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Vertical and Horizontal Expansions in Value-based Models

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Abstract

Strategy research has often treated vertical integration and diversification strategies as independent topics. Using a biform model, this paper reconciles the existing chiasm by examining the simultaneous interplay between vertical and horizontal corporate strategies. I find that firms in a classical Williamsonian scenario characterized by ?small numbers?, ex ante vertical integration decisions, and ex post bargaining do not necessarily prefer vertical integration to market transactions. Conversely, if one firm in the economy can develop a valuable, rare, inimitable, and non-substitutable resource that favors synergies from horizontal expansion strategies, said firm does strictly prefer vertical integration. Overall, I show that vertical and horizontal corporate strategies may be complements even when governance and production costs increase disproportionately to firm size.

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ABSTRACT

Strategy research has often treated vertical integration and diversification strategies as independent topics. Using a biform model, this paper reconciles the existing chiasm by examining the simultaneous interplay between vertical and horizontal corporate strategies. I find that firms in a classical Williamsonian scenario characterized by "small numbers", ex ante vertical integration decisions, and ex post bargaining do not necessarily prefer vertical integration to market transactions. Conversely, if one firm in the economy can develop a valuable, rare, inimitable, and non-substitutable resource that favors synergies from horizontal expansion strategies, said firm does strictly prefer vertical integration. Overall, I show that vertical and horizontal corporate strategies may be complements even when governance and production costs increase disproportionately to firm size.

Keywords:

Vertical Integration; Diversification; Biform Games

INTRODUCTION

Research on corporate strategies is a central analytical concern in the field of strategic management, which enlists a plethora of contributions examining the effects of different business units on the overall firm performance. Within this robust stream of academic inquiry, scholars have generally categorized the set of corporate strategies into two distinct subsets, treating diversification and vertical integration as separate managerial decisions.[1] Interestingly, this chiasm at the analytical level is similarly mirrored at the theoretical level. While vertical integration is traditionally examined through the lenses of transaction cost economics (TCE) (Williamson, 1975, 1985), diversification studies leverage the resource-based view of the firm (RBV) as their main theoretical driver (Montgomery & Wernerfelt, 1988; Peteraf, 1993; Wernerfelt, 1984; Wernerfelt & Montgomery, 1988).

More recently, however, a promising body of work has underlined the interdependence existing between value-creating activities performed by firms and their diversification strategies (Rawley & Simcoe, 2010; Zhou, 2011). According to this literature, related diversification strategies increase the costs of performing transactions within the organizational boundaries. Intuitively, this happens because diversifying firms leverage specific bundle of resources across multiple markets, intensifying the production and governance costs associated with the increasingly complex coordination of firm activities. Consequently, firms incurring high governance and production costs may react to related diversification strategies by reducing their vertical scope and, consequently, the number of in-house activities.

While these studies treat vertical and horizontal strategies as substitutes, suggesting that any increase in firm size may display decreasing returns to scale, the scholarly analysis of the

[1] There are, of course, a few notable exceptions which will be mentioned later in the paper.

contingencies under which vertical and horizontal strategies may be complement is less developed. This paper analyzes the relationship between vertical integration and diversification strategies through a formal model structured following the value-based foundations of corporate strategy (Adner & Zemsky, 2006; Brandenburger & Stuart, 1996; Brandenburger & Stuart, 2007; Chatain & Zemsky, 2007; Lippman & Rumelt, 2003; MacDonald & Ryall, 2004). Specifically, I examine firm incentives to expand vertically (i.e., across value-adding activities) and horizontally (i.e., across markets) leveraging the familiar format of *biform models* (Brandenburger & Stuart, 2007). *Biform games* consist of two stages, an initial non-cooperative stage and a cooperative value-based stage. Because the non-cooperative stage can accommodate features of transaction cost economics, while the cooperative stage can be modeled after the tenets of the resource-based view, *biform games* are ideal for the contemporaneous analysis of horizontal and vertical expansion.

In this paper, the model starts with a *biform game* examining the vertical integration incentives in a Williamsonian economy (Williamson, 1975, 1985).[2] I show that competition from firms that are not vertically integrated mitigates rivals' incentives to vertically integrate. Such a contingency happens because markets enjoy advantages with respect to firms in terms of governance and production costs (Williamson, 1975, 1985).

