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"Vertical Integration: Towards a Guide for Practitioners"

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Vertical Integration: Towards a Guide for Practitioners*

Jacques Crémer

Foreword

In this article, we embark on an experiment. We aim to present, in language accessible to management practitioners, the concepts and conclusions developed over the past twenty years in economic literature.

Around 1973, a cultural revolution occurred at the heart of economics: a formalized and precise language was discovered, enabling discussions about individual behaviors in situations where they leverage the information they possess. This revolution led to the development of a true theory of the firm, with contributions from some of the greatest minds in microeconomic theory.

Certain insights, terminology, and results from this economic literature are scattered across books and articles intended for practitioners, but no work systematically seeks to popularize these theoretical advancements[1]. This creates a delicate situation when a manager asks, "What do economists have to say about vertical or horizontal integration, optimal organizational structures, or employee and executive incentive schemes?" While many references may come to mind, they are often works written by economists for economists, using terminology that may appear esoteric to non-specialists. Sometimes the mathematical level can pose a challenge. The pitfall is subtler when this is not the case, as common terms are employed in technical senses, and an untrained reader can easily misunderstand them.

Consequently, this renewed economic theory of organizations has provided insights that do not seem to have the influence they deserve among non-academic economic circles. Economists, in my opinion, have not invested enough in technology transfer.

There is another internal reason, related to research itself, why this effort at popularization is important. It is extremely difficult to subject the theory of the organization to econometric tests. Historical data and case studies allow confrontation with reality and confirm its validity. However, for me, and as informal discussions with other specialists show that I am not alone, the most convincing empirical support

* I thank Marc Ivaldi, Michel Moreaux and Jean Tirole, as well as the researchers of the Institut d'Economie Industrielle, for their comments.

[1] The book by John McMillan, Games, Strategies & Managers, published by Oxford University Press, does this work for contract theory.

comes from discussions with individuals engaged in business life. The insights provided by extensive practice of the theory give me, or so it seems to me, an impression of understanding problems more quickly and accurately than would seem normal for someone who has spent their life in an "ivory tower." Making the theory more accessible should facilitate such testing.

If we were unable to formulate the theory in terms that allow practitioners to recognize their concerns within it, serious questions would be raised about its ability to explain the world[2].

I have chosen to attempt to present part of the economic theory of the firm by focusing on vertical integration. This issue concerns many businesses and is central to my current research. While the literature that explicitly addresses it is not extensive, it draws upon numerous concepts developed elsewhere.

Before we begin, I would like to explain the writing rules I have set for myself.

As with any academic literature, the study of organizational theory has its own dynamic. Sometimes, academic debates focus on subjects, such as the "correct" definition of vertical integration, whose long-term importance for better understanding the topic is fundamental, but which offer few clear and actionable lessons in the short term.

Occasionally, discussions focus excessively on topics that have limited practical or fundamental importance, while others are neglected. Generally, this imbalance is of little consequence to specialists because the insights gained from studying one topic can easily be applied to another, and these insights are the true focus of debate.

Certain topics are not addressed in depth because we are unable to provide satisfactory treatment. For instance, the theory pays insufficient attention to certain forms of bounded rationality, as we lack the tools to analyze them precisely.

As understandable as these omissions and excesses might be in the development of economic science, I felt they should not influence a presentation intended for a broader audience. I have thus decided to conceal them, supplementing or pruning the theory as needed. This means that the degree of certainty I attach to the various conclusions of this essay is not uniform.

I also opted to depart from the conventions of academic writing by avoiding attempts to present a balanced view of all aspects of the subject. Specifically, I did not include works that I consider interesting but lacking immediate practical significance. Moreover, I kept the bibliography to a minimum, aiming to enable non-specialist readers to begin

[2] This is not a general test for all propositions in social sciences, nor even in economics. For reasons too long to explain here, related to the kind of phenomena we seek to explain—rational and thoughtful choices made by agents explicitly—it seems appropriate in this case.

deepening their understanding of the topic. (Specialists will likely recognize the references easily and be more interested in the presentation method.)

As readers will notice, the ideas to be discussed are highly complex, and I hope they will not resent my emphasis on the word "towards" in the title of this essay. On numerous occasions during the writing process, I found myself compelled to make compromises and shorten an analysis that would otherwise lead to overly long developments.

I. Introduction

Vertical integration refers to the consolidation within a single company of two production activities where the product of one serves as an input for the other. For instance, there is vertical integration when a restaurant cultivates its own carrots, as the gardening activity's product becomes a production factor in cooking. The focus of this essay is vertical integration, distinct from horizontal integration—where a company markets two somewhat substitutable products—or holding integration, involving activities on separate markets. Unless otherwise stated, "integration" here will specifically refer to vertical integration.

Every company is somewhat vertically integrated.[3] Peeled carrots, for example, are one component of a successful stew; peeling them in the restaurant is a form of vertical integration. Imagine, however, outsourcing this task to a specialized company linked by a suitable agreement. Less obviously, separating activities like “cooking” and “service” into two companies with contracts is conceivable. This observation leads to the first principle:

Rule 1: The question for a company isn’t whether integrating certain activities is desirable but determining the optimal extent of such integration.

The optimal degree of integration varies with technology, management techniques, and the legal and economic environment. For instance, the European Commission's efforts to limit vertical integration in networks are only conceivable due to advancements in computing and communication technologies over the last two decades. Universal rules are impossible to establish, so instead, we seek general principles applicable case by case.

