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**MERGE AND COMPETE: STRATEGIC
INCENTIVES TO VERTICAL INTEGRATION**

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Abstract

Vertical integration followed by quantity competition is studied. The downstream firms simultaneously decide whether to integrate with one of the upstream suppliers. If firms are not able to observe whether the vertically integrated competitor enters the intermediate good market, they are indifferent about vertical integration. However, if it is possible to observe the entry choice of the vertically integrated entity, the unique equilibrium involves vertical integration and in-house production of the intermediate good. The importance of entry's observability sheds light on the strategic importance of information exchange institutions such as the internet and business fairs.

Keywords: Vertical integration, market entry.

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MERGE AND COMPETE: STRATEGIC INCENTIVES TO VERTICAL INTEGRATION

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1. Introduction

It has been evidenced that in general merging firms experience quite a poor post-merger performance, notwithstanding the pre-merger declarations (Cabral [6]). If in the real world mergers are not profitable then explanations given by the Economic Theory do not match well the reality. Vertical integration is usually explained in terms of technological synergies (e.g. scale or scope economies, input customisation and production co-ordination externalities) or in terms of market structure and interaction (e.g. double marginalisation and market foreclosure). A simple model that abstracts from these motives is here developed with the aim of analysing the purely strategic incentives to vertical mergers. The purpose of this paper is to propose a model in which vertical integration is neither profitable nor harmful *per se* yet constitutes the unique equilibrium, so as to append purely strategic incentives to the list of explanations of mergers.

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A production system of four interdependent plants is studied. This paper first analyses two separate cases with respect to plant-property structure: a dispersed configuration (each plant is an independent firm) and the vertically integrated duopoly. The other case analysed here is an asymmetric configuration consisting of one vertically integrated entity and of two other independent firms. In all configurations all four plants are operating. Similarly, all the goods are produced in all configurations. In the dispersed and in the asymmetric configurations there exists a market for the intermediate good. In duopoly however the intermediate good is only produced within each firm and transferred from the upstream to the downstream division. In all configurations, upstream technology exhibits constant returns to scale and only requires labour input. Moreover upstream firms are price-setters and hence compete in prices (à la Bertrand). The final good is horizontally differentiated among the two downstream producers which compete à la Cournot (Singh and Vives [27]). Downstream plants employ a convex, constant returns to scale technology that does not allow for total substitution of one production factor with the other. Finally the labour market is perfectly competitive and firms compete to employ (a given supply of) homogenous workers.

The aim of this paper is to study incentives to vertical mergers due to the structure of the strategic interaction between the different agents. The timing of the moves of the merge-and-compete game is as follows. First, downstream firms simultaneously decide whether to integrate with one of the upstream producers. Second, vertically integrated entities decide whether to be active in the intermediate good market. Finally, production and competition take place both upstream and downstream. While vertical integration is always observed after it takes place, both cases of observable and of unobservable entry in the intermediate good market are studied separately.

The results are the characterisation of the equilibria of this game. In the observable entry case the unique equilibrium of the merge-and-compete game is symmetric vertical integration. This Nash equilibrium is also strict since in the asymmetric case the vertically integrated entity is strictly better off than the independent downstream firm. The payoffs that players receive in both symmetric configurations are equal and lie between those of the asymmetric

configuration. If entry in the intermediate good market is not observable then firms are indifferent on whether to vertically integrate or not, as all the payoffs are equal.

Many real-world institutions allow for observable market entry. If for example a firm that operates in an internet-based market does not supply certain products on its website then everyone can observe that the firm's main objective is not to maximise the sale of these goods. Alternatively, the agglomeration of production activities in given locations may allow for direct observation of the nature of the output of a firm's plants. Finally, many firms regularly meet at least once a year -but generally more often- in sectoral business fairs, where each of the participants can observe the range of products sold by its competitors. It should be noted that the last two conditions are frequently met by small and medium enterprises since they are often localised in certain geographic locations (the so-called *industrial districts*) and they are also involved in business fairs.

The model is built in order to avoid the occurrence of the standard justifying motives for vertical integration.¹ Indeed, there are no increasing returns of scale and no economies of scope. Double marginalisation (Spengler [30]) is not a relevant issue since upstream firms compete in prices. Moreover, vertical integration does not lead to any profit increasing effect such as quality enhancements through input customisation or cost reductions due to better coordination in the production process (the so-called *just-in-time* production). Finally, the presence of two intermediate good producers prevents incentives to foreclose the input market from determining the choice of vertical integration. Yet, vertical integration is the unique strict equilibrium in the case of observable entry.

Some interesting implications for competition policy and merger control can be drawn from the results. Indeed, the Court of First Instance of the European Union recently confirmed that while assessing the anti-competitive effects of a merger the European Commission should also address the issue of the indirect effects that the merger can have. In our case a Commission's intervention, either by prohibiting the merger or by imposing remedies, eliminates the strategic incentives to vertical integration found in the model. In

¹Lieberman [17] empirically investigates the determinants of vertical intergration.

the USA however it would not be possible to justify any intervention of the Department of Justice on the basis of the Sherman Act hence the incentives would remain. Finally, small- and medium-sized enterprises are often below the threshold of attention for mergers both in the EU and in the US. This last point might again reinforce the link between the current analysis and small- and medium-sized enterprises.

In the industrial organisation literature most of the research efforts have been devoted to the analysis of the anti-competitive reasons and effects of vertical integration such as market foreclosure. This stream of research has been excellently reviewed by Motta [19] and Rey and Tirole [24]. Even if anti-competitive behaviour is a major concern in Industrial Organisation, Grossman and Helpman [10]’s analysis abstracts from these issues in order to focus on integration synergies due to input customisation. In a companion paper [11] they also address the questions of international outsourcing and of firms’ incentives to international fragmentation of production. Salinger [25] analyses an industry characterised two stages of production and by Cournot oligopoly both upstream and downstream. In the equilibrium vertical mergers can either cause an increase or a decrease of both the intermediate and the final good price, depending on the parameter values. Salinger [25]’s insightful paper does not however address the incentives to vertical integration in a strategic manner, yet it provides a comparative static analysis on the number of vertically integrated firms that operate in the industry.

The current paper also relates to the “raising rivals costs” literature such as Sibley and Weisman [26]. However while such a field studies the strategies that one firm may implement so as to induce its competitors to face higher costs -thus gaining a competitive advantage over them- here the cost asymmetry is not due to any direct action of any of the competing firms.

