agents will increase their prices, and if the upstream firms can collect the additional profits with fixed fees, this will increase the firms' profits compared to no delegation.[2] Even though the resulting prices are higher than with no delegation, firms are generally not able to obtain the fully collusive prices. When introducing bargaining between agents and buyers in the delegation model, upstream firms get an additional motive for raising the prices to their agents. Intuitively, one should expect this to push the final prices closer to a collusive level, but the possibility of exceeding the collusive level also arises. A central aim of this paper is to analyze how these two effects intermingle and how the joint effect interplays with the bargaining strength of the buyers.

According to this, we can identify two central motives for delegation. Sellers may delegate with high marginal prices in order to improve their agents' bargaining position vis a vis prospective buyers (henceforth denoted as the 'bargaining effect'). The bargaining effect on marginal prices will depend on the distribution of bargaining power between the sellers' agents and their buyers. Also there is the incentive to raise marginal price above costs to dampen the competitive environment with rival sellers (the 'competitive effect').

[1]These papers also abstract from the issue of renegotiation and therefore suffer from the same critique as the delegated bargaining literature. However, if renegotiation costs are sufficiently high the beneficial effects of delegation will naturally sustain.

[2]Vickers (1985) shows that with strategic substitutes firms loose from delegation, but the firms will end up in a prisoners' dilemma where they delegate anyhow.

We study the outcome of delegated bargaining in a setting where two sellers of differentiated products may delegate sales and price negotiations to independent and separate agents. Although our study is motivated by recent developments in the European gas industry, we believe that our results has much wider applications. The sellers may for instance be car manufacturers who delegate sales and price negotiations to independent and exclusive dealers, or the sellers may be producers of natural gas and the agents are intermediary firms that negotiate natural gas sales with large industrial customers. In any case, the relationship between the seller and the agent is regulated by a delegation contract.

We abstract from the possibility of renegotiation by assuming that the costs of renegotiating delegation contracts are prohibitively high. Under this assumption we focus on four key questions. First, what is the interplay between the competitive effect and the bargaining effect of delegation? Second, in what way is the equilibrium outcome affected by the observability of the delegation contracts? We will work with a Hotelling model where the agents are located at each end of a Hotelling interval, and customers are uniformly distributed on the interval. Each agent announces a price, and consumers decide where to buy. As shown by Katz (1991), the competitive effect of delegation relies on the delegation contracts being common knowledge to the agents (but not necessarily to the consumers). Hence, we will work with commonly observable contracts among the agents. With no bargaining, consumers are indifferent whether they can observe delegation contracts or not. In contrast, when bargaining over prices, it is of vital importance for the consumers whether and when they can observe the delegation contracts that the agents operate under, because the delegation contract will indicate the toughness of the agent as a counterpart in the negotiations. Here we will contrast two different assumptions, one where the delegation contracts are common knowledge to all parties before any consumer decides who to bargain with (early revelation), and the alternative where a consumer needs to decide which agent to negotiate with before the agent's delegation contract is revealed (late revelation).

The third key issue of our analysis is the pricing schedule chosen by the sellers. In our setting we will assume that sellers can choose delegation contracts that are either two-part tariffs or simple linear tariffs. This decision is made endogenous to the model presented below. Applying a linear tariff dampens competition on the manufactures level and burdens losses from bargaining on the agents. A two-part tariff enables extraction of the entire surplus from the agents, as sellers will anticipate the bargaining outcome between the agent and his customers. When bargaining is going on, the amount of profit sellers can extract using the fixed fee in a two-part tariff will be lower than when no bargaining is going on. In order to compensate for that, producers tend to increase marginal (wholesale) prices in the delegation contract.

Increased wholesale prices have generally two effects. First, they increase the seller's variable income from sales at the agent's level, and increased wholesale prices will increase the announced (advertised) prices by the agents. Second, since wholesale prices form the agent's reservation price in the negotiations with consumers, higher wholesale prices commit the agent to tougher bargaining. Much as under strategic delegation with fixed prices, higher wholesale prices and higher retail prices induce a beneficial strategic response from the rival agent. Hence, producers have both individual and joint interest in increasing wholesale prices as a response to point-of-sale bargaining. We will show under which circumstances producers prefer either two-part tariffs or linear tariffs to control wholesale prices.

Our fourth point is concerned with the question of vertical integration versus separation. Our model adds to the separation argument. We show that it is even more profitable to delegate when the competitive and bargaining effects are added. For consumers the result is rather depressing. We show that when delegation contracts are revealed late, consumers loose from the mere ability to bargain with the agents compared to the case when it is common knowledge to all parties that there is no bargaining going on.

The remainder of this paper is organized as follows. In Section 2 we specify the assumptions of the model and derive benchmarks for fixed pricing (no bargaining), vertical integration, and collusive behavior. In Section 3 we consider the possible pricing arrangements and derive the equilibria of our game when each agent bargains with his customers. A discussion of our results follows in Section 4, and Section 5 concludes.

2 The model

Two sellers/manufacturers produce differentiated products. The upstream production costs are normalized to zero and there are no fixed costs on the manufacturer level. Each firm distributes its product through an independent exclusive downstream agent/retailer, i.e. each agent carries only the product of one manufacturer. The agents provide services in order to distribute the products, e.g. advertising, maintenance, and customer service. The costs for these services are fixed, equal for both agents, and denoted by F.

Manufacturers sign delegation contracts with agents using one of two possible pricing arrangements. One alternative is a two-part tariff $\{A_i, w_i\}$ consisting of a fixed fee A_i, and a constant marginal wholesale price per unit

w_i (franchise fee pricing). The alternative pricing arrangement is a simple linear tariff that stipulates only a constant marginal wholesale price per unit w_i (linear pricing). Upstream firms are able to offer contracts on a take-it-or-leave-it basis. As a consequence, producers can extract all downstream profit under franchise fee pricing. Agents incur no marginal distribution costs associated with the provided services (but a fixed cost F). Hence, intermediate (wholesale) prices constitute agents' marginal costs.

Manufacturers' products are differentiated according to a Hotelling model. Consumers are uniformly distributed on the unit interval and each firm and its agent are located at the same point at each end of the interval. Each consumer has unit demand, a constant valuation of either product V, and incurs transportation costs t per unit of distance when buying either product. We will assume that V is sufficiently large so that all consumers buy in all equilibria we consider. A consumer located in x therefore gets gross utility $V - tx$ if he buys product 1 in $x = 0$, and $V - t(1 - x)$ when buying product 2 in $x = 1$.

We consider a three-stage game. At the first stage, each producer commits to a certain pricing arrangement, either franchise pricing or linear pricing. At the second stage, manufacturers set wholesale prices (and fixed fees if appropriate) according to the pricing arrangements chosen at the first stage. At stage three, each agent announces a retail price p_i observed by all consumers and consumers decide which agent to visit. Once at the agent's location, consumers and agents bargain over the price under complete and symmetric information, i.e. consumers' reservation prices and agents' costs (wholesale prices) are common knowledge by the time bargaining starts.

The latter assumption enables us to use the Generalized Nash Bargaining Solution as a solution concept for the bargaining game. In this setting, the announced prices act as price ceilings, since agents may agree to sell at a lower price, but are committed not to rise the price above p_i once bargaining starts. On the other hand, agents will not sell at a price below marginal cost, i.e. wholesale prices act as price floors. Thus, the eventually agreed upon price P_i will stem from the interval $P_i \in [w_i, p_i]$.