There are two primary motives for increasing vertical integration:

- Strengthening market power.
- Improving productive efficiency or information flow within a company.

[3] The discussion that follows is inspired by by Coase’s classic article (1937).

After outlining some general principles of analysis in the following section, we will successively examine these two reasons in Section 3 and the first two parts of Section 4, before turning to an analysis of the risks of vertical integration in the final part of Section 4

II. Choosing an Organizational Mode: General Considerations and Methodology

For the purposes of this discussion, we will define management as the organization of relationships between different individuals or groups of individuals. This definition excludes certain important issues. Even an individual working alone—such as a writer or an artisan—faces management challenges, which can be partially listed to grasp their importance: organizing time, sequencing different activities, investing, learning new techniques. We will assume that individuals are capable of resolving these challenges in their own best interests, given the physical, informational, and cognitive constraints they face. Our focus will instead be on exploring the constraints that organizations face.

To coordinate the actions of their members, organizations must fulfill several roles. While a comprehensive taxonomy wouldn't be particularly useful, discussing some of these roles is indispensable. We'll briefly examine the functions of coordination, information flow management, and incentives alignment.

The first role of an organization is to coordinate the actions of various parties. This requires both local optimization—where each individual involved takes the right action in response to their circumstances—and global optimization, ensuring actions are compatible across the organization, despite imperfect information about others' actions and problems. Typically, this coordination doesn't pose challenges for long-term planning, as sufficient time allows for thoughtful decision-making.[4] However, day-to-day decisions—each relatively minor but cumulatively significant—can prove more challenging, as demonstrated by proponents of "total quality management." For instance, in a custom manufacturing firm, the balance of production plans depends on decentralized decisions by numerous salespeople, workshop managers, and buyers, who cannot communicate continuously due to prohibitive costs. Vertical integration generally favors coordination for reasons we'll explore later.[5]

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[4] The distinction between long-term and short-term decisions is due to Simon (1973). He discusses its importance for the theory of internal organization. See also Crémer (1981).

[5] The development of computing facilitates data transmission but does not automatically solve coordination problems. Even if access to raw data is facilitated, individuals remain limited in their ability to assimilate it.

The second role of an organization is to manage communication systems between agents. This is intrinsically tied to the coordination role (see literature on team theory, particularly Marschak and Radner, 1972). Some authors view the organization as an immense computer, receiving data from its environment and calculating appropriate responses. The organization must manage its "processors"—its employees—ensuring appropriate information enters at the right level, is pre-processed as needed, and is transmitted or used for decision-making. Vertical disintegration[6] disrupts communication channels and impoverishes the richness of transmitted information.

Lastly, *the organization must align the incentives of its members with those of the organization itself*, using a clear and relevant analogy from Anglo-Saxon terminology. Without succumbing to cynicism, one must acknowledge that these interests often diverge. Employees may prefer fulfilling work, but some mundane tasks are unavoidable. Promotions must be granted based on observed contributions, which implies that less visible tasks might be harder to get done. Traditional analysis distinguishes two main challenges in aligning incentives:

The first challenge is to mitigate the problems of *adverse selection*,[7] that is, the distortion of information by those who possess it. For instance, a salesperson who fails to sell a product may conceal the fact that the client ordered a large quantity from a competitor, even though this information could be useful to the firm employing them—for the marketing department, as well as for assessing the salesperson's own abilities. In general, vertical integration helps align the interests of the parties involved and contributes to resolving such incentive-related issues (see 4.2.2).[8]

The second challenge is to mitigate the problems of *moral hazard*,[9] that is, to ensure sufficient and appropriate efforts from individuals. This would pose no issues if the relevant information were shared among all parties. By weighing the legitimate interests of the involved parties, an appropriate compromise could be reached. In reality, it is difficult to pinpoint the precise moment when an engineer transitions from useful product improvement to pursuing technical feats driven by a personal preference for

Figure 1: Contracts with vertical integration and disintegration

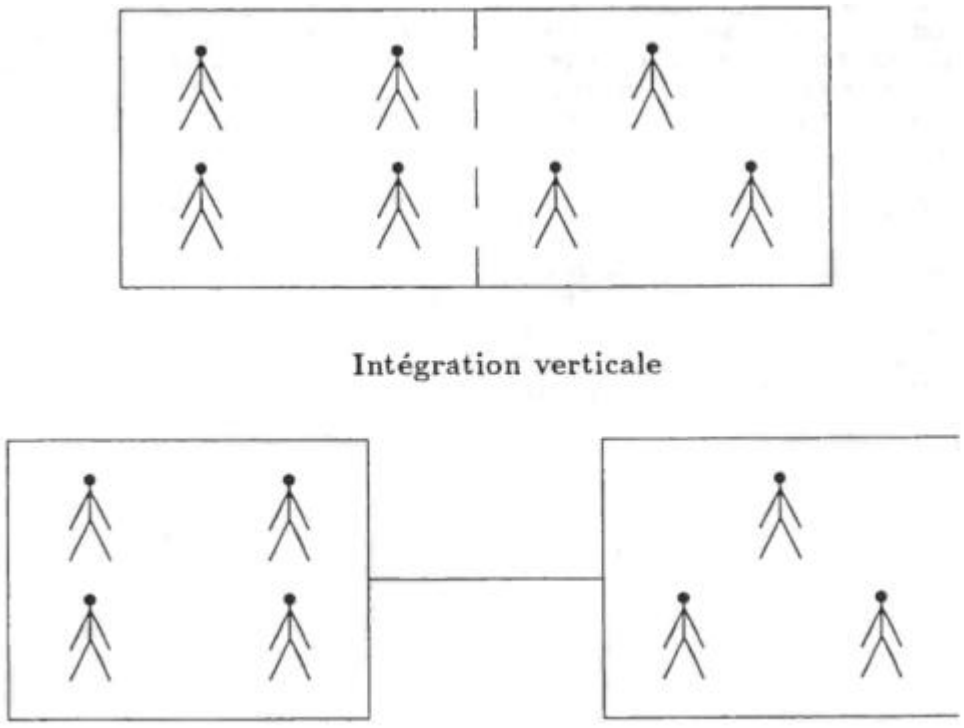
[6] To speak of a situation in which the seller and the buyer are two different firms, we will use the term "vertical disintegration".

