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**RESTRUCTURING OR DELEGATING:
WHICH IS BETTER?**

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Restructuring or delegating: which is better?*

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Abstract

In a certain industry, a given firm is operating with high costs of production and does not know if this is because the production costs in this industry are intrinsically high or because it is inefficient. To resolve this uncertainty, it must choose between continuing to produce correcting the inefficiency by itself (restructuring) or transferring a part or all its business to another firm of the same industry which is already efficient (subcontracting or delegating). Furthermore, regarding the policies of delegating, we consider two, temporary delegation (renting) and definitive delegation (selling). This paper justifies the existence of policies both of restructuring and subcontracting in a context of asymmetric information.

Keyword(s): Delegation; Transfer of production; Restructuring

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1. Introduction

Let us consider a given firm which, over time, has reached a low level of profitability. This may have arisen either because revenues have decreased (certain parts of its business may have become less profitable than when it entered the industry, due, for example, to a reduction in the level of demand, an increase in competition and consequently a downward pressure on prices, a deterioration in the general economic situation, because its process and/or product technologies have become obsolete, etc.), either because costs of production have increased, due to an increase in cost padding and rent-seeking activities by managers and workers inside the firm. In these circumstances a possible strategy to correct the inefficiencies could be to undertake a process of restructuring with the aim of downsizing. Another possibility could be simply to abandon certain aspects of its productive activities, transferring them to other firms (subcontracting), enabling the firm to focus on the core activities in its value chain.

Each one of these policies has been studied in depth by Industrial Organization literature on this subject, where the aim is to explain the rationality of these processes of restructuring, vertical disintegration, and delegation.¹ Nevertheless, the literature has devoted little effort to analyse how a firm, among its possible strategies to improve productive efficiency, chooses between restructuring and delegating to other firms. The aim of this paper is to develop an explanation of under which circumstances one of these policies becomes the optimal one.

Vertical disintegration may be interpreted as a particular form of delegation, where a firm –say firm *A*– (the Principal) transfers one of the activities of the industry chain to another firm –say firm *B*– (the Agent). One example of this is subcontracting, in which case one firm delegates part or the full of the production stage while still keeping the commercialization of the product. Delegation may also come through franchising or the sale or transfer of the whole business, i.e. production and marketing, from the Principal to the Agent.

Anyway, delegation usually creates agency problems that reduce the profits that *A* could obtain compared to those it could get if it performed the activity itself. If this is

¹ Schmidt (1997) studies the relationship between the market structure and the reorganisation processes of firms of the industry. The literature on dual sourcing, on the other hand, takes as given the vertical disintegration of the

so, where is the rationality in delegating to another firm? The explanation that we offer in this paper lies in the fact that delegation may be a way to avoid the costs involved in an uncertain restructuring. Sometimes it can be better for the Principal to resolve the uncertainty through others (and wait to incur the costs of restructuring later, when its value is better ascertained, or perhaps never incur them) rather than to undertake a costly restructure of the firm immediately. In fact, for very high levels of the restructuring cost, definitive delegation could be the best option, since the cost saving compensates for the profits foregone through the distortions caused by asymmetric information between parts in the delegation contract.

This paper shows that any of the three options available to the Principal (to carry out directly the restructuring, to delegate temporarily the activity to an Agent, or to delegate it permanently) could be rational in a context of asymmetric information. From this we can infer that the cost of restructuring is not always avoidable, as is the case under conditions of symmetric information. Moreover, we study the implications of each of the options in terms of the topics of the literature on implementation with adverse selection, namely the structure of the contracts, the disclosure of information, etc.

The rest of the paper runs as follows. In section 2 we present the model. In section 3 a brief reference to the result derived in a symmetric information setting is made. Section 4 analyses the problem under conditions of asymmetric information and establishes the optimal policy. Section 5 includes some final comments. Finally, an Appendix contains the proofs of the results.

