

Contracting versus Bypassing*

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Abstract

One existing distributor controls the existing access to end users. There are one incumbent producer and one potential entrant, both with a potential for bypassing the distributor. We find that the distributor always signs a contract with the producer that leads to the highest industry profits, a choice that can be detrimental to welfare. The contracting producer earns more than the profit it would have earned if it bypassed. We show how the contracting producer's profit is influenced by (1) its market share if it had bypassed, (2) the rivalry it would have triggered if bypassing, and (3) the rival producer's costs of bypassing.

Key words: bypass, contract, investment cost, competition, entry

JEL classification: L14, L22, L95, L96

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1 Introduction

In many industries a downstream firm has a dominant position, since it controls the access to the consumers. The dominant downstream firm can be an owner of a network in industries such as gas, electricity or telecommunication. Alternatively, it can be an owner of a marketing activity towards end users. Often, though, the control is not absolute. The producers can bypass the downstream firms by selling directly to the consumers. Producers can build their own network or establish their own marketing activities. The purpose of this paper is to investigate how the option to bypass influences which firm the distributor sign a contract with. We investigate how the profit potential when bypassing as well as the costs of bypassing for a producer affects the division of profits between producers and downstream firms.

There are numerous examples of bypassing, for example in deregulated industries. Bypass is often mentioned as an option in telecommunications.¹ However, it is also an important topic in the gas market. One example is Nova Gas in New Zealand, who challenged the existing seller Australian Gas Light (AGL) (see Martin, 2002). Nova Gas wrote contracts with several large local customers of AGL, and then built a pipeline that run in parallel to the existing AGL pipeline. The potential for bypass, although in a less drastic way, is also discussed in the US gas market. An end user and a producer can write a contract, and bypass some of the services initially offered by the network companies.²

Another example is the gas market in Europe, which historically has been heavily regulated.³ The EU Commission recently introduced new rules that may change the existing market structure quite dramatically. One important element in the new regulatory regime is that producers are able to contract directly with end users. Will producers then establish their own marketing

¹For a policy oriented discussion of bypass in telecommunication, see for example Small (2000). See also Curien *et al.* (1998), where the option to bypass in telecommunication is the motivation for their particular modelling of price regulation.

²See for example Michaels (2003), who discuss natural gas regulation in the US. He writes: '*An industrial firm might buy gas from a producer, use an interstate pipeline to transport it to the city gate (currently legal), and then use local distribution facilities (LDC) for the final miles. Some state regulators have tried to prohibit such bypass of full LDC service, in hopes of perpetuating a rate regime in which industrial consumers cross-subsidize residential customers.*' (p. 5)

³At present, there are large differences between countries. On the one hand, the liberalization of the UK market for natural gas started already in the 80s. For example, in 1989 the gas producers were allowed to sign contracts directly with industrial users. On the other hand, the natural gas market in France is still dominated by Gas de France. In March 2002 EU decided that from 2004 and onwards gas producers should be allowed to sign contracts directly with industrial users.

activities towards end users rather than let the existing distributor sell to the end users?⁴ Furthermore, it is still an open question whether new pipelines can be built that makes it possible to bypass an existing distributor.⁵

With a few notable exceptions, there are no studies of bypass.⁶ To capture the mechanisms at work when bypass is an option, we consider a simple setting with one existing producer (incumbent), a potential producer (entrant) and an existing distributor. Either the incumbent or the potential entrant signs a contract with the distributor, while the other producer (with no contract with the distributor) may bypass by selling directly to some of the final users.⁷ We assume that the incumbent has made an investment that connects him to the existing distributor, and that the distributor has made the sunk investment that connects him to all the end users. Furthermore, we assume that the incumbent and the potential entrant are producing identical products. If either firm decide to bypass, additional investments must be made by the bypassing firm. In the case of contracting with the existing distributor, only the entrant will have to incur extra investments.

As a benchmark we consider the case where neither the incumbent nor the potential entrant has any outside option (bypass is ruled out). Since the two producers sell identical products, a second producer cannot generate any incremental industry profit. By pitting the producers against each other, the distributor is able to extract a substantial fraction of the rent in the industry.

⁴One example is Statoil. In Britain it has established its own marketing firm, Alliance Gas, that coordinates sales to industrial buyers. Bypassing a distributor's marketing activities may be an option in other countries as well. For example, should it bypass Gas de France in the french market?

⁵One example is the so-called Yamal-2 pipeline connecting Kondratki (Poland) and Velke Kapuzany (Slovakia), which would allow gas producers from Russia to bypass Ukraine (see Cholet *et al.*, 2001).

⁶Mathewson and Winter (1997) analyse the incentive for buyers and sellers to bypass a market outcome. Their study is mainly concerned with the incentive for collective bargaining, an issue not raised in our study. See also Aghion and Bolton (1987), who analyse how contracts between an incumbent seller and buyers can be used to deter a potential seller. In their study, though, bypass is not an option. Concerning bypass and regulation, see Laffont and Tirole (1990) and Curien *et al.* (1998). Their main concern is optimal price regulation of the network operator, an issue we do not consider in our setting.