[7] This terminology, traditional in economics, is borrowed from the vocabulary of insurance. It describes the phenomenon whereby insurers cannot completely know the characteristics of their clients, so it is not necessarily the population they desire that benefits from such or such policy. The selection of clients is poorly done.

[8] In some cases, vertical disintegration will allow better alignment of incentives within the newly created companies and will mitigate this kind of problem.

[9] This term is also borrowed from the field of insurance. A party insured against a risk will tend to reduce the efforts it makes to avoid a disaster. The moral hazard in question is the risk that a clause stipulating sustained effort in this direction will not be respected.

"elegant" solutions. Generally, vertical disintegration facilitates the resolution of such incentive problems by removing managers from the safety net provided by a parent company and subjecting them to market discipline.



Intégration verticale

Vertical integration replaces a relationship between the client firm and the supplier with numerous relationships between the firm that acquires the other and its new employees. Figure 1 illustrates these relationships. Under a regime of vertical integration, the employees, who primarily serve their firm, have multifaceted relationships with each other. In contrast, under a regime of disintegration, the relationships between employees—now located in different companies—are subordinate to the relationship between the companies. While individuals might engage in direct interactions across firms, within these contacts, they act as representatives of their respective employers.

Inevitably, vertical integration alters the dynamics between a firm and its employees. This shift isn't necessarily apparent at first glance. One might assume that, after acquiring a supplier, the newly integrated division could simply be instructed to "behave as though you were still an independent company." Such instructions are not credible. The powers and incentives of the ex-client, now both a client and owner, fundamentally change upon acquisition: decisions now account for both the quality of acquired factors and the profits of the subsidiary. For instance, a decline in service quality wouldn't systematically prompt the search for another supplier, as the firm might

instead invest time and capital to enhance production management—something it wouldn't consider for an ordinary supplier. Anticipating this, the integrated supplier adjusts its behavior. Analyzing potential integration involves assessing the consequences of these adjustments and comparing the costs against the potential benefits of integration.

The study of the benefits of vertical integration are complicated by the multitude of ways integration can be structured, as well as by the diverse forms of relationships possible in the absence of integration. In practice, one must compare the best solution identifiable under integration with the best solution absent integration. This necessitates a dual optimization process: optimizing integrated and non-integrated relationships separately and selecting between the two optimal solutions. The goal is not necessarily to identify situations where integration will work flawlessly but to choose the most suitable management techniques available, even if none are entirely satisfactory. This leads us to the principle:

Rule 2: Vertical integration is chosen when it is preferable to other transaction management modes: market relationships and contractual relationships.

The formulation of Rule 2 employs the fundamental concept of transactions (see Coase (1937) and Williamson (1975)). An organizational system must facilitate transactions, which are exchanges of goods and services between agents. There are various modes of transaction management:

- They might occur via a "spot" market when exchanges involve a precise quantity of goods and a monetary sum.
- They might be managed through short- or long-term contracts, common examples being employment contracts and leasing agreements.
- They might be handled internally within a company, such as transfers between units or informal exchanges between employees.

This list, of course, is not exhaustive. Certain transactions, for example, are managed through state mechanisms, as seen with judicial system services.

The aim of this essay is to identify the characteristics of transactions that favor one management mode over another. More specifically, we will first review factors promoting vertical integration before addressing its disadvantages.

III. Market Power and Vertical Integration[10]

Many companies hold market power over intermediate goods. They set the prices of the goods they sell, but these goods are combined with other production factors by other companies before reaching the final consumer. For instance, a chemical company producing nylon for clothing may sell almost all its output to companies that combine it with labor, thread, and buttons to make garments sold to consumers. If the nylon has specific characteristics, the chemical producer may possess a certain degree of market power, allowing it to sell the good above production costs.[11]

In this section, we address the following question: Does a company dilute its market power by not directly participating in the final market? Other considerations may support vertical integration, such as the desire to obtain better market information by establishing direct contact with the public. These considerations fall under the category of "efficiency improvements" and will be addressed in Section IV.

Let us return to our culinary examples from the previous section and consider a seller of kitchen equipment for institutions and restaurants who holds a monopoly in their region. This supplier provides all the local restaurants and takes advantage of market power by charging a price above cost. Would it be beneficial for the supplier to acquire one of these restaurants?

To analyze this issue, we need to understand the strategies of the various players before and after the acquisition. The high price of kitchen equipment has two effects on the strategies of restaurants which are its clients:

- The first effect is to encourage them to raise their prices because their production costs have increased. The demand for the product "restaurant meals" decreases, and consequently, the demand for kitchens is reduced. This reduction inevitably follows the seller's desire to take advantage of their market power;
- The price increase also encourages restaurant clients to modify their production technology. If dishwashing automation is expensive, restaurateurs will rely more on labor and less on machinery. As a result, the choice of production techniques becomes inefficient, but this effect can be mitigated if there is integration. Indeed, by acquiring a restaurant, the kitchen equipment seller can mandate that dishwashing be done automatically. This will reduce the total production

[10] The literature on the subject treated in this section is very extensive. A fairly complete discussion can be found in Jacquemin and Slade (1989).