2. The model

Let us assume that the intrinsic costs of production (in terms of marginal cost) in a certain industry can be of two types, high or low. Let us denote by c the level of these intrinsic costs which can take values on the dual support $c \in \{\underline{c}, \bar{c}\}$, where $0 \leq \underline{c} < \bar{c}$, and each one occurs with a given probability. In particular, let $\text{Prob}(\underline{c}) = \gamma$ and $\text{Prob}(\bar{c}) = 1 - \gamma$, with $\gamma \in (0,1)$.

activities in different firms, and analyse which is the optimal number of suppliers [see Anton and Yao (1987, 1992) or García-Cestona (1992) for instance].

A given firm A , which operates in such an industry, at present has high costs of production. This could be because the costs in this industry are intrinsically high for any firm operating in it, or because the current productive organisation of A is inefficient, relative to the intrinsically low costs of the industry. In whichever case, let us suppose that if this firm made a productive restructuring it would know the true level of the intrinsic costs and therefore would produce at these costs in the future. This restructuring results in a fixed cost F , where $F > 0$, which the firm incurs once and for all. The aim of this investment is not to reduce the intrinsic costs, but rather to adjust the real or effective costs to the intrinsic costs through the elimination of any padding costs. If the fixed investment F is made in the time t , it is from the following period $t+1$ when the expected effect is produced.

Let us assume likewise that a second firm B , from the same industry than firm A , can produce, for whatever reason –because it can control the supply costs better than firm A , for example– at the intrinsic cost level of the industry, without incurring any fixed cost of restructuring. This means that firm A , instead of implementing an immediate restructuring, can opt for delegating temporarily or definitively in B , either just the production or the whole business, in accordance with the two interpretations we have given of delegation. However, in this paper we will follow the first interpretation given, i.e. that delegation refers to transferring the production only: firm A orders a level of production q from firm B for which a given amount T is paid, so that its profits are $\Pi^A = p(q)q - T$, where $p(q)$ is the inverse function of industry demand, whereas the profits of firm B are $\Pi^B = T - cq$.

In the case of production transfer, let us assume furthermore that when the intrinsic costs are low, the fact that firm A observes that the realization of the production cost for firm B is effectively low, $c^B = \underline{c}$, does not mean that firm A , if it recuperates the production, can produce at this low cost, saving the fixed cost of restructuring F ; what it means is that A knows that the restructuring, if carried out, will serve to reduce its cost to its intrinsic level, from that moment onwards. This is the information that firm A obtains, having delegated in firm B . Finally it is assumed that both firms are risk-neutral and that the market interest rate is r , where $r > 0$.

In this framework, three possible options for firm A are discussed: to restructure, to transfer temporarily the production, and to transfer it permanently. With regard to the notation, with $\Pi^A(c) \equiv \bar{\Pi}^A$ we denote the current profit of firm A when it produces and

its cost is low, whereas $\Pi^A(\bar{c}) \equiv \underline{\Pi}^A$ stands for the same when its cost is high. For regularity purposes, the following two assumptions are included in the model.

$$\text{A1. } \frac{\underline{\Pi}^A}{r} > 0,$$

and

$$\text{A2. } \gamma \frac{\bar{\Pi}^A - \underline{\Pi}^A}{r} - F \geq 0.$$

Through Assumption A1 we guarantee that there is always profitable to exploit the market, whereas Assumption A2 establishes that, in expected value, restructuring is always worth. Hence the important thing to know is whether there are better options for firm A than immediate restructuring itself.

3. The symmetric information setting

Consider first, as a benchmark, the solution of the problem that firm A faces when there is symmetric information between both firms. In this case the only efficient policy for A (first best) is to delegate in firm B forever. If it is A who offers the delegation contracts, it is evident that with this policy it will be able to collect all the rents from B without distorting the production; besides, there is no need to incur the restructuring cost. With this, if the intrinsic costs are low, $c^B = \underline{c}$, profits of the firm A will be $\bar{\Pi}^A$ per period, whereas if they are high, $c^B = \bar{c}$, profits will be $\underline{\Pi}^A$ in each period.

4. Asymmetric information between firms

Things change dramatically when there is private information between firms A and B . In this case, none of the three policy options for firm A can be ruled out a priori. Let us analyse each option in turn.