The existing literature on industrial relations does not address vertical integration. Horn and Wolinsky [14]’s paper focuses on a similar model to that analysed here: a duopoly supplies an intermediate good to a duopoly which then sells to final consumers. However their analysis concerns horizontal mergers and is centered on the assumption that input-suppliers and downstream firms are locked into a bilateral monopoly and hence bargain on input-prices. Horn and Wolinsky [13] and Dobson and Waterson [9] both

analyse bargaining problems between unions and entrepreneurs or producers and retailers. Although these studies address closely related issues, the crucial hypothesis of bargaining makes the results inapplicable to the current setting.

In the light of the remark that industrial districts² are a field where the hypotheses of this paper can be satisfied, it is interesting to notice that a phase of both vertical and horizontal merges is being observed in Italy. Indeed, Brioschi *et al.* [4] empirically appreciate the extent of the “groupification” process on a large data set of small- and medium-sized enterprises located in the industrial districts of Emilia Romagna, district-wise one of the most representative regions in Italy. They note that *the pervasiveness of the group organisational form in Emilia Romagna is (...) high* (Brioschi *et al.* [4], p. 1045). Such a development of the organisation of these districts was actually predicted by Brusco *et al.* [5] and Nuti and Cainelli [20]. Similarly, Becattini [3] and Dei Ottati [8] evidence that also in the Tuscan industrial districts firms display the tendency to organise in groups. Also Withford [34], who analyses the institutional, social and economic developments of Italian industrial districts in the past twenty years, notes that groups are becoming increasingly more common among district firms.

As pointed out by Krugman [16], the New Economic Geography³ singles out the reasons for the aggregation of similar firms in the same location.⁴ Recently the on-going globalisation of economic activities generated an opposite phenomenon: the international fragmentation of production⁵. Belonging to a different research agenda, Souberayn and Thisse [28] analyse

²For the definition of industrial district, see Becattini [2]. The large world-wide diffusion of industrial districts is documented by Pyke *et al.* [23] and Vergara Caffarelli [33].

³See Basevi and Ottaviano [1], Ottaviano, Tabuchi and Thisse [22], Ottaviano [21] and Venables [32], among others.

⁴New Economic Geography does not describe the phenomenon of industrial districts in fullness. Aggregation is explained by the fact that location choice of a firm directly affects the market size since firms bring along their workers who are also consumers. Actually target markets for industrial districts are generally outside the district area. So location decisions of a firm do not significantly affect the size of the district’s end-markets.

⁵Some sectors of manufacturing experience a dispersion of different phases of production in various countries rather than integration of the production process in one location. The main reason for such a policy appears to be the existence of large international wage differential. See Guerrieri and Vergara Caffarelli [12] and references therein.

the collective learning-by-doing dynamics that can explain the comparative advantages clustered firms have on isolated competitors. Souberayn and Weber [29] qualify the learning dynamics by observing that district firms are contemporarily engaged in competition on the markets for final goods and production factors and cooperation in investments, development of new technologies and of new products.

The remainder of the paper is organised as follows: section 2 introduces the model and discusses the hypotheses. Sections 3, 4 and 5 respectively analyse the equilibrium in the dispersed configuration, in the vertically integrated Duopoly case and in the asymmetric configuration. The complete merge-and-compete game is solved in Section 6. Section 7 presents some policy implications of the model and section 8 concludes.

2. The Model

There are four plants, two upstream and two downstream. Downstream plants produce the final good q_i combining labour l_i and the intermediate good y_i according to the concave, constant returns to scale production function $f(l_i, y_i)$ that does not allow for total factor substitution. Labour employed downstream is paid a wage w and the price of the intermediate good is ρ . Let $C(w, \rho, q_i)$ be the cost function associated with the production function $f(l_i, y_i)$. By the constant-returns-to-scale assumptions on the production technology, the cost function is homogenous of degree one in the output, as well as homogenous of degree one in the factor prices. So it can be written as $C(w, \rho, q_i) = q_i C(w, \rho, 1) = q_i c(w, \rho)$. The function $c(\cdot, \cdot)$ is homogenous of degree one in its two arguments. Thus there exists a function $\alpha(\cdot) : \mathbb{R}_+ \longrightarrow \mathbb{R}_+$, such that

$$c(w, \rho) = \rho \alpha\left(\frac{w}{\rho}\right) \quad (1)$$

Final goods are horizontally differentiated and the demand function for each good is $p_i = a - bq_i - vq_j$, where $i = 1, 2, j \neq i, b > v > 0$. Therefore the profit function of plant i is:

$$\pi_i(q_i, q_j, w, \rho) = aq_i - bq_i^2 - vq_iq_j - q_i c(w, \rho) \quad (2)$$

Upstream plants produce their output, indicated with $t_n, n = 1, 2$, with a constant-return-to-scale technology. The only market for upstream firms'

output is the intermediate good market generated by the conditional factor demands of the downstream plants. Upstream firms only input labour and hence use a linear production function: $t_n = h\lambda_n$, where $h > 0$ and λ_n represents the labour employed in upstream plant n . Indicating the wage in the upstream sector with ω , the cost function of each upstream plant is $c_n(\omega, t_n) = (\omega/h) t_n$.

To close the model it is necessary to analyse the labour market. Let us assume that insider workers are endowed with industry specific skills so that the total labour supply L is fixed. Workers from outside cannot compete (in the short run) with insiders, because they lack the necessary training. However insiders supply homogenous labour to the four plants and are perfectly mobile. The labour market is characterised by perfect competition.

In the examples used below to illustrate the results, downstream plants employ a Cobb-Douglas technology $q_i = l_i^\gamma y_i^{1-\gamma}$, $i = 1, 2$, which satisfies all the assumption above. It is well known that Cobb-Douglas production functions have a linear cost function: $c(w, \rho, q_i) = [(\gamma/1-\gamma)^{1-\gamma} + (1-\gamma/\gamma)^\gamma] w^\gamma \rho^{1-\gamma} q_i$. For the sake of simplicity, γ is set equal to $\frac{1}{2}$, hence $c(w, \rho, q_i) = 2q_i\sqrt{w\rho}$.

Let us now turn to the structure of the strategic interaction of the players. In the dispersed configuration each plant is an independent firm. Downstream firms compete à la Cournot, while upstream firms are price-setters hence they compete à la Bertrand. Downstream firms are price-takers in the intermediate good market. Whenever a pair of firms vertically integrate the upstream division transfers the intermediate good to the downstream plant at marginal cost. If the upstream division of an integrated entity enters the market for the intermediate input then it behaves as a price-setter. In the model vertical integration is necessary because neither side of the intermediate good market can exercise any market power on the other one. For example, it is impossible for upstream firms to use non-linear pricing schemes, such as a franchise fee,⁶ and downstream buyer(s) cannot open a bargaining phase with the seller(s) in bilateral monopoly fashion.