[11] There is no moral judgment in this expression. This profit can, for example, be the just reward for significant research and development effort on this product and others that have not met the same success. That said, in some cases, this extension of market power may be undesirable from a social point of view and may be the subject of legitimate prohibitions by public authorities.

cost and allow for higher profits for the "kitchen sales-restaurant" entity as a whole

More generally, a supplier of intermediate goods will benefit from downstream integration (i.e., acquiring a customer activity) if the price increases associated with exercising market power drive clients to adopt inefficient production technologies. Conversely, if client companies are effectively captive and unable to substitute other production factors for those the supplier provides, vertical integration offers no additional benefits.

We have simplified the reasoning here by assuming the company holds monopoly power. More commonly, it competes with a limited number of rivals—in technical terms, it operates in an oligopoly. In such cases, the analysis must be refined to consider competitor reactions. However, we will not address this issue in this essay.

A symmetric reasoning applies, albeit less frequently in practice, when a company holds power in the market for its production factors. In this case, market power translates into excessively low remuneration for specialized production factors, and downstream integration becomes desirable when it helps mitigate production inefficiencies.

In many countries, extending monopoly power through mergers is prohibited. This is true in the United States and increasingly so within the European Economic Community due to community law. Extending market power can also be prohibitively costly, requiring substantial funds to gain control of other companies or even entire industries. These challenges may be circumvented by imposing “vertical constraints,” or conditions on downstream companies when market power is exercised downstream. As Rule 2 highlights, we must compare vertical integration with the best set of vertical constraints available.

Consider a company that wants to ensure its clients do not adopt alternative production techniques that limit the use of the products it sells. In some cases, it may adjust the terms under which it sells its product to achieve the same outcome without acquiring control. Two frequently used techniques include:

- The supplier may contractually impose production techniques on downstream firms. For example, a kitchen equipment seller could require fully automated dishwashing by bundling ovens and dishwashing machines in its sales.
- For frequently purchased goods, such as nylon in our earlier example, the supplier might lower the price of the good while imposing an annual fixed fee. Once the fixed fee is paid, the client firm has no incentive to limit the use of the production factor, thereby addressing inefficiencies.

The fundamental idea is to encourage client companies to adopt production techniques they would have used if the production factor had been priced at marginal cost, while finding a way to capture the profits associated with market power. Such approaches can be implemented only if:

1. The legal system does not render their cost prohibitive.
2. An appropriate contract can be designed. Contract drafting techniques play a central role, as discussed in the next section.

Rule 3: When legal, vertical integration consolidates market power under the following conditions:

- *The exercise of market power leads to inefficiencies caused by inappropriate production techniques.*
- *No contractual or pricing techniques directly address these inefficiencies.*

IV. Efficiency of the Productive System

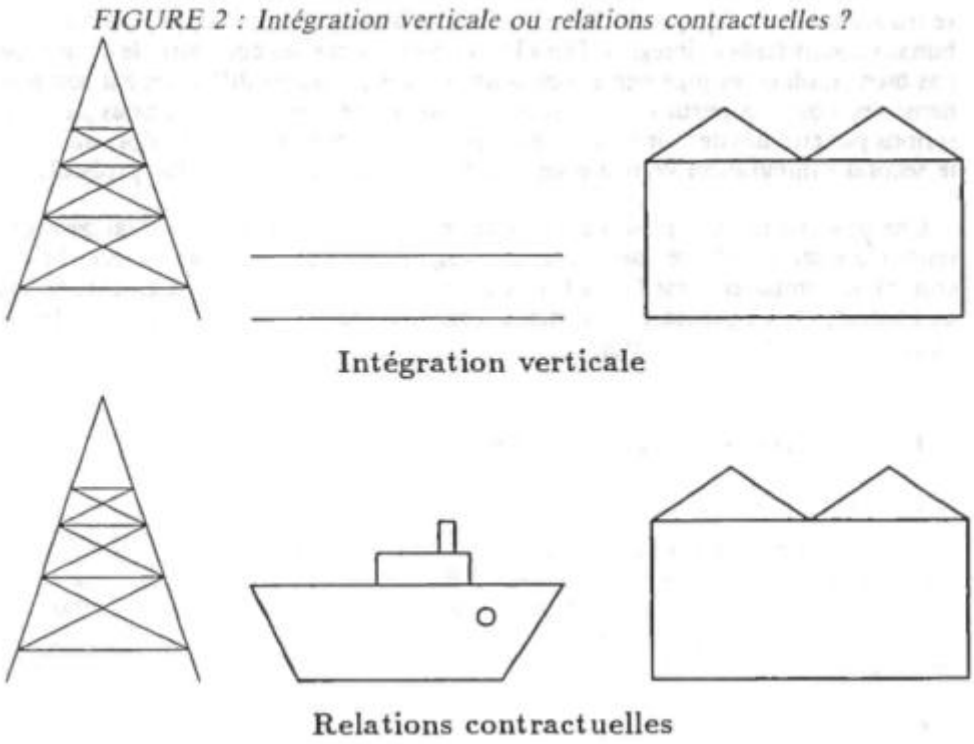
Thus far, our reasoning has followed a traditional path for economists, finding the foundation of economic action in the exploitation of market power. We now turn to themes more recently introduced to economic science, situated at the intersection of economics and management. To structure our exploration, we first present some examples that will serve as references later.

