Vertical integration and right of first refusal

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ABSTRACT

We consider a partially integrated industry and examine the effects of contracts with a right of first refusal, whereby the vertically integrated firm has the option to match a quote from an independent supplier to supply an independent downstream firm.

1. Introduction and summary

Many industries are characterized by partial vertical integration: a few firms are vertically integrated while others are not. For example, a common structure of the Iberian (Portugal and Spain) refining and retailing gasoline industry is the co-existence of vertically integrated national firms (which refine gasoline and sell it in the retail market) and independent firms which operate at the retail level only.

An additional characteristic of the Portuguese gasoline industry is the prevalence of contracts stipulating a right of first refusal (ROFR), also known in this context as matching contracts. ROFR clauses are very common in real estate contracts. For example, the British law governing rental property sales grants the tenant the ROFR, were the owner to sell the property. Such clauses also appear in a variety of other contexts, including sports and broadcasting rights.[1]

In the specific case of gasoline retailing in Portugal, a matching contract gives the vertically integrated firm the right to supply the non-integrated independent firms' input at a price equal to the best alternative price they can find elsewhere. Specifically, in the Portuguese industry the non-integrated downstream firms (Repsol and BP) can either (a) import gasoline from third parties located abroad, (b) import from their own upstream division abroad (e.g. Repsol in Spain), or (c) purchase gasoline from Galp (the vertically integrated firm). The matching contract establishes that Galp has the option to match the price that Repsol or BP would pay if they were to directly import the fuel to be sold at their retail outlets (Autoridade da Concorrência, 2009, p. 180). Because Galp produces at a lower price than the import price (including transportation cost), the matching contract has "bite": fuel imports are minimal, that is, Repsol and BP purchase most of their input from the vertically integrated firm (Autoridade da Concorrência, 2009, p. 119).

There are industries other than gasoline where a similar structure is in place. In particular, industries with high transportation costs, such as cement and sugar, are frequently characterized by a combination of vertically integrated firms and independents; and a

[1] Walker (1999) states that "although the details will vary, such rights of first refusal are ubiquitous in commercial contracts and encumber assets ranging from gas stations to oil pipelines, from shares of stock to livestock; and they are not limited to constraining sales or even to restricting the disposition of property".

For additional examples regarding the use of ROFR clauses, see Walker (1999), Lee (2008), and references therein.
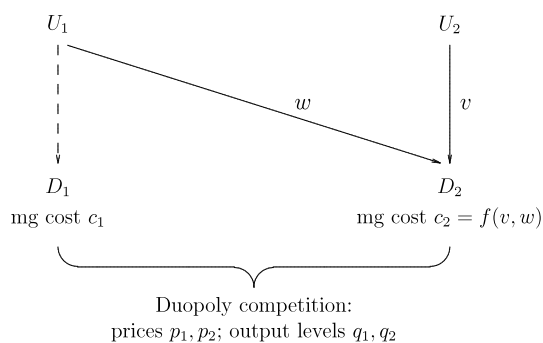
Fig. 1. Industry structure. Solid lines represent market transactions, dashed lines internal transfers.

very low level of imports.[2] We have no information regarding possible ROFR clauses in these industries, but we also note that these contracts are typically not public.

Our goal in this paper is to analyze the competitive effects of matching contracts in a partially vertically integrated industry. Matching contracts are shown to have two different effects. First, there is a *competition softening effect*. Since the vertical integrated firm supplies the downstream non-integrated firms, it becomes less aggressive in the downstream market. In fact, losing market share is not so bad to the extent that it leads to increased input sales to independent downstream firms at a positive margin. Second, there is also a *cost efficiency effect*. To the extent that the vertical integrated firm is more efficient than the third party supplier, matching implies more efficient input supply, and this efficiency is captured by the (domestic) vertical integrated firm. That is, under matching, the independent firm observes no change in the price it pays for the input, but there is an additional rent that is transferred to the more efficient domestic producer.

Our paper is related to the literature on vertical integration and vertical relations (see Rey and Tirole, 2006, for a survey). Much of this literature is concerned with the foreclosure or otherwise anti-competitive effects of vertical integration (Salop and Scheffman, 1987; Riordan and Salop, 1995; Nocke and White, 2007). Particularly germane to our paper is Chen (2001). While he focuses on different issues and does not consider ROFR clauses or matching contracts as we do, he too examines collusion and efficiency effects of partial vertical integration.