⁷Note that we rule out the alternative where the distributor serves both producers (common agency). By allowing for more than one producer serving the distributor would not change the mechanisms at work as long as we have more producers than the one served by the distributor. Moreover, when the producers have access to alternative distribution, models of common agency find that the distributor may earn low and even zero profits in a common agency equilibrium. For details, see Bernheim and Whinston (1985) and Gabrielsen (1997). For modelling of common agency, where several producers share facilities, see Gabrielsen (2003).

In such a setting it is quite obvious that the distributor and the incumbent writes a contract, and the potential entrant is deterred. The competition for serving the distributor will force the incumbent to offer a contract such that the potential entrant is indifferent between competing with this contract and staying out of the market. The outcome entails that the incumbent is able to extract a profit exactly equal to the entrant's investment costs associated with connecting him to the distributor, while the remaining profit is extracted by the distributor. It is notable that when bypass is ruled out the producer with the lowest investment costs offers the distributor the most favorable terms and wins the contract.

Next we extend the model by assuming that the incumbent, but not the potential entrant, has an outside option. If the incumbent does not sign a contract with the distributor, he will bypass and serve some end users directly. We show that even if the incumbent has an outside option and can bypass by making an infinitesimal small investment, it will always sign a contract with the distributor. By doing so the distributor and the incumbent will ensure that profits is not competed away in the end user market, since the potential entrant is deterred. Now the incumbent can extract an additional gain. It is equal to the profits the distributor would have lost if the incumbent had chosen to bypass.

If only the potential entrant has an outside option, then the incumbent will be foreclosed. This will be true despite the fact that the incumbent has made a sunk investment so that it is connected to the existing distributor. In fact, the incumbent will be foreclosed even if it is willing to sell at marginal cost and with zero fixed fee. The driving force is that the distributor will prevent bypassing if it signs a contract with the potential entrant, and thereby avoids profit loss due to competition in the downstream market. This is good for industry profits, but disadvantageous from an anti-trust perspective. Bypassing is blockaded in equilibrium, and then there is no competition in the downstream market.

Note that in both previous outcomes, where either the incumbent or the entrant has an outside option, the producer with the outside option earns more in the equilibrium outcome than what would have been the case if the outside option in fact had been realized. The producer with the outside option may always offer a contract that makes the distributor weakly prefer his product. This implies that the alternative to a contract with the firm with an outside option is for the distributor to trigger bypassing and thereby incur a profit loss. The producer with an outside option can then take this into account and present a contract where he extracts more profits than what he would have earned if he bypassed. Put differently, the producer with an outside option exploits the fact that it has a credible threat point: signing

no contract with him would trigger competition in the downstream market.

We extend the model further by assuming that both firms have viable outside options. Obviously, in such a case one of the producers will bypass in equilibrium. In our basic model we find that the producer with the highest cost of bypassing will contract with the distributor and the firm with the lowest bypassing cost will bypass.

It is no surprise that the producer that have highest costs of bypassing will be willing to sacrifice most to obtain a contract with the distributor. More surprisingly, though, is the fact that a producer's potential for capturing market shares when bypassing does not play a role. Why would not the distributor want to contract with a firm with a large potential for capturing market shares when bypassing, thereby avoiding a large market share reduction? The reason is that the distributor has to compensate the contracting producer for what it would have earned if it had bypassed. A producer with a large potential for capturing market shares must therefore receive a large payment from the distributor to prefer contracting over bypass.

We also find that the 'insider', *i.e.* the firm that contracts with the distributor, earns more than his outside option. This is always true, also when the insider has a less favorable outside option than the firm that ends up bypassing. In the latter case, the firm with low fixed costs of bypassing bypasses and (by definition) receives its outside option, thereby creating a gain for the industry that is totally accrued by his rival. In fact, we find that the contracting producer can be better off if the rival producer faces lower costs of bypassing. The reason is that lower costs of bypassing would encourage the rival producer to bid less aggressively for the contract, which in turn allows the producer that actually writes a contract to bid less aggressively as well.

Finally, we extend the model by letting the total industry profits when bypassing takes place (duopoly profits) be influenced by the bypassing firm's market share. The reason can be that if the bypassing firm captures a large market share, this may lead to fierce competition. We then show that the bypassing firm's market share as such does not have any impact on which firm the distributor writes a contract with. This is in line with the above referred results, and implies that a firm with a large market potential does not more often sign a contract with a distributor. However, we find that the market share indirectly can play a role, because the market share can affect total industry profits. If this is true, the distributor and the producer with a large market share potential will both be interested in avoiding bypass that may trigger intense rivalry. Consequently, these parties may still end up signing a contract, even if the contracting producer has lower costs of bypassing than the other producer. The equilibrium outcome is the one that ensures

the highest net industry profits. Since the producer is the one presenting a take-it-or-leave-it contract, it exploits the situation by extracting the loss of profits the distributor would have experienced if this particular producer had bypassed. However, anti-trust authorities should be concerned since the distributor - all else equal - will sign a contract with the one that would have led to fierce competition if it bypassed.