1. Examples[12]

Example 1: Let us begin with a canonical example, illustrated in Figure 2, where we consider two seemingly similar situations. In the first, a landlocked oil well supplies a refinery via a pipeline. In the second, the oil well is located near a port and supplies the refinery by ship. Intuitively, the first situation appears much more conducive to vertical integration, and it would be hard to imagine three different owners managing the system—unlike the case with maritime transportation.

[12] The examples and much of the discussion that follow take up the theses developed by Klein, Crawford, and Alchian (1978).

Figure 2: Vertical Integration or contractual relationships?



Example 2: Continuing with our oil well example, we examine two scenarios, assuming transportation occurs via pipeline:

- *First Scenario:* The well's output is precisely known—a steady production is expected over the next ten years, after which the well must close. The refinery holds a monopoly over a market with perfectly predictable demand.
- *Second Scenario:* The well's output is subject to fluctuations caused by factors that cannot be exhaustively listed. The demand for refined products depends on random factors, efforts by the refinery's owners, and the policies of the group managing it.

It would seem that vertical integration is strongly favored in the second scenario, while a detailed contract could adequately cover responsibilities and objectives in the first scenario.

Example 3: Let us conduct a deeper analysis of the first case from Example 2 by considering two sub-cases. In the first, the well, the refinery, and the pipeline are located in a country where commercial law is well-developed, with competent and honest courts. In the second sub-case, on the contrary, the law is not well-established, and judgments are subject to pressures that are difficult to understand for the involved parties. In the first sub-case, we would not be surprised to see the parties sign a contract, whereas in the second, vertical integration seems to be the more probable choice.

One observation about this example is worth noting: a deficient legal system will make management challenging regardless of the chosen organizational form. However, Rule 2 urges us to compare the best form of vertical integration with the best form of contract, and generally, a poorly established legal system creates more problems when there is no integration.

2. The Advantages of Vertical Integration

I. Specific Investment

It is important to keep in mind the distinction, introduced by Hirshman (1970), between "exit" and "voice." This distinction, while very important, has been insufficiently exploited. For Hirshman, these are two fundamental modes of organizational control. When an individual finds themselves in an undesirable situation, they can react in two ways:

- they can leave, either literally by emigrating or resigning, or figuratively, as in the case of a consumer who switches to another brand of yogurt. This is referred to as exercising the exit option;
- alternatively, they can try to change the situation from within, by becoming active in a political party, organizing a strike, or writing to the consumer service department of the yogurt brand.

In competitive markets, supplier control is primarily exercised through the exit option. A consumer selects the product that offers the best combination of price and quality, and if dissatisfied, they choose a different product next time. Conversely, vertical integration generally eliminates the exit option and primarily relies on voice. Two companies engaged in a long-term relationship, having invested significant resources into it, may employ a mixture of voice and exit options.

The issue then becomes, in part, determining the optimal balance between voice and exit for managing different types of economic relationships. However, a caution must be noted: if a long-term contract represents a mix of voice and exit, the precise components are established at the time the contract is signed. According to Rule 2, we must compare the best-organized vertical integration with the best contract.

Let us revisit Example 1. If oil is transported by ship, in case of disagreement between the contracting parties, it is easy to exercise the exit option, which is inexpensive and provides the desired incentives to agents. A freight market exists, and the price in this market reliably indicates the costs and benefits for the parties of maintaining the contract.

On the other hand, when transportation is carried out through a pipeline, the cost of interrupting the relationship between the parties is very high. A contractual relationship requires a very comprehensive contract, meaning a large number of clauses outlining

the obligations of both parties and considering numerous contingencies over an extended horizon.[13] In the event of disagreements, voice must be exercised, which can be costly, as there are no general principles to resolve them.

The difference between the two situations stems from the presence of a "specific" investment in the second case (see Klein, Crawford, and Alchian (1978)). This refers to an investment that cannot be redeployed to other activities. Such an investment involves businesses in a long-term relationship, necessitating a very high number of contingencies in the contract. However, despite this, some grey areas will remain. Vertical integration resolves this issue by consolidating decision-making power.

Rule 4: The presence of a specific investment favors vertical integration.

Three key points of interpretation:

- There are degrees of specificity in capital. A machine purchased to meet a specific demand may be redeployed at a greater or lesser cost. The more specific the investment, the higher the benefits of vertical integration will be.
- Capital specific to a relationship is not necessarily physical. It can be “informational” capital. A subcontractor with extensive experience working with a particular client possesses information that is not useful in relationships with other clients. They know whom to contact for additional information, can anticipate the client’s demands and integrate them into their work plan, and understand the internal language unique to every company, etc.
- The degree of specificity of capital can itself be influenced by the chosen organization. If one decides to manufacture a component "in-house," highly specific techniques may be employed. Conversely, if a subcontractor is used, they will seek to protect themselves from contract termination by adopting more flexible technology.

2. Uncertainty

In the second example described above, we observe two situations. In one, likely a textbook case, there is no uncertainty regarding future production or refinery requirements. It is easy to draft a contract: the well owner commits to producing a fixed quantity, which the pipeline must transport and the refinery must accept. Vertical integration is not needed to manage this relationship.

On the contrary, in a typically uncertain market, drafting a contract is an extremely challenging task.