We distinguish between what we call 'early revelation' of the delegation contracts and 'late revelation'. In the early revelation case the consumer learns the true delegation contracts before he incurs the transportation cost, i.e. before he decides which agent to bargain with. Thus with a geographic interpretation of the product differentiation parameter t, the delegation contracts are commonly observable to everyone before the customers decide who to bargain with. Late revelation means that any customer must first incur the transportation cost and then learns the delegation contracts of the agent at that location. From a marketing point of view, the product differentiation parameter t constitutes a disutility consumers incur due to the fact that they are not able to purchase their most preferred product. Thus, the farer away a consumer is positioned from either boundary of the unit interval the higher is his 'psychological loss' from not buying the ideal product. In this case, late revelation means that consumers base their decision where to shop only on advertised prices and the expected disutility from buying second best. In the early revelation case, on the other hand, consumers can consider the additional utility from paying a price below the advertised price due to the opportunity to negotiate over the price with the agent. Thus, knowing the delegation contract allows consumers to infer on the bargaining outcome by the time they decide on which product to buy. For the remainder of the paper we will focus on the geographic interpretation of the product differentiation parameter t.

With late revelation, wholesale prices are unobservable by the time consumers choose their agent. That means, consumers base their buying decision solely on advertised prices and transportation costs. Once they have reached the agent's location, they learn the true wholesale price and start negotiating about the eventually agreed upon price. Of course, the agent may want to conceal his marginal costs in order to realize higher revenue. On the other hand, the true costs may be revealed by a sequence of offers and counteroffers during the bargaining process. Since we are not interested in the exact bargaining process, it seems to be a reasonable to apply the most parsimonious bargaining model. We are confident that the qualitative results would also hold, if we applied a more sophisticated strategic bargaining model (Rubinstein 1982).[3] With early revelation of delegation contracts, consumers can explicitly anticipate the bargaining outcome and choose an agent contingent upon the expected value. Note that the observability of wholesale prices is irrelevant to customers if agents fix prices in advance and do not negotiate.

In what follows, we compare two different situations. In the following we derive some useful benchmarks when no bargaining is going on: (i) equilibrium for the delegation game without bargaining, (ii) equilibrium for vertically integrated firms, and (iii) collusive behavior. Then we contrast the outcome of these games with the original game when the agent and the customers bargain over prices.

[3] Also note that the agents will have a strong incentive to reveal thier marginal costs as long as these are above marginal production costs of the upstream firm. Failure to do so may induce customers to believe that marginal costs are low.

3 Benchmarks: No bargaining

When no bargaining is going on, each seller first commits to a pricing scheme. Then each seller offers a contract to his (exclusive) agent consisting of a wholesale price w_i (and possibly a fixed fee A_i). Each agent then accepts or refuses the contract and sets final prices to consumers. Finally, consumers choose which agent they will buy from.

Solving the game backwards, we have to consider the consumers' buying decision at the last stage first. With fixed prices, a consumer located in x buying from agent 1 gets utility $u_{1x} = V - tx - p_1$, whereas buying from agent 2 yields utility $u_{2x} = V - t(1-x) - p_2$. Since consumers have no opportunity to bargain, they base their decision upon the advertised prices, visit the agent at which they maximize their utility, and pay the price that has been advertised in the first place. Hence, from $u_{1x} = u_{2x}$ we find the position of the marginal consumer given by

$$x = \tfrac{1}{2}\tfrac{p_2 - p_1 + t}{t}. \tag{1}$$

At stage three, given any pricing arrangement, the agents solve

$$\max_{p_i} \pi_i^R = (p_i - w_i)\,\tfrac{1}{2}\tfrac{p_j - p_i + t}{t} - A_i - F, \qquad i \neq j; i, j = 1, 2, \tag{2}$$

where $A_i > 0$ only if producer i chooses a two-part tariff at stage 1, otherwise $A_i = 0$. The retail prices that solve (2), however, are independent of A_i and F. Thus no matter what pricing arrangement the sellers choose, the profit maximizing retail prices are given by

$$p_i = t + \tfrac{1}{3}w_j + \tfrac{2}{3}w_i, \qquad i \neq j; i, j = 1, 2. \tag{3}$$

At stage two, we have to distinguish between all possible combinations of pricing arrangements chosen by the two sellers at stage one. Thus, we have to evaluate four combinations: (a) both sellers commit to franchise pricing (TPT, TPT), (b) both sellers commit to linear pricing (LT, LT), and (c, d) one seller commits to franchise pricing, the other one to linear pricing, (TPT, LT) or (LT, TPT).

Consider case (a). In this case, the sellers choose wholesale prices w_i and franchise fees A_i in order to

$$\max_{w_i} \pi_i^P = w_i \tfrac{1}{2}\tfrac{p_j - p_i + t}{t} + A_i, \qquad i \neq j; i, j = 1, 2, \tag{4}$$

s.t. equations (3) and

$$\pi_i^R = (p_i - w_i)\,\tfrac{1}{2}\tfrac{p_j - p_i + t}{t} - A_i - F \geq 0, \qquad i \neq j; i, j = 1, 2. \tag{5}$$

Assuming that the sellers can offer take-it-or-leave-it contracts to the agents, they can extract the entire downstream surplus, such that (5) is strictly binding, the solution of the maximization problem yields

$$w_i^* = t, \qquad \text{and} \qquad p_i^* = 2t, \qquad i = 1, 2,$$

from which we find

$$\pi_i^P = t - F, \qquad \text{and} \qquad \pi_i^R = 0, \qquad i = 1, 2.$$

Very much in the same fashion we can calculate optimal prices and resulting profits for the remaining three configurations. Under the assumption that $F \leq F^*$, i.e. F is not too large so that retail profit is non-negative in all outcomes, Table 1 summarizes the results.[4]

	TPT	LT
TPT	$\pi_1^P = t - F; \pi_2^P = t - F$ $\pi_1^R = 0; \pi_2^R = 0$	$\pi_1^P = \frac{81}{49}t - F; \pi_2^P = \frac{75}{98}t$ $\pi_1^R = 0; \pi_2^R = \frac{25}{98}t - F$
LT	$\pi_1^P = \frac{75}{98}t; \pi_2^P = \frac{81}{49}t - F$ $\pi_1^R = \frac{25}{98}t - F; \pi_2^R = 0$	$\pi_1^P = \frac{3}{2}t; \pi_2^P = \frac{3}{2}t$ $\pi_1^R = \frac{1}{2}t - F; \pi_2^R = \frac{1}{2} - F$

Table 1: Equilibria profits with fixed retail prices

Now we can refer to this payoff matrix in order to find subgame perfect equilibria.

Proposition 1 *With fixed prices there exist no asymmetric equilibria with (TPT, LT) or (LT, TPT). When* $0 \leq F \leq \frac{15}{98}t$ *the action profile (TPT, TPT) constitutes part of a subgame perfect equilibrium. When* $\frac{15}{98}t < F < \frac{23}{98}t$ *both (TPT, TPT) and (LT, LT) are possible equilibrium outcomes, and for* $\frac{23}{98}t \leq F_i \leq \frac{25}{98}t$ *(LT, LT) constitutes the unique equilibrium outcome.*

Proof. See the appendix. ■

For sufficiently high V the market is fully covered.[5] Let us consider the case $F = 0$. Manufacturers set wholesale prices above marginal production costs $w_i = t$. This is the well-known strategic delegation effect first recognized by Bonanno/Vickers (1988) that we have denoted the 'competitive effect'. High wholesale prices will induce the agents to increase their retail prices to $p_i = 2t$. Since retail prices are strategic complements, a higher retail price will trigger a higher equilibrium retail price set by the rival agent. This is beneficial, because in the given setting profits will increase with higher prices.

[4]We use the convention that seller 1 is the row player and seller 2 is the column player. By inspection of Table 1, we see that retail profit is always non-negative when $F \leq F^* = \frac{25}{98}t$. See the appendix for a complete table of results.

[5]Throughout this paper we will assume that the market is fully covered.