Subsequently, a different game is analyzed. One firm with a valuable, rare, inimitable, and non-substitutable (VRIN) resource, which allows synergies from horizontal expansion, is introduced in the economy. Because VRIN resources increase rents along the value chain without necessarily increasing the focal firm's outside option, the asset specificity problem

[2] A Williamsonian economy is characterized by "small numbers" – ex post uncompetitive supplier and buyer markets -, transaction-specific investments, *ex ante* vertical integration decisions, and *ex post* bargaining.

generated by “small numbers” - uncompetitive supplier and buyer markets - is exacerbated in the last game. In this scenario, the firm endowed with the VRIN resource strictly prefers vertical integration to market transactions.

This paper makes a series of important contributions. First, the conceptual framework I develop stresses the importance of the complementarities existing between vertical integration and related diversification strategies, adding to the existing literatures that traditionally examine corporate strategies such as vertical expansion and related diversification as independent topics. Second, the paper takes a different perspective from the recent studies attempting to analyze the trade-offs faced by firms expanding both horizontally and vertically. Even when expansion along the vertical and horizontal dimensions may be hampered by a disproportional increase in governance and production costs, related diversification strategies that use more of the same input, increasing one firm’s dependence over its buyers and suppliers, could lead to more vertical integration. Finally, to the author’s knowledge, this is also the first paper that uses a *biform model* (Brandenburger & Stuart, 2007; Chatain & Zemsky, 2007; Chatain & Zemsky, 2011) to examine vertical integration decisions. This is quite surprising because there are evident synergies between *biform models* and the two most influential theories - TCE and the RBV – used to examine firm boundaries. Future research may further explore the potential of *biform games* in this new analytical setting.

The paper proceeds as follows: the ‘Background’ section provides the theoretical motivation for the model. The section titled ‘Model’ describes the *biform games* used to formally analyze firms’ incentives to simultaneously expand along the vertical and horizontal dimension. The ‘Conclusion’ section summarizes the main finding of this conceptual paper.

BACKGROUND

According to the resource-based view of the firm, a firm has a competitive advantage if it possesses valuable, rare, inimitable, and non-substitutable (VRIN) resources (Barney, 1991). However, competitive advantage translates into superior profits only if the rents extracted at the market level thanks to superior resources are not fully spent to develop or buy those same resources (Barney, 1986; Dierickx & Cool, 1989; Peteraf, 1993). In other words, in order to attain superior economic performance, a firm must access superior inputs at a cost lower than their value to the firm. This, in turn, happens if the inputs are worth more to the firm than to its competitors (i.e. the value of the inputs to the firm is superior to the second highest valuation), otherwise auctions in strategic factor markets may dissipate the rents the superior resources could possibly generate once combined into products (Barney, 1986; Dierickx & Cool, 1989; Peteraf, 1993).

In order for a resource to be worth more to the firm than to its competitors, the firm must already control a complementary VRIN resource (Barney, 1986; Dierickx & Cool, 1989; Peteraf, 1993). In economics, perfect complementarities are generated if the value of one object is realized only when its fruition is contemporaneous to the fruition of another object. The classical example is the one of the running shoes. Using one shoe at the time provides no value. If the owner of one shoe is aware of the presence of another shoe owner, she can increase the value she extracts from ownership by bargaining an exchange with the other shoe owner. By definition of complementarities, only the economic agents that controls one of two complementary inputs value the other input more than their competitors.

Ownership is not the only way to access complementarities. Alternatively, it is possible to write down a contract where one of the owners of the complementary resources pays a fee every time she accesses the complementary resources it does not own. In other words, market transactions can be a substitute for ownership.