2. Model and assumptions

Consider an industry with two downstream competitors, D_1 and D_2, and two upstream suppliers, U_1 and U_2.[3] Each downstream firm's cost consists exclusively of the input it must procure from one of the upstream suppliers. U_1 is vertically integrated with D_1, and we denote the pair (U_1, D_1) simply as F_1. Industry structure is represented in Fig. 1, where solid lines represent market transactions and the dashed line an internal transfer within F_1.

For simplicity, we assume that D_1 uses exclusively input supplied by U_1 at some transfer price. Since both U_1 and D_1 maximize F_1's profit, the particular value of such transfer price is irrelevant. Firm D_2, however, has an important decision to make:

whether to purchase from U_1, the rival firm's integrated upstream supplier, or from U_2, a third party, independent supplier.

The situation we have in mind is that of a domestic vertically integrated firm, F_1, and an alternative, foreign supplier, U_2. Consistently with the assumption that the country in question is a small country (as in our example), we treat the foreign supplier's pricing decision as exogenous. The value of v is then given by the exogenous international price plus transportation and other related costs that D_2 must pay if its input is imported (that is, acquired from U_2).

Suppose firm i's demand is given by $q_i(\mathbf{p})$, where $\mathbf{p}$ is the price vector. We make the following assumptions regarding demand.

Assumption 1 (*Strategic Complementarity*)**.** For all i and $j \neq i$,

$$\frac{\partial^2 q_i(\mathbf{p})}{\partial p_i \, \partial p_j} > 0.$$

Assumption 2 (*Market Coverage*)**.** For all $\mathbf{p}$,

$$\sum_{i=1}^{n} q_i(\mathbf{p}) = S$$

where S is total market size.

If we assume that firms compete in prices, then the assumption of strategic complementarity is fairly reasonable. The assumption of market coverage is implicitly assumed in many models, including Hotelling competition (with high enough consumer valuation). Empirical studies of gasoline demand indicate very low price elasticities, which suggests Assumption 2 is a good approximation in this industry.[4]

We will compare two alternative regimes of organizing production and sales: one where there is a matching contract and one where there is no such matching contract. Under a matching contract, D_2 (credibly) reveals to U_1 the price v at which it can obtain the input from a third party and U_1 has the option to match that price and supply D_2 its input. Under no matching rule, U_1 offers D_2 a wholesale price w, and D_2 then decides whether to purchase from U_1 at w or from U_2 at v (inclusive of transportation cost). Table 1 shows the timing of the game under the two alternative assumptions regarding matching contracts.

The supplier "bidding" process is similar to a first price auction in the sense that the buyer pays the price bid by the seller. However, unlike a first price auction, the buyer is not committed to choose the lowest bid. In fact, as we show below, there will be cases when the buyer prefers to purchase from U_1 at a higher price because of the strategic effect this has on downstream competition. Moreover, although we use the word "bid", it is important to note we assume that v is generated randomly and exogenously. The idea is that there is an exogenous, competitive international market that U_1 and D_2 take as given. The source of information asymmetry corresponds to other components of the cost of importation (e.g., transportation costs) which, again, we assume are exogenous.[5]

We assume that, a priori, v is distributed according to a commonly known continuous c.d.f. $F(v)$ with bounded density $f(v)$. We also assume that $q_2(\mathbf{p}) < s$ (for all $\mathbf{p}$), where s is a fraction of total market demand S, that is, $s \leq S$. Stated as such, this assumption is without additional loss of generality with respect to Assumption 2. However, our first result below considers the limiting case when $s \to 0$, which corresponds to Firm 2 being very small.

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[2] For example, Salvo (2010, p. 332) highlights that "in the wake of Brazil's wide-reaching trade-liberalizing reforms that started in 1990, one might have expected the unpredicted construction boom of 1995–1997 to lead to sizable imports of cement …. However, Brazilian imports of cement and clinker remained subdued, hovering around 1%–2% of domestic consumption during this period and beyond".

[3] The qualitative nature of our results extends to n firms. However, for the purpose of the present section, the analysis is greatly simplified by considering two firms only.

[4] For example, William Greene (private communication) estimates an elasticity of −0.0544.

[5] From a modeling point of view, the case when U_2 acts strategically is considerably more complex. See for example Maskin and Riley (2000). In general, there is no closed-form solution to the game where U_1 and U_2 simultaneously set w and v.

Table 1
Timing of the game with and without a matching contract.