In the case of franchise pricing between seller and agent, the increased profits can be captured by the sellers through the fixed fees. Thus, both sellers have an incentive to raise wholesale prices above costs. The competitive delegation effect is even stronger if both producers commit to linear pricing. Linear pricing involves a commitment to leave some share of the surplus to the agent and extract profits through even higher wholesale prices $w_i = 3t$. Agents are forced to set higher retail prices $p_i = 4t$ and are left with non-negative profits. When $t = 0$, the competitive effect evaporates and the Bertrand result reappears. Prices are at marginal costs and consumers capture the entire surplus, which in this case is equal to $V - \frac{1}{4}t$.

On the other hand, if the fixed retailing costs are sufficiently high, linear tariffs will be used. In this case, the loss from not using profit extracting fixed fees is low, because the surplus on the retail level is relatively small. On the positive side, linear tariffs soften price competition and allow upstream firms to earn rents by marginalization over production costs. Both producers and agents gain from higher wholesale prices. That means, consumers must be hurt from linear pricing. In fact, consumers surplus CS drops from $V - \frac{9}{4}t$ to $V - \frac{17}{4}t$ if fixed costs are sufficiently high and manufacturers use linear pricing. Of course, this has to be the case, since we consider a situation of inelastic demand, i.e. whatever agents gain, consumers lose.

In an intermediate range of F producers face a coordination problem. Both (TPT, TPT) and (LT, LT) are part of a subgame perfect equilibrium, with (LT, LT) being the payoff dominant and (TPT, TPT) being the risk dominant equilibrium outcome. Since our primary focus is on the competitive effect and the bargaining effect under delegation, we will not apply any further equilibrium refinements (Harsanyi/Selten 1988).

Our results in this section largely correspond with Gal-Or (1991). Gal-Or (1991) considers a similar setting, but with a non-address model of product differentiation. In the model presented in this paper, differentiation is captured by the Hotelling model, in which transportation costs act as a measure of differentiation. In spite of the inelastic demand in our model, the qualitative results are similar to Gal-Or (1991). In the absence of any retailing costs, franchise fee pricing is the only subgame perfect equilibrium. The higher fixed costs the more likely it is that equilibrium behavior involves linear pricing.

Before we extend our analysis to the bargaining subgame, let us briefly consider the case that both manufacturers vertically integrate. Now, the competitive delegation effect disappears, manufacturers set prices $p_i = t$, and earn profits $\pi_i^P = \frac{1}{2}t - F$. Obviously, consumers are better off in this situation, since $CS = V - \frac{5}{4}t$. A third benchmark is the collusive solution. Under the restriction of full coverage the collusive prices are $p_i = V - \frac{1}{2}t$, producers realize a joint profit of $\Sigma\pi_i^P = V - \frac{1}{2}t$, and consumers surplus drops to $CS = \frac{1}{4}t$.

4 Equilibria with consumer bargaining

This section derives equilibrium outcomes when there is bargaining over prices between agents and customers, and where producers delegate sales to agents. We distinguish between the case where consumers learn the agents' wholesale prices before they decide who to bargain with (early revelation of wholesale prices), and the case where wholesale prices are revealed once a customer are locked into bargaining with a specific agent (late revelation). We start by the former case.

4.1 Early revelation of wholesale prices

With early revelation of wholesale prices, consumers base their buying decision not merely upon the advertised prices p_i, but on the expected bargaining outcome, which they are able to anticipate knowing the true wholesale prices in advance.

Applying the Generalized Nash Bargaining Solution, the bargaining outcome solves

$$\arg\max_{P_i}(p_i - P_i)^{\gamma} \times (P_i - w_i)^{(1-\gamma)} \Longrightarrow P_i = p_i - \gamma\left(p_i - w_i\right), \qquad i = 1, 2, \quad (6)$$

with P_i being the eventually agreed upon price. In this bargaining model γ represents the buyers' and $(1-\gamma)$ the sellers' bargaining power, respectively. As can be easily seen from equation (6) the actually paid price stems from the interval $[w_i, p_i]$. Agents' price announcements, therefore, have two different aims. On the one hand, prices are announced in order to attract customers, but the advertised price also acts as a price ceiling for the negotiation. Hence, there is a trade-off, since lower advertised prices attract more consumers, but also lower the eventually agreed upon price.

Consumer's utility at position x from buying from agent 1 is now given by $u_{1x} = V - tx - (\gamma w_1 + p_1 - \gamma p_1)$ and utility from buying from agent 2, respectively, is given by $u_{2x} = V - t(1-x) - (\gamma w_2 + p_2 - \gamma p_2)$. From this we find the marginal consumer's location

$$x = \frac{1}{2}\frac{t - \gamma w_1 - p_1 + \gamma p_1 - \gamma p_2 + \gamma w_2 + p_2}{t}. \quad (7)$$

Thus, we get the agents' maximization problem at stage three

$$\begin{aligned} \max_{p_1} \pi_1^R &= \int_0^x (\gamma w_1 + p_1 - \gamma p_1 - w_1)\, dx - A_1 - F, \\ \max_{p_2} \pi_2^R &= \int_x^1 (\gamma w_2 + p_2 - \gamma p_2 - w_2)\, dx - A_2 - F. \end{aligned} \tag{8}$$

Again, agents' optimal prices do not depend upon the pricing arrangement chosen at stage two of the game. Thus, the price equilibrium is given in either case by

$$\begin{aligned} p_1 &= \tfrac{1}{3}\tfrac{3\gamma w_1 - 3t - 2w_1 - w_2}{\gamma - 1}, \\ p_2 &= \tfrac{1}{3}\tfrac{3\gamma w_2 - 3t - w_1 - 2w_2}{\gamma - 1}. \end{aligned} \tag{9}$$

Manufacturers choose wholesale prices and franchise fees (if appropriate) according to

$$\begin{aligned} \max_{w_1} \pi_1^P &= w_1 \int_0^x dx + A_1, \\ \max_{w_2} \pi_2^P &= w_2 \int_x^1 dx + A_2, \end{aligned} \tag{10}$$

s.t. equations (9) and

$$\begin{aligned} \pi_1^R &= \int_0^x (\gamma w_1 + p_1 - \gamma p_1 - w_1)\, dx - A_1 - F \geq 0, \\ \pi_2^R &= \int_x^1 (\gamma w_2 + p_2 - \gamma p_2 - w_2)\, dx - A_2 - F \geq 0. \end{aligned} \tag{11}$$

Given this maximization problem, we are able to calculate the equilibrium actions at the second stage of the game for every combination of price arrangements in the same way as demonstrated in section 2. Table 2 summarizes the results.[6]

	TPT	LT
TPT	$\pi_i^P = t - F$ $\pi_i^R = 0$	$\pi_1^P = \frac{81}{49}t - F; \pi_2^P = \frac{75}{98}t$ $\pi_1^R = 0; \pi_2^R = \frac{25}{98}t - F$
LT	$\pi_1^P = \frac{75}{98}t; \pi_2^P = \frac{81}{49}t - F$ $\pi_1^R = \frac{25}{98}t - F; \pi_2^R = 0$	$\pi_i^P = \frac{3}{2}t$ $\pi_i^R = \frac{1}{2}t - F$

[6] See the appendix for a complete table of results.

Table 2: Equilibria profits with ex ante observable wholesale prices

Proposition 2 *Under consumer bargaining, observable wholesale prices and sufficiently high valuation V, all consumers are served. Manufacturers' and agents' profits equal the profits in the case of no bargaining. Also consumers' surplus is unaffected by bargaining in this case. Advertised prices are higher than in the no bargaining case if consumers have some bargaining power, i.e. if $\gamma > 0$.*

Proof. See the appendix. ■

It follows from proposition 2 that the results are exactly the same as in the benchmark presented in section 2, except advertised retail prices now depend upon bargaining power. Since the manufacturers' equilibrium strategies only depend upon their own profits and the agents' profits, respectively, proposition 1 even holds in the case of consumer bargaining when wholesale prices are observable by the time consumers make their buying decision. Likewise, in all configurations producers charge wholesale prices above marginal costs independent of the distribution of bargaining power. Thus, there is a competitive effect, but we are not able to identify any bargaining effect. The opportunity to negotiate retail prices has neither any effect on wholesale pricenor on the eventually agreed upon retail prices. Therefore, there is no effect on consumers' surplus.[7] On first sight, this is a contra-intuitive result. One should expect consumers to gain from the opportunity to negotiate about prices on the retail level. As mentioned above, the eventually agreed upon price will stem from the interval $P_i \in [w_i, p_i]$, in which w_i acts as a price floor and p_i as a price ceiling. The higher consumers' bargaining power the higher should be the share of surplus consumers can extract in a bargaining situation.