As discussed by Williamson (1975), asset specificity arises when complementary assets are characterized by "small numbers", that is, the market for the complementary assets is not *ex post* competitive.[3] Asset specificity, *per se*, does not influence the boundary of the firm (Teece, 1980). However, human beings are both boundedly rational and opportunistic (Williamson, 1975). Boundedly rational individuals, when specifying contractual details, incur the costs associated to the gathering of information on unknown contingencies that may impact future states of the world, but also the costs associated to the computational burden required to predict those future states. If these costs are higher than the expected benefits, the contract will be left incomplete. The fact that certain complementary resources may be covered by incomplete contracts is an issue because human beings are opportunistic. When unexpected events occur, one contracting party may exploit the dependency over the complementary asset covered by the contract.

Example 1 (Running shoes)

Going back to the example of the running shoes, let's examine the situation of an economy where there exist only two running shoes, a right shoe and a left shoe, which are owned by two different economic agents. If the owner of the left shoe decides to pay a price for the fruition of the complementary shoe every time she wants to use it, the two contracting parties in

[3] The term *ex post* characterizes the fundamental transformation arising once firms make sunk investments that reduce the attractiveness of alternatives to the current transaction.

this market transaction can formalize an incomplete contract that specifies a sequence of ongoing payments that, when appropriately discounted and multiplied by the number of times the complementary shoe is expected to be used, is equivalent to, let's say, half of the value generated by the complementary assets. This transaction is no worse than ownership, unless something unexpected happens: the party engaging in the spot market transaction enrolls to a marathon. Participating to the marathon is worth something to that party, but it is a sunk investment[4] (i.e. the enrollment fee cannot be refunded or the right to participate cannot be sold to somebody else). If this is the case, the opportunistic seller can augment its share of the surplus generated by increasing the price of the shoe – the buyer may be willing to accept higher prices because the complementary input is now worth more - although the costs of the marathon accrued to only one party. If this relation-specific investment is more costly than the increase of the value appropriated, the buyer is worse off. Had she anticipated this, she would have not enrolled to the marathon, even when it is efficient to do so in the absence of contract incompleteness and opportunism. Alternatively, the buyer would have strictly preferred to buy out the seller when she had the chance. Note that the buyer would be indifferent between vertical integration and market transactions if the market for running shoes were competitive. In fact, competition among right-shoe suppliers would reduce spot market prices to their marginal costs.

Example 2 (Value chain)

The running shoes metaphor can be easily adapted to a value chain setting characterized by "small numbers". In a value chain with two undiversified monopolists, a buyer and a supplier, the buyer may be regarded as a necessary intermediary who controls VRIN resources that add

[4] Note that a sunk investment is a complementary investment with no value outside the transaction. In other words, a sunk investment is an transaction-specific investment.

value to the products sold by the supplier. If we assume that the supplier products are worth zero to the final consumer, both the buyer's and the supplier's resources are perfect complements with an outside option equal to zero. Let's assume for convenience that these two economic actors split the value V they generate along the value chain equally, such that each player obtains $\frac{V}{2}$. Because of the possible existence of decreasing returns to firm scale, which may be due to coordination costs (Rawley, 2010; Rawley & Simcoe, 2010), complexity (Zhou, 2011), or decreasing returns to the managerial function (Coase, 1937), the buyer and the supplier may more efficiently operate as separate entities rather than as a vertically integrated firm, i.e., $C_{VI} > C_B + C_S$, where C_{VI}, C_B, and C_S are the costs incurred by the buyer, the supplier, and an hypothetical vertically integrated entity, respectively. The buyer, then, may be reluctant to buy out the supplier, because the money necessary to compensate the supplier for its resources are less than the increment in profits resulting from vertical integration, i.e., $(V - C_{VI}) - \left(\frac{V}{2} - C_B\right) < \left(\frac{V}{2} - C_S\right)$.

Things however may be different if the buyer, unexpectedly, discovers a new technology *m* that may facilitate related diversification strategies by increasing resource fungibility. In a related diversification setting, the inputs used for the different products in related markets are, at least partially, the same (Levinthal & Wu, 2010; Zhou, 2011). Accordingly, once the buyer invests to increase the fungibility of its resources, the complementarities existing between the buyer and the supplier increase in that the supplier's output may be worth more to the buyer after it develops technology *m*. In fact, if we assume that the value chain resources can now be used in *n* identical markets, the supplier's output is no longer used to create value V, but value $n \times V$. The supplier may now appropriate $\frac{n \times V}{2}$. If the costs of investing in *m* are bigger than $\frac{n \times V}{2}$, which

is the surplus appropriated by the buyer itself, but lees than $(n-1) \times V$, which is the value added by the investment, the buyer may not invest in m even if it would have done so as a vertically integrated firm. Similarly to the running shoes example, such a contingency may generate transaction costs higher than the increase in governance and production costs associated with vertical integration. The buyer may then buy out the supplier before undertaking the investment. In what follows, I specify a formal model that generalizes the above analysis.