The order of the moves of the merge-and-compete game is as follows: I) downstream firms simultaneously choose whether to integrate or not with their own supplier; the vertical integration decision is observed; II) if verti-

⁶See Motta [19], ch. 6, p. 411 ff., and Tirole [31], p. 170 ff.

cally integrated, each firm decides whether to enter the intermediate good market in addition to in-house production; III) upstream production takes place and active upstream firms simultaneously set the price for the intermediate good; IV) finally, downstream production and quantity-competition take place. The main point which will be discussed below is the effect on the equilibrium of different assumptions concerning the observability (by the competitor) of intermediate good market entry by a vertically integrated firm.

Lastly, it is necessary to discuss the possibility of entry of new firms into the industry. It is assumed that entry cannot take place. This final assumption can be justified by setting the time horizon of the model to the short run. As a matter of fact, the very definition of short-term analysis prescribes that the number of firms in the market is given. Moreover, barriers to entry may remain in the long run if there exist high sunk costs for the establishment of new firms in the industry. This frequently happens in the case of highly specialised industries. To complete this discussion it is necessary to sketch the long-run equilibrium. As said in the introduction, if entry in the intermediate good market is observable then both firms vertically integrate in the short-run equilibrium and hence there is no market for an independent producer of the intermediate good. Likewise, none of the two vertically integrated entities has any incentive to sell the intermediate good to an entrant in the production of the final good, thus foreclosing the market to any such entrant. Hence if the number of active firms in the intermediate good market is observable, no entry of a single firm occurs in the long run. Nevertheless if two firms simultaneously enter one upstream and the other downstream they will then integrate and remain in the market adding a new vertically integrated entity in the long run equilibrium. In the unobservable entry case firms are indifferent between integrating or not in the short run. However the intermediate good is exchanged at its marginal cost. So in the long run there are no incentives to enter the intermediate good market as it either does not exist (in the case of vertical integration) or no profits are attainable there (otherwise). If a firm enters downstream, however, unless the incumbents are vertically integrated, they will accommodate entry.

It might seem that these are too many specific assumptions on produc-

tion technologies and competition structure. However, these assumptions are necessary in order to correctly focus on the desired effects. Bertrand competition upstream is necessary to abstract from double marginalisation, which would otherwise be sufficient to set strong incentives for vertical integration.⁷ Cournot competition downstream can be argued along the lines of Kreps and Scheinkman [15] as the reduced form of a game of price-competition with previous choice of capacities.

Let us now move on to the discussion of the hypotheses about production technologies. The stronger assumption is clearly that the downstream technology is convex and does not allow for the total substitution of one production factor with another. These technologies have the important property that the solution of the firm's maximisation problem is internal, because a strictly positive output can only be produced with strictly positive quantities of all (in the specific case both) inputs. This condition implies that the system of four plants is viable, i.e. it is a genuine multistage production process in which it is not possible to totally substitute one factor with another. Total input substitution would be neither realistic nor sound: a corner solution means that downstream firms either use only the intermediate good (which is not realistic) or only labour (which implies that in equilibrium upstream firms do not operate). The further assumption of constant returns to scale is introduced to abstract from the scale factor, so that the results can only be attributed to the different assumptions on market entry observability. Finally the existence of two plants that supply the intermediate good prevents anti-competitive incentives (for example foreclosure) from determining the vertical integration decision.

For the sake of clarity the following three sections analyse each of the subgames, separately: first, the dispersed configuration which is the case when no pair of firms vertically integrate; then, the duopoly that occurs when both pairs integrate simultaneously; and finally the asymmetric configuration in which one vertically integrated entity competes with a chain of independent firms. Both the case of observable entry in the intermediate good market and that of unobservable entry are analysed. Section 6 presents the equilibrium analysis of the whole game.

⁷See Spengler [30], Tirole [31], p. 174 ff. and Motta [19], p. 419 ff.

3. The dispersed configuration

The four plants correspond to four independent firms (see Figure 1).

[INSERT FIGURE 1 ABOUT HERE]

Consider, first, the final (differentiated) good market. To calculate the Cournot equilibrium it is necessary to find a fixed point of the best response correspondence. Thus solving

$$\begin{cases} R_1(q_2) = \frac{a-vq_2-c(w,\rho)}{2b} \\ R_2(q_1) = \frac{a-vq_1-c(w,\rho)}{2b} \end{cases}$$

we obtain $q_d^* = q_1^* = q_2^* = (a - c(w, \rho))(2b - v)/(4b^2 - v^2) = (a - c(w, \rho))/(2b + v)$ which are the equilibrium quantities. The profits of both Cournot competitors are identical: $\pi^*(w, \rho) = b(q_d^*(w, \rho))^2 = b\left(\frac{a-c(w,\rho)}{2b+v}\right)^2$.

By Shepard's Lemma (Mas-Colell *et al.* [18], p. 141), conditional factor demands are $l_i(w, \rho, q_d^*) = q_d^* \frac{\partial}{\partial w} c(w, \rho)$ and $y_i(w, \rho, q_d^*) = q_d^* \frac{\partial}{\partial \rho} c(w, \rho)$ which are homogenous of degree zero. Thus, recalling the function $\alpha(w/\rho)$ defined in equation (1), let us rewrite the labour demand as $l_i(w, \rho, q_d^*) = q_d^* \alpha'(w/\rho)$ and the demand schedule for the intermediate good as $y_i(w, \rho, q_d^*) = q_d^* \alpha(w/\rho) - q_d^* \frac{w}{\rho} \alpha'(w/\rho)$.

Knowing the conditional factor demand for the intermediate good, we can calculate not only the equilibrium price of the intermediate good (which is the marginal cost) but also the equilibrium quantity produced by each of the two upstream firms. Each of them produces half of the demand. The total quantity demanded by the downstream sector is: $y_1(w, \rho, q_d^*) + y_2(w, \rho, q_d^*) = 2q_d^* \alpha(w/\rho) - 2q_d^* \frac{w}{\rho} \alpha'(w/\rho)$, which implies, substituting the upstream marginal cost ω/h for ρ , that the actual quantity produced in equilibrium is $2q_d^* \alpha(hw/\omega) - 2q_d^* h \frac{w}{\omega} \alpha'(hw/\omega)$.