The key counter-argument, however, is that manufacturers fix wholesale prices independent of γ and agents perfectly anticipate the bargaining outcome. In other words, once consumers start to negotiate about prices, the price floor w_i is given and the advertised price p_i is set in a way that allows agents to agree upon prices P_i that equal exactly the posted prices in the no bargaining environment. Announcing sufficiently high retail prices compensates the effect of high consumer bargaining power. To illustrate this, imagine $F = 0$. In this case, manufacturers will have a joint incentive to offer two-part tariffs, and the optimal wholesale prices are given by $w_i^* = t$. The optimal retail prices are $p_i^* = t\frac{\gamma-2}{\gamma-1}$. The eventually agreed upon price is given

[7] Since consumers valuation V is sufficiently high by assumption, such that the market is fully covered, the total welfare is also the same as in the no bargaining case.

by

$$P_i = p_i - \gamma \left(p_i - w_i \right) \Longrightarrow P_i = t\tfrac{\gamma-2}{\gamma-1} - \gamma \left(t\tfrac{\gamma-2}{\gamma-1} - t \right) = 2t,$$

which has been shown to be the optimal retail price in the no bargaining case. By the same token, the expected bargaining outcome equals the no bargaining case for all tariff configurations. Manufacturers ignore consumers' bargaining power knowing that the agents will take consumers' bargaining power into consideration when announcing their prices. The higher bargaining power the consumers have, the higher prices the agents will announce. The outcome will be the same as if there were no bargaining going on at all. Note that we assume that V is high. Actually, V has to be high enough in order to make all consumers buy, i.e. to guarantee full market coverage.[8] $V > 5t$ is a sufficient condition for full market coverage.

4.2 Late revelation of wholesale prices

If wholesale prices are ex ante unobservable by the consumers, they are unable to anticipate the bargaining outcome by the time they choose their agent. In this case, consumers select an agent on the basis of the announced prices p_i. Following the steps from the previous section, the marginal consumer is characterized by

$$x = \tfrac{1}{2} \tfrac{p_2 - p_1 + t}{t}. \tag{12}$$

Now, once a consumer comes to an agent, w_i is revealed and the agent and the consumer bargain about the price. Note that all customers that arrive at the agent's location face the same situation, i.e. the transportation costs are sunk and should not affect the bargaining outcome.

The agents' maximization problem is given by

$$\begin{aligned} \max_{p_1} \pi_1^R &= \int_0^{\frac{1}{2}\frac{p_2-p_1+t}{t}} \left(\gamma w_1 + p_1 - \gamma p_1 - w_1 \right) dx - A_1 - F, \qquad (13) \\ \max_{p_2} \pi_2^R &= \int_{\frac{1}{2}\frac{p_2-p_1+t}{t}}^{1} \left(\gamma w_2 + p_2 - \gamma p_2 - w_2 \right) dx - A_2 - F, \end{aligned}$$

from which we calculate the equilibrium of the agents' pricing game

$$\begin{aligned} p_1 &= t + \tfrac{1}{3} w_2 + \tfrac{2}{3} w_1, \qquad (14) \\ p_2 &= t + \tfrac{2}{3} w_2 + \tfrac{1}{3} w_1. \end{aligned}$$

[8] Note that when consumers bargaining power tends towards one, the advertised prices in our model will go to infinity. However, since consumers have full information by the time they decide where to shop, they can anticipate the bargaining outcome. Knowing w_i allows consumers to infer on the price they will actually have to pay.

Producers solve the following maximization problem, with $A_i > 0$ if a two-part tariff is considered, otherwise $A_i = 0$,

$$\max_{w_1} \pi_1^P = w_1 \int_0^{\frac{1}{2}\frac{p_2-p_1+t}{t}} dx + A_1, \tag{15}$$
$$\max_{w_2} \pi_2^P = w_2 \int_{\frac{1}{2}\frac{p_2-p_1+t}{t}}^1 dx + A_2,$$

s.t. equations (14) and

$$\pi_1^R = \int_0^{\frac{1}{2}\frac{p_2-p_1+t}{t}} (\gamma w_1 + p_1 - \gamma p_1 - w_1)\, dx - A_1 - F \geq 0, \tag{16}$$
$$\pi_2^R = \int_{\frac{1}{2}\frac{p_2-p_1+t}{t}}^1 (\gamma w_2 + p_2 - \gamma p_2 - w_2)\, dx - A_2 - F \geq 0.$$

Table 3 contains the manufacturers' and agents' profits for all possible tariff configurations.[9]

	TPT	LT
TPT	$\pi_i^P = \frac{1}{2}t(\gamma+2) - F$ $\pi_i^R = 0$	$\pi_1^P = \frac{81}{2}t\frac{2+\gamma}{(7+2\gamma)^2} - F$ $\pi_2^P = \frac{3}{2}t\frac{(5+4\gamma)^2}{(7+2\gamma)^2}$ $\pi_1^R = 0$ $\pi_2^R = \frac{1}{2}t(1-\gamma)\frac{(5+4\gamma)^2}{(7+2\gamma)^2} - F$
LT	$\pi_1^P = \frac{3}{2}t\frac{(5+4\gamma)^2}{(7+2\gamma)^2}$ $\pi_2^P = \frac{81}{2}t\frac{2+\gamma}{(7+2\gamma)^2} - F$ $\pi_1^R = \frac{1}{2}t(1-\gamma)\frac{(5+4\gamma)^2}{(7+2\gamma)^2} - F$ $\pi_2^R = 0$	$\pi_i^P = \frac{3}{2}t$ $\pi_i^R = \frac{1}{2}t(1-\gamma) - F$

Table 3: Equilibria profits with unobservable wholesale prices

We now make the following substitutions:

$$X \equiv \tfrac{3}{2}t\frac{5-\gamma-4\gamma^2}{49+28\gamma+4\gamma^2},$$
$$Y \equiv \tfrac{1}{2}t\frac{23-15\gamma-12\gamma^2+4\gamma^3}{49+28\gamma+4\gamma^2},$$
$$Z \equiv \tfrac{1}{2}t(1-\gamma)\frac{(5+4\gamma)^2}{(7+2\gamma)^2}.$$

[9] See the appendix for a complete table of results.

Proposition 3 *Under consumer bargaining, ex ante unobservable wholesale prices, and when* $V \geq 5t$*, all consumers are served. There exist no asymmetric equilibria with (TPT, LT) or (LT, TPT). The action profile (TPT, TPT) constitutes part of an equilibrium in dominant strategies, if* $0 \leq F \leq X$*. For* $X < F < Y$ *both (TPT, TPT) and (LT, LT) are possible equilibrium outcomes, and for* $Y \leq F \leq Z$ *(LT, LT) constitutes the unique equilibrium outcome.*

Proof. See the appendix. ∎

Similar to the no bargaining case we find different regions for F in which either (TPT/TPT) or (LT/LT) constitute the unique equilibrium outcome. In a intermediate range for F manufacturers face a coordination problem where both (TPT/TPT) and (LT/LT) are possible equilibrium outcomes. When $\gamma = 0$, i.e., consumers have no bargaining power, the results in propositions 1 and 3 converge. The intuition is that with no bargaining power consumers must accept the advertised price. The ex ante unobservability of wholesale prices does not matter since the only variable relevant for decision making is p_i. Once consumers have observed the retail prices, they decide which agent to approach and pay the advertised price. Hence, for $\gamma = 0$ we find the same subgame perfect equilibria in the critical intervals of F.