MODEL

In this section, I start with a value-based game that analyses the vertical integration decision of a group of firms in a classical Williamsonian scenario (Williamson, 1975, 1985). In this same section, I subsequently examine a variation of the same game, where one firm in the economy is endowed with the opportunity to develop a valuable, rare, inimitable, and non-substitutable (VRIN) resource that allows synergies from horizontal expansion. These games follow the familiar form of two-stage *biform games* (Brandenburger & Stuart, 2007; Chatain & Zemsky, 2007; Chatain & Zemsky, 2011), where a first noncoperative stage is solved using the concept of Nash equilibrium, while the second cooperative game is solved using the concept of 'core'. The core is very appealing as a solution concept because it does not impose any structure on the type of contractual agreements between economic agents.

I consider an economy with n identical firms belonging to the set of players $N \equiv \{1, \dots, n\} \subset \mathbb{N}^+$. On the demand side, there are m markets belonging to the set of markets $M \equiv \{1, \dots, m\} \subset \mathbb{N}^+$. In each market there are $q = k \times n$ consumers, where $k \in \mathbb{N}^+$.[5] The set of consumers is $Q \equiv \{1, \dots, q\} \subset \mathbb{N}^+$. Each consumer obtains value $\theta \in \mathbb{R}^+$ from the

[5] This assumption ensures that no firm is left out from any market just because there are not "enough" customers.

consumption of the good, with $\theta > q^2$.[6] Each consumer can consume at most one unit of the good produced in each market, for a total of *m* goods.

Game G_{tce}

Given this economy, the first game I analyze (G_{tce}) is Williamsonian in nature to the extent it is characterized by "small numbers", transaction-specific investments, *ex ante* vertical integration decisions, and *ex post* bargaining.[7] Because G_{tce} aims at analyzing firms' incentives to vertically integrate in the absence of related diversification decisions, m is set equal to 1. In the first stage, firms decide noncooperativley the coalitional structure of the second stage. More specifically, they can decide whether they will produce the good within a coalition $C \subseteq N$ or to be vertically integrated, thus being member of the set I such that $I \equiv N \setminus S$. C is interpreted as a group of firms forming a value chain where each firm locates in a specific stage of the value creation process and acts as a monopolist over that stage. If a firm decides to join the coalition, its production costs are given by $\left(\frac{q_c}{|C|}\right)^2$, where q_c is the quantity of the good provided to the market by the coalition. The production costs of the coalition as a whole are given by $|C|\left(\frac{q_c}{|C|}\right)^2$. Let $v(\cdot)$ and $Q_c \subseteq Q$ be the characteristic function of the game and the set of customers served by the coalition, respectively. Then, $v(Q_c \cup C) = \theta q_c - |C|\left(\frac{q_c}{|C|}\right)^2$. Conversely, the production costs of vertically integrated firms are given by q_i^2, where q_i is the quantity produced by the vertically integrated company $i \in I$. Let $Q_i \subseteq Q$ be the set of customers served by vertically integrated firm $i \in I$. Then $v(Q_i \cup \{i\}) = \theta q_i - q_i^2$.

[6] This assumption ensures that every customer would be served.

[7] Contrarily to Williamson, we do not assume uncertainty and bargaining. However, we do assume contract incompleteness in that ex ante arrangements in period 1 cannot be enforced in period 2.

Note that the characteristic functions imply decreasing returns to firm size and that the coalition is more efficient than vertically integrated firms. Decreasing returns simulate the presence of "governance costs" and "complexity costs" that increase more than proportionally to firm size. The functional form implying that the coalition is more efficient than vertically integrated firms comes from the fact that firms within the coalition are assumed to share the costs of producing each unit of the good.