The article is organized as follows. In Section 2 we present our setting and set up our model. The equilibrium outcomes for different outside option alternatives are presented in Section 3. In Section 4 we offer some concluding remarks.

2 The model

In the market there are two upstream producers, denoted by firm 1 and 2, and one downstream distributor denoted by D . One of the upstream firms, firm 1, is an incumbent. The incumbent has invested in infrastructure that connects him with the distributor and these costs are sunk. The distributor on his side has made sunk investments that connects him with all final consumers. The second upstream firm, firm 2, is a potential entrant that can access the market in one of two ways. He can make a sunk investment E to connect to the distributor or he can make an investment $E + I_2$ to access a part of the market outside the existing distributor (bypass). The existing distributor can at most sign a contract with one of the upstream firms. If the entrant contracts with D , the incumbent must invest I_1 in order to establish an alternative distribution channel. If the incumbent is awarded the contract with D , there is no investment to be made by 1 and D , as these investments are already made and sunk. If we were to use an example from the gas market it may be useful to think of E as the pipeline to the market, and I_i as the cost of building distributive facilities from the pipeline/beach terminal to the end users. Note, though, that the bypass investment can also be interpreted as - for example - investment in a marketing firm that replaces the distributor's marketing activities towards the end users.

Figure 1 approximately here

We assume that the two producers are offering a homogeneous product. The benchmark situation is when the market is served by one single producer, illustrated in Figure 1 by the unbroken arrows. Since products are homogeneous, the gross industry profit does not depend on who the monopolist producer is. Let π^m denote the gross industry monopoly profit. The dotted arrows in Figure 1 illustrates the bypass possibilities for each upstream firm.

When one of the upstream firms signs a contract with D , and the other bypasses by investing, the market is a duopoly. Under duopoly the gross *aggregate* industry profit is denoted by π^d .⁸ Since products are identical, there is no market expansion effect when two rather than one firm are active in the market. On the other hand, duopoly typically leads to a more competitive outcome with lower gross profits, hence we have that $\pi^m > \pi^d$. Furthermore, let π_i denote the profits of firm i , where $i = 1, 2, D$.

If a firm bypasses, it no longer sells through the established distributor. This implies that the firm bypassing the downstream firm must capture market shares. Some consumers are assumed to be loyal to the downstream firm. To take into account that market shares may differ, we let γ_i denote the market share of firm i , where $i = 1, 2$, when firm i bypasses the existing distributor. In this case the other firm that signs a contract with the distributor achieves a market share of $1 - \gamma_i$. For example, if firm 1 bypasses then the gross profits of firm 1 is $\gamma_1 \pi^d$ while the combined gross profits for D and firm 2 is $(1 - \gamma_1) \pi^d$. We assume that $\gamma_1 + \gamma_2 < 1$. We denote the outside option for firm i by π_i^o . For firm 1 we have that $\pi_1^o = \gamma_1 \pi^d - I_1$ and for firm 2 $\pi_2^o = \gamma_2 \pi^d - I_2 - E$.

Finally, we assume that upstream firms offer unobservable two-part tariffs. Since we have normalized marginal costs to zero, the unobservability assumption implies that price per unit is also set equal to zero in the contract. A contract between firm i and D is then simply a fixed payment T_i to be made from the distributor to the producer.

The timing of events is as follows:

Stage 1: The incumbent and the entrant offers a contract T_i , $i = 1, 2$, to the downstream firm.

Stage 2: Firm D chooses one or none of the contracts.

Stage 3: If 2 signs a contract with D , it invests E , in which case firm 1 decides whether to invest I_1 or not. If 1 signs a contract with D , firm 2 decides whether to invest $E + I_2$ or not. If no firm bypasses there is a monopoly with profit π^m , and if one of the firms bypasses there is a duopoly with aggregate profit of π^d .

3 The equilibrium outcome

We now derive the equilibrium outcomes depending on the parameters of our model. The investment level is crucial for the outside option for firm 1 and

⁸Note that we assume that the duopoly profit is by assumption not influenced by the market share of the bypassing firm. We relax this assumption later on.

2. We start with the simpler case when firms have no outside options. This is true when I_i is sufficiently high. Then we have the following result:

Proposition 1 *Suppose that $\pi_i^o < 0$ for $i = 1, 2$. If i) $E > \pi^m$ entry is blockaded and $\pi_1 = \pi^m$ and $\pi_2 = \pi_D = 0$. If ii) $E < \pi^m$ entry is deterred and $\pi_1 = E$, $\pi_2 = 0$, and $\pi_D = \pi^m - E$.*