4.1. *Implement immediately the reorganisation (restructuring).*

In this case, firm A incurs, as we have said, a fixed cost F in $t=0$, which means that from $t=1$ on its infinite flow of discounted profits is given by $V_R^A = \frac{\gamma \bar{\Pi}^A + (1-\gamma)\underline{\Pi}^A}{r} - F$, where the subscript R denotes restructuring. Assumption 2 guarantees that the restructuring produces an increase in profits, since the cost of restructuring F is bounded to take values below $\bar{F} \equiv \gamma \frac{\bar{\Pi}^A - \underline{\Pi}^A}{r}$; hence the important thing is to know if A has any better option than restructuring.

4.2. *Delegate the production in firm B during n periods (renting).*

In other words, sign a temporary production transfer contract with B of the type $\{(T(\hat{c}), q_t^{ai}(\hat{c}))_{t=1}^n\}$, in which payments and the level of production are specified according to the type of cost announced by firm B , \hat{c}^B , during the n periods that the transfer lasts, together with A 's commitment to recover the production in $n+1$ once the contract has expired.

During the n periods of the transfer, the inefficiencies in the contracting due to informational asymmetry between both firms causes a reduction in the annual profits of firm A . In particular, during the n periods of renting, the current profit that A can obtain is reduced from $\bar{\Pi}^A$ to $\bar{\Pi}^{A,ai} \equiv p(q^{ai}(\underline{c}))q^{ai}(\underline{c}) - T(\underline{c})$ if firm B is \underline{c} , and from $\underline{\Pi}^{A,ai}$ to $\underline{\Pi}^{A,ai} \equiv p(q^{ai}(\bar{c}))q^{ai}(\bar{c}) - T(\bar{c})$ when B is \bar{c} , where superscript ai denotes an asymmetric information regime between both firms during the transfer. The cause of this reduction is that not all of the rents from firm B can be extracted. If firm B becomes \underline{c} , its production is not distorted during the rental period, but B obtains informational rents. On the contrary, if the resulting type of firm B is \bar{c} , then it does not obtain informational rents but its production is distorted in order to reduce the informational rents that would have existed if it were type \underline{c} .

Despite this reduction in profits, a longer or shorter length of the contract of transfer does not change its shape nor the distortions in each period. In accordance with a result well established by the literature on adverse selection, the best contract of

delegation for n periods is one that is revealing and lies in the replica, period by period, of the one-shot contract [see Fudenberg and Tirole (1991), Section 7.6.4].

Once the renting contract has expired, the information becomes complete and firm A will know in $t=n+1$ the true intrinsic costs, with which the profits that it can obtain will again be those of symmetric information. If these costs are low, then it will carry out the restructuring, since according to Assumption A2 an increase of $\frac{\bar{\Pi}^A - \underline{\Pi}^A}{r} - F$ in the expected profits can be achieved; on the other hand, if the intrinsic costs are high, then restructuring does not give higher profits than not restructuring, and thus will not be carried out.

In order that the temporary transfer be a cost-revealing mechanism, several conditions must be met. First, firm A must commit to recover the production at the end of the transfer contract, whatever the type announced by B . With this commitment, and with assumption 1 –according to which when A recovers the business it is profitable for it to continue producing, even though cost \bar{c} has been observed– the informational rents of B are fenced in. This is because firm A prevents an efficient firm B from disguising itself as an inefficient one in the hope to keep the production at the end of the contract. A contract contingent to the cost announced by B with a clause of the type ‘*continue with the business since I have observed that the cost is \bar{c}* ’ is not a cost-revealing contract, or rather, it is only revealing in exchange for conceding an enormous amount of informational rents. In fact, it induces any type \underline{c} firm to disguise itself as \bar{c} and thus obtain the informational rents per period $(\bar{c} - \underline{c})q^{fb}(\bar{c})$, where $q^{fb}(\bar{c})$ denotes the optimal production of a bad type under symmetric information.

Secondly, when firm B reveals a cost \underline{c} , then firm A , to reach this level of cost, has to incur the restructuring investment F –an expense that by now it would prefer to save, transferring the production to firm B for ever. The fact that restructuring cannot be avoided in a context of asymmetric information (whereas it is clearly avoidable in the first best case) lies again to the necessity that firm A has for establishing a commitment which permits it to extract firm B 's private information through the production transfer contract.