The two stages of the model can be interpreted as a reduced form for the Williamsonian "fundamental transformation". In the first stage, the decision to join the coalition can be seen as a transaction-specific investment that binds each firm to the other firms in the coalition. Given the assumption that each member of C is a monopolist along specific stages of the value chain, each member is necessary to produce the good. In other words, each member adds value $\theta q_c - |C|\left(\frac{q_c}{|C|}\right)^2$, or, equivalently, $v(Q_c \cup C) - v(Q_c \cup C \setminus \{c\}) = 0$, for $c \in C$. In the second stage, I assume firms in the coalition have equal bargaining abilities, sharing their added value equally. Furthermore, I assume that the consumers obtain half of the value they add, which leaves the other half either to the coalition or to the vertically integrated firm who serves them.

Proposition 1: In G_{tce}, there is a unique equilibrium. In this equilibrium:

(i) $N \subseteq C$ *, i.e., all firms join the coalition;*

(ii) $I \subseteq \emptyset$*, i.e., no firm is vertically integrated;*

Proof: The proof consists of two parts: (i) I demonstrate that in equilibrium all vertically integrated firms must produce the same quantity, (ii) I demonstrate that in equilibrium such a quantity is equal to zero and then firms find it optimal to be part of the coalition. Let $|I| = i \leq n$.

Given any pair $i, j \in I$, the value added by firm i to the pair is equal to $v(Q_j \cup Q_i \cup \{j\} \cup \{i\}) - v(Q_j \cup Q_i \cup \{j\}) = (q_i + q_j)^2 - (q_i{}^2 + q_j{}^2) = 2q_i \times q_j$. Because we assume that vertically integrated firms capture half of their added value, if we keep the portion of the market served by the pair fixed – i.e., $\chi = q_i + q_j$ - each firms maximizes the value it captures by serving half of the market associated to the pair. Because this is true for all pairs of elements in I, each firm in I serves exactly the same market portion. This completes the proof of (i).

Given any firm $i \in I$, the value added by firm i to the portion of the market served by the coalition C is equal to $v(Q_c \cup Q_i \cup C \cup \{i\}) - v(Q_c \cup Q_i \cup C) = |C| \left(\frac{q_c + q_i}{|C|}\right)^2 - |C| \left(\frac{q_c}{|C|}\right)^2 - q_i{}^2$. Keeping fixed the portion of the market served by the pair – i.e., $W = q_c + q_i$ - it is possible to show that firm i maximizes the value it captures (which is half of its value added) at the corner solution q_i = 0. Any positive q_i is not in the core because the customers and the coalition can improve the surplus they capture by excluding the vertically integrated firm, which is less efficient. Because this is true for all firms in I, vertically integrated firms make zero profits while firms in the coalition make positive profits. Consequently, every firm, in equilibrium, decides to join the coalition. ■

The intuition from G_{tce} is that in static environments, where efficiency is very salient, vertically integrated firms will be selected out by competitive pressures. The coalition is more efficient because it reduces both production and governance costs. This means that, even in the presence of "small numbers", transaction-specific investments, *ex ante* vertical integration decisions, and *ex post* bargaining between buyers and suppliers, competitive pressures between vertically integrated firms and the coalition of firms in the value chain will favor the coalition.

Game G_{rbv}

In more dynamic settings, where firms invest to develop VRIN resources that underpin related diversification strategies, economic actors may behave differently than in $\boldsymbol{G_{tce}}$. The cost of sharing the augmented surplus coming from the VRIN resource may cause underinvestment in resource development and reduce the effectiveness of the coalition as a governance structure. In what follows, I consider a game similar to G_{tce}, with the difference that in the first stage, one firm, rbv, can decide the level of investment in a technology T, which determines the number of markets *rbv* can enter. In game G_{rbv}, investing in T scales up fixed factors of production and improves their fungibility, allowing for synergies across product markets (Levinthal & Wu, 2010). Variable costs, instead, are not affected by investments in *T*. Variable costs, in fact, are not a source of synergies because variable inputs, which vary with the quantity of the goods produced by the firm in each market, cannot be shared across markets (Levinthal & Wu, 2010).