Proof. If $E > \pi^m$ the entrant cannot offer D a profitable contract since the maximum profit is less than the investment the entrant must make to access the distributor. Since the firms can offer take-it-or-leave-it offers, then firm 1 obviously offers $T_1 = \pi^m$. When $E < \pi^m$, the entrant will offer a contract such that $T_2 \geq E$ and the incumbent such that $T_1 \geq 0$. If $T_1 > T_2 > E$, D would choose T_2 and 1 would be out of the market. This cannot be an equilibrium since 1 would wish to lower T_1 . The same would apply if $T_1 > T_2 = E$ is offered. Hence in equilibrium the firms will offer $T_2 = T_1 = E$, and D will choose T_1 . Actually, D will be indifferent in this case, but as a tie-break assumption we assume that when indifferent D always chooses the incumbent. QED. ■

Since the two upstream firms offer identical products, a second product does not generate any incremental industry profit. If E is larger than the monopoly profit, the entrant can never enter and expect to earn a positive profit. Therefore, the incumbent firm and the distributor can jointly earn the monopoly profit. Since the incumbent firm can offer take-it-or-leave-it contracts, he will be able to extract the entire monopoly profit. When entry is not blockaded, the distributor has an alternative supplier. By pitting the suppliers against each other, the distributor is able to earn some rent. Since the entrant will compete for access to the distributor's asset until it barely covers his investment cost E , the incumbent firm will match such a contract and earn marginally less than E .

Note that the only equilibrium outcome is that the distributor signs a contract with the incumbent firm. It is also worth noting that when the upstream firms have no outside options it is the firm with the lowest investment costs that are willing to offer the distributor the best terms, and therefore wins the competition for access to the distributor's asset.

From now on we will assume that entry is not blockaded, i.e. $E \leq \pi^m$, and that at least one of the upstream firms has a positive outside option. First, consider the case where only the incumbent has a non-negative outside option. If so we have the following result:

Proposition 2 *Suppose that $\pi_1^o \geq 0$ and $\pi_2^o < 0$. Entry is always deterred and equilibrium profits are $\pi_D = (1 - \gamma_1)\pi^d - E$, and $\pi_1 = \pi^m - (1 - \gamma_1)\pi^d + E > \pi_1^o$.*

Proof. Obviously, since firms require non-negative profits, the contracts offered to D must satisfy:

$$\begin{aligned} T_1 &\geq \gamma_1 \pi^d - I_1 \\ T_2 &\geq E. \end{aligned}$$

Suppose 2 offers $T_2 = E$. If the incumbent does not match this contract and D accepts the contract of the entrant, the distributor will earn $\pi_D = (1 - \gamma_1)\pi^d - E$. Therefore, if the incumbent should match this contract, T_1 must satisfy

$$\begin{aligned} \pi^m - T_1 &\geq (1 - \gamma_1)\pi^d - E \\ &\Downarrow \\ T_1 &\leq \pi^m - (1 - \gamma_1)\pi^d + E \end{aligned}$$

When this inequality holds with equality, the incumbent is accepted. Then the incumbent earns more than his outside option if $\pi^m - (1 - \gamma_1)\pi^d + E \geq \gamma_1 \pi^d - I_1 \iff \pi^m + \pi^d \geq -I_1 - E$ which always holds, hence the incumbent will always match the entrant's best contract, and entry is deterred. In this equilibrium, the distributor earns $\pi_D = \pi^m - T_1 = \pi^m - (\pi^m - (1 - \gamma_1)\pi^d + E) = (1 - \gamma_1)\pi^d - E$, and the incumbent earns $\pi_1 = T_1 = \pi^m - (1 - \gamma_1)\pi^d + E$. QED. ■

When the entrant has no outside option, he will be willing to offer the distributor a very beneficial contract to obtain access to the market. However, as it turns out, the incumbent firm will always match the entrant's offer. The intuition is as follows. The best contract the entrant will offer is one that enables the entrant to cover his investment cost E . The incumbent firm can either match this contract or go for his outside option by investing I_1 . The benefit of matching the entrant's contract for the incumbent is i) that the monopoly profit can be realized, ii) the investment I_1 is saved, and iii) more profit can be extracted from the distributor. The latter is due to the fact that the alternative for the distributor is to sign a contract with the entrant and earn a fraction of the duopoly profit minus the entrant's investment cost E .

Now, let us turn to the case where the incumbent has no outside option, but the entrant has. Then we have the following result:

Proposition 3 *Suppose that $\pi_1^o < 0$ and $\pi_2^o \geq 0$. Then, the incumbent is always deterred and equilibrium profits are $\pi_D = (1 - \gamma_2)\pi^d$, and $\pi_2 = \pi^m - (1 - \gamma_2)\pi^d - E > \pi_2^o$.*

Proof. The contracts offered to D must obviously satisfy:

$$\begin{aligned} T_1 &\geq 0 \\ T_2 &\geq \gamma_2 \pi^d - I_2 - E. \end{aligned}$$

Suppose 1 offers $T_1 = 0$. If D accepts this contract he will earn $\pi_D = (1 - \gamma_2)\pi^d$. Therefore, if the entrant should match this contract T_2 must satisfy

$$\begin{aligned} \pi^m - T_2 &\geq (1 - \gamma_2)\pi^d \\ &\Updownarrow \\ T_2 &\leq \pi^m - (1 - \gamma_2)\pi^d \end{aligned}$$