Hence the labour demand from the upstream sector is $\frac{2}{h} q_d^* \alpha(hw/\omega) - 2 \frac{w}{\omega} q_d^* \alpha'(hw/\omega)$. Therefore the aggregate labour demand of the industry is:

$$L_d^D(w, \omega, q_d^*) = q_d^* \frac{2}{h} \alpha(hw/\omega) - q_d^* 2 \frac{w}{\omega} \alpha'(hw/\omega) + q_d^* 2 \alpha'(hw/\omega) \quad (3)$$

Let us now analyse the labour market. Since labour is homogenous and perfectly mobile, the equilibrium wage will be unique and equal upstream and

downstream. The equilibrium wage w_d^* is determined by $2q_d^*\alpha(h)/h = L$ i.e. $(a - c(w_d^*, \rho))/(2b + v) = Lh/(2\alpha(h))$ which means that it solves

$$c\left(w_d^*, \frac{w_d^*}{h}\right) = a - L\frac{h(2b+v)}{2\alpha(h)} \quad (4)$$

This establishes a first result:

Proposition 1 *Equilibrium wage level in the dispersed configuration is given by equation (4).*

Before moving to the analysis of the duopoly configuration, let us consider the Cobb-Douglas production technology case.

Example 1 *Assume that downstream production employs a Cobb-Douglas technology: $f(l_i, y_i) = \sqrt{l_i y_i}$. Then $\alpha(w/\rho) = c(w, \rho)/\rho = 2\sqrt{w/\rho}$ and $\alpha(h) = 2\sqrt{h}$.*

Recall the labour market equilibrium condition (4). Using the Cobb-Douglas specification above, it becomes $2\sqrt{w(w/h)} = a - \frac{Lh(2b+v)}{4\sqrt{h}}$ therefore the equilibrium wage is $w_d^ = \frac{1}{2}a\sqrt{h} - \frac{1}{8}Lh(2b+v)$.*

4. The vertically integrated duopoly

The vertically integrated production function maps total labour input (employed both in the upstream and in the downstream plant) into the final good: $q_i = F(L_i)$. It is obtained by plugging the upstream technology into the downstream technology: $F(L_i) := f(l_i, h\lambda_i)$ and $L_i = l_i + \lambda_i$. Recall the assumptions on $f(\cdot, \cdot)$: it is concave, exhibits constant returns to scale and does not allow for total substitution of one production factor with the other. However, these assumptions do not translate easily into properties of the vertically integrated production function $F(\cdot)$. The ownership structure in the duopoly configuration is depicted in the following Figure 2.

[INSERT FIGURE 2 ABOUT HERE]

Now consider the cost function. Note that workers receive the same wage upstream and downstream. So the cost function is $Z(w, q_i) := C(w, \frac{w}{h}, q_i) = c(w, \frac{w}{h}) q_i$.

As before the Cournot equilibrium is given by the solution of the system of the best responses $R_1(q_2) = (a - vq_2 - c(w, w/h))/2b$ and $R_2(q_1) = (a - vq_1 - c(w, w/h))/2b$. Hence $q_D^* = q_1^* = q_2^* = (a - c(w, w/h))(2b - v)/(4b^2 - v^2) = \frac{a - c(w, \frac{w}{h})}{2b + v}$ and firms profits are $\pi^* = \pi_1(q_D^*) = \pi_2(q_D^*) = b(q_D^*)^2$.

Using Shepard's Lemma again, the labour demand of each firm is then

$$\begin{aligned} L_i(w, q_D^*) &= \frac{\partial}{\partial w} Z(w, q_D^*) = \left(\frac{\partial}{\partial w} c(w, \frac{w}{h}) + \frac{1}{h} \frac{\partial}{\partial \rho} c(w, \frac{w}{h}) \right) q_D^* = \\ &= (\alpha'(h) + \frac{1}{h}(\alpha(h) - h\alpha'(h))) q_D^* = \frac{1}{h} \alpha(h) q_D^* \end{aligned} \quad (5)$$

Thus the equilibrium wage is determined by $L_1(w, q_D^*) + L_2(w, q_D^*) = q_D^* \frac{2}{h} \alpha(h) = L$ i.e. by $(a - c(w, w/h))/2b + v = Lh/(2\alpha(h))$. So the equilibrium wage w_D^* solves the same equation (4) of the previous case:

$$c\left(w_D^*, \frac{w_D^*}{h}\right) = a - L \frac{h(2b+v)}{2\alpha(h)} \quad (6)$$

We have therefore established the following result:

Proposition 2 *Equilibrium wage level in the vertically integrated duopoly is given by equation (6).*

Moreover it is also possible to conclude that:

Corollary 1 *Simultaneous vertical (dis-)integration does not affect the market outcome.*

These results are important since they establish the benchmark for the rest of the paper. In particular notice that the irrelevance result in Corollary 1 is not surprising since the model abstracts from all the reasons that traditionally give rise to vertically integrated structures, such as increasing returns, scope economies, customised inputs, foreclosure and double marginalisation.

So far the comparison has only been made between symmetric situations where firms are either both vertically disintegrated or both integrated. However asymmetric configurations must also be considered. The result in Corollary 1 might well be only due to symmetry. Therefore, in the next section the asymmetric configuration in which one vertically integrated entity competes with a chain of independent firms is analysed.

5. The asymmetric configuration

The configuration in which one vertically integrated entity competes with a vertical chain of independent firms is referred to as the asymmetric configuration. The ownership links and the interactions are depicted in the following Figure 3: the branch that goes from u_2 (the upstream division of the vertically integrated entity D_2) to the intermediate good market is dashed since it might happen the former only does in-house production.

[INSERT FIGURE 3 ABOUT HERE]

In the asymmetric configuration, careful attention must be given to the order of the moves and to the observability assumptions. In fact, the results will heavily depend on the different levels of observability. Let us recall the game form: I) downstream firms simultaneously choose whether to integrate or not with their own supplier; vertical integration is then observed; II) if vertically integrated, the firm decides whether to enter the intermediate good market in addition to in-house production; III) upstream production and competition take place; and, finally, IV) downstream production and competition take place. Hence, the following subsections analyse both cases of unobservable and of observable entry in the intermediate good market.