We can identify three aspects of this difficulty:

[13] Such contracts do exist because it is sometimes impossible to avoid them. We simply want to emphasize their costs.

- The number of cases to consider becomes very large. The complexity of the contract leads to significant costs, and the risk of conflicts arising from divergent interpretations increases.
- Information is not well-shared among the parties: for example, the refinery would have a much better estimate of demand than the oil producer. It becomes difficult to introduce clauses that depend on these parameters, which are hard to verify. The refinery would prefer the well to have high capacity to ensure a sufficient flow in all circumstances, and during contract negotiations, it tends to exaggerate its estimates of future demand. These challenges can be partially overcome, but they require either changes to the contract terms or information gathering, which could be costly for one or both parties. Here, the phenomena of adverse selection, mentioned earlier, come into play.
- It is difficult to verify whether the parties truly adhere to the contract's terms. For instance, to ensure a steady flow, the pipeline and well might request that the refinery owners commit to maintaining it in good condition and not divert production to other units they own. Non-compliance with such clauses is very hard to prove. This brings into play moral hazard phenomena.

Any of these types of uncertainty favors vertical integration .[14]

Rule 5: In the context of a long-term relationship, the presence of uncertainty favors vertical integration.

In this rule, the words "in the context of a long-term relationship" are important: if the uncertainty concerns the duration of the period during which a component will be needed, greater uncertainty will favor relying on an external supplier.

3. Difficulties in Drafting Contracts

We have come far enough to take a step back and revisit Rule 2, particularly to explore contractual relationships in greater detail.

A transaction in a competitive market is extremely simple: “you give me this product, and I give you this amount of money.” In what we call contractual relationships—that is, those that effectively involve drafting an explicit contract between the parties—such a contract can also be very simple, e.g., “we will deliver this sack of potatoes this afternoon.” However, it can also be extremely complex, as in the case of delivering a turnkey factory. In general, it is easier to vertically integrate transactions that would require very complex contracts. This is not worthwhile in the case of a turnkey factory, as it is a standalone transaction.

[14] A more precise analysis would show that it is not the "quantity" of uncertainty, measured by the variance of the random variables in question, but the impossibility of describing it that constitutes the important variable.

Rule 6: Vertical integration is favored for long-term relationships that, in its absence, would require complex contracts.

We include within the scope of contractual relationships the many commercial relationships in which the parties rely on implicit, unwritten contracts. For example, a supplier regularly checks to see if their client needs specific products. No contract has been signed, and no penalty could be legally imposed if the supplier were to change its practices, yet this service is part of the package of goods purchased by the client and can even be decisive in the choice of supplier. The practice of subcontracting often involves contracts that have both explicit and implicit components. This is, for example, the case in the Japanese automotive industry, where explicit short-term contracts are signed within the framework of a long-term relationship.

As we saw in Section 2, vertical integration replaces the contracts governing the relationships between companies with multiple employment contracts signed with each individual in the absorbed company.[15] For simplicity, we refer to this situation as if there were a single contract, which should be understood as encompassing all these employment contracts.

The decision-maker's challenge is to find the most suitable form of contract for the specific situation they face. To do so, they must first identify the most appropriate contract within each available category and then select the best one after this pre-selection process. Two additional difficulties in drafting almost all types of contracts arise on top of those already mentioned:

Commitment

The first difficulty concerns the ability of the parties to commit, which arises at multiple levels. On the most obvious level, it is impossible to rely on the judicial system for every violation of contract terms. Generally, reallocating resources within a company is subject to fewer legal constraints than reallocating between companies. Vertical integration becomes even more necessary to compensate for contractual deficiencies when the legal system is less developed.

Rule 7: Vertical integration is favored by the presence of underdeveloped or inadequate commercial law.

This rule has very practical implications for Eastern European countries transitioning to a market economy: it is not advisable to dismantle firms that integrate an industrial sector too quickly before commercial law has been rebuilt.

A partner in a contract may also face difficulties in committing to desirable actions at the time the contract is signed, but which are costly ex-post. In particular, it is

[15] Reality can be more complex, of course. The employee of a subsidiary is not legally an employee of the parent company. We neglect these complications in this quick presentation.

challenging to commit to penalizing actions that go against the spirit or letter of the contract. For instance, our oil well cannot credibly commit to cutting off the flow if the refinery does not purchase regularly enough. Such an action would be so costly that the threat would fail to serve its deterrent purpose.

Rule 8: If, in the absence of vertical integration, drafting a contract between companies encounters difficulties in enforcing its terms, vertical integration will be preferred.

The possibility of renegotiating the contract, which might initially seem like an appealing element of flexibility, can in fact undermine the very purpose of the contract. This observation is a generalization of the point raised in the previous paragraph: failing to impose a penalty is a form of renegotiating the contract by removing one of its clauses, which is costly for both parties.

Incomplete Contracts

Contracts are often "incomplete".[16] As previously discussed, one reason for this is the complexity of future possibilities. Consequently, some terms of a contract will remain vague. For example, a company outsourcing part of its research and development must acknowledge that the contract will necessarily be vague, as it is difficult to describe the various possible outcomes in advance. Thus, contracts are limited in their level of detail.

Often, certain dimensions of the service provided by a company are difficult to measure, with quality being an important example. Under such conditions, drafting a contract becomes challenging: penalties for deficient quality are difficult to enforce. Sometimes this issue is circumvented by letting the client be the sole judge. For example, in the steel industry, the purchasing department can unilaterally refuse a delivery. In this case, two conditions are met, which are not always present:

- There is a substantial cost for the client to refuse a delivery, which protects the supplier from abusive demands.
- Very little specific capital is invested in the relationship, so Rule 4 does not apply.