When this holds with equality, the entrant is accepted. The entrant earns more than his outside option when $\pi^m - (1 - \gamma_2)\pi^d - E \geq \gamma_2 \pi^d - I_1 - E \iff \pi^m - \pi^d \geq -I_2$ which always holds, hence the entrant will always match the incumbent's best offer, and the incumbent is deterred. The distributor earns $\pi_D = \pi^m - T_2 = \pi^m - (\pi^m - (1 - \gamma_2)\pi^d) = (1 - \gamma_2)\pi^d$, and the entrant earns $\pi_2 = T_2 - E = \pi^m - (1 - \gamma_2)\pi^d - E$. QED ■

As in Proposition 2, the firm with no outside option is foreclosed from the market. In this case when the incumbent has no outside option, the entrant always outbids him for access to the existing distributor. It is interesting to note that under the conditions of Proposition 3 foreclosure of the incumbent occurs even if the incumbent is willing to give the distributor his product for free. The basic intuition is as above: The benefits of foreclosure is that the monopoly profit can be achieved and investments can be saved. Moreover, since the alternative for the distributor is to earn a share of the duopoly profit in a relation with the incumbent, the entrant can extract more profit from the distributor in this case than when no firms have an outside option.

Intuitively, one should think that the distributor could be able to keep the upstream firms at their reservation level. However, as it turns out the upstream firm that are able to foreclose his rival always earns strictly more than his outside option. The intuition is that the producer's threat point would be to bypass and thereby trigger competition downstream. Since a producer do in fact has an outside option, a threat of bypassing will be credible if the distributor decides not to sign a contract with him and then potentially forecloses him from the market.

Note that in the case where only one firm has an outside option, the distributor chooses the configuration that yields the highest net industry profit. As bypassing would induce competition in the industry as well as costs for the bypassing firm, net industry profits are maximized when no firm bypasses.

Our results so far seem to suggest that if a firm has high costs of obtaining alternative access, this firm will lose in a contest for access to the existing distributive facility. The distributor signs a contract with the firm with a feasible outside option, and the other firm with a prohibitively high outside option is foreclosed from the market. However, we have so far only considered the case where one of the firms had a positive outside option. We now turn to the more interesting case where both firms have positive outside options, *i.e.*, both firms can bypass the distributor and make positive profit. It then turns out that the equilibrium outcome depends on the relative size of the investments that the two upstream firms have to make to gain alternative access to consumers.

Proposition 4 *Suppose that $\pi_i^o \geq 0$, $i = 1, 2$. Then, i) if $I_1 \geq E + I_2$ the incumbent and D signs a contract and the entrant bypasses. The equilibrium profits are:*

$$\begin{aligned}\pi_1 &= \gamma_1 \pi^d - I_2 - E > \pi_1^o \\ \pi_2 &= \gamma_2 \pi^d - I_2 - E = \pi_2^o \\ \pi_D &= (1 - \gamma_1 - \gamma_2) \pi^d + I_2 + E.\end{aligned}$$

ii) If $I_1 < E + I_2$ the entrant and D signs a contract and the incumbent bypasses. The equilibrium profits are:

$$\begin{aligned}\pi_1 &= \gamma_1 \pi^d - I_1 = \pi_1^o \\ \pi_2 &= \gamma_2 \pi^d - I_1 > \pi_2^o \\ \pi_D &= (1 - \gamma_1 - \gamma_2) \pi^d + I_1.\end{aligned}$$

Proof. The contracts offered to D must obviously satisfy:

$$\begin{aligned}T_1 &\geq \gamma_1 \pi^d - I_1 \\ T_2 &\geq \gamma_2 \pi^d - I_2 - E.\end{aligned}$$

Suppose 2 offers $T_2 = \gamma_2 \pi^d - I_2 - E$. Accepting the offer from the entrant the distributor earns $\pi_D = (1 - \gamma_1) \pi^d - (\gamma_2 \pi^d - I_2 - E) = (1 - \gamma_1 - \gamma_2) \pi^d + I_2 + E$. If the incumbent should match this offer T_1 must satisfy:

$$\begin{aligned}(1 - \gamma_2) \pi^d - T_1 &\geq (1 - \gamma_1 - \gamma_2) \pi^d + I_2 + E \\ &\Downarrow \\ T_1 &\leq \gamma_1 \pi^d - I_2 - E\end{aligned}$$

When this holds with equality, the incumbent will be accepted by D . The incumbent earns more than his outside option when $\gamma_1 \pi^d - I_2 - E \geq \gamma_1 \pi^d -$

$I_1 \iff I_1 \geq E + I_2$. Hence when this inequality holds, the incumbent will sign a contract with D . Then the distributor earns $\pi_D = (1 - \gamma_2) \pi^d - T_1 = (1 - \gamma_2) \pi^d - (\pi^d \gamma_1 - I_2 - E) = (1 - \gamma_1 - \gamma_2) \pi^d + I_2 + E$, the entrant earns his outside option $\pi_2 = \gamma_2 \pi^d - I_2 - E$, and the incumbent earns $\pi_1 = T_1 = \pi^d \gamma_1 - I_2 - E$.