5.1 Case 1: Unobservable entry

Assume that the independent upstream firm u_1 cannot observe whether or not the vertically integrated firm is active on the intermediate good market. Notice then that since the decision of the latter is not observed by the former, D_2 cannot credibly commit not to enter the market. Hence the independent upstream firm behaves as if the vertically integrated firm has announced that it is entering the market. Such a conjecture is correct, as the vertically integrated entity is actually competing. Therefore, both u_1 and D_2 simultaneously choose the price for the intermediate good. Now, simultaneity implies that there are no incentives for either firm to price above the (common) marginal cost. If either firm was pricing above marginal cost the other one would simply slightly undercut it and steal all the market, gaining all the profits. If the independent upstream firm prices at marginal cost it makes zero profits. Moreover given u_1 's strategy the vertically integrated

firm is then indifferent between selling and not selling to the independent downstream firm d_1 . However, if D_2 decided not to serve d_1 then the latter firm would be subject to the independent upstream firm's monopoly pricing (this is the best response of u_1 to D_2 's action "*Don't sell to d_1* "). Then it would be profitable for D_2 to slightly undercut u_1 and steal its market share and (almost) all profits, without (practically) changing its downstream profits. So it is the unique equilibrium that both firms sell to d_1 , competing à la Bertrand and sharing the demand for the intermediate good. Hence the equilibrium of the market is identical to the one found in the previous cases. This actually means that when the decision of the integrated entity to enter the market for the intermediate good is unobservable both firms are indifferent between vertical integration or disintegration. Let us now make this argument formal.

Proposition 3 *If the intermediate good market's entry decision of the vertically integrated entity is not observable then the unique equilibrium in the subgame is that both the independent upstream firm and the vertically integrated entity serve the independent downstream firm pricing the intermediate good at the (common) marginal cost.*

Proof. Let us proceed by backward induction. In the last stage of the subgame downstream Cournot competition takes place. The reaction functions for the two players are $R_{d_1}(q_{D_2}) = (a - vq_{D_2} - c_{d_1})/2b$ and $R_{D_2}(q_{d_1}) = (a - vq_{d_1} - c_{D_2})/2b$. The resulting equilibrium quantities are $q_{d_1}^* = \frac{a(2b-v)-2bc_{d_1}+vc_{D_2}}{4b^2-v^2}$ and $q_{D_2}^* = \frac{a(2b-v)-2bc_{D_2}+vc_{d_1}}{4b^2-v^2}$ and the equilibrium profits are $\pi_i^* = b(q_i^*)^2$ for $i = d_1, D_2$.

It is now important to observe that there is an asymmetry in the cost structure of the two competitors: D_2 only pays wages (because the upstream division is transferring downstream the intermediate good at the marginal cost), while d_1 pays both wages to workers and the price of the intermediate good ρ .

In taking the decision concerning whether to supply the independent firm, the vertically integrated entity has to anticipate the outcome of the Cournot competition. It also anticipates that if it decides not to sell to d_1 then the independent upstream firm acts as a monopolist facing the inverse demand

function $\rho = \varphi(y_{d_1})$ which is downward sloping by the law of supply since it is the inverse of the downstream firm's conditional factor demand of the intermediate good $y_{d_i}(w, \rho, q_{d_1}^*) = q_{d_1}^* \frac{\partial}{\partial \rho} c_{d_i}(w, \rho) = q_{d_1}^* \alpha(w/\rho) - q_{d_1}^* \alpha'(w/\rho) w/\rho$

The monopolist's problem is

$$\max_t \pi_{u_1} = (\varphi(t) - \omega/h) t \quad (7)$$

where ω is the upstream wage level. The solution t_0 solves the first order condition $\varphi(t_0) + t_0 \varphi'(t_0) = \omega/h$. The monopoly price is $\rho_0 = \varphi(t_0)$. Lemma 1 at the end of this proof shows that the monopoly price is greater than the internal transfer price within the vertically integrated entity. The equilibrium is depicted in the Figure 4 below.

[INSERT FIGURE 4 ABOUT HERE]

The figure depicts both Bertrand behaviour (t^*, ρ^*) and monopolistic behaviour (t_0, ρ_0) of an upstream firm.

However, (*Monopoly pricing, Don't sell to d_1*) is not an equilibrium, because the vertically integrated entity has the profitable deviation to slightly undercut the independent upstream firm. By so doing D_2 gains all u_1 's profits without practically changing the cost level of its competitor in the downstream market (i.e. keeping the downstream profits practically unchanged). This reasoning generalises to any price decided by u_1 which is greater than its marginal cost. For any price $\rho' \in (\omega/h, \rho_0]$ charged by the independent upstream firm, it is always profitable for D_2 to sell to d_1 at a price $\rho' - \varepsilon$ for some $\varepsilon > 0$. Therefore, "*Don't sell to d_1* " cannot be an equilibrium action for D_2 .

Given the argument above the only action of the vertically integrated firm that can be part of the equilibrium is "*Sell to the downstream firm d_1 at a price equal to the marginal cost*". The independent firm u_1 is then indifferent between any price (it makes no profits in any case), however the unique equilibrium is by virtue of the symmetric argument as the one developed above to sell the intermediate good at a price equal to the marginal cost. ■

This Lemma shows that the monopoly price of the intermediate good is greater than the internal transfer price in vertical integration.

Lemma 1 *The monopoly price is greater than the (marginal) cost at which the intermediate good is internally transferred from the upstream to the downstream division of the vertically integrated firm.*

Proof. In general monopoly price is greater than the competitive one, i.e. it is greater than the marginal cost of the monopolist. In equilibrium given labour mobility and homogeneity the wage is unique, so the marginal cost of production of the intermediate good is equal between the two upstream plants. Thus, we can conclude that $\rho_0 > \omega/h = w/h$. ■

Let us now conclude the analysis of the unobservable entry case of the asymmetric configuration. Given the equilibrium found in Proposition 3, it is possible to calculate the equilibrium in the intermediate good market. The price is then $\rho^* = \omega/h$ and the equilibrium quantity is $t^* = q_{d_1}^* \alpha\left(\frac{w}{\omega/h}\right) - q_{d_1}^* \frac{w}{\omega/h} \alpha'\left(\frac{w}{\omega/h}\right)$ a fraction $\delta \in (0, 1)$ is produced by the integrated firm's upstream plant and a fraction $1 - \delta$ by the independent upstream firm. Hence given the linear technology the labour requirement of the upstream sector is

$$\begin{aligned}\lambda_1 &= \frac{1-\delta}{h} \left[q_{d_1}^* \alpha\left(\frac{w}{\omega/h}\right) - q_{d_1}^* \frac{w}{\omega/h} \alpha'\left(\frac{w}{\omega/h}\right) \right] \\ \check{\lambda}_2 &= \frac{\delta}{h} \left[q_{d_1}^* \alpha\left(\frac{w}{\omega/h}\right) - q_{d_1}^* \frac{w}{\omega/h} \alpha'\left(\frac{w}{\omega/h}\right) \right]\end{aligned}$$

where $\check{\lambda}_2$ indicates the labour employed by the vertically integrated entity to serve the independent downstream firm. The vertically integrated firm also demands labour for its own production line:

$$\begin{aligned}l_2 &= \frac{\partial}{\partial w} c\left(w, \frac{w}{h}\right) q_{D_2}^* = q_{D_2}^* \alpha'(h) \\ \bar{\lambda}_2 &= \frac{\partial}{\partial \rho} c\left(w, \frac{w}{h}\right) q_{D_2}^* = q_{D_2}^* \frac{1}{h} (\alpha(h) - h\alpha'(h))\end{aligned}$$

where $\bar{\lambda}_2$ indicates the labour employed to serve the integrated downstream plant. Finally, recall from Section 3 above that the labour demand of the independent downstream firm is $l_{d_1} = q_{d_1}^* \alpha'(wh/\omega)$.