Also in this game, in the first stage, firms decide either to join the coalition or to be vertically integrated. Simultaneously, *rbv* decides its level of investment in *T*. Firm *rbv* can select $t \in T$, where $T \subset M$. Investment of "quantity" one in *T* allows entering one market. Following the RBV lineage (Levinthal & Wu, 2010; Montgomery & Wernerfelt, 1988; Wernerfelt & Montgomery, 1988), I assume decreasing returns to horizontal expansions. Consequently, to access *t* markets, *rbv* must incur investment costs equal to t^2. If *rbv* decides to be vertically integrated, it behaves like a monopolist over *t-1* markets and it competes with the other firms in the "original market". Let tQ, where $|tQ| = (t-1)q$, and $Q_{rbv} \subseteq Q$, where $|Q_{rbv}| = q_{rbv}$, be the set of customers *rbv* supplies in the "new" markets and in the "original market", respectively. The characteristic function of the game is given by $v(tQ \cup Q_{rbv} \cup \{rbv\}) = (t-1)(\theta q - q^2) + \theta q_{rbv} - q_{rbv}^2$ if *rbv* decides to be vertically integrated, and by $v(tQ \cup Q_c \cup C) =$

$t\left(\theta q_c - |C|\left(\frac{q_c}{|C|}\right)^2\right)$ if *rbv* joins the coalition *C*. Otherwise, the characteristic function is identical to the one specified in G_{tce}. Note that the costs associated with an investment *t* in *T* do not show up in the characteristic function. Consequently, T can be regarded as a sunk, transaction-specific, investment. Once rbv invests in *T* and commits to the be part of the coalition, *rbv*'s outside options and opportunity costs are not influenced by its past investments in T. This means that investments in *t* increase *rbv*'s added value, but also the added value of all the other members of the coalition.

In the second stage of G_{rbv}, I assume all firms within the coalition have equal bargaining abilities. Consequently, they share their added value equally. Furthermore, I assume that the consumers obtain half of the value they add, which leaves the other half to either the coalition or the vertically integrated firm who serves them.

Proposition 2: In $G_{rbv,}$ there is a unique equilibrium. In this equilibrium*:*

(i) $t > 0$*, i.e., rbv makes a positive investment in T;*

(ii) $rbv \in I$*, i.e., rbv is vertically integrated;*

(iii) $C = N \setminus \{rbv\}$*, i.e., all the firms that are not rbv join the coalition.*

Proof. The proof concerning the behavior of the $n-1$ firms, which are not *rbv,* is identical to the one provided for Proposition 1. It's formulation is omitted for the sake of brevity. Intuitively, G_{rbv} is very similar to G_{tce} for firms who do not incur the costs of investing in T. In what follows, I demonstrate that *rbv* will opt out of the coalition and be vertically integrated.

If *rbv* joins the coalition, then the coalition will act as a "monopolist" over the *t* markets that it can access thanks to *rbv* investment in technology *T*. Given any $c \in C$, the value added by

each firm in the coalition is given by $v(tQ \cup C) - v(tQ \cup C \setminus \{c\}) = t\left(\theta q - n\left(\frac{q}{n}\right)^2\right)$. Because I am assuming that *rbv*, as any other firm in the coalition, obtains one nth of its added value, the level of investment in *T* is given by $t_c = argmax_t \frac{t\left(\theta q - n\left(\frac{q}{n}\right)^2\right)}{n} - t^2 = \frac{q\left(\theta - \frac{q}{n}\right)}{2n}$.