When $T_1 \geq \gamma_1 \pi^d - I_1$ binds and the distributor accepts this contract, the distributor earns $\pi_D = (1 - \gamma_2) \pi^d - (\gamma_1 \pi^d - I_1) = (1 - \gamma_1 - \gamma_2) \pi^d + I_1$. In order to match this contract, 2 must offer T_2 such that:

$$\begin{aligned} (1 - \gamma_1) \pi^d - T_2 &> (1 - \gamma_1 - \gamma_2) \pi^d + I_1 \\ &\Updownarrow \\ T_2 &< \gamma_2 \pi^d - I_1 \end{aligned}$$

This is a profitable strategy for the entrant if $\gamma_2 \pi^d - I_1 > \gamma_2 \pi^d - I_2 - E \iff I_1 < I_2 + E$. QED. ■

Note that it is solely the cost of bypassing the retailer that determines which firm will contract with the distributor in equilibrium. When the incumbent has the highest cost of bypassing the distributor, he will be willing to offer D the most favorable contract, and vice versa when the entrant faces the highest investment cost.

We thus find that gross benefit of bypassing, i.e. $\gamma_i \pi^d$, has no bearing whatsoever on which firm will bypass. The reason for such an apparently counter-intuitive result is that these benefits will be reflected in the contract with the distributor, and the distributor will thus be hurt irrespective of whether this producer bypasses or not. If one firm has a large gross profit outside option, it will receive this large gross profit either directly through bypassing or indirectly through favorable terms in the contract with the distributors if no bypassing. Put differently, the distributor will face identical costs associated with a particular producer: either it loses from forcing the producer to bypass, or it pays the producer an amount in the contract that reflects the loss associated with bypassing by this producer.

It is also interesting to note that the upstream firm that contracts with the distributor always earns strictly more than his outside option, whereas the bypassing firms (of course) earns exactly his outside option. To understand this, note that a producer with a high investment cost associated with bypassing will always bid aggressively for winning the contract with the distributor. The lower investment cost the rival has with bypassing the less aggressive the high cost producer must bid to win the contract. Hence, the producer with the high investment costs associated with bypassing earns a larger profit the lower the bypassing producer's investment costs are. Put differently, a producer with high investment costs associated with bypassing

capture more rent in the industry the more favorable bypassing is for the other producer.

Also, comparing the results in Proposition 4 with the ones in Propositions 2 and 3, where only one firm could bypass, reveals that now the upstream firm with the *highest* investment cost wins the battle for the existing distributor. When only one firm could bypass, the result was exactly the opposite; the firm with the lowest investment would win and foreclose its rival with prohibitively high investment costs. The difference is due to the fact that now one of the two producers will bypass, and it turns out that the one that bypasses is the one with the lowest investment costs associated with bypassing. It implies that in both cases, whether either one or both have an outside option, the distributor picks the one that leads to the highest industry profits.

We can summarize by considering how differences in relative costs between the incumbent and the entrant changes the division of profits between the players. In Figure 2 we have illustrated how profits to the incumbent, the entrant and the existing distributor depends on the entrant's entry cost E .

Figure 2 approximately here

The regimes i and ii replicate cases i and ii in Proposition 4, respectively, while regime iii replicates the case reported in Proposition 2. Note that in the intermediate regime (regime ii) a change in E has no effect on the division of profits between the three players. The reason is that in this case the entrant does not bypass, and so the entrant's entry cost is not a binding constraint. In regime iii , though, an increase in E would shift profits from the distributor to the incumbent. The intuition is that the distributor has a less viable alternative the higher the entrant's entry cost.

In regime i , we see that the entrant's profits is decreasing in its own entry cost. This is no surprise. More surprisingly, though, is the fact that also the incumbent's profit is decreasing in the entrant's entry cost. This is the opposite of what was the case in regime iii . How could it be that the incumbent gains from a high investment cost for the entrant? The intuition is that in this regime the bypassing producer (the entrant) does not bid aggressively for a contract with the distributor if it has a low cost associated with bypassing. It knows that it has a low cost bypass alternative, and the incumbent wins the contract with the distributor at a favorable price.