Labour homogeneity and mobility imply that there is only one wage; thus the aggregate demand for labour is

$$\begin{aligned}L_A^D &:= \frac{1-\delta}{h} [q_{d_i}^* \alpha(h) - q_{d_i}^* h\alpha'(h)] + \frac{\delta}{h} [q_{d_i}^* \alpha(h) - q_{d_i}^* h\alpha'(h)] + \\ &+ q_{d_1}^* \alpha'(h) + q_{D_2}^* \alpha'(h) + q_{D_2}^* \frac{1}{h} (\alpha(h) - h\alpha'(h)) = \frac{1}{h} \alpha(h) (q_{d_i}^* + q_{D_2}^*)\end{aligned}$$

Since both final good producers have the same costs, the equilibrium quantities are equal, $q_A^* = \frac{a-c(w, \frac{w}{h})}{2b+v}$, and therefore the aggregate labour demand is given by:

$$L_A^D = \frac{2}{h} q_A^* \alpha(h) \quad (8)$$

The competitive wage is then given by the usual condition which equates supply and demand $2q_A^* \alpha(h)/h = L$ which means that the equilibrium wage w_A^* solves:

$$c\left(w_A^*, \frac{w_A^*}{h}\right) = a - L \frac{h(2b+v)}{2\alpha(h)} \quad (9)$$

where the subscript A indicates asymmetric configuration with observable entry. Equation (9) determines the equilibrium wage in the unobservable entry case of the asymmetric configuration. Notice that it is identical to equation (4) for the dispersed configuration and to equation (6) for the vertically integrated duopoly.

These results can be summarised in the following proposition:

Proposition 4 *In the equilibrium of the asymmetric configuration with unobservable entry the competitive wage is determined by equation (9).*

The comparison of the equilibrium wage level in the unobservable entry case of the asymmetric configuration with the market-clearing wages in the dispersed and in the duopoly configurations is given by the following corollary.

Corollary 2 *The competitive wage is equal to the corresponding wage levels of the dispersed and of the duopoly configurations.*

Proof. Simply compare equation (9) with equations (4) and (6). ■

Notice that the inability to commit not to undercut monopoly pricing by the independent upstream firm harms the vertically integrated firm. Modifications to the game form would make the strategy profile (*Monopoly pricing, Don't sell to d_1*) an equilibrium, actually the unique equilibrium of the subgame. It is enough that the vertically integrated firm's choice of serving its downstream competitor is observable by the upstream firm before the latter

chooses the price. In this game with observable actions the unique equilibrium is indeed that the vertically integrated entity abstains from serving the independent downstream firm, so as to let the independent upstream firm monopolise the market for the intermediate good. This is the subject of the next section.

5.2. Case 2: Observable entry

Quite different results arise when the independent upstream firm has the possibility of observing whether the vertically integrated entity is active or not in the intermediate good market. Two assumptions made in the set-up of the model in Section 2 play a role in the establishment of this result: the absence of entry in the intermediate good market and the impossibility for the independent upstream firm to use a two-part tariff rule, such as unitary cost plus a franchise fee that extracts the profits from the independent downstream firm. As discussed above vertical integration is motivated by the impossibility for downstream firms to open a bargaining with the suppliers on price and quantity of the intermediate good. Furthermore absence of entry is a restriction in the dynamics of the industrial system that can be easily accepted in the short term. If the industry is highly specialised and has high set-up sunk costs it is sound in long run as well.

In the observable entry case the vertically integrated entity abstains from competing with the independent upstream firm. So it enjoys the fact that it is competing in the downstream market with a firm which has higher marginal costs. Observability makes it possible to commit not to compete in the input market and thus it sustains the strategy profile (*Monopoly pricing, Don't sell to d_1*) as the unique equilibrium in the subgame.

As usual solving the system of the best reply functions $R_{d_1}(q_{D_2}) = \frac{a-vq_{D_2}-c_{d_1}}{2b}$ and $R_{D_2}(q_{d_1}) = \frac{a-vq_{d_1}-c_{D_2}}{2b}$ one obtains the Cournot equilibrium quantities

$$q_{D_2} = \frac{2b(a-c_{D_2})-v(a-c_{d_1})}{4b^2-v^2}; \quad q_{d_1} = \frac{2b(a-c_{d_1})-v(a-c_{D_2})}{4b^2-v^2} \quad (10)$$

which using function $\alpha(\cdot)$ defined in equation (1) are equal to $q_{D_2}^* = \frac{2b(a-\frac{w}{h}\alpha(h))-v(a-\rho\alpha(\frac{w}{\rho}))}{4b^2-v^2}$ and $q_{d_1}^* = \frac{2b(a-\rho\alpha(\frac{w}{\rho}))-v(a-\frac{w}{h}\alpha(h))}{4b^2-v^2}$.

Consider the independent upstream firm: it observes that the vertically integrated entity abstains from competing in the intermediate good market.

So it becomes a monopolist. We already know that the monopolist's problem is (7) and its solution is (ρ_0, t_0) . Lemma 1 shows that $\rho_0 > \rho^*$ and hence $t_0 < t^*$.

The following example shows that with Cobb-Douglas technology it is possible both to calculate the monopoly price and to show that the solution of the monopolist problem always exists.