If consumers have strictly positive bargaining power the results change dramatically. In contrast to the no bargaining case, the identified regions of F now depend on consumers' bargaining power. Figure 1 shows the relevant (F, γ)-space that is cut off into four pieces.[10]

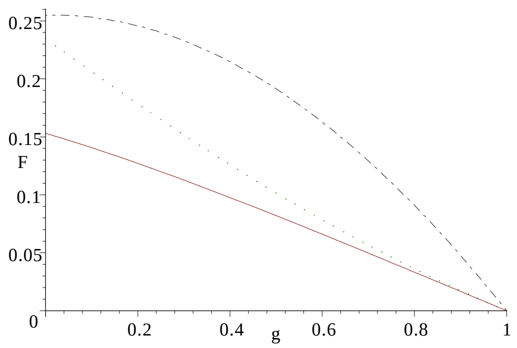

Figure 1: Equilibrium conditions

[10] In this example we have assumed $t = 1$.

In region 1 (below the solid line) that is given by $F \leq X$, (TPT/TPT) is the only equilibrium outcome. Thus, for relatively low fixed costs manufacturers jointly prefer franchise pricing to linear pricing as long as consumers' bargaining power is sufficiently low. On the other hand, the higher consumers' bargaining power, the more likely manufacturers switch to linear pricing. In region 2, $X < F < Y$, (between the solid and the dotted line), both (TPT/TPT) and (LT/LT) can be equilibrium outcomes and producers face a coordination game. Region 3, $Y < F \leq Z$, (above the dotted and below the dashed line) captures all (F, γ)-combinations for which (LT/LT) is the only equilibrium outcome. Above the dashed line the participation constraints for the agents are violated.

As has been shown in section 2, linear pricing is jointly preferable for manufacturers for relatively high fixed costs, because the additional profit that can be extracted using a fixed franchise fee is relatively low. Thus, producers extract more profit through higher wholesale prices and leave the agents with low but positive profits. When consumers have some bargaining power, the agents' profits are even smaller. That favors linear pricing even more.

$>$From figure 1 we see that all conditions collapse to a single point $F = 0$ if consumers have all the bargaining power $\gamma = 1$. All action profiles at stage one lead to exactly the same results when there are no fixed costs of retailing. This is also a quite intuitive result. Consumers having all the bargaining power means that the only function of the advertised prices is to attract consumers. Once consumers have incurred their transportation costs they learn the true wholesale prices. Since consumers have all the bargaining power, the eventually agree upon prices will equal wholesale prices. Thus, agents make no profit in either case and manufacturers gain from selling at relatively high wholesale prices. These turn out to be equal for franchise pricing and linear pricing.

A closer inspection of prices and profits in the equilibria with (TPT/TPT) and (LT/LT) reveals that different levels of consumers' bargaining power differently affect agents, manufacturers, and consumers. This leads to our main result:

Proposition 4 *Under consumer bargaining and ex ante unobservable wholesale prices, consumers' surplus depends upon manufacturers' equilibrium strategies in the following way: In all equilibria where manufacturers choose two-part tariffs, consumers get worse off the higher bargaining power they have. When linear tariffs are chosen by manufacturers, consumers' surplus is increasing in consumers' bargaining power.*

Proof. See the appendix. ■

Since, by assumption, all consumers are served in equilibrium, total welfare is unaffected by the division of bargaining power. Hence, the division of bargaining power only affects the division of surplus between manufacturers, agents, and consumers. With two-part tariffs the total surplus is divided between manufacturers and consumers only, since rents at the agents' level are fully extracted by the fixed fees. The surprising part of proposition 4 is that under two-part tariffs consumers loose from more bargaining power, whereas manufacturers increase their profits as consumers' increase their power.

Intuitively, one should expect exactly the opposite, namely that an increase in consumer bargaining power would increase consumers' surplus. This intuition would hold, if the agents' costs (wholesale prices) remained unchanged as consumer bargaining power increased, which is exactly what happens under linear tariffs. With linear tariffs wholesale prices are constant at $w_i^* = 3t$ whatever bargaining power consumers have. In this case, manufacturers' profits do not depend upon consumers' bargaining power. On the other hand, announced prices are also constant at $p_i^* = 4t$. Thus, whatever consumers win, agents lose. With increasing bargaining power the consumers are better off, because they get a bigger piece of a constant pie. Clearly, from $CS(LT/LT) = V - t\left(\frac{17}{4} - \gamma\right)$ we see that consumer surplus is strictly increasing in γ.

However, if an increase in consumers' bargaining power goes hand in hand with an increase in wholesale prices, as it is the case when two-part tariffs are used, we get very different results. An increase in consumers' bargaining power may indeed be harmful for the consumers' surplus. From the proof of proposition 4 we know that under two-part tariffs $w_i^* = (1 + 2\gamma)\,t$ and $p_i^* = 2t\,(1 + \gamma)$. We see that an increase in γ increases both the wholesale prices and the announced retail prices. The competitive delegation effect on wholesale prices can again be identified, but we also see that compared to the no bargaining case wholesale and announced retail prices are increased by $2\gamma t$. This is the 'bargaining effect'.

When consumers' bargaining power increases, the producers will increase their wholesale prices. The reason is that higher wholesale prices will make agents tougher when bargaining with the consumers. In addition, higher wholesale prices tend to increase the announced prices. Recall that the announced prices form a ceiling for the outcome of the bargaining.Higher ceilings tend to hurt consumers. Since p_i forms a ceiling for the negotiated price, $V - tx - p_i$ constitutes a guaranteed consumer surplus. On the other hand, $p_i - w_i$ constitutes the negotiable surplus that is divided between the agent and each consumer in accordance with the bargaining power of each party. Note that under two-part tariffs, we find $p_i - w_i = t$ such that the negotiable surplus is, again, constant. Truly, with increasing γ, consumers get a bigger share of this surplus. Note also that $\frac{\partial p_i}{\partial \gamma} = 2t$. Hence, a parallel upward shift in p_i and w_i caused by a marginal increase in γ increases the negotiable surplus by t but reduces the guaranteed surplus by $2t$. In other words, the benefits from increased ability to bargain is always outweighed by an increase in announced prices due to an increase in wholesale prices.

5 Discussion

We are able to identify two effects from delegation in our setting. First, there is a competitive delegation effect that induces firms to increase wholesale prices for strategic reasons. Higher wholesale prices will tend to increase end prices and under competition rivals tend to respond to this by increasing their prices too. This effect is independent from consumers' ability to bargain and works for both posted prices and when prices can be negotiated between consumers and agents. Second, with negotiable prices on the downstream level, a bargaining effect from delegation becomes apparent. Manufacturers will anticipate that consumers bargain at the downstream level and increase their wholesale prices in order to commit their agents to be tougher in the negotiations with consumers. As we have shown in the previous section, this may make consumers worse off when agents' costs are not observable ex ante. It turns out that the exact time when consumers learn agents' costs is potentially important in the process of retail price negotiations. As stated in proposition 4, both the competition and the bargaining effect are present when wholesale prices are ex ante unobservable. Both effects drive up wholesale prices, yielding a substantial loss in consumer surplus. But consumers do not only lose from the ability to bargain. They may indeed lose more, the higher their bargaining power is. The latter is true when manufacturers use two-part pricing. It is also true that consumers may also gain from higher bargaining power, for instance when firms use linear pricing. However in absolute terms consumers are always worse off when linear tariffs are used compared to when two-part pricing prevails. This is shown in the following result:

Proposition 5 *If agents' fixed costs are sufficiently low, such that manufacturers play (TPT/TPT) for any $\gamma \in [0,1]$, consumers' surplus is maximized for $\gamma = 0$. Moreover, for any $\gamma \in [0,1]$ consumers' surplus from (TPT/TPT) is always at least as high as under (LT/LT).*

Proof. See the appendix. ■

For the sake of illustration, consider the case $V = 5$, $F = 0.1$ and $t = 1$. Figure 2 shows consumers' surplus as a function of bargaining power for this example. The upper line represents consumers' surplus for when two-part tariffs are enforced. As γ increases consumers' surplus decreases until manufacturers enter the coordination game, represented by the upper and lower dashed line ($\gamma > 0.384$). For $\gamma > 0.506$ manufacturers will jointly switch to linear pricing (the lower line in figure 2) in which case consumers' surplus is strictly increasing with γ. Truly, once manufacturers use linear prices, consumers gain from additional bargaining power. When switching from two-part to linear tariffs, consumers' surplus drops and the gains from increased bargaining power under linear pricing are insufficient to compensate for the loss stemming from the change in tariffs. Hence, on the balance, consumers would always prefer two-part pricing. Only at $\gamma = 1$ consumers would be indifferent with respect to the pricing structure chosen by the manufacturers. However, for $\gamma = 1$ we must have $F = 0$ to have a pure strategy equilibrium. In any other case, there is a critical γ above which neither (TPT/TPT) nor (LT/LT) are equilibrium pricing arrangements. In the example above, this is the case if $\gamma > 0.777$.

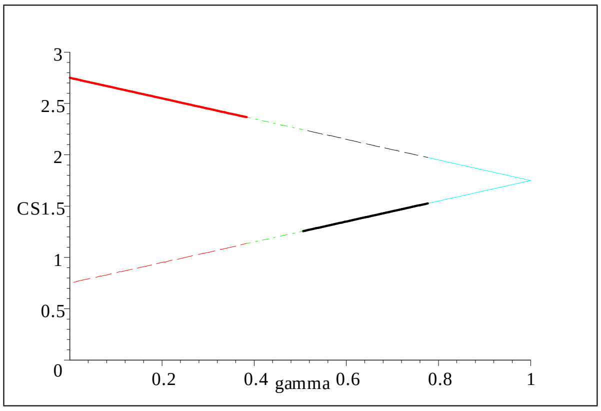

Figure 2: Consumers' surplus

Our main result depends on the ex ante unobservability of wholesale prices. When contracts are publicly observable before consumers choose their agents, consumers can calculate the exact outcome of the bargaining process from approaching a specific agent. This means that everything is as if prices were fixed, and consumers choose the agent that minimizes the sum of price and transportation costs. Thus, in this case, producers cannot gain anything by increasing wholesale prices. Higher wholesale prices would only induce agents to inflate advertised prices in response to higher consumer bargaining power, and consumers end up paying exactly the same price as when agents are able to commit not to bargain. On the other hand, when only advertised prices are observable by the consumers, they can only infer the maximum outcome of the bargaining process when they choose a store. The consumers have no other choice than choosing the store that minimizes the sum of transportation costs and advertised price. Once at an agent's location, all consumers are locked-in to their choice, as all consumers will have higher transportation costs to the rival agent. This lock-in-effect enables producers to increase wholesale prices without losing their customers. This tends to increase the level of negotiated prices, and consumers lose.

The empirical implications of our model is that we should expect to observe two-part pricing when retailing costs are relatively low and consumers have little bargaining power. On the other hand, we should find linear tariffs if fixed costs are high and consumers have non-negligible bargaining power. We think car dealing is a good example of the latter. Here fixed costs may be substantial at the retail level, linear pricing prevails and bargaining between car dealers and their customers is expected to happen. Moreover, car dealers are often exclusive dealers.

Finally, if fixed costs are very high and customers have a high degree of bargaining power, an independent dealer system would not be viable. An alternative for the manufacturers is to operate as vertically integrated firms. Therefore, let us compare our results with the benchmarks of vertically integrated firms and collusive behavior.

As we have shown in section 2, vertically integrated manufacturers price $p_i^* = t$ and earn profits of $\pi_i^P = \frac{1}{2}t - F$ if there is no bargaining. A vertically separated producer would prefer consumer bargaining if two-part pricing prevails, but what about a vertically integrated producer? We know that an integrated producer is equivalent to $w_i^* = 0$, hence there can be neither a competitive delegation effect on wholesale prices nor a bargaining effect. Being unable to change wholesale prices in response to consumer bargaining hurts producers and benefits consumers.

To see this, suppose consumers do not observe the producers' production costs. Like in the case of ex ante unobservable wholesale prices, consumers lack the information about the price floor and base their decision only upon the advertised prices. From the producers' profit functions

$$\pi_i^P = (1-\gamma)\, p_i \tfrac{1}{2} \tfrac{p_j - p_i + t}{t} - F, \qquad i \neq j; i, j = 1, 2,$$

we find the price equilibrium

$$p_i^* = t, \qquad i = 1, 2.$$

In equilibrium producers get $\pi_i^P = \frac{1}{2}t(1-\gamma) - F$, which is strictly decreasing in γ. Accordingly, consumer surplus is strictly increasing with bargaining power, $CS = V - t\left(\frac{5}{4} - \gamma\right)$. The vertically integrated producer is clearly hurt by bargaining with consumers if these are not aware of the production costs.

If, on the other hand, consumers know production costs, they anticipate the bargaining outcome correctly. Knowing this, manufacturers set the advertised prices accordingly, such that the expected bargaining outcome is $P_i = t$. Thus, bargaining has no effect in this case, as can be shown by

$$\pi_i^P = (1-\gamma)\, p_i \tfrac{1}{2} \tfrac{t+p_i-\gamma p_i - p_j + \gamma p_j}{t} - F, \qquad i \neq j; i, j = 1, 2,$$

and

$$p_i^* = \tfrac{t}{1-\gamma}, \qquad i = 1, 2,$$

which yields equilibrium profits of $\pi_i^P = \frac{1}{2}t - F$, consumer surplus of $CS = V - \frac{5}{4}t$, and the agreed upon price equals t. Of course, there is no competitive effect and no bargaining effect. Producers compensate for consumers' bargaining power by setting a higher price in the first place. Therefore, if producers can make it credible they should communicate their production costs. That allows to jointly rise advertised prices.

6 Conclusion

In this paper, we have focused on delegation effects on competition and bargaining when firms can delegate sales and negotiations with their customers to independent and exclusive agents. Previous literature has focused on delegation effects on competition in similar settings, and delegation effects on bargaining in models without competition. As far as we are aware of, our study is the first that analyses the combined effects of delegation on both the competitive outcome and the outcome of the bargaining process between agents and customers.

We find that the structure of the delegation contract and the information structure are of crucial importance for the equilibrium outcome. For tractability reasons we have assumed complete and symmetric information between the negotiating parties at the point when negotiations start. This assumption enables us to use the generalized Nash bargaining solution, which greatly simplifies our analysis. Of course, using a strategic bargaining model (Rubinstein 1982) rather than an axiomatic bargaining model would be closer to reality. On the other hand, applying a strategic bargaining model would not alter our qualitative results. In such a setting, bargaining power would be substituted by a discount factor that stands for the patience of the two parties involved. That would focus the attention on the bargaining process, but would not add any considerable new insights concerning the equilibrium strategies. Thus, as long as we operate in a full information setting, the main results in propositions 4 and 5 are still valid. In an asymmetric information setting, however, we would have to apply an appropriate bargaining model for one-sided (Grossman/Perry 1986a, 1986b; Chatterjee/Samuelson 1988) and two-sided uncertainty, respectively. We leave this extension for further research.