Throughout the analysis we have assumed that the duopoly profit is not influenced by the market share of the bypassing firm. It could be that a bypassing firm that captures a large market share triggers more fierce competition than what is the case if the bypassing firm is small. Let us relax our assumption, and define duopoly profit as $\pi^d(\gamma_i)$. It means that the duopoly

profit is influenced by the market share of the firm that bypasses (firm i), and it is natural to assume that $\partial\pi^d/\partial\gamma_i < 0$. It can then easily be shown:

Proposition 5 *Suppose that $\pi_i^o \geq 0$ and $\pi^d = \pi^d(\gamma_i)$, where $i = 1, 2$. The incumbent and D signs a contract and the entrant bypasses if $I_1 + \pi^d(\gamma_2) \geq E + I_2 + \pi^d(\gamma_1)$, and the equilibrium profits are:*

$$\begin{aligned}\pi_1 &= \pi^d(\gamma_2) - (1 - \gamma_1)\pi^d(\gamma_1) - I_2 - E > \pi_1^o \\ \pi_2 &= \gamma_2\pi^d(\gamma_2) - I_2 - E = \pi_2^o \\ \pi_D &= (1 - \gamma_1)\pi^d(\gamma_1) - \gamma_2\pi^d(\gamma_2) + I_2 + E.\end{aligned}$$

Otherwise, the entrant and D signs a contract and the incumbent bypasses.

Proof. By using the same procedure as in Proposition 4 the result in the proposition can easily be verified. ■

We see that the market share as such has no effect on the incumbent's choice of contract partner. This corroborates the result in Proposition 4. The intuition is as above. However, market shares may have an indirect effect on the distributor's choice. If the incumbent's market share has a larger impact on duopoly profits than the entrant's market share would have, then this is an argument for the distributor to sign a contract with the incumbent. By doing so it avoids the alternative that leads to the lowest total profit in the industry.

Note that the producer that would trigger fierce competition when bypassing can exploit this fact. When presenting its take-it-or-leave-it contract it can take into account the fact that the distributor would lose more profits when he bypasses than when his rival bypasses. We see that a marginal reduction in $\pi^d(\gamma_1)$ would lead to an increase in the incumbent's profit and an identical reduction in the distributor's profit, while the firm that actually bypasses is not affected by this change. This illustrates that the threat of fierce competition is shifting profits from the distributor to the producer that would indeed have triggered fierce competition when bypassing.

Finally, note that the distributor will always sign a contract with a producer so that total industry profit is maximized. To see this, let us rearrange the condition for when the incumbent signs a contract with the distributor:

$$\pi^d(\gamma_2) - E - I_2 \geq \pi^d(\gamma_1) - I_1$$

The left hand side is the industry's net profit if the incumbent signs a contract, while the right hand side is the industry's net profit if the entrant signs a contract. We see that there is a trade off between a cost effect and a competition effect. For example, the cost savings associated with the

incumbent bypassing can be outweighed by the loss of profits from the rivalry that would be triggered if the incumbent rather than the entrant bypassed. A producer with high costs of bypassing may then end up as the one bypassing. Obviously, this is in conflict with what society would prefer. In particular, society would never prefer that a cost inefficient producer bypassed and this bypass led to less rivalry than would have been the case if the cost efficient firm bypassed.

4 Some concluding remarks

We have applied a very simple model to capture the role of a dominant downstream firm facing an incumbent producer and a potential entrant. In particular, we have focused on how different options concerning bypassing - where a producer serves end users directly instead of through an existing distributor - affects the equilibrium outcome and the division of profits in the industry.

Will a distributor sign a contract with a producer with low investment costs associated with bypassing? We show that the answer depends on the cost structure for the producers associated with bypassing. If one producer has prohibitively high costs associated with bypassing, the distributor will sign a contract with the other producer with a viable outside option. By doing so it prevents downstream competition. However, the producer with an outside option can exploit this, and offers a contract where it extracts the profit loss the distributor would have had if it had chosen bypassing.

If both producers have viable outside options, the distributor no longer signs a contract with the producer with the lowest costs associated with bypassing. The producer with low investment costs associated with bypassing does not bid aggressively for a contract but instead bypasses the distributor. The producer with the high investment cost associated with bypassing exploits this, and offers a contract so that he can benefit from the fact that the other producer is not willing to bid aggressively for a contract.

We show that the producer's market share when bypassing is not of importance for which one of the producers that ends up bypassing. The producer with high investment costs will be the one signing a contract with the distributor. The market share is in such a case irrelevant, because the distributor will either lose revenues when this producer bypasses or have to compensate the producer for this outside option profit if he signs a contract with the distributor. But if the market share affects total duopoly profits, then market share has an indirect effect on which firm that ends up bypassing. In such a case a distributor may sign a contract with a firm which has a high

cost of bypassing, because this firm has the largest negative effect on total industry profits if it had bypassed. The contracting producer is the one that exploits this fact, because it presents a take-it-or-leave-it contract that takes into account the distributor's loss of profits if it had bypassed.

Furthermore, we have found that an incumbent producer with high costs associated with bypassing may lose if the entrant producer's costs of bypassing is increasing. The reason is that such a change would force the entrant to bid more aggressively for a contract with the existing distributor. This would leave less rent to the incumbent producer if it ends up with signing a contract with the distributor. On the other hand, when bypass is no viable option the incumbent would always gain from an increase in the entrant's entry cost. The reason then is that the distributor has a more costly alternative than before, and the incumbent producer can respond by capturing a larger share of the industry's profit.