Matching contract	No matching contract
Nature generates v	Nature generates v
U_1 learns v	U_1 sets w
U_1 has the option to match $v(w = v)$	D_2 chooses between U_1 (price w) and U_2 (price v)
Market competition	Market competition

3. Results

The question at hand is, what impact does a matching regime have on equilibrium prices? The next result provides an unequivocal answer.

Proposition 1. *Under a matching contract, with probability $\rho > 0$ equilibrium prices (p_1 and p_2) are higher than without a matching contract. Moreover, $\rho \to 1$ as $s \to 0$.*

Proof of Proposition 1. Since D_2's payoff is decreasing in the price it pays U_1 for its input, under no matching rule there is a threshold value v' such that D_2 selects the third party if and only if $v < v'$. In general, v' is different from w: D_2 internalizes that, by purchasing from its rival's upstream division, market outcomes are different than purchasing from a third party supplier. In fact, as we will see below, strategic complementarity implies that purchasing from U_1 softens D_1 as a price competitor, which is good for D_2. This implies that $v' < w$. However, as $s \to 0$, the strategic effect of purchasing from U_1 instead of a third party supplier becomes arbitrarily small, and so $v' \to w$. Moreover, given our assumption that $F(v)$ is continuous, the probability that $v \in [v', w]$ converges to zero as $s \to 0$. In what follows, we assume that $s = 0$ and $v' = w$; the results then follow by continuity.

If there is no matching contract, then U_1 sets $w = \hat{w}$ and D_2 picks U_1 as a supplier if and only if $\hat{w} < v$. If there is a matching contract, then U_1 matches v if and only if $v > c_1$. If follows that D_2 picks U_1 as a supplier if and only if $v > c_1$. Whichever is the case, D_2 purchases its input at price v.

Fig. 2 depicts the equilibrium input prices paid by D_2 with and without a matching contract. There are three regions in the v space to consider. If $v < c_1$, then D_2 purchases its input from U_2 regardless of whether there is a matching contract or not. If $c_1 < v < \hat{w}$, then D_2 purchases its input at v. The difference between the two contractual regimes is that with a matching contract D_2 purchases from U_1, whereas without a matching contract it purchases from U_2. Finally, if $v > \hat{w}$, then D_2 purchases from U_1. The input price paid to U_1 is $\hat{w}$ when there is no matching contract and v when there is a matching contract.

We thus conclude that a switch to a matching contract implies

A. If $c_1 < v < \hat{w}$, a switch from U_2 to U_1, keeping the same input price;
B. If $v > \hat{w}$, an increase in input price from $\hat{w}$ to v, keeping U_1 as the supplier.

We now consider each of these cases.

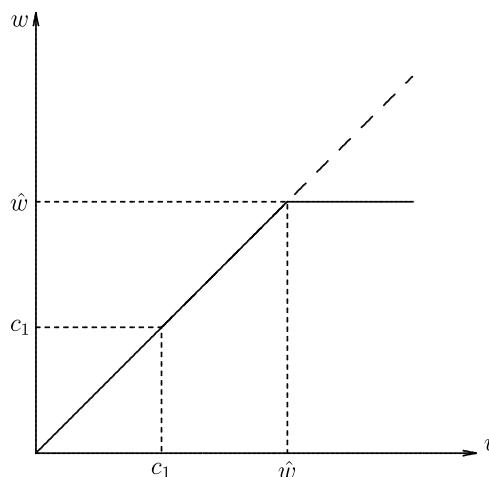□ *Case* A: $c_1 < v < \hat{w}$. Under no matching contract, profit functions are given by

$$\pi_1 = (p_1 - c_1)q_1$$
$$\pi_2 = (p_2 - v)q_2$$

where π_1 corresponds to F_1's profit and π_2 corresponds to D_2's profit. First-order conditions for profit maximization are given by

$$q_1 + (p_1 - c_1)\frac{\partial q_1}{\partial p_1} = 0 \tag{1}$$

$$q_2 + (p_2 - v)\frac{\partial q_2}{\partial p_2} = 0. \tag{2}$$

Fig. 2. Input prices with and without matching contracts when $s \approx 0$.