Concerning the delegation contract, however, we do allow for asymmetric information at an early stage of the game, i.e. customers may be unaware of an agent's delegation contract when choosing an agent to negotiate with. That information is revealed once this choice is made (late revelation). We contrast this situation with the case where the information on delegation contracts is commonly observable from the beginning (early revelation).

In our model the traditional delegation effect on competition earlier studied by Bonanno/Vickers (1988), Sklivas (1987), and others reappears. However, with bargaining and competition there is an additional motive for firms to raise wholesale prices as increased wholesale prices not only will tend to increase final prices to consumers, but also make the negotiating agents tougher in the negotiations. Our most interesting results appear under two-part pricing and when delegation contracts are ex ante unobservable for the customers. In this case, we show the ability to bargain over prices is detrimental for the final customers, and more so the higher bargaining power the consumers have. The reason is that the combined effect of delegation on competition and bargaining will tend to raise wholesale prices to a level at which consumers would be better off if they could commit not to bargain over prices.

7 Appendix: Proofs

Table A1: Fixed prices, no bargaining.

	TPT	LT
TPT	$\pi_1^P = t - F; \pi_2^P = t - F$ $\pi_1^R = 0; \pi_2^R = 0$ $p_1 = 2t; p_2 = 2t$ $w_1 = t; w_2 = t$ $\Sigma\pi = 2t - 2F$ $CS = V - \frac{9}{4}t$ $W = V - \frac{1}{4}t - 2F$	$\pi_1^P = \frac{81}{49}t - F; \pi_2^P = \frac{75}{98}t$ $\pi_1^R = 0; \pi_2^R = \frac{25}{98}t - F$ $p_1 = \frac{18}{7}t; p_2 = \frac{20}{7}t$ $w_1 = \frac{9}{7}t; w_2 = \frac{15}{7}t$ $\Sigma\pi = \frac{131}{49}t - 2F$ $CS = V - \frac{577}{196}t$ $W = V - \frac{53}{196}t - 2F$
LT	$\pi_1^P = \frac{75}{98}t; \pi_2^P = \frac{81}{49}t - F$ $\pi_1^R = \frac{25}{98}t - F; \pi_2^R = 0$ $p_1 = \frac{20}{7}t; p_2 = \frac{18}{7}t$ $w_1 = \frac{15}{7}t; w_2 = \frac{9}{7}t$ $\Sigma\pi = \frac{131}{49}t - 2F$ $CS = V - \frac{577}{196}t$ $W = V - \frac{53}{196}t - 2F$	$\pi_1^P = \frac{3}{2}t; \pi_2^P = \frac{3}{2}t$ $\pi_1^R = \frac{1}{2}t - F; \pi_2^R = \frac{1}{2} - F$ $p_1 = 4t; p_2 = 4t$ $w_1 = 3t; w_2 = 3t$ $\Sigma\pi = 4t - 2F$ $CS = V - \frac{17}{4}t$ $W = V - \frac{1}{4}t - 2F$

Proof of proposition 1:

$>$From table 1 we know that the maximum equilibrium retail price is $p_i^* = 4t$. Full market coverage requires that consumers' valuation V is higher than the posted price plus transportation costs. Since transportation costs are at most t, we find

$$V \geq 4t + t = 5t.$$

Now consider the agents' profits in the subgame starting at stage two. The participation constraint requires that agents realize non-negative profits in any subgame. Thus, from table A1 we find that $\pi_i^R = \frac{25}{98}t - F > 0$, such that $F \leq \frac{25}{98}t$. Next, for an asymmetric equilibrium the following inequalities have to be satisfied, considering manufacturer 1 playing LT and manufacturer 2 playing TPT:

$$\begin{aligned} \pi_1^P(LT, TPT) &\geq \pi_1^P(TPT, TPT), \\ \pi_2^P(TPT, LT) &\geq \pi_2^P(LT, LT). \end{aligned}$$

On the basis of our computations this can only be the case if $\frac{75}{98}t \geq t - F \wedge \frac{81}{49}t - F \geq \frac{3}{2}t$ which yields $\{\emptyset\}$. Thus, there exists no asymmetric equilibrium. Now let us turn to symmetric equilibria. In order for TPT to be a (weakly) dominant strategy,

$$\begin{aligned}
\pi_1^P(TPT,TPT) &\geq \pi_1^P(LT,TPT), \\
\pi_1^P(TPT,LT) &\geq \pi_1^P(LT,LT),
\end{aligned}$$

have to be satisfied. These inequalities hold if $F \leq \frac{15}{98}t$. On the other hand, LT constitutes an equilibrium in (weakly) dominant strategies if

$$\begin{aligned}
\pi_1^P(LT,TPT) &\geq \pi_1^P(TPT,TPT), \\
\pi_1^P(LT,LT) &\geq \pi_1^P(TPT,LT),
\end{aligned}$$

from which we find $\frac{23}{98}t < F$. By the same token, both (TPT,TPT) and (LT,LT) constitute equilibria in the medium range $\frac{15}{98}t \leq F < \frac{23}{98}t$.

Table A2: Ex ante observable wholesale prices.

	TPT	LT
TPT	$\pi_1^P = t - F; \pi_2^P = t - F$ $\pi_1^R = 0; \pi_2^R = 0$ $p_1 = t\frac{\gamma-2}{\gamma-1}; p_2 = t\frac{\gamma-2}{\gamma-1}$ $w_1 = t; w_2 = t$ $\Sigma\pi = 2t$ $CS = V - \frac{9}{4}t$ $W = V - \frac{1}{4}t - 2F$	$\pi_1^P = \frac{81}{49}t - F; \pi_2^P = \frac{75}{98}t$ $\pi_1^R = 0; \pi_2^R = \frac{25}{98}t - F$ $p_1 = \frac{9}{7}t\frac{\gamma-2}{\gamma-1}; p_2 = \frac{5}{7}t\frac{3\gamma-4}{\gamma-1}$ $w_1 = \frac{9}{7}t; w_2 = \frac{15}{7}t$ $\Sigma\pi = \frac{131}{49}t - 2F$ $CS = V - \frac{577}{196}t$ $W = V - \frac{53}{196}t - 2F$
LT	$\pi_1^P = \frac{75}{98}t; \pi_2^P = \frac{81}{49}t - F$ $\pi_1^R = \frac{25}{98}t - F; \pi_2^R = 0$ $p_1 = \frac{5}{7}t\frac{3\gamma-4}{\gamma-1}; p_2 = \frac{9}{7}t\frac{\gamma-2}{\gamma-1}$ $w_1 = \frac{15}{7}t; w_2 = \frac{9}{7}t$ $\Sigma\pi = \frac{131}{49}t - 2F$ $CS = V - \frac{577}{196}t$ $W = V - \frac{53}{196}t - 2F$	$\pi_1^P = \frac{3}{2}t; \pi_2^P = \frac{3}{2}t$ $\pi_1^R = \frac{1}{2}t - F; \pi_2^R = \frac{1}{2}t - F$ $p_1 = t\frac{3\gamma-4}{\gamma-1}; p_2 = t\frac{3\gamma-4}{\gamma-1}$ $w_1 = 3t; w_2 = 3t$ $\Sigma\pi = 4t - 2F$ $CS = V - \frac{17}{4}t$ $W = V - \frac{1}{4}t - 2F$

Proof of proposition 2:

Part one of proposition 2 can be easily shown by comparing table 1 and table 2. Retail prices p_i^* equal prices in the no bargaining case only if consumers have no bargaining power. To see this we set $\gamma = 0$ and find

$$\begin{aligned}
p_i(TPT,TPT) &= 2t, & i &= 1,2, \\
p_i(LT,LT) &= 4t, & i &= 1,2, \\
p_1(TPT,LT) &= \tfrac{18}{7}t; & p_2(TPT,LT) &= \tfrac{20}{7}t, \\
p_1(LT,TPT) &= \tfrac{20}{7}t; & p_2(LT,TPT) &= \tfrac{18}{7}t,
\end{aligned}$$

which equal prices in table A2. In any other case, retail prices are strictly increasing with γ.