Rule 9: The difficulty in committing to contract terms favors vertical integration.

3. The Risks of Vertical Integration

We now want to identify three considerations that argue against vertical integration: relationships with other companies, personnel policy issues, and the harmful effects on agent incentives. We will then show, through an example, that the difficulties in drafting contracts—which, as discussed earlier, generally favor vertical integration—can sometimes have the opposite effect.

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[16] The first formal analysis of incomplete contracts that I know of is due to Simon (1951). They were brought "back into fashion" by Grossman and Hart (1986).

The issue we address here is one of the most challenging in economic theory. Indeed, a very simple and seemingly flawless reasoning suggests that vertical integration can never have negative consequences (see Williamson (1985), Chapter 4).

It can always be argued that the managers of the various divisions of the newly integrated company should behave exactly as they would if they were independent. This proves that, at worst, vertical integration leads to the same outcome as disintegration, and thus it is never to be discouraged.

The primary goal of the following pages is to demonstrate why this reasoning is fallacious. There is consensus on the general outline of the argument, which has been developed over the past ten years. However, the details are not yet fully established and remain subject to debate.

I. Relationships with Other Companies

Computer manufacturers consume a large number of integrated circuits, and some of them choose to produce the circuits they use internally. This provides several advantages. Gaining internal expertise on the development of such a significant component allows for better planning of new products. The production and design of integrated circuits can be tailored to the client's specific needs at a lower cost. All these considerations align with the previous discussion. However, most manufacturers do not produce integrated circuits and prefer to purchase them from external suppliers.

One reason a manufacturer might prefer to purchase circuits from a third party is that their demand is not sufficient to justify the establishment of a factory.

Let us explore the following question: why don't we find vertically integrated computer manufacturers in the production of integrated circuits who sell part of their production? At first glance, such a solution would allow for both the benefits of mass production and vertical integration.

To understand this situation, we must consider the incentives of the potential clients of the integrated manufacturer, who prefer to source their circuits from independent suppliers for two main reasons:

- They increase the reliability of their supplies.
- They avoid sharing strategic information with a competitor.

A contract, whether explicit or implicit, between a client and a supplier specifies that the latter will make "normal" efforts to deliver the good to the client. Defining the standard is a complex matter, and only some contingencies can be anticipated in advance. When discussing this point with industrialists, they explain that as merchants, it is in their interest to satisfy the customer. When faced with unforeseen circumstances, such as technical problems or excessive demand, they strive to find an

acceptable compromise. Predicting how this compromise will be managed is important for the client when selecting the supplier.

A computer manufacturer relying on a competitor to provide a component as strategic as integrated circuits will generally harbor doubts about how such compromises will be handled. If demand for computers increases and all orders cannot be fulfilled, will the supplier prioritize its internal demand? In the case of technical problems, will the shortage be allocated fairly? Clearly, it is impossible to foresee all these contingencies and draft a contract that manages them precisely. Consequently, while it is not impossible to turn to a competitor for occasional orders, it is far more difficult to do so for products requiring sustained relationships.

Beyond this difficulty in guaranteeing fair treatment to competitors, this example also highlights a second challenge associated with vertical integration. Ordering integrated circuits cannot easily be done without revealing information about their use. If this information holds strategic value, the potential client will struggle to trust a supplier controlled by a competitor.

Rule 10: Vertical integration will be challenging when efficient production requires a minimum scale that depends on sales to competitors.

2. Personnel Policy

Equality in Employee Treatment

Both employees and employers benefit from a certain uniformity in the treatment of different categories of employees, and it is challenging for many companies to treat various categories of agents in a substantially different manner. While some differentiation in salaries is relatively well-accepted, non-monetary benefits are generally distributed more equitably. The complexity of daily personnel management would increase significantly with the offer of a wide range of such benefits.

Certain companies, whose workforce is on average highly qualified, nevertheless employ workers for whom the market salary is significantly lower. If the work performed by these employees is easily identifiable and can be outsourced, vertical disintegration can lead to substantial savings. Thus, in recent years, there has been significant growth in the outsourcing of maintenance and security services.

Flexibility of Employment

It is tempting to state a rule that vertical integration would lead to harmful rigidities in a company's personnel policy. The reasoning might be framed as follows:

"Upon hiring, an employer promises a certain level of job stability for reasons of economic efficiency, as the company is better equipped to handle risk than its employees, and for legal reasons, as laying off employees is costly.

It is generally much less difficult to stop dealing with a supplier. The law does not protect the supplier in the same way, and addressing them for an order, or even a series of orders, is generally not interpreted as a promise of an ongoing relationship. Therefore, vertical disintegration will be preferred for activities characterized by high uncertainty."

In reality, such reasoning requires so many adjustments that no general rule can be stated. Outsourcing does not eliminate risk, and the analysis must determine whether this risk is better borne by the company or by a third party, who would incorporate it into their prices. A deeper analysis would lead us into a detailed discussion of contract theory.

3. Vertical Integration and Incentives

The improvement in information about the supplier due to vertical integration comes with a cost, which we will explore by comparing the following two situations:

- A component is produced by a division within a company.
- The division is sold to its manager, who assumes its profits and bears its losses, potentially shared with their bankers.

There are many other structures of disintegration, and we could use numerous variations of the second case. I hope this example provides readers with insight into the analytical techniques to be employed.