Thirdly, the assumption of not being able to determine the rental contract to the type announced by firm B is also important to make credible the commitment to recover the production, even though the announcement be \bar{c} . One possible interpretation is that

firm A must keep some of the facilities even though it transfers the production, to enable it to effectively recover the production.

To sum up, the policy of transferring the production, although it allows to delay the decision regarding restructuring until it is known whether the restructuring will give positive outcomes (*informational effect*), it produces a loss of rent per period during the transfer time (*efficiency effect*). In accordance with the literature on investment under conditions of uncertainty [see Dixit and Pindyck (1994)], there exists a trade off between the saving of the restructuring cost and the temporary loss of some positive expected profit.

The first thing to be stressed is that if it is profitable to transfer the production, then only two policies of transfer can be optimal, as is established in the following lemma:

Lemma. *If Assumptions A1 and A2 hold, then within the possible contracts of production transfer, only two can be optimal depending on the value of the fixed cost of restructuring, F . In particular:*

- a) *transfer it immediately and for only one period iff F is low enough,*
- b) *transfer it immediately and for ever, i.e. sell it, iff F is high enough.*

Proof. See the Appendix.

This lemma states that, in the trade off between the saving of the cost F and the loss of profits $\gamma(\bar{\Pi}^A - \bar{\Pi}^{A,ai}) + (1 - \gamma)(\underline{\Pi}^A - \underline{\Pi}^{A,ai})$ due to asymmetric information, firm A sells the production if cost F is dominant (to save this cost), and transfers it during only one period if what dominates is the dissipation of rents during the transfer (to reduce to a minimum this loss).

If the optimum is to delegate for only one period, then the discounted flow of expected profits of firm A is given by:

$$V_L^A \equiv V_L^A(1) = \frac{1}{1+r} (\gamma \bar{\Pi}^{A,ai} + (1-\gamma) \underline{\Pi}^{A,ai}) + \gamma \left(\frac{\bar{\Pi}^A}{r} - F \right) + (1-\gamma) \frac{\underline{\Pi}^A}{r},$$

where subscript L stands for renting (or lending).

Finally, and as we established in the lemma above, firm A also has the following option.

4.3. Delegate the production in firm B for ever (selling).

In this case, firm A saves the fixed cost of restructuring F but bears for ever the inefficiency derived from the vertical separation, since there is not any cost-revelation.

Thus, its expected flow of profits is given by $V_S^A = \frac{\gamma \bar{\Pi}^{A,ai} + (1-\gamma)\underline{\Pi}^{A,ai}}{r}$, where subscript S indicates the selling policy.

Clearly, the Principal, to resolve the uncertainty that exists regarding the true intrinsic costs, will choose the most efficient option from the two available (to perform the action immediately to obtain the said information or to wait for the Agent to reveal the information and then to perform the action). From this, we arrive at the following proposition.

Proposition (Optimal decision of firm A). *If Assumptions A1 and A2 hold, then there exist two values of the fixed cost of restructuring, namely F^* and F^{**} , with $0 < F^* < F^{**} < \bar{F}$, such that,*

- a) for $F < F^*$, it is optimal for firm A to restructure immediately,
- b) for $F^* < F < F^{**}$, the optimal decision is renting for one period only,
- c) for $F^{**} < F$, the optimal policy is to sell,

where, $F^* = \frac{1}{1+r-\gamma} \left[\gamma(\bar{\Pi}^A - \bar{\Pi}^{A,ai}) + (1-\gamma)(\underline{\Pi}^A - \underline{\Pi}^{A,ai}) \right]$ and

$$F^{**} = \frac{1}{r\gamma} \left[\gamma(\bar{\Pi}^A - \bar{\Pi}^{A,ai}) + (1-\gamma)(\underline{\Pi}^A - \underline{\Pi}^{A,ai}) \right].$$

Proof. See the Appendix.