When *rbv* is vertically integrated, its value added is given by $v(tQ \cup Q_{rbv} \cup Q_c \cup \{rbv\} \cup C) - v(tQ \cup Q_{rbv} \cup Q_c \cup C) = (t-1)(\theta q - q^2) + (n-1)\left(\frac{q}{n-1}\right)^2 - q_{rbv}^2 - (n-1)\left(\frac{q_c}{n-1}\right)^2$. The level of investment in *T* is then given by $t_{vi} = argmax_t (t-1)(\theta q - q^2) + (n-1)\left(\frac{q}{n-1}\right)^2 - q_{rbv}^2 - (n-1)\left(\frac{q_c}{n-1}\right)^2 - t^2 = \frac{q(\theta - q)}{2}$. Given the parametrization of the model, we have that $t_{vi} > t_c$ and that the profits made by *rbv* under vertical integration are higher than the profits obtained from sharing surplus with the coalition. But then, *rbv* prefers to be vertically integrated. Interestingly, it is also possible to show that *rbv* abandons the "original market" and it focuses its operations only on the "new markets". ■

CONCLUSION

In this paper, I develop a *biform game* analyzing the vertical integration decision of a group of firms in a classical TCE setting (1975). I show that competition from firms that are not vertically integrated may reduce rivals' incentives to vertically integrate. Such a contingency happens because markets enjoy advantages with respect to firms in terms of governance and production costs.

However, when one firm is endowed with the opportunity to develop a valuable, rare, inimitable, and non-substitutable (VRIN) resource that favors synergies from horizontal expansion, a different result is reached. Because the development of a VRIN fixed factor of

production increases the value generated by the value chain without necessarily increasing the focal firm's outside option, the asset specificity problem generated by uncompetitive supplier and buyer markets is exacerbated. The firm endowed with the VRIN resource may not only pursue a vertical integration strategy, but it may also diversify more than it would otherwise have had by not integrating.

While these results echo some of the main tenets of two classic theories in strategic management – the RBV and TCE – the use of a formal model that analyses the interplay between vertical and horizontal expansion strategies sheds light on multiple issues. *In primis*, the model stresses the importance of the complementarities existing between vertical integration and related diversification strategies. Firm planning to pursue related diversification strategies may decide to vertical integrate *ex ante* in order to avoid misappropriation hazards from buyers and suppliers *ex post*. *In secundis*, the model displays the contingencies under which vertical integration is a necessary evil. While expansion along either the vertical or horizontal dimension may disproportionally increase governance and production costs, limiting firm size and scope, related diversification strategies that use more of the same input, increasing one firm's dependence over its buyers and suppliers, could lead to the opposite outcome. In terziis, the model identifies competition among vertical integrated entities and nonintegrated firms as a decisive dimension characterizing firms' governance structure. Because nonintegrated firms enjoy lower production and governance costs, the market will select out vertically integrated firms whose output does not differ from their rivals'. Furthermore, competition mitigates asset specificity and bargaining costs because it reduces the amount of appropriable quasi-rents – i.e., profits in excess of opportunity costs - available in the market. On the contrary, when firms can escape competitive pressures by leveraging VRIN resources in new markets, bargaining costs and asset specificity

may become more salient than efficiency considerations in determining the vertical strategies of firms. These findings are germane because they show that vertical integration strategies do not depend only on transaction costs, governance costs, or production costs, but also on the nature of firms' resources and capabilities, and on how those resources and capabilities affect competition within and outside the value chain.

Finally, to my knowledge, this is also the first paper that uses a *biform model* (Brandenburger & Stuart, 2007; Chatain & Zemsky, 2007; Chatain & Zemsky, 2011) to examine vertical integration decisions. This is quite surprising because *biform games* seem ideal to analyze situations that are both cooperative and rivalrous in nature. Corporate strategies, in particular, may, at times, be underpinned by "opportunistic behavior with guile", as often underlined by TCE; but they may be also motivated by considerations involving resource access and division of labor, as often recognized by the RBV. In *biform games*, the first noncoperative stage can be used to accommodate some of the principles developed by TCE, while the second cooperative stage can model some of the RBV tenets. *Biform games* may be a very effective tool to harness the possible synergies between TCE and the RBV (Conner, 1991; Mahoney & Pandian, 1992; Silverman, 1999). Future research may use this fruitful approach to analyze a variety of strategic situations that may influence organizational boundaries. For instance, the use *biform games* could be promising in analyzing how differentiation strategies along the technical and market dimensions may influence firm boundaries. By examining how vertical integration strategies influence firm scope and resource profiles, strategy scholars may investigate numerous grey areas concerning the origins of resources, firm heterogeneity, and, ultimately, competitive advantage.

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