Vertical integration enhances information flow between the supplier and the client; however, it generally weakens incentives to both reduce costs and maintain satisfactory quality (Williamson (1985)). The basic idea is intuitive: the head of a small business feels more pressure than a division manager within a company. Nevertheless, it is useful to deepen the analysis by asking: "Why can't a division manager be subjected to the same pressure as if they were responsible for an independent company?" The answer will help refine our classification of the circumstances that favor or disadvantage vertical integration.

Performance Measurement

(The following analysis is inspired by Riordan (1990)). The performance of a small business manager can be measured unambiguously: they ensure the survival of their company and strive to achieve sufficient profits. The rules for calculating profits and evaluating the company's assets are well-established and clear. These are not applicable to a division within a company.

- Firstly, because the process of consolidating the accounts and expenses of the company as a whole, and reallocating them across different profit centers, makes it difficult to estimate what the profits would have been in the absence of vertical integration.

- Secondly, because control over the accounting system changes hands. In the case of an independent firm, the firm's managers, within the framework established by law, have full freedom to set up an accounting system. In the case of a division, it is the company's managers who determine the accounting methods. The new manager of a division, who is intended to be strongly incentivized by profit, would review these accounting methods; however, there would still remain enough ambiguity for them not to accept the same direct link between their compensation and the figures that an independent business manager would.

The Second Chance Phenomenon

(See Crémer (1993a) and (1993b)). A subcontractor fails to deliver on the agreed date, and their prices rise too quickly. Even if replacing them incurs significant costs, many companies will choose to do so. If the same issues occur under vertical integration, the company will carefully examine the reasons for the underperformance and attempt to help its division resolve the problem. The company will use its superior access to information to verify whether the situation is truly hopeless. This strategy is far more expensive in the case of an independent supplier, where a serious audit requires learning a new management control system in a context where the partner has strong incentives to present the situation in the best possible light.

Knowing that the penalty for failure is lower, the division manager will have weaker incentives in their day-to-day management. This may manifest either as reduced effort or, more realistically, as a lesser resistance to staff demands or the allure of technical experimentation.

Contract Ambiguities

(See Grossman and Hart (1986)). As discussed earlier, the relationships that bind a supplier to its client, whether internal or external, are always tinged with some ambiguity. A contract with a supplier cannot predict all possible contingencies. Internal relationships within a company have developed over years but must continually adapt to new circumstances. The choice of vertical integration or disintegration results in very different ways of resolving conflicts that arise from gaps in the contract.

Under both vertical integration and disintegration, unforeseen circumstances not covered by the contract will lead to negotiations. These negotiations will be guided by clauses governing similar circumstances, as well as by the relative bargaining power of the parties involved. An independent supplier clearly has more leverage when they are not vertically integrated. An example will help clarify the consequences of choosing one mode or the other. As previously discussed, this can favor vertical integration; however, we aim to show that there are exceptions to this rule.

Example 4: A supplier must adapt their manufacturing processes to the needs of their client, and a contract specifies the rights and responsibilities of each party. The client is responsible for research on product improvement. However, an engineer from the supplier unexpectedly discovers a process to include new features—something no clause of the contract had anticipated.

> Without vertical integration: It is expected that patents that may result from research on improving manufacturing processes will be jointly owned by both parties. To whom should the rights to the patent describing product improvements belong?
>
> With vertical integration: The division manager responsible for producing the component has been informed that innovation is part of their responsibilities and that their evaluation will depend on it. They may have even been promised a bonus proportional to the cost reductions achieved under their direction. How will the evaluation take into account the newly discovered features?

A detailed analysis would take us too far, but it is intuitively clear—at least if the innovation is significant—that in the first case, without vertical integration, the supplier's manager would receive a larger share of the benefits from the innovation. The legal system complements the signed contract and the relationships between employees and employers. One of its roles is to "complete" contracts by clarifying how they should be interpreted in unforeseen cases or when they are not sufficiently precise. It gives more power to the non-integrated supplier.

The way the contract is completed impacts the incentives of the involved parties. In our example, it is in the absence of vertical integration that the supplier's manager has more incentives to invest their energy and skills to support an innovation that improves the product.

Conclusion: The Preconditions for Vertical Integration

The discussion we have conducted so far has overlooked the internal management structure of the company. Even a preliminary discussion would take us too far, but as a conclusion to this essay, I would like to highlight an essential point: certain forms of management facilitate the integration of other companies.[17] Two cases may arise:

- The personnel and capital of the supplier integrated into the company are absorbed into the existing structures. After integration, the supplier does not appear as a profit center. In this case, the costs of integration will depend on the flexibility of the company's structures, a topic on which economists have, to

[17] I do not know of any explicit discussion of this point in the case of vertical integration. The discussion of conglomerates in Williamson (1975) provides some useful insights.

date, not had much to say, and the similarity of technologies between the two organizations.

- If the supplier retains a distinct identity within the newly integrated firm, the company's operating mode will affect its ability to manage a semi-independent division. Specifically, if the company has already transitioned to a "multidivisional" structure, where semi-independent divisions are controlled strategically rather than operationally, it will have developed the management and cost accounting techniques necessary to integrate a new division at relatively low cost.

In this second case, the ability to integrate a new division at minimal cost will naturally favor vertical integration (as well as horizontal integration), and the cost-benefit comparisons mentioned earlier will be influenced as a result. A company planning to pursue an integration strategy must strive to adapt its management approach.

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