The interpretation of this proposition goes as follows. Among the different ways a firm has of readjusting its productive process over time, the size of the fixed cost of restructuring, the loss of efficiency due to the negotiation with another firm, and the

value of time are the factors which determine the optimal policies the said firm can follow. The underlying idea is that if F is moderate, then it is better for a given firm to wait for others (who know the true intrinsic costs of the industry) to be the ones who disclose the information (at the cost of the reduction in profits that this implies) before immediately performing the restructuring process itself. For the same reason, if cost F is low enough, the best is to undertake the restructuring directly and to obtain the information itself through this action (relatively inexpensive). Finally, when F is high enough, the optimal policy is to reject the restructuring and delegate for ever in another firm.

5. Concluding remarks

The aim of this work has been to examine succinctly the problem faced by a productively inefficient firm when it has to decide about the different ways of correcting its inefficiency over time. The result we find is that in an asymmetric information setting, and depending on how costly is a productive restructuring, on the loss of efficiency derived from the existence of informational asymmetries, and on the value of time, reflected in the rate of interest, it will be optimal, rather than immediately undertaking the expense of restructuring, to delegate –temporarily or definitely– the production to other firms that either have always been efficient or have already completed their own restructuring process.

Finally, there are two extensions to this paper which we expect to make in the future. The first will be to model the competition rule between firms at the product market, in order to study how the policy of inefficient firms to resolve the uncertainty about their costs is affected by it. The second will be to study the effects on the optimal contracts brought by the assumption that the Principal has not commitment power, or that having it, the renegotiation between the Principal and the Agent or Agents over time is possible [in the spirit of Fudenberg and Tirole (1991), Section 7.6.4]. In short, to determine what renegotiation-proof contracts arise.

Appendix

Proof of lemma. From Assumption A2 it is straightforward that once firm A decides to transfer the production to firm B , the best is to do this immediately. In fact, a delegation contract of n periods gives a profit for A of:

$$V_L^A(n) = \gamma \sum_{t=1}^n \left(\frac{1}{1+r}\right)^t \left[\gamma \bar{\Pi}^{A,ai} + (1-\gamma) \underline{\Pi}^{A,ai} + \left(\frac{1}{1+r}\right) \left(\gamma \left(\frac{\bar{\Pi}^A}{r} - F\right) + (1-\gamma) \frac{\underline{\Pi}^A}{r} \right) \right], \quad (1)$$

where the subscript L denotes the lending (or renting) policy. From condition (1), a length of n periods of the contract is better than a length of $n+1$ periods, if and only if:

$$V_L^A(n) - V_L^A(n+1) = \left(\frac{1}{1+r}\right)^{n+1} \left[\gamma (\bar{\Pi}^A - rF) + (1-\gamma) \underline{\Pi}^A - \gamma \bar{\Pi}^{A,ai} - (1-\gamma) \underline{\Pi}^{A,ai} \right] \geq 0 \quad (2)$$

holds. As the fulfilment of condition (2), in the sense indicated or in the opposite, only depends on the value of F and not on the number of periods considered, it is enough to define $F^{**} \equiv \frac{1}{r\gamma} \left[\gamma (\bar{\Pi}^A - \bar{\Pi}^{A,ai}) + (1-\gamma) (\underline{\Pi}^A - \underline{\Pi}^{A,ai}) \right]$ to verify that $V_L^A(n) \geq V_L^A(n+1)$ if and only if $F \leq F^{**}$ (in which case it is optimal to transfer the production during one period, $n=1$), whereas $V_L^A(n) < V_L^A(n+1)$ if and only if $F > F^{**}$ (and the optimal is to transfer the production for ever, i.e. to sell it). Q.E.D.

Proof of Proposition. a) Comparing the values F^* and F^{**} , it can immediately be seen that if $\gamma < 1$, then $F^* < F^{**}$. On the other hand, if we compare V_R^A and V_L^A we prove that $V_R^A > V_L^A$ if and only if $F < F^*$, and given that $F^* < F^{**}$, then $V_R^A > V_L^A$ implies $V_R^A > V_S^A$.

b) In the light of the lemma, we arrive at $V_S^A > V_R^A$ if and only if $F > F^{**}$ and, again given that $F^* < F^{**}$, it follows that $V_S^A < V_L^A$ implies $V_S^A > V_R^A$.

c) Finally, for $F \in (F^*, F^{**})$, it can be concluded that $V_L^A > \max\{V_R^A, V_S^A\}$. Q.E.D.

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