If there is a matching contract, U_1 exercises the option of matching U_2's price. F_1 thus has two revenue sources. Its profit function is now given by

$$\begin{aligned}\pi_1 &= (p_1 - c_1)q_1 + (v - c_1)q_2 \\ &= (p_1 - c_1)q_1 - (S - q_1)c_1 + v\,q_2 \\ &= p_1\,q_1 - S\,c_1 + v\,q_2\end{aligned}$$

where Assumption 2 is used in the second equality. F_1's first-order condition for profit maximization is now given by

$$q_1 + p_1\frac{\partial q_1}{\partial p_1} + v\frac{\partial q_2}{\partial p_1} = 0. \tag{3}$$

By Assumption 2, $q_1 = S - q_2$. Therefore,

$$\frac{\partial q_1}{\partial p_1} = -\frac{\partial q_2}{\partial p_1}.$$

It follows that the first-order condition (3) may be re-written for Firm 1 as

$$q_1 + (p_1 - v)\frac{\partial q_1}{\partial p_1} = 0. \tag{4}$$

Let $f^z(\mathbf{p}) = 0$, $z = N, M$ be the first-order condition under no matching ($z = N$) and matching ($z = M$). As to D_2's first-order condition is the same with and without a matching contract: (2). Comparing (1) and (4) and noting that $c_1 < v$, we conclude that $f^M(\mathbf{p})$ is weakly greater than $f^N(\mathbf{p})$. Assumption 1 and standard supermodularity results (e.g., Theorem 2.3 in Vives, 2000) then imply equilibrium prices are uniformly higher under matching.

□ *Case* B: $v > \hat{w}$. Under no matching contract, profit functions are given by

$$\pi_1 = (p_1 - c_1)q_1 + (\hat{w} - c_1)q_2$$
$$\pi_2 = (p_2 - \hat{w})q_2.$$

Under a matching contract, profit functions are given by

$$\pi_1 = (p_1 - c_1)q_1 + (v - c_1)q_2$$
$$\pi_2 = (p_2 - v)q_2.$$

The only difference between the two regimes is that Firm 2's marginal cost is greater under a matching contract. By the same supermodularity arguments as in Case A, we conclude prices are higher under a matching contract.

The above argument shows that, as $s \to 0$, a switch to matching contracts leads to higher prices with probability 1. Now suppose that $s > 0$. The structure of equilibrium input prices is as described in Fig. 2 with the difference that D_2 threshold v' below which it chooses U_2 is no longer equal to $\hat{w}$. Nevertheless, if v is sufficiently large, then the situation will be as in Case B above: first-order conditions are the same except that, under a matching contract, marginal cost is higher. Since v is distributed according to a continuous c.d.f., we conclude that this takes place with positive probability, which in turn implies the first part of the result. □

Intuitively, under a matching contract the integrated firm's downstream first-order condition is not a function of its cost, only of its rival's. To the extent that the vertically integrated firm is more efficient than its rival, this leads to less aggressive pricing behavior by the integrated firm. Finally, strategic complementarity leads to less aggressive behavior all around.

Although Proposition 1 is fairly intuitive, the proof is not trivial and the restriction on s is necessary. The reason is that, with positive probability, a matching contract leads to *lower* equilibrium prices. To see why, suppose that v is uniformly distributed in $[\bar{v} - \epsilon, \bar{v}]$. If $s = 0$ and ϵ is sufficiently small, then $\hat{w} = \bar{v} - \epsilon \approx \bar{v}$. Now suppose that $s > 0$. Since purchasing from U_1 softens the rival and increases D_2's profits, U_1 can charge a higher $\hat{w}$ and still get D_2's custom. It follows that a switch to a matching contract leads to lower prices.[6]

Our next result pertains to the cost efficiency of a matching contract.

Proposition 2. *Total input cost is lower when there is a matching contract.*

Proof of Proposition 2. If $v < c_1$, then D_1 buys from U_2, regardless of whether there is or there is not a matching contract. Consider now the case when $v > c_1$. Under a matching contract, D_2 always purchases from U_1. Under no matching contract, D_2 purchases from U_1 if and only if $v > v'$. Finally, U_1's cost is lower than the cost of procuring from a third party. □

We should note the inequality of Proposition 2 is weak. There may be parameter values such that w is so low (possibly even lower than c_1) such that Firm 2 always purchases from Firm 1. In this case, total input cost remains the same with or without a matching contract. A small value of s is a sufficient condition to make the inequality of Proposition 2 strict.

4. Conclusion

The bottom line of our analysis is that matching contracts (a type of ROFR clause) have a negative unilateral effect (softening downstream competition) and a positive cost efficiency effect (welfare-increasing input substitution). Therefore, it is important that competition authorities try to assess the relative strengths of these effects so as to evaluate the net competitive effect of matching contracts.

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[6] This however raises the issue of why U_1 would agree to a matching contract.