Table A3: Ex ante unobservable wholesale prices.

	TPT	LT
TPT	$\pi_i^P = \frac{1}{2}t(\gamma+2) - F$ $\pi_i^R = 0$ $p_i = 2t(1+\gamma)$ $w_i = (1+2\gamma)t$ $\Sigma\pi = t(\gamma+2) - 2F$ $CS = V - t\left(\frac{9}{4}+\gamma\right)$ $W = V - \frac{1}{4}t - 2F$	$\pi_1^P = \frac{81}{2}t\frac{2+\gamma}{(7+2\gamma)^2} - F$ $\pi_2^P = \frac{3}{2}t\frac{(5+4\gamma)^2}{(7+2\gamma)^2}$ $\pi_1^R = 0$ $\pi_2^R = \frac{1}{2}t(1-\gamma)\frac{(5+4\gamma)^2}{(7+2\gamma)^2} - F$ $p_1 = 18t\frac{1+\gamma}{7+2\gamma}; p_2 = 4t\frac{5+4\gamma}{7+2\gamma}$ $w_1 = 9t\frac{1+2\gamma}{7+2\gamma}; w_2 = 3t\frac{5+4\gamma}{7+2\gamma}$ $\Sigma\pi = t\frac{131+108\gamma+12\gamma^2-8\gamma^3}{(7+2\gamma)^2} - 2F$ $CS = K$ $W = V - \frac{1}{4}t\frac{53+20\gamma+8\gamma^2}{(7+2\gamma)^2} - 2F$
LT	$\pi_1^P = \frac{3}{2}t\frac{(5+4\gamma)^2}{(7+2\gamma)^2}$ $\pi_2^P = \frac{81}{2}t\frac{2+\gamma}{(7+2\gamma)^2} - F$ $\pi_1^R = \frac{1}{2}t(1-\gamma)\frac{(5+4\gamma)^2}{(7+2\gamma)^2} - F$ $\pi_2^R = 0$ $p_1 = 4t\frac{5+4\gamma}{7+2\gamma}; p_2 = 18t\frac{1+\gamma}{7+2\gamma}$ $w_1 = 3t\frac{5+4\gamma}{7+2\gamma}; w_2 = 9t\frac{1+2\gamma}{7+2\gamma}$ $\Sigma\pi = t\frac{131+108\gamma+12\gamma^2-8\gamma^3}{(7+2\gamma)^2} - 2F$ $CS = K$ $W = V - \frac{1}{4}t\frac{53+20\gamma+8\gamma^2}{(7+2\gamma)^2} - 2F$	$\pi_i^P = \frac{3}{2}t$ $\pi_i^R = \frac{1}{2}t(1-\gamma) - F$ $p_i = 4t$ $w_i = 3t$ $\Sigma\pi = t(4-\gamma) - 2F$ $CS = V - t\left(\frac{17}{4}-\gamma\right)$ $W = V - \frac{1}{4}t - 2F$

with $K = \frac{49V+28V\gamma-131t-108t\gamma+4V\gamma^2-12t\gamma^2+8t\gamma^3}{(7+2\gamma)^2} - \frac{1}{4}t\frac{53+20\gamma+8\gamma^2}{(7+2\gamma)^2}$.

Proof of proposition 3:

This proof follows the proof of proposition 1. Again, the maximum equilibrium retail price is $p_i^* = 4t$. Full market coverage requires that consumers' valuation V is higher than the posted price plus transportation costs. Since transportation costs are at most t, we find

$$V \geq 4t + t = 5t.$$

The participation constraint requires that agents realize non-negative profits in any subgame. Thus, from table A3 we find $\pi_i^R = \frac{1}{2}t(1-\gamma)\frac{(5+4\gamma)^2}{(7+2\gamma)^2} -$

$F > 0$, such that $F \leq \frac{1}{2}t(1-\gamma)\frac{(5+4\gamma)^2}{(7+2\gamma)^2} = Z$. Next, for an asymmetric equilibrium the following inequalities have to be satisfied, considering manufacturer 1 playing LT and manufacturer 2 playing TPT:

$$\begin{aligned}
\pi_1^P(LT, TPT) &\geq \pi_1^P(TPT, TPT), \\
\pi_2^P(TPT, LT) &\geq \pi_2^P(LT, LT).
\end{aligned}$$

This can only be the case if $\frac{3}{2}t\frac{(5+4\gamma)^2}{(7+2\gamma)^2} > \frac{1}{2}t(\gamma+2) - F \wedge \frac{81}{2}t\frac{2+\gamma}{(7+2\gamma)^2} - F > \frac{3}{2}t$ which yields $\{\emptyset\}$. Thus, there exists no asymmetric equilibrium. Now let us turn to symmetric equilibria. In order for TPT to be a (weakly) dominant strategy,

$$\begin{aligned}
\pi_1^P(TPT, TPT) &\geq \pi_1^P(LT, TPT), \\
\pi_1^P(TPT, LT) &\geq \pi_1^P(LT, LT),
\end{aligned}$$

have to be satisfied. These inequalities hold if $F \leq \frac{3}{2}t\frac{5-\gamma-4\gamma^2}{49+28\gamma+4\gamma^2} = X$. On the other hand, LT constitutes an (weakly) dominant strategy if

$$\begin{aligned}
\pi_1^P(LT, TPT) &\geq \pi_1^P(TPT, TPT), \\
\pi_1^P(LT, LT) &\geq \pi_1^P(TPT, LT),
\end{aligned}$$

from which we find $F \geq \frac{1}{2}t\frac{23-15\gamma-12\gamma^2+4\gamma^3}{49+28\gamma+4\gamma^2} = Y$. By the same token, both (TPT, TPT) and (LT, LT) constitute equilibria in the medium range $Y = \frac{1}{2}t\frac{23-15\gamma-12\gamma^2+4\gamma^3}{49+28\gamma+4\gamma^2} < F < \frac{3}{2}t\frac{5-\gamma-4\gamma^2}{49+28\gamma+4\gamma^2} = X$.

Proof of proposition 4:

The proof follows directly from table A3. In equilibrium (TPT, TPT) agreed upon prices P_i are given by

$$P_i(TPT, TPT) = t(2+\gamma),$$

hence, we find consumers' surplus CS to be

$$\begin{aligned}
CS(TPT, TPT) &= \int_0^{\frac{1}{2}} (V - tx - (t(2+\gamma)))\,dx \\
&\quad + \int_{\frac{1}{2}}^1 (V - t(1-x) - (t(2+\gamma)))\,dx, \\
\Longrightarrow &\ CS(TPT, TPT) = V - t\left(\tfrac{9}{4}+\gamma\right),
\end{aligned}$$

which obviously is strictly decreasing with γ. Accordingly, in equilibrium (LT, LT) we have

$$P_i(LT, LT) = t\,(4-\gamma)\,,$$

hence, we find consumers' surplus CS to be

$$\begin{aligned} CS(LT, LT) &= \int_0^{\frac{1}{2}} (V - tx - (t\,(4-\gamma)))\,dx + \int_{\frac{1}{2}}^1 (V - t\,(1-x) - (t\,(4-\gamma)))\,dx, \\ &\Longrightarrow\ CS(LT, LT) = V - t\left(\tfrac{17}{4} - \gamma\right), \end{aligned}$$

which is strictly increasing with γ.

Proof of proposition 5:
>From table A3 we find immediately

$$\arg\max_{\gamma} CS(TPT/TPT) \Longrightarrow \gamma = 0,$$

and

$$CS(TPT/TPT) > CS(LT/LT)\ \forall\,\gamma \in [0, 1).$$

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