Example 2 *Using the conditional factor demands, the monopolist problem (7), can be rewritten as:*

$$\max_{\rho} (\rho - \omega/h) y_{d_1}(w, \rho, q_{d_1}(w, \rho)) \quad (11)$$

and monopoly price ρ_0 solves the first order condition $y_{d_1}(w, \rho_0, q_{d_1}(w, \rho_0)) + (\rho_0 - \frac{\omega}{h}) \frac{\partial}{\partial \rho} y_{d_1}(w, \rho_0, q_{d_1}(w, \rho_0)) \left(1 + \frac{\partial}{\partial \rho} q_{d_1}(w, \rho_0)\right) = 0$

By the law of supply, we know that factor demands are downward sloping (i.e. the necessary condition for the existence of the solution is satisfied). Graphically, the solution is the one depicted in Figure 4 above since equations (7) and (11) describe the same problem.

Consider again the Cobb-Douglas case: $f(y_i, l_i) = \sqrt{y_i l_i}$ $i = d_1, d_2$. The monopolist's problem becomes

$$\max_{\rho} \left(\rho - \frac{\omega}{h}\right) \frac{\left(2\sqrt{w/\rho} - \frac{w}{\rho} / \sqrt{w/\rho}\right) \left(2b(a - 2\rho\sqrt{w/\rho}) - v(a - \frac{w}{h}2\sqrt{h})\right)}{4b^2 - v^2}$$

From the first order condition we obtain $-8bh^{\frac{3}{2}}\sqrt{w}\rho^{\frac{3}{2}} - va\sqrt{h}\omega + 2ab\sqrt{h}\omega + 2vw\omega + 2baph^{\frac{3}{2}} - vaph^{\frac{3}{2}} + 2vwh\rho = 0$ which is a polynomial of the form $-Ax^3 + Bx^2 + C$ where $x = \sqrt{\rho}$ and the coefficients are $A := 8b\sqrt{w}h^{\frac{3}{2}}$, $B := 2abh^{\frac{3}{2}} - vah^{\frac{3}{2}} + 2vwh$ and $C := va\sqrt{h}\omega + 2ab\sqrt{h}\omega + 2vw\omega$, all positive. The unique real root is $x^* = \frac{K}{6A} + \frac{2}{3}\frac{B^2}{AK} + \frac{1}{3}\frac{B}{A} > 0$ where $K := \sqrt[3]{108CA^2 + 8B^3 + 12A\sqrt{3}\sqrt{27C^2A^2 + 4CB^3}}$. This equation shows that the solution always exists given the signs of the coefficients.

Building on the previous discussion, the following proposition characterises the equilibrium of the observable entry subgame.

Proposition 5 *If entry in the market for the intermediate good is observable then the upstream division of the vertically integrated entity only performs in-house production and leaves the whole intermediate market to the independent upstream firm that therefore acts as a monopolist. In the market for the final good, D_2 competes in quantities with the independent downstream firm.*

Proof. Given the discussion above, one only needs to show that $\pi_{D_2}^* > \pi_{d_1}^*$. Recall that Cournot profits are given by $\pi_i^* = b(q_i^*)^2$, for $i = d_1, D_2$, and from equation (10), the Cournot quantities are $q_{d_1} = (2b(a - c_{d_1}) - v(a - c_{D_2}))/4b^2 - v^2$ and $q_{D_2}^* = (2b(a - c_{D_2}) - v(a - c_{d_1}))/4b^2 - v^2$.

It can be trivially shown that $q_{D_2}^* - q_{d_1}^* = \frac{c_{d_1} - c_{D_2}}{2b - v}$. Therefore to show that abstaining from competition is the equilibrium of the subgame, it is simply necessary to show that $c_{d_1} - c_{D_2} = c(w, \rho_0) - c(w, w/h) > 0$. Now downstream production technology is convex and does not allow for total substitution of one production factor with the other, i.e. $l_i(w, \rho, q_i) > 0$ and $y_i(w, \rho, q_i) > 0$ for all w, ρ and $q_i, i = d_1, D_2$. This implies that, using Shepard's lemma again, the cost function $c(w, \rho)$ is strictly increasing in each of the arguments. We have established in Lemma 1 that the monopoly price of the intermediate good is greater than the marginal cost of the upstream division of the vertically integrated entity. Hence, the average and marginal cost of the vertically integrated entity is smaller than that of the independent downstream firm. Therefore the equilibrium quantity and profits of the former are greater than those of the latter. Finally, the vertically integrated entity is better off when it competes with a firm which has higher costs than itself rather than with a firm which has equal costs. This is shown by the fact that $\frac{\partial}{\partial c_{d_1}} q_{D_2}^* > 0$. ■

The equilibrium described in the above Proposition 5 completes the analysis of the subgames.

6. The merge-and-compete game

The analysis of the previous sections establishes the ranking of the payoffs of the firms in each configuration. Thus, the reduced form of the merge-and-compete game can be represented as in Figure 5. Note that observable entry implies that $\pi_{VI} > \pi_D = \pi_d > \pi_\Delta$, while unobservable entry makes the game trivial since $\pi_{VI} = \pi_D = \pi_d = \pi_\Delta$, where the subscripts respectively stand

for vertically integrated, Duopoly, dispersed and independent downstream firm.

	Integrate	Don't
Integrate	π_D, π_D	π_{VI}, π_Δ
Don't	π_Δ, π_{VI}	π_d, π_d

Figure 5: The reduced form game

Notice that in the observability case the strategy “*Integrate*” is dominant for both players and that the profile (*Integrate*, *Integrate*) is a strict Nash equilibrium. This establishes the following result:⁸

Proposition 6 *The merge-and-compete game in the case of observable entry has a unique equilibrium which is (Integrate, Integrate). This equilibrium is a strict Nash equilibrium. However, if entry in the intermediate good market is not observable, then firms are indifferent whether to vertically integrate or not.*

Observable entry is a characteristic which is not rare in the real world. If the intermediate good market is web-based, the absence or the presence of the opportunity of buying on line the intermediate good on the website of the vertically integrated entity indicates whether such a firm is indeed active or not in the intermediate good market. Moreover, it might be possible that competitors observe whether or not one firm does sell its intermediate goods simply because they can observe the nature of the output which is shipped out the plants of the vertically integrated entity. A third example of observable entry are the periodical sectoral fairs in which firms launch their new products and present themselves. If intermediate goods are not

⁸It can be shown that Proposition 6 also holds in the case of a monopolist trade union. Hence the results of the paper are robust with respect to the wage-setting institution. Details are available from the author upon request.

presented then it is likely that they will not be sold on the market. These last two examples are very important in the case of small- and medium-sized enterprises, which are -as mentioned in the introduction- often clustered in industrial districts and regularly participate in sectoral business fairs.