Finally, note that the anti trust authorities should in some instances be concerned about the equilibrium outcome in such a game. First, if only one producer has an outside option the one with the outside option is the one signing a contract with the distributor. By doing so they prevent bypassing, thereby not triggering any downstream competition. Second, if both have viable outside options the distributor signs a contract with the one that leads to the largest total industry profits. Industry profit is determined by the duopoly profits deducted the costs of bypassing for the bypassing firm. Then it is obvious that the distributor may end up signing a contract with a firm that would have led to fierce competition if it had bypassed, even if this particular firm has lower costs of bypassing than the firm that actually bypasses.

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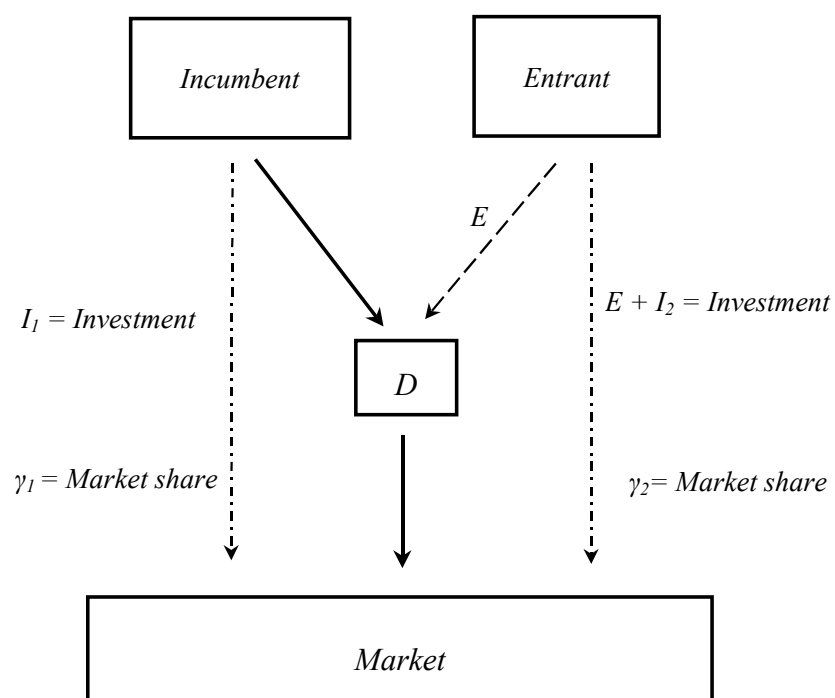


Figure 1: The market structure

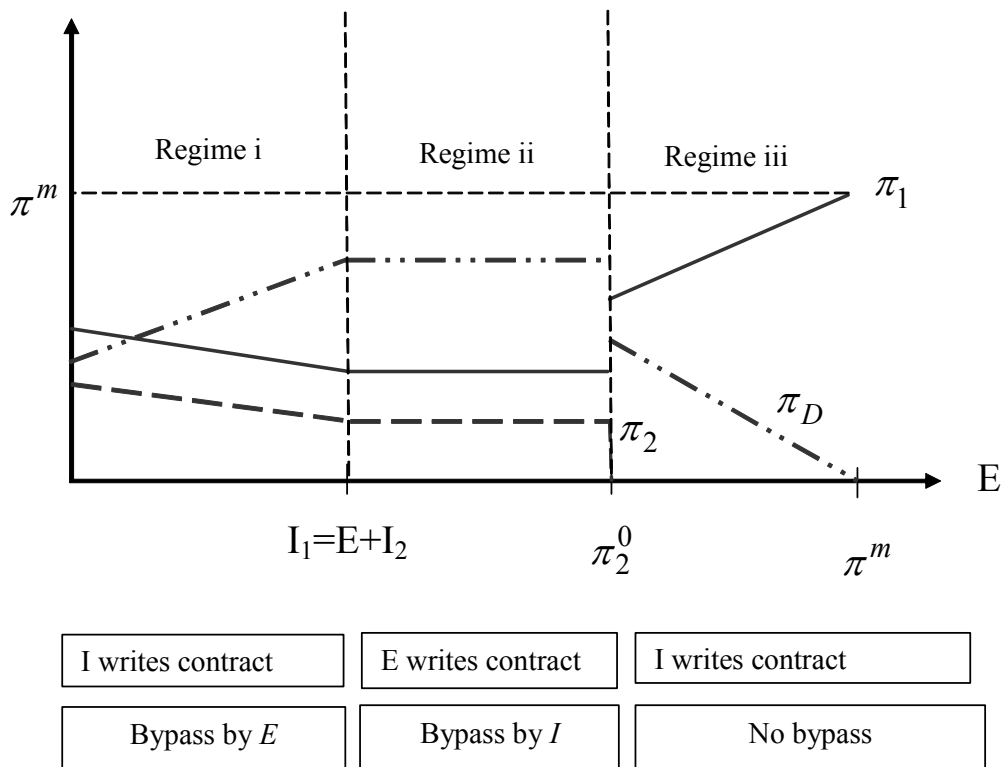


Figure 2: Profits for different values of E