It is interesting to notice that the strategic incentives for vertical integration are found in the context of perfect and symmetric information about the opponent's moves, rather than in the unobservability scenario. As a matter of fact, it might have been more intuitive to obtain a result stating that players had an incentive to merge vertically in the case their actions were not observable by competitors. However, the reason for which the vertically integrated entity enters the intermediate good market in the unobservability scenario is that it cannot resist the temptation of stealing the market from the independent upstream firm. Thus, it is obvious why observability sustains the strategic incentives to vertically integrate: it makes it possible to commit not to compete in the intermediate good market.

7. Implications for economic policy

The analysis above has interesting policy implications. The strategic incentives for vertical integration found in Proposition 6 are based on the fact that no firm wants to be the independent downstream producer in the asymmetric configuration. However in the EU these incentives would be inhibited by the Commission's competition policy, unless the firms involved are so small that they are subject to national merger control rather than subject to the EU merger regulation or even exempt from any merger control because of their size. This last point again suggests that the phenomenon described in this paper might apply to the context of small- and medium-sized enterprises.

According to the EC Merger Regulation,⁹ in the case of observable entry in the intermediate good market the integrated entity becomes dominant through the vertical merger. So the European Commission can veto the vertical integration or at least impose a remedy. The ideal remedy is an obligation

⁹Art. 2(3) of the EC Merger Regulation: Council Regulation (EEC) No 4064/89 of 21 December 1989 on the control of concentrations between undertakings (OJ L 395, 30.12.1989; corrected version OJ L 257, 21.9.1990, p.13) with amendments introduced by Council Regulation (EC) No 1310/97 of 30 June 1997 (OJ L 180, 9.7.1997, p. 1, corrigendum OJ L40, 13.2.1998, p. 17).

for the vertically integrated firm to be active (and hence to compete) in the intermediate good market. In the observability case the vertically integrated firm enjoys a larger market share in the downstream market than the independent downstream firm and almost drives it out of the market. This is due to the fact that it abstains from competing in the intermediate good market. It is exactly this abstention from competition that creates the dominant position of the vertically integrated firm, which is what the Commission is concerned about. The action by the Commission is legitimised¹⁰ by the fact that consumers are worse off in the relevant market, which is the final good market in the model. Indeed, prices for both varieties of final goods increase and also the first variety (the one produced by the independent downstream firm) becomes more rare and in the model consumers value variety.

Recently, the Tetra/Laval merger was not approved by the Commission since it was argued, using an argument similar to the one developed in this paper, that it threatened to create a dominant position among other effects. According to the Commission's decision C (2001) 3345 final of 30 October 2001 the merger was not only (directly) creating a dominant position, i.e. directly harming competition, but its indirect consequences were detrimental for competition in the relevant markets. Although, the Court of First Instance did not confirm¹¹ the Commission's decision, affirming that the Commission had failed to provide sufficient evidence in support of its claim, it did state that the latter's reasoning was perfectly legitimate and correct in its addressing the issue of future and mediate effects of a merger.¹² The Tetra/Laval judgement was hence interpreted as the Court's establishing standards of proof higher than those used by the Commission.¹³

Finally, notice that in the United States of America, where only active, or intentional, monopolisation of a market is prohibited under the Sherman

¹⁰ According to art. 2(1)(b) of the EC Merger Regulation.

¹¹ Case T-5/02, Tetra Laval BV vs Commission of the European Communities, 25 October 2002.

¹² This is explicitly stated in the Court of First Instance's press release no. 87/02.

¹³ In support of this interpretation, see the wording used by the Court of First Instance in the judgment on the Tetra Laval case (T-5/02). In particular recital 336 thereof which carries the conclusions on the conglomerate effects states that the Commission's "*contested decision does not establish to the requisite legal standard*" that the merger would have anticompetitive effects.

Act,¹⁴ the strategic incentives for vertical integration given by Proposition 6 hold. Indeed, the independent upstream firm does not attempt to monopolise the intermediate good market, but simply finds itself alone in the market because the vertically integrated entity voluntarily abstains from competing. Moreover, the independent upstream firm is by no means building barriers to entry so as to preserve its monopoly. On these grounds, the Sherman Act does not condemn the monopolisation of the intermediate good market.

8. Conclusions

It is known that, in general, merging firms performance declines in the post-merger period. The research of this paper is motivated by the following puzzle: why do firms merge, if it is not profitable to do so? This essay focuses on vertical integration. A simple model of four plants is analysed, in which none of the traditional reasons for vertical integration (such as scale or scope economies, input customisation, market foreclosure and double marginalisation) holds; here vertical mergers only respond to purely strategic incentives. The two upstream plants produce an homogeneous good that is a necessary input for downstream production. The producers of the horizontally-differentiated final good compete in quantities, while upstream firms compete in prices.

In the model downstream firms simultaneously have the opportunity to take over one input supplier. The resulting vertical integration is observed. Then, before production and competition take place, vertically integrated entities decide whether to enter the intermediate good market or to perform only in-house production. Whether this market entry decision is observable or not by the competitors has a crucial impact on the results. If entry of the vertically integrated entity in the market for the intermediate good is not observable, firms are indifferent about vertical integration. However, if the market entry choice is observable then vertical integration is the unique equilibrium of the model. Observability makes it possible for the vertically integrated entity to commit not to enter the intermediate good market. So in an asymmetric situation in which one integrated firm competes with a chain of independent enterprises, the independent upstream firm becomes a

¹⁴ 15 *U.S.C.A. § 2*. For a comparative discussion of European and US competition policies, see Motta [19], ch. 1, pp. 1-21.

monopolist. This makes the independent downstream firm worst-off and the vertically integrated entity best-off, giving rise to the strategic incentives to vertical integration.

Observable market entry is not a remote hypothesis. Indeed, it happens all the time doing *e*-business that everyone competitors included can observe what products are being offered on a firm's website. A more traditional channel of information flow can be the concentration in a specific area of the production plants of all the competitors that may allow for direct observation of the specific nature of the commodities shipped out of the competitors' plants. Moreover, many firms regularly meet (together with wholesale dealers, suppliers, and other specialised agents) in sectoral business fairs where each firm launches the products it is basing its business plans upon. The last two examples are of great importance for small- and medium-sized enterprises. Indeed, these firms are often clustered in industrial districts and regularly take part in sectoral business fairs.

It is finally interesting to notice that the European Union's merger regulation and the US Sherman Act have different impacts on the strategic incentives to vertical integration found in the model. The EU regulation would inhibit these incentives, while the American anti-trust authorities would not intervene.

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Figure 1: Dispersed configuration

Figure 2: Duopoly

Figure 3: Asymmetric Configuration

Figure 4: Monopolistic behaviour of upstream firm